COUNTY OF FLUVANNA, VIRGINIA
(IFB) #2021-01
FLUVANNA COUNTY – BASEMENT RENOVATION

ADDENDUM # 1:

Reference – Invitation for Bid:	IFB #2021-01
Title of Request for Proposal:	FLUVANNA COUNTY – BASEMENT RENOVATION
Issue Date:	September 16, 2020
Original Bid Due Date and Time:	September 23, 2020 at 2 pm
Bid Due Date and Time:	September 28, 2020 at 2pm (as revised by this Addendum #1)

The above IFB #2020-01 is hereby amended and modified as follows:

1. Addendum No 1 entitled "Fluvanna County Multipurpose Room Additions and Renovations CRA Project No. 3430" including Volume I, Volume II, and Volume III, attached hereto and incorporated herein replaces, modifies and supplements that Exhibit 1 attached to IFB #2021-01 (the "IFB"). As used in the IFB "Exhibit 1" and "Plans" shall now refer to the attachment Addendum No 1 entitled "Fluvanna County Multipurpose Room Additions and Renovations CRA Project No. 3430" including Volume I, Volume II, and Volume III, as the same may be further modified in this Addendum #1 below. Any modifications below in the body of this Addendum #1 control over Addendum No 1 entitled "Fluvanna County Multipurpose Room Additions and Renovations CRA Project No. 3430" including Volume I, Volume II, and Volume III attached hereto.

2. The Specifications, being sections numbered Section 024113 "Selective Site Demolition" through and including Section 334613 "334613", added under section 1 above are hereby modified as follows:
    a. Please note Sections of the Specifications are referred to numerically herein, and "-#" after a section number shall refer to the page number of that section when referenced.
    b. General Language Modifications:
        i. Please note within these general language modifications the replacements and modifications shall occur regardless of differences in capitalization, singular or plural, or grammar so long as the language and meaning of the language to be replaced or modified is materially the same.
        ii. The language "shall be directed in writing to the attention of the Architect" shall be replaced in each occurrence with "shall be directed in writing to the attention of the Architect and Owner". For example only, and not as a limitation, the replacement occurs in Sections 024119 (1.7)(F) and (1.7)(J).
        iii. The language "Architect's approval" and "Engineer's approval" shall be replaced in each occurrence with "Owner's approval made in consultation with the Architect and/or Engineer". For example only, and not as a limitation, the replacement occurs in Section 014000 (1.7)(I)(4) and Section 033000 (3.14)(E) and (3.14)(F).

iv. The language “directed by [the] Architect” or “directed by [the] Engineer” shall be replaced in each occurrence with “directed by the Owner (who shall consult with the Architect and/or Engineer)”. For example only, and not as a limitation, the replacement occurs in Section 014000 (1.7)(I)(1), Section 015000 (3.3)(A)(3), Section 033000 (3.15)(C)(12), Section 042000 (1.2)(F)(1)*, (1.2)(G)(11)*, and (3.4)(H), and Section 200100 (37)(A). Please note the changes in Section 042000 (1.2) occur in the 2nd section of 042000 labeled as “1.2”.

v. The language “approved by Architect in writing” shall be replaced in each occurrence with “approved by Owner in writing in consultation with the Architect”. For example only, and not as a limitation, the replacement occurs in Section 042000 (1.2)(F)(5)* and 1.2(G)(10)*. Please note the changes in Section 042000 (1.2) occur in the 2nd section of 042000 labeled as “1.2”.

vi. The language “approved by [the] Architect”, “approved by [the] Engineer(s)” and “approved by the Architect or Engineer” shall be replaced in each occurrence with “approved by Owner in consultation with the Architect and/or Engineer”. For example only, and not as a limitation, the replacement occurs in Section 092550 (3.8)(C), Section 099123 (3.6)(A), Section 122413 (3.4)(C), Section 200100 (6)(A) and (10)(A), Section 260501 (39)(A), and Section 329300 (3.2)(A).

vii. The language “acceptable to [the] Engineer”, “acceptance by the engineer”, “accepted by [the] Architect”, “acceptable to Landscape Architect”, “acceptable solely by [the] Architect”, and “acceptable to [the] Architect” shall be replaced in each occurrence with “acceptable to Owner in consultation with the Architect and/or Engineer”. For example only, and not as a limitation, the replacement occurs in Section 201100 (4)(A) and Section 017700 (1.3)(C) and (1.3)(C)(1).

viii. The language “selected by Architect” and “selected by the Architect” shall be replaced in each occurrence with “selected by Owner in consultation with Architect”. For example only, and not as a limitation, the replacement occurs in Section 042000 (2.13)(I), Section 0792200 (2.1)(E), Section 084100 (2.5)(D)(1), Section 095113 (2.2)(D)(1) and Section 101100 (2.3)(B)(2)(iii), Section 101100 (2.4)(A)(a), Section 101423 (2.2)(C)(3)(b) and (2.3)(A), Section 122413 (2.2)(E)(2)(b), (2.2)(F)(3) and (2.3)(B)(5), Section 262726 (3)(A), and Section 265113 (4)(C)(3).

ix. The language “Architect will select” shall be replaced in each occurrence with “Owner in consultation with Architect will select”. For example only, and not as a limitation, the replacement occurs in Section 099123 (1.5)(C)(1).

x. The language “submit report to Architect” shall be replaced in each occurrence with “submit report to Architect and Owner”. For example only, and not as a limitation, the replacement occurs in Section 075323 (3.6)(D).

xi. The language “Architect will supply a color selection” shall be replaced in each occurrence with “Owner will supply a color selection after consultation with the Architect”. For example only, and not as a limitation, the replacement occurs in Section 099123 (1.2)(B).

xii. The language “shall be submitted to the Engineer” shall be replaced in each occurrence with “shall be submitted to the Engineer and Owner”. For example only, and not as a limitation, the replacement occurs in Section 200100 (3)(A).

xiii. The language “shall be called to the attention of the Engineer” shall be replaced in each occurrence with “shall be called to the attention of the Engineer and Owner”. For example only, and not as a limitation, the replacement occurs in Section 200100 (3)(F).

xiv. The language “Review of Shop Drawings by the Engineers does not [in any way] absolve the Contractor of this responsibility” shall be replaced in each occurrence with “Review of Shop Drawings by the Engineers or Owner does not in any way absolve the Contractor of this responsibility” For example only, and not as a limitation, the replacement occurs in Section 200100 (5)(A) and Section 26501 (5)(A).

xv. The language “in the judgment of the Engineer” shall be replaced in each occurrence with “in the judgment of the Owner in consultation with its Engineer”. For example only, and not as a limitation, the replacement occurs in Section 200100 (5)(B) and Section 260501 (5)(B).

xvi. The language “Requested substitutions shall be submitted to the Engineer a minimum of twelve days prior to bids.” and “Substitutions shall be submitted to the Engineer a minimum of ten days prior to bid date for approval to bid in written form thru addenda or other method selected by the Engineer.” shall all be replaced in each occurrence with “Proposed substitutions shall be submitted only in accordance with Section 0125000 - Substitutions.” For example only, and not as a limitation, the replacement occurs in Section 200100 (5)(B) and Section 260501(5)(B).

xvii. The language “Engineer shall choose” shall be replaced in each occurrence with “Owner in consultation with its Engineer shall choose”. For example only, and not as a limitation, the replacement occurs in Section 200100 (5)(D).

xviii. The language “State of West Virginia” and “Pennsylvania” shall be replaced in each occurrence with “Commonwealth of Virginia”. For example only, and not as a limitation, the replacement occurs in Section 200100 (7)(J) and (7)(N).

xix. The language “furnish to Engineer” shall be replaced in each occurrence with “furnish to Owner and Engineer”. For example only, and not as a limitation, the replacement occurs in Section 200100 (10)(A).

xx. The language “the Engineer’s determination shall be final” shall be replaced in each occurrence with “the Owner’s determination made in consultation with its Engineers shall be final”. For example only, and not as a limitation, the replacement occurs in Section 200100 (19)€.

xxi. The language “the Engineer shall reserve the right to determine the quality of workmanship” shall be replaced in each occurrence with “the Owner shall reserve the right to determine the quality of workmanship”. For example only, and not as a limitation, the replacement occurs in Section 200100 (21)(A) and Section 260501 (19)(A).

xxii. The language “considered objectionable by the Engineer” shall be replaced in each occurrence with “considered objectionable by the Owner or Engineer”. For example only, and not as a limitation, the replacement occurs in Section 200100 (28)(A) and Section 260501 (27)(A).

xxiii. The language “to the satisfaction of the Architect and[/or] Engineer”, “to the satisfaction of the Architect”, “to the satisfaction of the Architect/Engineers” and “to the satisfaction of the Engineer” shall all be replaced in each occurrence with “to the satisfaction of the Owner who may consult with the Architect and/or Engineer”. For example only, and not as a limitation, the replacement occurs in Section 012700 ((1.4)(E), Section 200100 (30)(A) and (34)(A), Section 201100 (1)(E), Section 26501 (24)(A), and Section 260505(2)(A).

xxiv. The language “approval of the Engineer” shall be replaced in each occurrence with “approval of the Owner who may consult with the Engineer and/or Architect”. For example only, and not as a limitation, the replacement occurs in Section 200100 (34)(B).

xxv. The language “indemnify the Engineer, employees, officers, agents and consultants” shall be replaced in each occurrence with “indemnify the Engineer, employees, officers, agents and consultants and the Owner and its employees, officers, agents and consultants”. For example only, and not as a limitation, the replacement occurs in Section 200100 (42)(A) and Section 260501 (40)(A).

xxvi. The language “the Engineer shall have the option of selecting” shall be replaced in each occurrence with “the Owner (who may consult with its Engineer) shall have the option of selecting”. For example only, and not as a limitation, the replacement occurs in Section 200300 (1)(H).

xxvii. The language “written instructions from the Engineer” shall be replaced in each occurrence with “written instructions from the Engineer approved by the Owner”. For example only, and not as a limitation, the replacement occurs in Section 201200 (4)(E).

xxviii. The language “work deemed unacceptable by the Engineer(s)” shall be replaced in each occurrence with “work deemed unacceptable by the Owner (who may consult with the Architect and/or Engineer)”. For example only, and not as a limitation, the replacement occurs in Section 202200 (1)(C).

xxix. The language “The Contractor shall notify the Engineer in writing ten calendar days prior to bid of any discrepancy so a written clarification by Addendum may be made.” Shall be replaced in each occurrence with “The Contractor shall give written notice to the Owner and Engineer of any discrepancy prior to the bid consistent with the requirements of the **IFB in Section 4(A)(ii)**, as amended by any addendum to the IFB, so that the Owner can respond with a written clarification in an Addendum to all Bidders.” For example only, and not as a limitation, the replacement occurs in Section 250100 (2)(A).

xxx. The language: “The Contractor shall give written notice of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted a minimum of ten days prior to bid.” Shall be replaced in each occurrence with “The Contractor shall give written notice of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted to the Engineer and Owner in advance of the bid consistent with the requirements of the **IFB in Section 4(A)(ii)**, as amended by any addendum to the IFB, so that the Owner can respond in a written Addendum to all Bidders.” For example only, and not as a limitation, the replacement occurs in Section 260501 (1)(D).

xxxi. The language “acceptable to the Architect and Engineer” shall be replaced in each occurrence with “acceptable to the Owner, Architect and Engineer”. For example only, and not as a limitation, the replacement occurs in Section 260508 (1)(E).

xxxii. The language “specific direction of the Architect” or “direction of the Architect” shall be replaced in each occurrence with “specific direction of the Architect with prior approval of the Owner”. For example only, and not as a limitation, the replacement occurs in Section 312000 (1.4)(B) and (1.4)(C).

xxxiii. The language “written approval from [the] Engineer” and “written approval from [the] Architect” shall be replaced in each occurrence with “written approval from the Owner and Architect and/or Engineer”. For example only, and not as a limitation, the replacement occurs in Section 265113 (4)(A)(4) , and Section 312000 (1.6)(A).

xxxiv. The language “Architect’s written permission” and “Engineer’s written permission” shall be replaced in each occurrence with “Owner and Engineer’s/Architect’s written permission.” For example only, and not as a limitation, the replacement occurs in Section 312000 (1.8)(B)(2) and Section 333000 (1.6)(C)(2).

xxxv. The language “permission of [the] Architect” or “permission of [the] Engineer(s)” means “permission of the Owner and the Architect and/or Engineer”. For example only, and not as a limitation, the replacement occurs in Section 012700 (1.4)(C).

xxxvi. The language “the Contract price shall be adjusted” shall be replaced in each occurrence with “the Contract price may be subject to adjustment and Contractor shall submit a claim for adjustment to the Architect and Engineer if applicable which shall be reviewed and approved or denied by the Owner in writing.” For example only, and not as a limitation, the replacement occurs in Section 312000 (3.2)(B).

xxxvii. The language “Architect will authorize” shall be replaced in each occurrence with “Owner in consultation with the Architect and/or Engineer will authorize in its discretion”. For example only, and not as a limitation, the replacement occurs in Section 012700 (1.6)(D) and Section 312000 (3.9)(B).

xxxviii. The language “in the opinion of [the] Architect”, “in [the] Architect’s sole opinion” and “in the opinion of [the] Engineer” shall be replaced in each occurrence to “in the reasonable opinion of the Owner made in consultation with the Architect and/or Engineer”. For example only, and not as a limitation, the replacement occurs in Section 201200 (5)(H), Section 206501(19)(C) and Section 312000 (3.20)(A)(1).

xxxix. The language “directed by [the] Architect” and “directed by [the] Engineer” shall be replaced with “directed by Owner and/or the Architect/Engineer”. For example only, and not as a limitation, the replacement occurs in Section 312000 (3.9)(E), Section 321313 (3.9)(C) and (3.9)(D).

xl. The language “Owner or Architect” shall be replaced in each occurrence with “Owner and Architect”. For example only, and not as a limitation, the replacement occurs in Section 015000 (2.1)(A) and (2.2)(A).

xli. The language “as requested by [the] Architect” and “as requested by [the] Engineer” shall be replaced in each occurrence with “as requested by the Owner who shall consult with the Architect and/or Engineer”. For example only, and not as a limitation, the replacement occurs in Section 015000 (3.5)(A).

xlii. “Customer” means “Owner” in each occurrence.

xliii. “A.D.A.” and “ADA” means the “Americans with Disabilities Act, as amended or modified in each occurrence.

xliv. “School district-owned property” is replaced in each occurrence with “Owner’s property”. For example only, and not as a limitation, the replacement occurs in Section 014100 (3.14)(A).

xlv. “Owner’s Board of School Directors” shall be replaced in each occurrence with “Owner”.

xlvi. “Applicable Law(s)” and “governing regulations and standards” “means all applicable Federal, Commonwealth of Virginia or local laws, ordinances, statutes, rules, regulations, standards, or similar criteria”.

c. In Section 012500 “Substitutions”:

i. “Architect” in every occurrence in Section 012500 shall be replaced with “Owner (who shall consult with the Architect)”.

ii. 012500-1 (1.3)(C) – The following is added at the end of this subsection: :"Approved Equals must comply with Applicable Laws, including specifically, but without limitation, Code of Virginia Section 2.2-4315."
iii. 012500-3 (1.4) – In addition to the stated requirements Contractor's requests for substitution must certify the following: (i) extensive revisions to the Contract Documents are not required; (ii) the proposed changes are in keeping with the general intent of the Contract Documents; and (iii) the requested change offers a substantial advantage to the Owner such as cost saving, time savings, or energy conservation.
iv. 012500-3 (1.4)(C) – "the consent of the Owner" is replaced with "the advance written consent of Owner".

d. In Section 012600 "Modification Procedures":
   i. 012600-1 (1.3)(A) – "Architect" shall be replaced with "Architect subject to prior Owner consent in writing".
   ii. 012600-2 (1.5)(A) – is replaced with the following: "Construction Change Directive: When the Owner and the Contractor disagree on the terms of a Proposal Request, the Architect will advise the Owner related to the disagreement at the request of the Owner. The Owner may decide to issue a Construction Change Directive. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order." Portion (1.5)(A)(1) remains unchanged as a subsection hereof.
e. In Section 012800 "Field Engineering":
   i. 012800-2 (3.2)(B)(1) – "advise the Architect" is replaced with "advise the Architect and Owner".
f. In Section 012900 "Applications for Payment":
   i. 012900-2 (1.3)(A)(2) – The Schedule of Values must also be submitted to the Owner at the same time as to Architect.
   ii. 012900-4 (1.4)(E) and (E)(1) – "Architect" shall be replaced in each occurrence with "Architect and Owner".
   iii. 012900-8 and 012900-9 – The "Initial Statement of Contract Value" form being pages 8 and 9 of Section 012900 of the Specifications is intentionally deleted.
   iv. 012900-10 – In item (1) "the Mechanics Lien Law of 1963" shall be replaced with "Applicable Laws"; and in item (4) "Pursuant to 49 P.S. §1401(b)(2)" is deleted.
   v. 012900-11 - In item (7) "Pennsylvania Mechanics' Lien Law of 1963, as amended" shall be replaced with "Applicable Laws"; and in Item (9) "any attorney of any Court of Common Pleas of the Commonwealth of Pennsylvania" is replaced with "Owner, if permitted by Applicable Laws,"; and in Item (10) "submittal to Architect" is replaced with "submittal to Architect and Owner".
   vi. The following applies to Section 012900 generally: All Applications for Payment are subject to review and approval by Owner. Owner shall notify Contractor of any questions, concerns, issues or conflicts related to the Application for Payment and the Contractor shall respond to the same in a timely manner.
g. In Section 013150 "Project Meetings":
   i. 013150-2 (1.4)(B) – "Advise the Architect" is replaced with "Advise the Owner and Architect".
h. In Section 013200 "Construction Progress Documentation":
   i. 013200-2 (1.4)(B) – "as determined by the Architect" is replaced with "as determined by the Owner (who shall consult with the Architect)".
   ii. 013200-3 (1.5)(A) – "Architect for review" is replaced with "Owner and Architect for review".

iii. 013200-5 (1.7)(J) – Deleted in its entirety and replaced with the following. Pursuant to Section 3(E)(ii) work on the Project can be completed 24 hours a day, 7 days a week. In addition, Section 3(I) of the IFB entitled "Time for Completion" is incorporated herein by reference, as modified by this Addendum, and shall control in the event of conflict with any other provision of the Specifications or Contract Documents. The Substantial Completion Date and Final Completion Date are firm, final and shall not be extended except with the express written approval of the Owner which may be denied in Owner's sole discretion. Notwithstanding any other provision of the Contract Documents, no weather, force majeure, pandemic, strike, act of god or other similar issue shall relieve the Contractor from performance in accordance with the Contract Documents for Substantial Completion by the Substantial Completion Date and Final Completion of the Project by the Final Completion Date.

i. In Section 013300 "Submittals":
   i. 013300-2 (1.3)(D) – "Final approval of a product submitted as an 'equal' shall be solely by the Architect." is replaced with "Final approval of a product submitted as an 'equal' shall be solely by the Owner who may consult with the Architect."
   ii. 013300-2 (1.4)(A) – The sentence "The Owner will pay the fees associated to acquire the use of a license for the project" is deleted.
   iii. 013300 (1.4) and (1.5) - "Architect" is replaced with "Architect and Owner" in each occurrence.
   iv. 013300-4 (1.7)(A)(1) – "Architect's sample" is replaced with "Architect's sample approved by the Owner".
   v. 013300-6 (1.7)(A)(4) – Deleted and replaced in its entirety with the following: "Upon review and approval by the Owner, the Architect will review return preliminary Submittals with the Architect's notation, indicating selection and other action.
   vi. 013300-6 (1.8)(B) – "The Architect reserves the right to require this certification to be notarized[notarized]." is replaced with "Either the Owner or the Architect may require this certification to be notarized."
   vii. 013300-7 (1.9) – the following subsection "D" shall be added: "D. All review and actions of the Architect related to Submittal shall not be final and binding on the Owner unless and until approved in writing by the Owner."
j. In Section 014000 "Quality Requirements":
   i. 014000-5 (1.8)(C) – Items (1) through (5) in subsection 014000 (C) shall be done only after the Owner's testing agency has submitted any relevant notice, report, deviations, or other information to the Owner first, allowed the Owner to review the same, and thereafter has received the Owner's written permission to proceed as indicated in Item (1) through (5).
   ii. 014000-6 (1.8)(F)(1) – Owner must also be notified.
k. In Section 014100 – "Safety"
   i. 014100-1 (1.2)(C)(6) – Is deleted and replaced with the following "Separation of Owner officer and employees and Owner's visitors from workers will be required to the greatest extent possible."
   ii. 014100-3 (3.5) – Subsection "B" is hereby added as follows "Contractor must comply with all Applicable Laws and health directives and best practices related to the COVID-19 pandemic issued by the Federal, State, or local authorities, including without limitation, the Virginia Department of Health and the Centers for Disease Control. If and while best practices recommended by such authorities include the wearing of masks, the Contractor shall insure that all persons at the job-site are in compliance with such best practices. Until further

notice, the Owner requires masks be worn at the job-site, the Contractor will insure masks are worn at the job-site unless notified in writing by the County that such is no longer required. In addition to any directives or best practices, the Contractor shall institute a policy to screen each person daily prior to access to the job-site to insure that any person who has symptoms or exposure to COVID-19 or who is otherwise recommended or required to quarantine under health directives or best practices does not work at the job site until it is safe for them to do so as indicated under directives and best practices. Contractor shall immediately send any person at the job-site home if they develop symptoms of COVID-19 or as otherwise required under the directives or best practices. The Contractor must immediately notify the Owner of any potential exposure to COVID-19 of Owner, its agents, employees, representatives, officers, guests or other persons on the premises where the work is occurring such that the Owner can insure notification and compliance with Applicable Laws. When in doubt, Contractor must notify the Owner. As used herein Contractor means the Contractor its employees, officers, subcontractors, and any person on the job-site under Contractor's control, supervision or at Contractor's request or invitation."

iii. 014100-4 (3.13) – is deleted in its entirety and replaced with the following "Smoking or use of any tobacco products and vapor pens is not allowed and shall be cause for removal from the Project."

l. In Section 017200 "Project Record Documents":
   i. 017200-1 (1.2)(D) – "Architect's inspections" is replaced with "Architect or Owner's inspections".
   ii. 017200-1 (1.3)(a) – "Architect's reference" is replaced with "Architect or Owner's reference".
   iii. 017200-3 (1.4)(A) – "Architect's instructions" is replaced with "Owner's instructions".
m. In Section 017700 "Contract Closeout":
   i. 017700-3 (1.4)(C) and (1.4)(D) – "Architect" shall be replaced in each occurrence with "Architect and Owner".
   ii. 017700-3 (1.4)(D) – "Architect's inspection" shall be replaced with "Owner and Architect's inspection".
   iii. 017700-4 (1.5)(B) – "Architect" shall be replaced in each occurrence with "Architect and Owner".
n. In Section 017823 "Operation and Maintenance Data":
   i. 017823-2 (1.4) – subsection (A)(4) is added as follows: "4. Each approved manual will thereafter be inspected by Owner. Owner shall submit any comments or modifications to the Contractor and Architect within fifteen (15) days, and the Contractor must comply with the Owner's comments and modifications within five (5) days and submit a final revised copy to Owner and Architect."
o. In Section 0179000 "Warranties":
   i. 017900-2 (1.5)(A) and (1.5)(A)(1) – "Architect" shall be replaced in each occurrence with "Architect and Owner".
p. In Section 024119 "Selective Demolition":
   i. 024119-7 (3.4)(E) – the language "When permitted by Architect…" shall be replaced with "When permitted by Owner…"
q. In Section 033000 "Cast in Place Concrete":
   i. 033000-17 (3.14)(C)(3) – the language "as determined by Architect." Shall be replaced with "as determined by Owner in consultation with the Architect."

r. In Section 042000 “Unit Masonry (Assemblies)”:
    i. 042000-3 (1.1)*(F)(1) – the language “brought to the attention of the Architect and approved in writing.” Shall be replaced with “brought to the attention of the Owner who shall then consult with the Architect. Only changes approved in writing by the Owner shall modify the Contract Documents.” Please note this change occurs in the 2nd section of 042000 labeled as “1.1”.
s. In Section 081416 “Flush Wood Doors”:
    i. 081416-3 (2.1)(B) is deleted in its entirety.
t. In Section 087100 “Door Hardware”:
    i. The last sentence of 087100-6 (2.1)(D) is deleted and replaced with the following: “Approval of requests is at the discretion of the Owner (who will consult wit the Architect and any other consultants it desires.”
u. In Section 093000 “Tiling”:
    i. 093000-2 (1.4)(C) – the following sentence is hereby added: “Samples shall be submitted and approved by Owner.”
v. In Section 096513 “Acoustical Panel Ceilings”:
    i. 096513-1 (1.3)(B) – the following sentence is hereby added: “Samples shall be submitted and approved by Owner.”
w. In Section 099123 “Painting”:
    i. 099123-4 (1.4)(B) and (2.2)(C) – “Architect’s” is replaced with “Owner’s”.
    ii. 099123-4 (1.5)(D)(1) – “Architect” is replaced with “Architect and Owner”.
    iii. 099123-11 (3.4)(B)(7) – “The Architect, Construction Manager or Owners Representative” at the beginning of the subsection is replaced with the following: “The Owner in consultation with the Architect and Project Manager”.
x. In Section 101100 “Visual Display Units”:
    i. 101100-2 (1.4)(C)(1) – every occurrence of “Architect” is replaced with “Architect and Owner”; and every occurrence of “Architect’s” is replaced with “Architect’s and Owner’s”.
y. In Section 101423 “Panel Signage”:
    i. 101423-1 (1.3)(B)(3)(c) and (1.3)(B)(3)(d) – “input by the Architect” is replaced with “input by the Owner in consultation with Architect”.
    ii. 101423-3 (1.6)(C) – “as judged by the Architect” is replaced with “as reasonably judged by the Owner in consultation with the Architect.”
z. In Section 200100-1 “General Provisions – Mechanical”:
    i. 200100-1 (1)(A) – the last sentence is deleted and replaced with “In case of conflict between the General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Owner and Engineer for clarification and final determination by Owner.”
    ii. 200100-1 (1)(E) – in the 2nd sentence the following is added at the end of that sentence: “,and finally to the Owner”.
    iii. 200100-4 (3)(B) – is replaced with “The drawings and specifications are intended to supplement each other. No Proposer shall take advantage of conflict between them, or between parts of either. Should this condition exist, the Proposer shall request a clarification prior to the submission of the proposal consistent with the requirements of the **IFB in Section 4(A)(ii)**, as amended by any addendum to the IFB, so that the condition may be clarified by Addendum issued by the Owner. In the event that such a condition arises after work is started, the interpretation of the Owner in consultation with its Engineer shall be final. In all instances, unless modified in writing and agreed upon by all the parties thereto, the Contract to accomplish the work shall be final and binding on the Contractor.”

iv. 200100-4 (3)(F) – “instructions in writing are received from the Engineer.” Is replaced with “instructions in writing are received from the Owner who shall consult with its Engineer.”
v. 200100-6 (7)(A) – “and deliver same to Engineers” is replaced with “and deliver the same to Owner and Engineers”.
vi. 200100-7 (7)(G) – Contractor must also provide Final Inspection Certificates to Owner.
vii. 200100-8 (11)(A) is deleted and replaced with the following: “All equipment, apparatus, materials, and workmanship shall be the best of its respective kind. The Contractor shall replace all parts at his own expense, which are proven defective as described in the General Conditions. The effective date of completion of the work shall be the date of the Statement of Substantial Completion as approved by Owner. Items of equipment which have longer guarantees, as called for in these specifications, shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Owner. The Contractor shall present the Owner with such warranties and guarantees at the time of final acceptance of the work. The Owner reserves the right to use equipment installed by the Contractor prior to date of final acceptance. Such use of equipment shall not invalidate the guarantee except that the Owner shall be liable for any damage to equipment during this period, due to negligence of his operator or other employees. Refer to other sections for any special or extra warranty requirements.”
viii. 200100-9 (15)(C) – “instructions from the Engineer” is replaced with “instructions from the Engineer approved by Owner”.
ix. 200100-12 (21)(B) – Proof and Certification may also be requested by Owner.
x. 200100-12 (21)(D) – “written approval from the same” is replaced with “written approval from the Owner”.
xi. 200100-19 (43)(D) – “CMTA, its principals, employees, agents or[and] consultants” shall be replaced in each occurrence with “CTMA its principals, employees, agents or[and] consultants and the Owner and its employees, officers, agents and consultants”.
xii. 200100-20 (44)(B) – in each occurrence “Engineer” or “Engineer’s” is replaced with “Engineer and Owner” or “Engineer’s and Owner’s”, respectively.

aa. In Section 200300 “Shop Drawings, Descriptive Literature, Maintenance Manuals, Parts Lists, Special Keys & Tools:
i. 200300-1 (1)(F) – is deleted and replaced with the following: “The Engineers or Owner review of shop drawings, schedules or other required submittal data shall not relieve the Contractor from responsibility for: adaptability of the item to the project; compliance with applicable codes, rules, regulations and information that pertains to fabrication and installation; dimensions and quantities; electrical characteristics; and coordination of the work with all other trades involved in this project. Any items that differ from the Drawings or Specifications shall be flagged by the Contractor so the Engineer and Owner will be sure to see the item. Do not rely on the Engineer or Owner to “catch” items that do not comply with the Drawings or Specifications. The Contractor is responsible for meeting the Drawings and Specification requirements, regardless of whether or not something does not get caught by the Contractor or Engineer or Owner during shop drawing reviews. Only changes specifically approved by the Owner in writing to the specifications shall be binding on the Owner.”

bb. In Section 200500 “Coordination Among Trades, Systems, Interfacing and Connection of Equipment Furnished by Others”:
    i. 200500-1 (1)(C) – The language “report such discrepancies to the Architect” shall be replaced with “report such discrepancies to the Architect and Owner”.
cc. In Section 203100 “Testing, Balancing, Lubrication and Adjustments”:
    i. 203100-2 (3)(F) – Contractor must also report deficiencies to the Owner.
dd. In Section 220100 “Plumbing Specialties”:
    i. 220100-2 (2)(B)(4) – the last sentence is replaced with the following: “The Contractor shall coordinate the finish of all access panels installed in finished areas with Architect and Owner.”
ee. In Section 230200 “HVAC Equipment and Hydronic Specialties”:
    i. 230200-26 – toward the bottom of the page the sentence “It will also allow the HVAC equipment to more closely match the actual building load without students and equipment in use.” is deleted.
    ii. 230200-27 – the very last subsection of the Section which states “Do not start all of the units until the students are starting school. When students start school the normal setpoints, schedules, and fan cycling times shall being” is deleted.
ff. In Section 231100 “Registers, Grilles, Diffusers & Louvers”:
    i. 231100-1 (A) – the language “Finishes shall be selected by Architect. If Architect elects not to select color, all colors shall be off-white.” Shall be replaced with: “Finishes shall be selected by Owner in consultation with Architect. If Owner elects not to select color, all colors shall be off-white.”
gg. In Section 250200 “Controls – Direct Digital”:
    i. 250200-1 (1)(B) – “Architect and Engineer” is replaced with “Owner, Architect and Engineer”.
    ii. 250200-1 (1)(D) – “acceptance by the Engineer” is replaced with “acceptance by the Owner, who may consult with the Architect and/or Engineer”.
hh. In Section 260501 “General Provisions – Electrical”:
    i. 260501-1 (1)(E) – at the end of the last sentence of this subsection the following is added “and then to the Owner.”
    ii. 260501-3 (3)(B) – is replaced in its entirety with the following: “The drawings and specifications are intended to supplement each other. No Proposer shall take advantage of conflict between them, or between parts of either. Should this condition exist, the Proposer shall request a clarification prior to the submission of the proposal consistent with the requirements of the **IFB in Section 4(A)(ii)**, as amended by any addendum to the IFB, so that the condition may be clarified by Addendum issued by the Owner. In the event that such a condition arises after work is started, the interpretation of the Owner in consultation with its Engineer shall be final. In all instances, unless modified in writing and agreed upon by all the parties thereto, the Contract to accomplish the work shall be final and binding on the Contractor.”
    iii. 260501-4 (3)(D), (3)(G) and (3)(H) – “Engineer” is replaced with “Engineer and Owner” in each occurrence.
    iv. 260501-5 (4)(B) – “The Contractor shall verify all work shown on the drawings and conditions at the site, and shall report in writing to the Engineer ten days prior to bid, any apparent omissions or discrepancies in order that clarifications may be issued by written addendum.” is replaced with the following: “The Contractor shall verify all work shown on the drawings and conditions at the site, and shall report in writing to the Owner and Engineer prior to the submission of the proposal consistent with the requirements of the **IFB in**

Section 4(A)(ii), as amended by any addendum to the IFB, any apparent omissions or discrepancies in order that clarifications may be issued by written addendum of the Owner."

v. 260501-5 (5)(C) – "accepted in writing by the Engineer" is replaced with "accepted in writing by the Engineer and Owner".

vi. 260501-5 (5)(D) – "the Engineer shall have the right to choose" is replaced with "the Owner (who may consult with its Engineer) shall have the right to choose".

vii. 260501-7 (9)(B) – is replaced in its entirety with the following: "Items of equipment which have longer guarantees, as called for in these specifications or as otherwise offered by the manufacturer, such as generators, engines, batteries, transformers, etc., shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Owner. The Contractor shall present the Owner with such warranties and guarantees at the time of final acceptance of the work. The Owner reserves the right to use equipment installed by the Contractor prior to date of final acceptance. Such use of equipment shall in no way invalidate the guarantee except that Owner shall be liable for any damage to equipment during this period due to negligence of his operator or other employee."

viii. 260501-7 (10)(A) – "Before requesting a final review of the installation from the Architect and/or Engineer," is replaced with "Before requesting a final review of the installation from the Owner, Architect and/or Engineer,".

ix. 260501-7 (10)(E) – "All work under this contract is subject to the review of the Architect and/or Engineer, whose decision is binding." is replaced with "All work under this contract is subject to the review of the Owner who may consult with the Architect and/or Engineer."

x. 260501-11 (22)(A) – "(as determined by the Engineer)" is replaced with "(as determined by the Owner who may consult with the Engineer)".

xi. 260501-19 (41)(D) – "CMTA, its principals, employees, agents or[and] consultants" shall be replaced in each occurrence with "CTMA its principals, employees, agents or[and] consultants and the Owner and its employees, officers, agents and consultants".

xii. 260501-20 (42)(B) – in each occurrence "Engineer" or "Engineer's" is replaced with "Engineer and Owner" or "Engineer's and Owner's", respectively.

ii. Section 260503 "Shop Drawings, Literature, Manuals, Parts Lists, and Special Tools":

i. 260503-1 (1)(A) – "Architect and/or Engineer" is replaced with "Owner, Architect and Engineer" in each occurrence. The following sentence is added to the end of the subsection: "Only changes approved in writing by the Owner shall modify the Contract Documents."

ii. 260503-1 (1)(B) – "Architect and/or Engineer" is replaced with "Owner, Architect and Engineer" in each occurrence.

iii. 260503-1 (1)(C) and (1)(D) – "Engineer" is replaced with "Owner or Engineer" in each occurrence.

iv. 260503-3 (2)(A) – "shall be turned over to the Architect prior to completion of the project." shall be replaced with "shall be turned over to the Owner prior to completion of the project."

jj. In Section 260519 "Conductors, Identification, Splicing Devices & Connectors":

i. 260519-1 (1)(F) – at the end of the subsection "to engineer for approval." Is replaced with "to Owner for approval."

kk. In Section 260531 "Cabinets, Outlet Boxes and Pull Boxes":

i. 260531-2 (2)(A)(7) – "<u>Any change in fixture or layout shall be coordinated with and approved by the Engineer before this change is made.</u>" is replaced with

"Any change in fixture or layout shall be coordinated with and approved by the Engineer and Owner before this change is made."

ll. In Section 260544 "Excavation, Trenching, Backfilling and Grading":

i. 260544-2 (4)(C) – "Blasting shall not be permitted unless authorized in writing by the Architect." shall be replaced with "Blasting shall not be permitted unless authorized in writing by the Owner and Architect."

mm. In Section 265113 "LED Lighting Fixtures and Lamps":

i. 265113-1 (1)(C) – "(Submission shall be made via the University's online project management system.)" is deleted.

ii. 265113-1 (1)(E) – "Proposed substitutions must be submitted to the Engineer ten working days prior to bid date for written approval to bid." is replaced with "Proposed substitutions shall be submitted only in accordance with Section 0125000 - Substitutions."

nn. Section 270610 "Voice/Data System":

i. 270610-1 (1.1)(A) – "Known equals are listed, but will require cut sheets with performance parameters to be submitted for final approval at least 10 days prior to bid." is replaced with "Known equals are listed, but will require cut sheets with performance parameters to be submitted prior to the submission of bid consistent with the requirements of the **IFB in Section 4(A)(ii)**, as amended by any addendum to the IFB, so that the Owner can respond in a written Addendum to all Bidders."

ii. 270610-6 (1.10)(C) – "call the attention of the Engineer to" is replaced with "in a way consistent with the requirements of the **IFB in Section 4(A)(ii)**, as amended by any addendum to the IFB, so that the Owner can respond in a written Addendum to all Bidders, call the attention of the Owner and Engineer to".

iii. 270610-43 (3.12)(A) – "to the Engineer for approval." is replaced with "to the Owner and Engineer for approval."

iv. 270610-43 (3.12)(B) – "at the request of Engineer," is replaced with "at the request of Engineer or Owner,"

v. 270610-43 (3.12)(C) – "Engineer," is replaced with "Engineer or Owner" in each occurrence.

oo. In Section 283100 "Fire Alarm System":

i. 283100-2 (C)(4) – "local review" is replaced with "Owner, local permitting/governing body or department and Engineer".

ii. 283100-7 (1)(I)(2) – "coordinate the legends with the Engineer" shall be replaced with "coordinate the legends with the Engineer, Owner and Architect".

iii. 283100-13 (1)(L)(3) – the last sentence of the subsection is replaced with the following "Provide additional training time if required by the Owner at no charge."

pp. In Section 311000 "Site Clearing":

i. 311000-3 (3.2)(C): "Coordinate extent of material removed with Landscape Architect." shall be replaced with "Coordinate extent of material removed with Owner and Landscape Architect."

ii. 311000-3 (3.2)(C)(1) – "at the Landscape Architect's direction." shall be replaced with "at the Landscape Architect's direction and approved in advance by the Owner."

qq. In Section 312000 "Earthwork":

i. 312000-3 (1.7)(A) – "requirements of authorities having jurisdiction" shall be read to include compliance with all Applicable Laws as defined in this Addendum.

ii. 312000-4 (3.1)(B) – "Section 02230 'Site Clearing" is replaced with "Section 312000 'Site Clearing'".

rr. In Section 329200 "Lawn and Grasses":
   i. 329200-2 (1.9)(B) – ", if applicable." is added to the end of this sentence.

ss. In Section 329300 "Exterior Plants":
   i. 329300-2 (1.4)(C)(4) – "Engineer" is replaced in each occurrence with "Engineer and Owner".
   ii. 329300-3 (1.7)(A)(1) is replaced in its entirety with the following: "The Contractor shall provide written notice to the Engineer and Owner of any practice which will affect the warranty if not remedied promptly. The Engineer will render an opinion to the Owner related thereto upon request of the Owner."

tt. In Section 333000 "Sanitary Sewerage":
   i. 333000-1 (1.4) – A section "C" is added as follows: "C. Comply with Applicable Laws as defined in the Addendum No. 1 to the IFB."

uu. In Section 334100 "Storm Drainage":
   i. 334100-2 (1.5)(C) – "Owner of others" is replaced with "Owner or others"

3. Notwithstanding any other provision or language to the contrary of the IFB including any language of "Exhibit 1" or the "Plans" as modified by this Addendum #1, the following general provisions apply and control over all other language in this Addendum #1, the IFB, and Addendum No 1 entitled "Fluvanna County Multipurpose Room Additions and Renovations CRA Project No. 3430" including Volume I, Volume II, and Volume III, or any exhibit to any of the foregoing (including without limitation, the Contract Documents and Specifications) thereto:

vv. Any receipt, proof, certification, writing, notice, written or otherwise, of any kind required to be made by the Contractor, or its subcontractors or inspectors, to the Architect or Engineer or under the Contract must also be made and delivered to the Owner by the Contractor.

ww. Any tests, shop drawings, equipment drawings, samples, certificates, reports, documents, copies, blue prints, instructions for operation or maintenance, manuals, or investigations, to be submitted or provided by the Contractor, or any subcontractor thereof, to the Architect or Engineer shall also be submitted or provided to the Owner.

xx. Neither Architect nor Engineer is authorized to approve or consent to any modifications, changes, additions, extensions, exceptions or other matters which would affect the obligations, duties, or responsibilities of the Owner or Contractor under the Contract or to otherwise affect the Contract Documents, Project or Plans. Only the Owner can approve or consent to any modifications, changes, additions, extensions, exceptions or other matters which would affect the Contract Documents, the Plans or the Project. Such consent and approval of the Owner must be in writing to be valid and binding on the Owner.

yy. Whenever the language "approved in writing", "approved in writing by [the] Architect" or "approved in writing by [the] Engineer" appears in this IFB, the Contract or any Exhibit to either, or any Contract Documents it shall be read to also require Owner approval in writing.

zz. Architect is not to permit, authorize, or consent to any disruption in utilities of Owner or to removal of any existing items of the Owner except with Owner's advance written consent.

aaa. All specific warranties stated are minimum standards and are in addition to any general or other warranties provided under the Contract including all exhibits thereto. Warranties shall be read together and run concurrently.

bbb. Shop Drawings must also be submitted to Owner; and Owner shall review shop drawings after approval by the Engineer.

ccc. Contractor and all of its subcontractors must comply with Applicable Laws in performance of all aspects of the work required described in the IFB and under the Contract. No request for equitable adjust or change in Contract Price from the Contractor shall relate to the cost of Contractor's conformance with Applicable Laws.

ddd. Requested or proposed substitutions shall be submitted only in accordance with Section 0125000 - Substitutions. In no event shall Owner, Architect or Engineer be requested to pre-approve any substitution during the Bid period. Contractor's shall submit Bids based on the Specifications and requirements contained in the IFB and exhibits thereto.

eee. All references to "Initial Statement of Contract Value" are deleted and omitted. The "Initial Statement of Contract Value" form being pages 8 and 9 of Section 012900 of the Specifications is intentionally deleted.

4. The Architect has proposed a draft Standard Form of Agreement Between Owner and Contractor in Section 000500 of the Plans (also referred to in that Addendum No 1 entitled "Fluvanna County Multipurpose Room Additions and Renovations CRA Project No. 3430" as the "Contract"), draft General Conditions of the Contract for Construction in Section 00700 of the Plans (also referred to in Addendum No 1 entitled "Fluvanna County Multipurpose Room Additions and Renovations CRA Project No. 3430" as the "General Conditions") and draft Supplementary Conditions in Section 000750 of the Plans (also referred to in Addendum No 1 entitled "Fluvanna County Multipurpose Room Additions and Renovations CRA Project No. 3430" as the "Supplementary Conditions") (with the General Conditions and the Supplementary Conditions referred to collectively as the "General and Supplementary Conditions"). **The draft Contract and General and Supplementary Conditions are a draft only and have not been reviewed or approved by Fluvanna County (the "Owner") or the Fluvanna County Attorney's Office. The County anticipates significant modifications will be made thereto; and the Contractor by submitting its bid understands and acknowledges the same.** The Contractor and it's attorney shall negotiate an agreement in good faith with the Owner and Owner's attorney relating to the work required by this IFB. The County of Fluvanna's General Terms, Conditions and Instructions to Bidders and Contractors (the "County's General Terms") shall control and in the event of any direct conflict between the County's General Terms and the proposed Contract and General and Supplementary Conditions, the Contractor may presume that the County's General Terms control. Without limiting the other modifications and changes to the draft Contract and General and Supplementary Conditions the Owner or the County Attorney may require or request, the following issues related to provisions of the draft Contract and General and Supplementary Conditions are noted by the County:

   i. The County will not pay finance charges.
   ii. The County will not agree to mandated mediation.
   iii. The County will not agree to arbitration.
   iv. The County will not indemnify the Contractor.
   v. The Contractor shall submit any claims in accordance with the Virginia Claims Act as required by Virginia law (See Virginia Code Section 2.2-4363).
   vi. The County will not agree to future unknown costs, charges or expenditures of any kind.
   vii. The County will require all provisions of the County's General Terms be incorporated into the Contract documents.
   viii. The Contractor must indemnify, hold harmless and defend the County against any and all claims, losses, demands, or other charges related to the work on the Project or the Contractor's performance under the Contract.

ix. Approval for any modifications to the Contract Documents, Plans or Specifications shall only be valid and binding when made by the Owner in writing.
x. Final approval of any payment requests and for Substantial Completion and Final Completion shall be made by the Owner in consultation with the Architect and Engineer.

5. The Davis Bacon Act applies to the work on this Project and Contractor shall conform to all requirements of the Davis Bacon Act, including, without limitation, all Davis-Bacon prevailing wage requirements. The Copeland "Anti-Kickback" Act also applies and the Contractor shall conform to all requirements thereof. Contractors on projects subject to DBRA labor standards may also be subject to additional prevailing wage and overtime pay requirements under State (and local) laws, and the Contractor shall investigate the same and insure compliance with all Applicable Laws. Also, overtime work pay requirements under CWHSSA and the Fair Labor Standards Act may apply to work, and if applicable, the Contractor shall comply therewith.
6. The winning Contractor shall provide and submit performance and payment bonds for the total Contract Price in forms satisfactory to the County.
7. The “Substantial Completion Date” shall be changed to “December 7, 2020”.
8. The “Final Completion Date” shall be changed to “December 18, 2020”.
9. The due date for bids shall be changed to September 28, 2020.
10. Notwithstanding any other provision of the IFB, all questions concerning the IFB must be submitted in writing by September 21, 2020 at 10 a.m. This modifies Section 4(A)(ii) of the IFB.
11. A list of proposed sub-consultants will not be required until after bid is accepted, but will be required prior to contract award and all sub-consultants must meet all requirements of the IFB and the Plans as modified by this Addendum #1.
12. Third-party Asbestos reports are attached.
13. Pre-bid sign in sheet is attached
14. The chosen color scheme is attached
15. Clarifications from questions received
    a. Will the architect/owner/project require the standard submittal process? Or will certain submittals be waived due to time constraints?
        i. All submittals will be provided via email. To expedite we will review all submittals (if complete) within 5 days of receipt.
    b. What is the duration required for review by architect/owner for approval? (With such an aggressive schedule, these would need to be reviewed and approved ASAP)
        i. All submittals will be provided via email. To expedite we will review all submittals (if complete) within 5 days of receipt.
    c. The specs note that the building will be available for work 24/7, will the architect/owner be available for submittal review and approval 7 days a week? Will the owner’s inspectors or third party inspectors be available for inspections 7 days a week?
        i. The Architect is available on a near 24/7 basis, if needed. The Inspection company would be available during a standard work week. Your schedule should plan for inspections during the standard work week.
    d. Appendix 01, County of Fluvanna General Terms, Conditions and Instructions to Bidders and Contractors: Item #18 notes the County is exempt from the payment of any Virginia Sales Tax. Please confirm that sales tax is to be excluded from all permanently installed products for this project.
        i. The county is exempt from paying sales tax, this does not extend to the contractor.

e. Please confirm anticipated dates for the award and owner contract execution. (Based on the aggressive schedule, these need to occur ASAP after bid)
    i. The intent is to have a final contract approved by the Board of Supervisors on October 7, 2020 with execution the following day.
f. Please confirm whether or not the plans have been submitted for building permit and approved.
    i. No, however, the Building Official is aware of the project and the timeline.
g. S0, Structural Notes #02 Special Inspections: notes that the Owner will engage a third party testing agency for special inspections. Please confirm that the cost of special inspections will be paid for by the owner and are not to be included in the proposal cost.
    i. Special Inspections will be the responsibility of the county.
h. Please confirm the contractor is responsible for obtaining the building permit with fees waived by the county.
    i. This is correct.

Note: A signed acknowledgment of this addendum must be received at the location indicated on the IFB either prior to the bid due date and hour or attached to your bid. Signature on this addendum does not substitute for your signature on the original bid document. The original bid document must be signed.

Very truly yours,

Cyndi Toler, Purchasing Officer
Fluvanna County, Virginia
132 Main Street
Palmyra, VA 22963
(434) 591-1930
Name of Firm: _____

BY:_____

Signature of duly authorized representative

Title:_____

Date:_____

Crabtree, Rohrbaugh & Associates - Architects
250 West Main Street, Suite 200
Charlottesville, VA 22902
Virginia • Pennsylvania • Maryland • West Virginia

ADDENDUM NO. 1 September 14, 2020

Fluvanna County
Multipurpose Room Additions and Renovations
CRA Project No. 3430

TO: All Perspective Bidders and Other Recipients of Contract Drawings and Specifications

This Addendum is hereby made a part of the Contract Document, which will be the basis of the Contract. The Addendum is issued to modify and/or correct the original Contract Documents dated August 28, 2020, Attach this Addendum to your Contract Documents. Receipt of this Addendum must be acknowledged on the Proposal Form. Failure to do so may subject the bidder to disqualification.

SPECIFICATIONS:

1. ADD the following attached specifications:

SECTION 000500	STANDARD FORM OF AGREEMENT BETWEEN OWNER & CONTRACTOR (STIPULATED SUM) (AIA DOCUMENT A101-2007) – SAMPLE CONTRACT
SECTION 000700	GENERAL CONDITIONS OF CONTRACT FOR CONSTRUCTION (AIA DOCUMENT A201-2007)
SECTION 000750	SUPPLEMENTARY GENERAL CONDITIONS
SECTION 010200	GENERAL SITEWORK REQUIREMENTS
SECTION 012500	SUBSTITUTIONS
SECTION 012600	MODIFICATION PROCEDURES
SECTION 012700	CUTTING AND PATCHING
SECTION 012800	FIELD ENGINEERING
SECTION 013100	PROJECT COORDINATION
SECTION 013150	PROJECT MEETINGS
SECTION 013200	CONSTRUCTION PROGRESS DOCUMENTATION
SECTION 013300	SUBMITTALS
SECTION 014000	QUALITY REQUIREMENTS
SECTION 014100	SAFETY
SECTION 015000	TEMPORARY FACILITIES & CONTROLS
SECTION 017200	PROJECT RECORD DOCUMENTS
SECTION 017700	CONTRACT CLOSEOUT
SECTION 017800	FINAL CLEANING
SECTION 017823	OPERATION & MAINTENANCE DATA
SECTION 017900	WARRANTIES
SECTION 024113	SELECTIVE SITE DEMOLITION
SECTION 024119	SELECTIVE DEMOLITION
SECTION 033000	CAST IN PLACE CONCRETE
SECTION 042000	UNIT MASONRY ASSEMBLIES
SECTION 051200	STRUCTURAL STEEL FRAMING
SECTION 053100	STEEL DECKING
SECTION 054000	COLD-FORMED METAL FRAMING
SECTION 061000	ROUGH CARPENTRY

SECTION 064023	INTERIOR ARCHITECTURAL WOODWORK
SECTION 064216	WOOD PANELING
SECTION 072100	BUILDING INSULATION
SECTION 074113	STANDING SEAM METAL ROOF SYSTEM
SECTION 075323	EPDM SINGLE-PLY MEMBRANE ROOFING
SECTION 076150	METAL SOFFIT SYSTEM
SECTION 076200	SHEET METAL FLASHING AND TRIM
SECTION 079200	JOINT SEALANTS
SECTION 081100	STEEL DOORS AND FRAMES
SECTION 081416	FLUSH WOOD DOORS
SECTION 084100	ALUMINUM STOREFRONT
SECTION 087100	DOOR HARDWARE
SECTION 088000	GENERAL GLAZING
SECTION 092550	GYPSUM BOARD ASSEMBLIES
SECTION 093000	TILING
SECTION 095113	ACOUSTICAL PANEL CEILINGS
SECTION 096513	RESILIENT BASE AND ACCESSORIES
SECTION 096813	TILE CARPETING
SECTION 099123	PAINTING
SECTION 101100	VISUAL DISPLAY UNITS
SECTION 101423	PANEL SIGNS
SECTION 122413	ROLLER WINDOW SHADES
SECTION 200100	GENERAL PROVISIONS
SECTION 200200	SCOPE OF THE MECHANICAL WORK
SECTION 200300	SHOP DRAWINGS, DESCRIPTIVE LITERATURE, MAINTENANCE MANUALS, PARTS LISTS, SPECIAL KEYS AND TOOLS
SECTION 200400	DEMOLITION AND SALVAGE
SECTION 200500	COORDINATION AMONG TRADES, CONNECTION OF EQUIPMENT
SECTION 201100	SLEEVING, CUTTING, PATCHING AND REPAIRING
SECTION 201200	EXCAVATION, TRENCHING, BACKFILLING & GRADING
SECTION 201300	PIPE, PIPE FITTINGS, AND PIPE SUPPORT
SECTION 201310	WELDING
SECTION 202100	VALVES AND COCKS
SECTION 202110	ACCESS TO VALVES, EQUIPMENT, FILTERS, ETC.
SECTION 202200	INSULATION
SECTION 202300	THERMOMETERS AND OTHERS, MONITORING INSTRUMENTS
SECTION 202400	IDENTIFICATIONS, TAGS, CHARTS, ETC.
SECTION 202500	HANGERS, CLAMPS, ATTACHMENTS, ETC.
SECTION 202600	MECHANICAL/ELECTRICAL VIBRATION CONTROLS AND SEISMIC RESTRAINTS
SECTION 203100	TESTING, BALANCING, LUBRICATION AND ADJUSTMENTS
SECTION 203200	MECHANICAL MAINTENANCE
SECTION 220100	PLUMBING SPECIALTIES
SECTION 220200	PLUMBING FIXTURES, FITTINGS AND TRIM
SECTION 230200	HVAC EQUIPMENT
SECTION 230300	CONDENSATE DRAINAGE
SECTION 231100	REGISTERS, GRILLES, DIFFUSER AND LOUVERS
SECTION 231200	SHEET METAL
SECTION 250100	MOTOR STARTERS

SECTION 250200	CONTROLS
SECTION 260501	GENERAL PROVISIONS
SECTION 260502	SCOPE OF THE ELECTRICAL WORK
SECTION 260503	SHOP DRAWINGS, LITERATURE, MANUALS, PARTS LISTS, AND SPECIAL TOOLS
SECTION 260504	SLEEVING, CUTTING, PATCHING AND REPAIRING
SECTION 260505	DEMOLITION, RESTORATION AND SALVAGE
SECTION 260508	COORDINATION AMONG TRADES, SYSTEMS INTERFACING AND CONNECTION OF EQUIPMENT FURNISHED BY OTHERS
SECTION 260519	CONDUCTORS, IDENTIFICATIONS, SPLICING DEVICES AND CONNECTORS
SECTION 260526	GROUNDING AND BONDING
SECTION 260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
SECTION 260531	CABINETS, OUTLET BOXES AND PULL BOXES
SECTION 260533	RACEWAYS AND FITTINGS
SECTION 260544	EXCAVATION, TRENCHING, BACKFILLING AND GRADING
SECTION 260553	IDENTIFICATIONS
SECTION 262726	WIRING DEVICES AND PLATES
SECTION 265113	LIGHT FIXTURES AND LAMPS
SECTION 270610	VOICE DATA
SECTION 283100	FIRE ALARM SYSTEM
SECTION 311000	SITE CLEARING
SECTION 312000	EARTHWORK
SECTION 313116	TERMITE CONTROL
SECTION 321216	ASPHALT PAVEMENT
SECTION 321313	SITE CONCRETE
SECTION 329200	LAWNS AND GRASSES
SECTION 329300	EXTERIOR PLANTS
SECTION 333000	SANITARY SEWERAGE
SECTION 334100	STORM DRAINAGE
SECTION 334613	FOUNDATION SYSTEMS

DRAWINGS:

DRAWING CS.1 COVER SHEET

1. REPLACE this sheet in its entirety with the attached sheet.
    a. Added owners IFB number.

DRAWING CS.2 GENERAL INFORMATION

1. REPLACE this sheet in its entirety with the attached sheet.
    a. Revised Drawing List.
    b. Revised wall type S13.

DRAWING D1.1 DEMOLITION PLAN, ALTERATION NOTES AND LEGEND

1. REPLACE this sheet in its entirety with the attached sheet.
    a. Revised extent of concrete removal.
    b. Revised demolition tag “0A”.
    c. Revised demolition tag “3C”.

DRAWING A1.1 SUB-BASEMENT FLOOR PLAN

1. REPLACE this sheet in its entirety with the attached sheet.
2. Detail 1/A1.1 - Sub-Basement Floor
    a. Added base elevation marker.
    b. Added note to excavate, replace existing drainage pipe and waterproof a portion of the existing foundation.
    c. Added note to waterproof a portion of the existing foundation.
    d. Revised wall and door layout at Corridor 102.
3. DETAIL 2/A1.1 – Partial Basement Plan
    a. Area in existing Stair 107 where walls are to be scraped, prepared and painted.
4. Detail 3 – Section Detail.
    a. Revised the extent of slab removal.

DRAWING A1.2 SUB-BASEMENT REFLECTED CEILING PLAN AND ROOF PLAN

1. REPLACE this sheet in its entirety with the attached sheet.
2. Detail 1/A1.2 - Roof Plan
    a. Added perimeter snow guard system.
3. DETAIL 2/A1.2 – Sub-Basement Reflected Ceiling Plan
    b. Included electrical and HVAC devise locations for graphic purposes only.

DRAWING A2.1 EXTERIOR ELEVATIONS

1. REPLACE this sheet in its entirety with the attached sheet.
2. Detail 1/A2.1 – Partial East Elevation
    a. Added perimeter snow guard system.
3. DETAIL 2/A2.1 – Partial North Elevation
    a. Added perimeter snow guard system.
4. Detail 3/A2.1 – Partial South Elevation.
    a. Added perimeter snow guard system.

DRAWING A3.1 BUILDING SECTIONS

1. REPLACE this sheet in its entirety with the attached sheet.
2. Detail 1/A3.1 – Wall section at Vestibule
    a. Added perimeter snow guard system.
    b. Added notes for batt insulation and steel framing.
3. DETAIL 2/A3.1 – Wall Section
    a. Added perimeter snow guard system.
    b. Added notes for batt insulation and steel framing.
    c. Added window header detail callout.
    d. Added wall base detail callout.
4. Detail 3/ A3.1 – Wall Section
    a. Added perimeter snow guard system.
    b. Added notes for batt insulation and steel framing.
    c. Added wall base detail callout and foundation waterproofing requirements.
5. Detail 4/A3.1 – Wall section at Conference Room
    a. Added perimeter snow guard system.
    b. Added notes for batt insulation and steel framing.
6. Detail 5/A3.1 – Typical Operable Partition Detail
    a. Revised detail.

7. Detail 7/A3.1 – Typical Masonry waterproofing Detail
    a. Added detail.

DRAWING A5.1 DETAILS

1. REPLACE this sheet in its entirety with the attached sheet.
2. Detail 1/A3.1 – Typical Eave Detail
    a. Added perimeter snow guard system.
    b. Added notes for batt insulation and steel framing.
3. Detail 1/A3.1 – Typical Porch Eave Detail
    a. Added perimeter snow guard system.

DRAWING A6.1 – ROOM FINISH AND SIGNAGE SCHEDULES

1. Stair 107: REVISE to read as follows:
    a. Wall Finish: PNT

DRAWING A6.3 ALUMINUM WINDOW ELEVATIONS AND STOREFRONT DETAILS

1. REPLACE this sheet in its entirety with the attached sheet.
2. Detail 1/A6.3 – Typical Sill Detail at Metal Stud Framing
    a. Revised configuration of brick window sill.

DRAWING S1.0 FOUNDATION PLAN

1. REPLACE this sheet in its entirety with the attached sheet.
2. Foundation Plan
    a. Added detail callout 1/S1.0
    b. Added floor elevation benchmarks.
3. Added Detail 1/S1.0

DRAWING S1.1 ROOF FRAMING PLAN

1. REPLACE this sheet in its entirety with the attached sheet.
2. Roof Framing Plan
    a. Added a lintel and detail callout 1/S3.0

DRAWING S2.0 FOUNDATION DETAILS

1. REPLACE this sheet in its entirety with the attached sheet.
2. Section 1/S2.0
    a. Revised note and dimensions
3. Section 3/S2.0
    b. Revised note and dimensions

DRAWING S3.0 FRAMING DETAILS

1. REPLACE this sheet in its entirety with the attached sheet.
2. Added Section 1/S3.0, Lintel Details.

DRAWING M-100 MECHANICAL NEW WORK PLAN

1. REPLACE this sheet in its entirety with the attached sheet.
    a. AS-1 was eliminated, and V-1 is new outside air ventilation. Tie unit into new ductwork in existing mechanical room. A louver, L-2, was added to bring outside air to the unit.
    b. Revise note M2 and deleted notes M3 and M4, which pertained to DOAS-1.

c. VAV boxes were removed and ductwork sizes were changed accordingly.
d. New refrigerant piping to be run from CU-1 to V-1. Route new condensate from V-1 down to existing floor drain.

DRAWING M-200 MECHANICAL SCHEDULES, DETAILS AND CONTROLS

1. REPLACE this sheet in its entirety with the attached sheet.
    a. New unit V-1 and louver L-2 is scheduled.
    b. Added a remark to V-1 Unit schedule to provide air filter.

DRAWING P-001 PLUMBING LEGEND

1. REPLACE this sheet in its entirety with the attached sheet.
    a. P-3A and P-3B fixtures were updated to be pressure assisted water closets.

DRAWING P-101 FIRST FLOOR PLUMBING PLAN

1. REPLACE this sheet in its entirety with the attached sheet.
    a. Piping revisions at Women 111.

DRAWING E-200 POWER/SYSTEMS PLANS

1. Replace this sheet in its entirety with the attached sheet.
    a. Provide 120V power for AV sound system rack. Apply tagged note E37 and refer to sheet T-100 for sound rack location near Stair 107 behind Meeting Room 110.
    b. Provide (1) 2D located for monitor on plan east wall in Conference Room 104 at same height is receptacle intended for monitor.
    c. Provide (2) 2D located on wall behind board desk in Meeting Room 110 same height is receptacle intended for monitor.

DRAWING E-201 HVAC POWER PLAN

1. REPLACE this sheet in its entirety with the attached sheet.
    a. Electrical connections for new unit V-1 updated to match new unit's electrical requirements.

DRAWING E-400 PANEL SCHEDULES

1. REPLACE this sheet in its entirety with the attached sheet.
    a. Electrical connections for new unit V-1 updated to match new unit's electrical requirements.

DRAWING T-100 AUDIOVISUAL PLANS

1. REPLACE this sheet in its entirety with the attached sheet.
    a. Revisions to notes and details.

DRAWING T-200 AUDIOVISUAL DETAILS

1. REPLACE this sheet in its entirety with the attached sheet.
    a. Revisions to notes and details.

DRAWING T-201 AUDIOVISUAL FLOW DIAGRAMS

1. REPLACE this sheet in its entirety with the attached sheet.
    a. Revisions to notes and details.

DRAWING T-202 AUDIOVISUAL FLOW DIAGRAMS

a. ADD the attached DRAWING T-202 AUDIOVISUAL FLOW DIAGRAMS

DRAWING C0.0 COVER

1. ADD the attached drawing C0.0 COVER.

DRAWING C1.0 NOTES AND DETAILS

1. ADD the attached drawing C1.0 NOTES AND DETAILS.

DRAWING C2.0 EXISTING CONDITIONS & DEMO PLAN

1. ADD the attached drawing C2.0 EXISTING CONDITIONS AND DEMO PLAN

DRAWING C3.0 LAYOUT PLAN AND GRADING PLAN

1. ADD the attached drawing C3.0 LAYOUT PLAN.

End of Addendum No. 1

ATTACHMENTS:

SPECIFICATIONS:

SECTION 000500	STANDARD FORM OF AGREEMENT BETWEEN OWNER & CONTRACTOR (STIPULATED SUM) (AIA DOCUMENT A101-2007) – SAMPLE CONTRACT
SECTION 000700	GENERAL CONDITIONS OF CONTRACT FOR CONSTRUCTION (AIA DOCUMENT A201-2007)
SECTION 000750	SUPPLEMENTARY GENERAL CONDITIONS
SECTION 010200	GENERAL SITEWORK REQUIREMENTS
SECTION 012500	SUBSTITUTIONS
SECTION 012600	MODIFICATION PROCEDURES
SECTION 012700	CUTTING AND PATCHING
SECTION 012800	FIELD ENGINEERING
SECTION 013100	PROJECT COORDINATION
SECTION 013150	PROJECT MEETINGS
SECTION 013200	CONSTRUCTION PROGRESS DOCUMENTATION
SECTION 013300	SUBMITTALS
SECTION 014000	QUALITY REQUIREMENTS
SECTION 014100	SAFETY
SECTION 015000	TEMPORARY FACILITIES & CONTROLS
SECTION 017200	PROJECT RECORD DOCUMENTS
SECTION 017700	CONTRACT CLOSEOUT
SECTION 017800	FINAL CLEANING
SECTION 017823	OPERATION & MAINTENANCE DATA
SECTION 017900	WARRANTIES
SECTION 024113	SELECTIVE SITE DEMOLITION
SECTION 024119	SELECTIVE DEMOLITION
SECTION 033000	CAST IN PLACE CONCRETE
SECTION 042000	UNIT MASONRY ASSEMBLIES

SECTION 051200	STRUCTURAL STEEL FRAMING
SECTION 053100	STEEL DECKING
SECTION 054000	COLD-FORMED METAL FRAMING
SECTION 061000	ROUGH CARPENTRY
SECTION 064023	INTERIOR ARCHITECTURAL WOODWORK
SECTION 064216	WOOD PANELING
SECTION 072100	BUILDING INSULATION
SECTION 074113	STANDING SEAM METAL ROOF SYSTEM
SECTION 075323	EPDM SINGLE-PLY MEMBRANE ROOFING
SECTION 076150	METAL SOFFIT SYSTEM
SECTION 076200	SHEET METAL FLASHING AND TRIM
SECTION 079200	JOINT SEALANTS
SECTION 081100	STEEL DOORS AND FRAMES
SECTION 081416	FLUSH WOOD DOORS
SECTION 084100	ALUMINUM STOREFRONT
SECTION 087100	DOOR HARDWARE
SECTION 088000	GENERAL GLAZING
SECTION 092550	GYPSUM BOARD ASSEMBLIES
SECTION 093000	TILING
SECTION 095113	ACOUSTICAL PANEL CEILINGS
SECITON 096513	RESILIENT BASE AND ACCESSORIES
SECITON 096813	TILE CARPETING
SECTION 099123	PAINTING
SECTION 101100	VISUAL DISPLAY UNITS
SECTION 101423	PANEL SIGNS
SECTION 122413	ROLLER WINDOW SHADES
SECTION 200100	GENERAL PROVISIONS
SECTION 200200	SCOPE OF THE MECHANICAL WORK
SECTION 200300	SHOP DRAWINGS, DESCRIPTIVE LITERATURE, MAINTENANCE MANUALS, PARTS LISTS, SPECIAL KEYS AND TOOLS
SECTION 200400	DEMOLITION AND SALVAGE
SECTION 200500	COORDINATION AMONG TRADES, CONNECTION OF EQUIPMENT
SECTION 201100	SLEEVING, CUTTING, PATCHING AND REPAIRING
SECTION 201200	EXCAVATION, TRENCHING, BACKFILLING & GRADING
SECTION 201300	PIPE, PIPE FITTINGS, AND PIPE SUPPORT
SECTION 201310	WELDING
SECTION 202100	VALVES AND COCKS
SECTION 202110	ACCESS TO VALVES, EQUIPMENT, FILTERS, ETC.
SECTION 202200	INSULATION
SECTION 202300	THERMOMETERS AND OTHERS, MONITORING INSTRUMENTS
SECTION 202400	IDENTIFICATIONS, TAGS, CHARTS, ETC.
SECTION 202500	HANGERS, CLAMPS, ATTACHMENTS, ETC.
SECTION 202600	MECHANICAL/ELECTRICAL VIBRATION CONTROLS AND SEISMIC RESTRAINTS
SECTION 203100	TESTING, BALANCING, LUBRICATION AND ADJUSTMENTS
SECTION 203200	MECHANICAL MAINTENANCE
SECTION 220100	PLUMBING SPECIALTIES
SECTION 220200	PLUMBING FIXTURES, FITTINGS AND TRIM
SECTION 230200	HVAC EQUIPMENT

SECTION 230300	CONDENSATE DRAINAGE
SECTION 231100	REGISTERS, GRILLES, DIFFUSER AND LOUVERS
SECTION 231200	SHEET METAL
SECTION 250100	MOTOR STARTERS
SECTION 250200	CONTROLS
SECTION 260501	GENERAL PROVISIONS
SECTION 260502	SCOPE OF THE ELECTRICAL WORK
SECTION 260503	SHOP DRAWINGS, LITERATURE, MANUALS, PARTS LISTS, AND SPECIAL TOOLS
SECTION 260504	SLEEVING, CUTTING, PATCHING AND REPAIRING
SECTION 260505	DEMOLITION, RESTORATION AND SALVAGE
SECTION 260508	COORDINATION AMONG TRADES, SYSTEMS INTERFACING AND CONNECTION OF EQUIPMENT FURNISHED BY OTHERS
SECTION 260519	CONDUCTORS, IDENTIFICATIONS, SPLICING DEVICES AND CONNECTORS
SECTION 260526	GROUNDING AND BONDING
SECTION 260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
SECTION 260531	CABINETS, OUTLET BOXES AND PULL BOXES
SECTION 260533	RACEWAYS AND FITTINGS
SECTION 260544	EXCAVATION, TRENCHING, BACKFILLING AND GRADING
SECTION 260553	IDENTIFICATIONS
SECTION 262726	WIRING DEVICES AND PLATES
SECTION 265113	LIGHT FIXTURES AND LAMPS
SECTION 270610	VOICE DATA
SECTION 283100	FIRE ALARM SYSTEM
SECTION 311000	SITE CLEARING
SECTION 312000	EARTHWORK
SECTION 313116	TERMITE CONTROL
SECTION 321216	ASPHALT PAVEMENT
SECTION 321313	SITE CONCRETE
SECTION 329200	LAWNS AND GRASSES
SECTION 329300	EXTERIOR PLANTS
SECTION 333000	SANITARY SEWERAGE
SECTION 334100	STORM DRAINAGE
SECTION 334613	FOUNDATION SYSTEMS

DRAWINGS:

DRAWING CS.1 COVER SHEET
DRAWING CS.2 GENERAL INFORMATION
DRAWING D1.1 DEMOLITION PLAN, ALTERATION NOTES AND LEGEND
DRAWING A1.1 SUB-BASEMENT FLOOR PLAN
DRAWING A1.2 SUB-BASEMENT REFLECTED CEILING PLAN AND ROOF PLAN
DRAWING A2.1 EXTERIOR ELEVATIONS
DRAWING A3.1 BUILDING SECTIONS
DRAWING A5.1 DETAILS
DRAWING A6.1 – ROOM FINISH AND SIGNAGE SCHEDULES
DRAWING A6.3 ALUMINUM WINDOW ELEVATIONS AND STOREFRONT DETAILS
DRAWING S1.0 FOUNDATION PLAN

DRAWING S1.1 ROOF FRAMING PLAN
DRAWING S2.0 FOUNDATION DETAILS
DRAWING S3.0 FRAMING DETAILS
DRAWING M-100 MECHANICAL NEW WORK PLAN
DRAWING M-200 MECHANICAL SCHEDULES, DETAILS AND CONTROLS
DRAWING P-001 PLUMBING LEGEND
DRAWING P-101 FIRST FLOOR PLUMBING PLAN
DRAWING E-200 POWER/SYSTEMS PLANS
DRAWING E-201 HVAC POWER PLAN
DRAWING E-400 PANEL SCHEDULES
DRAWING T-100 AUDIOVISUAL PLANS
DRAWING T-200 AUDIOVISUAL DETAILS
DRAWING T-201 ADIOVISUAL FLOW DIAGRAMS
DRAWING T-202 ADIOVISUAL FLOW DIAGRAMS
DRAWING C0.0 COVER
DRAWING C1.0 NOTES AND DETAILS
DRAWING C2.0 EXISTING CONDITIONS & DEMO PLAN
DRAWING C3.0 LAYOUT PLAN AND GRADING PLAN

AIA® Document A101™ – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

CONTRACT:

for the following Project:
(Name, location and detailed description)

The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101™–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201™–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

Init.
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TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[X] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work **as stipulated in Article 9 of Specification Section 00010 and further defined on the Bid Form for this Contract**:
(Check one of the following boxes and complete the necessary information.)

[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[ ] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if
(Paragraphs deleted)
applicable shall be as stipulated in Paragraph 8.4 of Specification Section 000750 or another Contract Document.

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, **and approved by the Owner,** the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Refer to Article 9 of Specification Section 000750 and Specification Section 012900 for further information. The payment schedule will also be finalized at the first Pre-Construction Meeting.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and

.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

In accordance with AIA Document A201-2017 and as further described in Article 9 of Specification Section 000750.

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

In accordance with Article 9 of AIA Document A201-2017 and as further described in Article 9 of Specification Section 000750.

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

In accordance with Article 9 of AIA Document A201-2017 and as further described in Article 9 of Specification Section 000750.

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

In accordance with Article 9 of AIA Document A201-2017 and as further described in Article 9 of Specification Section 000750.

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect **and approved by the Owner**.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, **and approval by the Owner.**

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution
For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[
(Paragraphs deleted)
X] Pursuant to **Article 15** of AIA Document A201–2017 **and further modified in Specification Article 15 of Section 000750**

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION
§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

(Paragraphs deleted)
§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS
§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds
AIA Document A101™ -2017, Exhibit A, Insurance and Bonds, referenced on Page 1 of this Agreement is not being incorporated as part of this Agreement.

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in **AIA Document A201™–2017, General Conditions of the Contract for Construction, Article 11 of Specification Section 000750,** and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A201™–2017, General Conditions of the Contract for Construction, **Article 11 of Specification Section 000750, Article 7 of Specification Section 000101,** and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(Paragraphs deleted)
§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor **as modified**

.2 **Intentionally deleted**

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

.4

(Paragraphs deleted)

Intentionally deleted

.5 Drawings

Number	Title	Date
See Exhibit A – List of Drawings		

.6 Specifications

Section	Title	Date	Pages
See Exhibit B – Table of Contents			

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[
(Paragraphs deleted)
X] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
See Exhibit B – Table of Contents			

(Paragraphs deleted)

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders,

sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

Exhibits A List of Drawings and Exhibit B Table of Contents

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

THE OWNER:
(Name, legal status and address)

THE ARCHITECT:
(Name, legal status and address)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely

upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances
§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or

expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during

that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- **.1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

SECTION 000750 SUPPLEMENTARY GENERAL CONDITIONS

The following supplements modify, change, delete from or add to the "**General Conditions of the Contract for Construction" AIA Document A201, 2017 Edition**. Where any article of the General Conditions is modified or any paragraph, subparagraph or clause thereof is modified or deleted by these Supplementary General Conditions, the unaltered provisions of the Article, Paragraph or Subparagraph shall remain in effect.

The General Conditions of the Contract for Construction may also be supplemented elsewhere in the Contract Documents.

ARTICLE 1 - GENERAL PROVISIONS
Paragraph 1.1 - Basic Definitions
Subparagraph 1.1.1 – The Contract Documents

DELETE the first sentence of Subparagraph 1.1.1 in its entirety and, in lieu thereof, substitute the following:

[*Substitute:*] The Contract Documents are enumerated in the Agreement between Owner and Contractor (hereinafter the Agreement) and consist of the Copyright, the Advertisement for Bids, Instructions to Bidders (AIA Document A701), Supplementary Instructions to Bidders, Bid Forms, Contractor's Qualification Statement (AIA Document A305), Standard Form of Agreement Between Owner and Contractor (AIA Document A101), Employment Verification Act, Affidavit Accepting Provisions of any applicable Workman's Compensation Act, Bid Bond (AIA Document A310), Performance & Payment Bonds (AIA Document A312), Conditions of the Contract (General, Supplementary and Special), Contractor's Affidavit of Release of Liens (AIA Document G706A), List of Drawings, the Drawings, Specifications, all Addenda issued prior to execution of the Contract and all modifications thereto.

DELETE the last sentence of Subparagraph 1.1.1 in its entirety.

Subparagraph 1.1.3 – The Work

ADD the following to the end of the first sentence:

[*Add:*] "including any subcontractor's and sub-subcontractor's work and suppliers or any other entity for which Contractor is responsible and whether on or off the site of the Project."

Subparagraph 1.1.5 – The Drawings

ADD the following to the end of Subparagraph 1.1.5:

[*Add:*] "and shop drawings."

ADD the following new Subparagraphs:

1.1.9 The term "product" includes materials, systems and equipment.

1.1.10 The term “provide” includes furnishing and installing a product, complete in place, operating, tested and approved.

1.1.11 The term “building code” and the term “code” refer to regulations of governmental agencies having jurisdiction.

1.1.12 The terms “approved”, “required” and “as directed” refer to and indicate the work or materials that may be approved, required or directed by Architect acting as the agent of Owner.

1.1.13 The term “similar” means in its general sense and not necessarily identical.

1.1.14 The terms “shown”, “indicated”, “detailed”, “noted”, “scheduled” and terms of similar import refer to requirements contained in the Contract Documents.

Paragraph 1.2 - Correlation and Intent of the Contract Documents

ADD the following new Subparagraphs:

1.2.4 Computed dimensions shall take precedence over scale dimensions, and large scale drawings shall take precedence over small scale drawings.

1.2.5 Anything shown on the Drawings and not mentioned in the Specifications or mentioned in the Specifications and not shown on the Drawings shall have the same effect as if shown or mentioned respectively in both. Any work shown on one Drawing shall be construed to be shown in all Drawings, and Contractor shall coordinate the Work and Drawings to conform to the requirements of the Contract Documents.

1.2.6 In the event of conflict between different provisions in the Contract Documents, the provision calling for the higher quality or greater benefit to Owner shall prevail, unless Owner accepts in writing the provision calling for a lower quality or lesser benefit.

1.2.7 If any portion of the Contract Documents shall be in conflict with any other portion, after the application of the rules of interpretation set forth in this Paragraph 1.2, the various documents comprising the Contract Documents shall govern in the order of precedence as herein set forth according to their latest date of execution: (a) Change Orders submitted, processed and approved in accordance with applicable procedure; (b) written amendment to the various agreements (including but not limited to the Agreement) entered into or executed by Owner; (c) the various agreements entered into and executed by Owner, including but not limited to the Agreement (as modified by any Addenda thereto); (d) Addenda; (e) Supplementary and Special Conditions; (f) General Conditions; (g) Division 1 Specifications; (h) Instructions to Bidders; (i) Advertisement for Bids; (j) Bid Form; and (k) Drawings and Specifications. In the event of an inconsistency between the Specifications and Drawings, the interpretation as determined by Architect shall prevail; as between large scale drawings and small scale drawings, the large scale drawings shall take precedence. Specifications having greater detail or specificity take priority over specifications of lesser detail or specificity and detail takes precedence over general drawings.

1.2.8 Any component, material or equipment necessary to complete a system but not specifically described or depicted in the Contract Documents shall be included in the Work as if it were described or shown in the Contract Documents without an adjustment in the Contract Sum or Contract Time.

Paragraph 1.5 - Ownership and Use of Drawings, Specifications and Other Instruments of Service

ADD the following new Subparagraphs:

1.5.3 All reports, plans, specifications and computer files relating to this project (hereinafter the Instruments of Service) are the property of Crabtree, Rohrbaugh & Associates. Crabtree, Rohrbaugh & Associates retains all common law, statute and other reserved rights including the copyright thereto.

1.5.4 Except as provided in Section 000101, Sub-subparagraph 3.1.4.1, or as otherwise agreed upon with Owner, reproduction of the material herein or substantial use without written permission of Crabtree, Rohrbaugh & Associates violates the copyright laws of the United States and will be subject to legal prosecution.

Paragraph 1.6 – Notice
Subparagraph 1.6.1

DELETE the following from the end of the subparagraph and, in lieu thereof, SUBSTITUTE it as follows:

[*Delete:*] "if a method for electronic transmission is set forth in the Agreement."

[*Substitute:*] ", and actually received by the individual for which it was intended. Notice by mail shall be effective three (3) days after deposit in the mail. In addition, notice to the Contractor may be in the form of meeting minutes."

ADD new Subparagraph 1.6.3 as follows:

1.6.3 With regard to giving notice, the designated representative shall be as set forth in Paragraphs 8.3 and 8.4 of AIA Document A101 Standard Form of Agreement Between Owner and Contractor.

Paragraph 1.7 – Digital Data Use and Transmission

DELETE the last sentence of Paragraph 1.7 in its entirety, and in lieu thereof, replace it with the following:

[*Replace*] "Protocols governing the use of Architect's Instruments of Service are defined in Sub-subparagraphs 3.12.4.1 through 3.12.4.9 of these Supplementary General Conditions. The stated protocols apply only to the use of .dwf or .dwg format files. A separate Media Agreement, as provided by Architect, must executed by Contractor when requesting the Revit Model.

Paragraph 1.8 – Building Information Models Use and Reliance

DELTETE Paragraph 1.8 in its entirety and, in lieu thereof, SUBSTITUTE the following new Paragraph.

1.8 A separate Media Agreement stating protocols governing the use of Architect's building information model (Revit Model) must be executed by Contractor when requesting the Revit Model.

ARTICLE 2 - OWNER
Paragraph 2.1 - General
Subparagraph 2.1.1

CHANGE the first part of the first sentence to identify Owner as follows:

County of Fluvanna
132 Main Street
Palmyra VA 22963

In the second sentence, REVISE "with respect to all matters requiring Owner's approval or authorization" to "to the extent authorization by Owner's Board of School Directors."
Subparagraph 2.1.2

DELETE Subparagraph 2.1.2 in its entirety.

Paragraph 2.2 – Evidence of the Owner's Financial Arrangements

DELETE Paragraph 2.2, including all subparagraphs, in its entirety.

Paragraph 2.3 Information and Services Required of the Owner
Subparagraph 2.3.3

CHANGE "shall employ" to "may employ" in the first line.

DELETE "as to whom the Contractor has no reasonable objection" from the second line.

Subparagraph 2.3.4

DELETE the last sentence in its entirety, and in lieu thereof, SUBSTITUTE the following new sentence:

[*Substitute*] "Contractor shall be responsible to verify the accuracy of the site's physical characteristics, legal limitations and utility locations and bring to the attention of Owner and Architect any discrepancies discovered that may affect the Work."

Subparagraph 2.3.5

INSERT at the beginning of the first sentence: "Upon written request from the Contractor,"

Subparagraph 2.3.6

DELETE Subparagraph 2.3.6 in its entirety and, in lieu thereof, SUBSTITUTE the following new Subparagraph:

2.3.6 Contractor with whom Owner shall enter into a contract shall be entitled to receive up to three (3) sets of drawings and specifications without charge.

Paragraph 2.4 - Owner's Right to Stop the Work

DELETE the word "repeatedly" from the first sentence.

ADD the following to the end of the Subparagraph:

[*Add:*] "This right shall be in addition to and not in restriction of or derogation of Owner's rights under Article 14 hereof. Owner's right to stop the Work shall not relieve Contractor of its responsibilities and obligations under or pursuant to the Contract Documents. In the event an order by Owner to stop the Work is determined to be inappropriate, it shall not constitute a breach of Contract by Owner, but rather shall be a suspension of Work for the convenience of Owner.

Paragraph 2.5 - Owner's Right to Carry Out the Work

REVISE the second line of the first sentence from "a ten-day period" to a "a seven-day period".

DELETE the second sentence in its entirety and, in lieu thereof, SUBSTITUTE the following new sentence:

In such case, Owner shall have the right to deduct from payments then or thereafter due Contractor, the cost to Owner of correcting such default or neglect, including Owner's expenses and any fees or costs charged by attorneys, Architect or Owner's Representative in connection with such corrective action.

ADD the following to the end of the Subparagraph:

[*Add:*] "Nothing contained herein shall obligate Owner to carry out work for the benefit of Contractor."

[*Add:*] "This right shall be in addition to and not in restriction of or derogation of Owner's rights under Article 14 hereof. Owners right to stop the Work shall not relieve Contractor of its responsibilities and obligations under or pursuant to the Contract Documents.
[Add:] "Owner shall not be required to comply with the seven-day notice provision stated above, and shall have the right to immediately correct any deficiencies of Contractor subject to the remaining provisions of this Paragraph 2.5, where providing such notice would impose risk of substantial disruption to the Project schedule or to the safety of any person or property."

ADD new Paragraph 2.5 as follows:

Paragraph 2.6 – Owners Representative
Subparagraph 2.6.1

2.6.1 Owner's Representative during construction is Owner's designated and authorized representative to stop work for, including, but not limited to, unsatisfactory field test results, deficient materials, equipment or systems, deficient work or unsatisfactory installations. The following is a description of the services being provided by Owner's Representative to Owner and how Owner's Representative is to interact with Architect and Contractor. Owner's Representative shall assist Owner in observing performance of the work of Contractor. Owner's Representative shall endeavor to provide further protection for Owner against defects and deficiencies in the work of Contractor; but, furnishing of such services will not make them responsible for or give them control over construction means, methods, techniques, sequences or procedures for safety precautions or programs, or responsibility for Contractor's failure to perform the Work in accordance with the Contract Documents and in particular the specific limitations set forth in this Agreement are applicable. The duties and responsibilities of Owner's Representative are limited and described as follows:

2.6.1.1 Owner's Representative is Owner's agent at the site and will act as directed by and under the supervision of Owner and will confer with Architect, Owner and Contractor, keeping Owner advised as necessary. Owner's Representative's dealings with subcontractors shall only be through or with the full knowledge and approval of Contractor. Owner's Representative shall generally communicate with Owner with the knowledge and under the direction of Owner.

2.6.1.2 Schedules: Review the progress schedule, schedule of shop drawing submittals and schedules of value prepared by Contractor and consult with Architect and Owner concerning acceptability. Monitor Contractor's prepared Project Schedule and Contractor's progress and conformance with project completion dates, pursuant to the schedule criteria.

2.6.1.3 Conferences and Meetings: Attend meetings with Architect and Contractors, such as Pre-Construction Conferences, Progress Meetings, Job Conferences, and other project-related meetings.

2.6.1.4 Liaison: Service as Owner's liaison with Contractor, and assist in understanding the intent of the Contract Documents; assist Architect and Owner in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-site operations.

2.6.1.5 Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.

2.6.2 Shop Drawings and Samples:

2.6.2.1 Record date of receipt of Shop Drawings and Samples.

2.6.2.2 Receive samples which are furnished at the site by Contractor, and notify Architect and Owner of availability of samples for examination.

2.6.2.3 Advise Architect, Owner and Contractor of the commencement of any Work requiring a shop drawing or sample or if the submittal has not been approved by Architect and Owner.

2.6.3 Review of Work, Rejection of Defective Work, Inspections and Tests:

2.6.3.1 Conduct on-site observation of Work in progress to assist Architect and Owner in determining if the Work is in general, proceeding in accordance with the Contract Documents.

2.6.3.2 Report to Architect and Owner whenever they believe that any Work is unsatisfactory, faulty, or defective or does not conform to the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Architect and Owner of Work that they believe should be corrected or rejected or should be uncovered for observation or requires special testing, inspection or approval. Owner's Representative shall be officially designated to act on Owner's behalf as its authorized representative to exercise Owner's right to stop and/or suspend work or reject materials, equipment and systems or other non-conforming, deficient, incomplete and unacceptable work in complete accordance with AIA General Conditions, Article 2.3, provided in the Contract Documents by Architect.

2.6.3.3 Verify that all tests, equipment and systems startups and operating and maintenance training are conducted in the presence of appropriate personnel, and that Contractor maintains adequate records thereof; and observe, record, and report to Architect and Owner.

2.6.4 Interpretation of the Contract Documents: Report to Architect and Owner when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor, clarifications and interpretations as issued by Architect and Owner.

2.6.5 Modifications: Consider and evaluate Contractor's suggestions for modifications on Drawings or Specifications and report recommendations to Architect and Owner. Transmit to Contractor decisions issued by Architect and Owner.

2.6.6 Records:

2.6.6.1 Maintain at the job site orderly files for correspondence, reports of Job Conferences, Shop Drawings and Samples, reproductions of original Contract Documents including all Work Directive Changes, Addenda, Change Orders, Field Orders, additional drawings issued subsequent to the execution of the Contract, Architect and Owner clarifications and interpretations of the Contract Documents, progress reports, and other Project related documents.

2.6.6.2 Keep a diary or log book, recording Contractor hours on the job site, weather conditions, data relative to questions of Work Directive Changes, Change Orders or changed conditions, list of job site visitors, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures and send copies to Architect and Owner.

2.6.6.3 Record names, addresses and telephone numbers of all Contractors, subcontractors and major suppliers of materials and equipment.

2.6.7 Reports:

2.6.7.1 Furnish Architect and Owner periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of shop drawing and sample submittals.

2.6.7.2 Consult with Architect and Owner in advance of scheduled major tests, inspections or start of important phases of the Work.

2.6.7.3 Draft proposed Change Orders and Work Directive Changes, obtaining backup material from Contractor and recommend to Architect and Owner, Change Orders, Work Directive Changes, and Field Orders.

2.6.7.4 Report immediately to Architect and Owner upon the occurrence of any accident.

2.6.8 Payment Requests: Review Applications for Payment with Contractor for compliance with the established procedures for their submission and forward with recommendations to Architect and Owner, noting particularly the relationship of the payments requested to the Schedule of Values, Work completed and materials and equipment delivered at the site but not incorporated into the Work.

2.6.9 Certificates, Maintenance, and Operations Manuals: During the course of the Work, verify that certificates, maintenance and operations manuals and other data required to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have this material delivered to Owner prior to final payment for the Work.

2.6.10 Completion:

2.6.10.1 Before Architect and Owner issue a Certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction.

2.6.10.2 Conduct a final inspection in the company of Architect, Owner, and Contractor and prepare a final list of items to be completed or corrected.

2.6.10.3 Observe that all items on the final list have been competed or corrected and make recommendations to Architect and Owner concerning acceptance.

2.6.11 Owner's Representative - Limitations of Authority:

2.6.11.1 Shall not authorize any deviation from the Contract Documents or substitution of materials or equipment, unless authorized by Architect and Owner.

2.6.11.2 Shall not exceed limitations of Architect and Owner's authority as set forth in the Agreement or the Contract Documents.

2.6.11.3 Shall not undertake or limit any of the responsibilities of Contractor, Subcontractors or Contractor's superintendent.

2.6.11.4 Shall not advise on, issue directions relative to or assume control over any aspect of the means, methods, techniques, sequences, or procedures of construction unless such advice or directions are specifically required by the Contract Documents.

2.6.11.5 Shall not advise on, issue directions regarding or assume control over safety precautions and programs in connection with the Work.

2.6.11.6 Shall not accept Shop Drawings or Sample Submittals from anyone other than Contractor.

2.6.11.7 Shall not authorize Owner to occupy the Project in whole or in part.

2.6.11.8 Shall not participate in specialized field or laboratory tests or inspections conducted by others except as specifically authorized by Architect and Owner.

ARTICLE 3 - CONTRACTOR

Paragraph 3.2 - Review of Contract Documents and Field Conditions by Contractor

Subparagraph 3.2.2

DELETE the second sentence in its entirety and, in lieu thereof, SUBSTITUTE the following new sentences:

[*Substitute:*] "Contractor shall not be liable to Owner or Architect for any costs, fees or damage resulting from errors, inconsistencies or omissions in the Contract Documents unless Contractor should have reasonably recognized such error, inconsistency or omission and failed to report it to Architect. Contractor warrants that Contractor has carefully studied and reviewed the Contract Documents and that Contractor has reported any errors, inconsistencies or omissions to Architect. Contractor hereby acknowledges and declares that the Contract Documents are full and complete, are sufficient to have enabled Contractor to determine the cost of the Work and to fulfill all of Contractor's obligations under the Contract Documents. If Contractor encounters an error, inconsistency or omission, Contractor shall immediately submit it to Architect for resolution. If Contractor performs any construction activity knowing or having reason to know that it involves an error, inconsistency or omission, Contractor shall be responsible for such performance and shall bear the costs for correction. Contractor shall be liable to Owner for all costs fees by attorneys or Owner's Representative, and fees or costs for Additional Services of Architect (as defined in the Prime Agreement between Owner and Architect) to the extent that such fees and costs are caused by or arise from any deficient Work or the negligent acts or omissions of Contractor. Notwithstanding any other dispute resolution procedure or right provided in this Agreement, Architect shall render a determination regarding whether such Additional Services were caused by or arose from the negligent acts or omissions of Contractor and such determination shall be final and binding on Contractor."

3.2.2 Contractor shall carry out their duty with and shall exercise reasonable diligence in the performance of the Work contained in the Contract Documents as it pertains to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, and Contractor shall promptly report to the Construction Manager and Architect any nonconformity discovered by or made known to Contractor as a request for information submitted to Construction Manager and Architect in such form as the Construction Manager and Architect may require.

Subparagraph 3.2.4

DELETE Subparagraph 3.2.4 in its entirety.

Paragraph 3.3 - Supervision and Construction Procedures

Subparagraph 3.3.2

ADD the following to the end of the last Subparagraph:

[*Add:*] "…or claiming by, through or under Contractor and for any damages, losses, costs and expenses resulting from such acts or omissions. If any failure by Contractor to comply with the Contract Documents or to maintain an approved project schedule causes any damage or costs to Owner, then Contractor shall indemnify and hold harmless Owner for any such damage or costs. Such damage or cost to Owner shall include any payment by Owner to others or liability of Owner to others resulting from such failure by Contractor, including but not limited to (1) any payment for liability arising from change orders, claims, arbitration, or litigation, or (2) any payment or liability for fees or costs to Owner's Representative, Architect, consultants, experts and attorneys.

ADD the following new Subparagraph:

3.3.4 In the event any of the Work is required to be inspected or approved by any governmental authority having jurisdiction, Contractor shall cause such inspection or approval to be scheduled and performed. No inspection performed or failed to be performed shall release Contractor from its obligations to have such work inspected nor shall it be construed as an approval or acceptance of the Work or any part thereof.

Paragraph 3.4 - Labor and Materials
Subparagraph 3.4.1

ADD the following new Sub-subparagraph to Subparagraph 3.4.1:

3.4.1.1 Refer to Division 1, Section "Temporary Facilities and Controls", for detailed requirements regarding temporary utilities, services and facilities.

Subparagraph 3.4.2

DELETE Subparagraph 3.4.2 in its entirety, and in lieu thereof, SUBSTITUTE the following new Subparagraph:

3.4.2 Refer to Division 1, Section "Substitutions", for additional requirements regarding substitutions.

Subparagraph 3.4.3

ADD the following new sentence to the end of the Subparagraph:

[*Add:*] "Owner encourages but does not require that laborers and mechanics employed on the Project be residents of the County in which the work is being performed. Contractor shall be licensed in accordance with all applicable requirements of Fluvanna County. Upon request of Owner, Contractor shall remove from the project any worker who is incompetent, careless or unsafe."

Paragraph 3.5 – Warranty
Subparagraph 3.5.1

DELETE "inherent in the quality of the work" from the second sentence.

DELETE the word "may" from the third sentence and replace it with "will".

ADD to the following to the end of the third sentence.

[*Add*] "unless Owner accepts in writing such nonconforming Work."

ADD the following new sentence to the end of the Subparagraph:

[*Add:*] "Contractor will protect both new work and existing conditions during the period of construction which may be susceptible to damage or abuse.

ADD the following new Subparagraphs:

3.5.3 Contractor's warranty period shall be 1 year from the date of Substantial Completion of the Work and/or phase of the Work, except for specific items of work or equipment for which the warranty period is specified as a longer period elsewhere in the Contract Documents. During the warranty period, Contractor shall promptly correct all defects which are due to defective materials or workmanship at no cost to Owner. Such correction shall extend to any other work damaged by such correction.

3.5.4 At the end of the 11 month period from from the commencement of the warranty period, Contractor shall schedule a walk-through inspection with Owner and Architect to identify any warranty items to be corrected under such warranty period.

3.5.5 Contractor shall be responsible for scheduling the eleven (11) month walk-through inspection contemplated in this warranty Section. The one (1) year Contractor's warranty period shall be extended for a period of thirty (30) days beyond the date the eleven (11) month walk-through inspection is actually performed. It is the intent of this Section to extend the warranty period by thirty (30) days beyond the date the eleven (11) month walk-through inspection is finally completed in order to give Owner the benefit of the walk-through inspection prior to the expiration of the warranty period. The thirty (30) day extension period shall not begin to run until final completion of the walk-through inspection. Thus, if the walk-through inspection takes more than one day to complete, the thirty (30) day extension begins to run from the date the walkthrough is actually completed. If Owner unreasonably refuses to schedule the eleven (11) month walk-through inspection, Contractor shall notify Owner in writing of a date on which Contractor shall be available to perform the walk-through inspection, which date shall not be less than ten (10) days after the date of Contractor's letter, and the thirty (30) day extension shall begin to run from the date of the proposed walk-through inspection. Under no circumstances shall Contractor's warranty expire in less than one (1) full year.

3.5.6 Even after the eleven (11) month walk-through inspection, Contractor shall remain responsible to correct, at no cost to Owner, any defective Work or material discovered thereafter that is not in compliance with the Contract Documents and for any damages arising from such defective Work or material.

Paragraph 3.6 - Taxes

ADD the following new Subparagraph 3.6.1

3.6.1 Refer to Division 0, Section “Supplementary Instructions to Bidders”, Article 10, regarding tax advantages for political subdivisions.

Paragraph 3.7 - Permits, Fees, Notices and Compliance with Laws
Subparagraph 3.7.1

DELETE Subparagraph 3.7.1 in its entirety and, in lieu thereof, SUBSTITUTE the following new Subparagraph:

3.7.1 Owner, through Architect, will submit drawings and specifications to the appropriate public authorities having jurisdiction, for approval. Owner will pay all fees for plan checking.

Subparagraph 3.7.3

DELETE “knowing it to be” from the first line of subparagraph 3.7.3

ADD the following new sentence to the end of Subparagraph 3.7.3:

[*Add:*] “Owner shall not be responsible for any inspection fees due to re-inspection of rejected work due to faulty or defective workmanship of Contractor, or scheduling error by Contractor. Contractor shall be responsible for all such re-inspection fees.”

Subparagraph 3.7.4

CHANGE “14 days” to “10 days” in line five, and after “both” in line nine, ADD “if appropriate under Articles 7 and 8 hereof”.

Paragraph 3.8 - Allowances

DELETE Paragraph 3.8 in its entirety. No cash allowances are permitted.

Paragraph 3.9 – Superintendent
Subparagraph 3.9.2

DELETE subparagraph 3.9.2 in its entirety and, in lieu thereof, SUBSTITUTE the following new Subparagraph:

3.9.2 Contractor shall provide Architect and Owner a resume of its superintendent within 10 days after signing the Contract. If at any time during the course of the Project, Owner objects to any superintendent or assistant, Contractor shall submit a substitute to whom Owner has no objection. No increase in the Contract Sum or Contract Time shall be allowed for any such substitution.

DELETE subparagraph 3.9.3 in its entirety and, in lieu thereof, SUBSTITUTE the following new Subparagraph:

3.9.3 If during the course of the Project, Contractor proposes to replace its superintendent, written notice shall be given to Owner and Architect. Written notice shall include a

resume of the new superintendent. Upon objection by Owner, Contractor shall not assign the proposed new superintendent, and no increase in the Contract Sum or Contract Time shall be allowed.

Paragraph 3.10 - Contractor's Construction and Submittal Schedules

ADD new Sub-subparagraph 3.10.1.1 as follows:

3.10.1.1 Refer to Division 1, Section "Construction Progress Documentation", for further requirements regarding construction schedules.

Paragraph 3.11 - Documents and Samples at the Site

DELETE the last sentence of Paragraph 3.11 and, in lieu thereof, SUBSTITUTE the following new sentence:

[*Substitute:*] "These shall be in electronic form or paper copy, available to Architect and Owner, and shall be delivered to Owner, in good condition, upon completion of the Work, and before final payment is made."

Paragraph 3.12 - Shop Drawings, Product Data and Samples

ADD the following new Sub-sub paragraphs:

3.12.4.1 Issuance of the Design Professional's Instruments of Service via electronic media in either .dwf or .dwg file format, hereinafter referred to as "Media" will be provided at the request of Contractor. This Media is provided without detail and dimensions and is for illustrative purposes only and does not amend, supplement or replace any drawing, Contract Document, Specification and/or in any way, the Contract requirements of such. The purpose of this Media is solely for coordination by Contractor and shall not be relied upon for any other purpose. Contractor fully releases the Design Professional, its agents, officers, and employees, and consultants, from any and all liability, including without limitation, damages, consequential damages, costs and attorney's fees that Contractor may incur as a result of its reliance on the information contained in the Media.

3.12.4.2 In accepting and utilizing Media provided by the Design Professional, Contractor covenants and agrees that all such Media are instruments of service between the Design Professional and the client of the Design Professional, who shall be deemed the author of the Media, and the Design Professional shall retain all common law, statutory law and other rights, including copyrights, whether or not such copyright is registered. Contractor acknowledges that the information and designs contained on the Media are provided to Contractor as a convenience and at the request of Contractor. Contractor also acknowledges that there may be undiscovered errors or inconsistencies in the Media that may result from any number of issues, including migrating the data from printed material to the Media or from others adding information to, or changing information in, the Media once transmitted to Contractor. Contractor agrees not to hold the Design Professional responsible for any

defects Contractor may discover with the Media or information contained in the Media.

3.12.4.3 Contractor agrees not to use the Media, in whole or in part, for any purpose or project other than the Project of this Contract. Contractor agrees to waive all claims against the Design Professional resulting in any way from use of the Media.

3.12.4.4 Contractor agrees, to the fullest extent permitted by law, to defend, release, indemnify and hold the Design Professional harmless from and against any and all claims, damage, loss, liability or cost, including reasonable attorney's fees and costs of defense, arising out of or resulting from any changes made by anyone other than the Design Professional, or from any reuse of the Media, and data contained on the Media without the prior written consent of the Design Professional.

3.12.4.5 Contractor recognizes that information contained on the Media may not be 100% compatible with Contractor's computer system; therefore, Contractor agrees that the Design Professional shall not be liable for the completeness or accuracy of any materials provided on the Media arising out of, due to, or resulting from the difference in computer and software systems, or translations or mistranslation of electronic data, the incompatibility of viewing or operating programs, or the corruption of documents or data as a result of compatibility issues.

3.12.4.6 Contractor recognizes that information stored on electronic media including, but not limited to, computer disks may be subject to undetectable alteration and/or uncontrollable deterioration, due to, among other causes, errors in transmission, conversion, media degradation, software error or human error or alteration. Accordingly, the Media is provided for informational purposes only and is not intended as an end-product. Contractor therefore agrees that the Design Professional shall not be liable for the completeness or accuracy of any materials provided on the Media for this or any other reason whatsoever.

3.12.4.7 Under no circumstances shall the transfer of instruments of service in electronic media, for use by Contractor, be deemed a sale by the Design Professional, and the Design Professional makes no warranties, either expressed or implied, of merchantability and fitness for any particular purpose of the electronic media, or the information stored or contained thereon. Contractor acknowledges that the Media is provided as a convenience by the Design Professional at Contractor's request, and Contractor assumes all risk in the use of the Media, and the data contained therein for any purpose. Contractor further acknowledges that the Design Professional was not engaged to provide usable electronic data, or a usable system, compilation, Model or program to Contractor or any other party. Contractor agrees that the Design Professional shall not be liable in any manner whatsoever for any subsequent usage of the data provided on electronic media.

3.12.4.8 Contractor agrees that in the event of a conflict between non-electronic data and data provided on the Media, including but not limited to the Model, the data contained on non-electronic documents presides over data on the Media. While the Design Professional has made a reasonable effort in accordance with the generally accepted standards of professional skill and care so that the data contained on the Media is accurate, the Design Professional makes no representation or warranty concerning the accuracy of the data contained on the Media, or any viruses contained in the materials as delivered or any other defect or error or alleged defect or error in the materials as delivered.

3.12.4.9 Contractor, by submitting a Bid and requesting electronic media from the Design Professional, accepts all terms of use of the Media as stated herein. Media will be provided to Contractor, upon Contractor's request, and upon remittance of payment to the following schedule:

- 1 to 10 Sheets as they appear in the Contract Documents - $100
- 11 to 20 Sheets as they appear in the Contract Documents - $200
- 21 to 30 Sheets as they appear in the Contract Documents - $300
- 31 to 40 Sheets as they appear in the Contract Documents - $400

The above costs apply to Architectural sheets only. The cost for electronic files for the engineering disciplines may vary. The Engineer of Record, as the author of the engineering drawings, shall be contacted directly for cost information, and the procedures for requesting their electronic media.

ADD new Subparagraph 3.12.11 as follows:

3.12.11 Refer to Division 1, Section "Submittals", for further requirements regarding shop drawings, product data and samples.

Paragraph 3.13 Use of Site
Subparagraph 3.13.1

ADD new Subparagraph 3.13.1 as follows:

3.13.1 Control or Reference Points: Immediately upon occupancy of the project site for the purpose of commencement of the Work, Contractor shall locate, including but not limited to, all general control or reference points, benchmarks, etc., and take such action as may be necessary to prevent damage or destruction of such points. In the event Contractor fails to do so, Contractor shall be liable for all such costs necessary to re-establish such control or reference points.

Paragraph 3.14 - Cutting and Patching

DELETE Paragraph 3.14, including all subparagraphs, in its entirety, and in lieu thereof, SUBSTITUTE it with the following new Paragraph:

3.14 Refer to Division 1, Section "Cutting and Patching", for requirements regarding cutting and patching.

Paragraph 3.15 Cleaning Up
Subparagraph 3.15.1

ADD new Subparagraph 3.15.3 as follows:

3.15.3 Refer to Division 1, Section "Contract Closeout", for further requirements regarding cleaning up.

Paragraph 3.18 Indemnification
Subparagraph 3.18.1

ADD “of any kind” after the word “expenses” in the first sentence.

DELETE “provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself)” from the first sentence.

ADD “wrongful or” before the word “negligent” from the first sentence.

ADD the following new Paragraphs as follows:

3.19 Contractor shall indemnify Owner for any additional fee, cost or expense (beyond a base fee) charged to Owner by Architect or other project consultant pursuant to its own agreement with Owner to the extent such additional fee, cost or expense is caused by Contractor’s acts or omissions.

3.20 Owner may deduct amounts owed by Contractor pursuant to Paragraph 3.18 or 3.19 from payments otherwise due to Contractor, and upon request of Owner shall provide Contractor a copy of the written agreement requiring such additional payment.

ARTICLE 4 - ARCHITECT
Paragraph 4.1 - General
Subparagraph 4.1.2

DELETE the word “Contractor” from the second line.

Paragraph 4.2 – Administration of the Contract

Subparagraph 4.2.4

DELETE the first and second sentences in their entirety and, in lieu thereof, SUBSTITUTE the following:

[*Substitute:*] “Owner and Contractor shall endeavor to communicate with each other through Architect about matters arising out of or relating to the Contract.”

Subparagraph 4.2.5

ADD to the end of the subparagraph, the following:

[*Add:*] “, with Certificates for Payment being subject to Owner approval.”

Subparagraph 4.2.6

ADD the following to the end of the first sentence.

[Add:] “and shall do so unless Owner accepts such nonconforming work”

Subparagraph 4.2.9

ADD after “Certificates of Substantial Completion” AND after “a final Certificate for Payment”, both in the first sentence, the following:

[*Add:*] “subject to Owner approval,”

ARTICLE 5 – SUBCONTRACTORS

Paragraph 5.2 - Award of Subcontracts and Other Contracts for Portions of the Work

Subparagraph 5.2.1

DELETE the first sentence of Subparagraph 5.2.1 and, in lieu thereof, SUBSTITUTE the following new sentence:

[*Substitute:*] “Within fourteen (14) days after the award of the Contract, Contractor shall notify Owner and Architect, in writing, the names of the persons or entities, including those who are to furnish materials or equipment fabricated to a special design, proposed for each of the principal portions of the Work.

Subparagraph 5.2.3

DELETE the second and third sentences in their entirety and, in lieu thereof, SUBSTITUTE the following:

[Substitute:] “In the event of any such objection, Contractor shall not contract with the proposed person or entity, and there shall be no increase in the Contract Sum or Contract Time.”

Paragraph 5.3 – Subcontractual Relations

ADD the following to the end of Paragraph 5.3

[*Add:*] Under no circumstances shall it be deemed that privity of contract relationship is established or exists at any point between Owner and any subcontractors of Contractor.

ADD new Paragraph 5.5 as follows:

Paragraph 5.5 - Payment to Subcontractors

5.5.1 Contractor shall pay each subcontractor, upon receipt of payment from Owner, an amount equal to the percentage of completion allowed to Contractor on account of such subcontractor’s Work, less the percentage retained from payments to Contractor; PROVIDED, however, that Contractor shall make no payment to any subcontractor unless the subcontractor shall execute a waiver of liens in favor of Owner and Contractor reflecting the amount of each such payment. Contractor shall also require each

subcontractor to make similar payments to sub-subcontractors. All such payments shall be paid within the time limits.

5.5.2 If Owner fails to approve an Application for Payment for a cause which Owner and Architect determine is the fault of Contractor and not the fault of a particular subcontractor, or if Contractor fails to make payment which is properly due to a particular subcontractor, Owner may pay such subcontractor directly, less the amount to be retained under its Subcontract. Any amount so paid by Owner shall be repaid to Owner by Contractor. Owner shall have no obligation to pay or to see to the payment of any monies to any subcontractor. Nothing contained in Paragraph 5.5 shall be deemed to create any contractual relationship between Owner and any subcontractor or to create any rights in any subcontractor against Owner. Contractor shall promptly advise Owner of any claim or demand by a subcontractor claiming that any amount is due to such subcontractor or claiming any default by Contractor in any of its obligations to such subcontractor.

ARTICLE 6 – CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

Paragraph 6.1 – Owners Right to Perform Construction and to Award Separate Contracts

DELETE Subparagraph 6.1.3 in its entirety and, in lieu thereof, SUBSTITUTE the following new Subparagraph:

6.1.3 It is the sole duty and responsibility of Contractor to plan, direct, perform and coordinate their Work as to cause no delay, hindrance, loss, injury, or similar damage to their subcontractors or suppliers. In the event Contractor causes any delay, hindrance, loss, injury, or similar damage to their subcontractors or suppliers, the aggrieved subcontractors or suppliers may pursue recovery of money damages against Contractor pursuant to Article 15. There shall be no claim asserted against Owner or Architect, or their respective directors, employees or agents for money damages based on the alleged acts or omissions with respect to coordinating, expediting or directing the Work. If Contractor prosecutes a claim against Owner or Architect for money damages or for an alleged failure to coordinate, expedite or direct the Work, then Contractor shall indemnify and hold harmless Owner and Architect against any and all costs, losses or expenses, including counsel fees, that Owner or Architect incur in responding to any such claim plus 10% interest per annum on all such costs from the date of occurrence of such costs up to the date of payment.

Paragraph 6.2 – Mutual Responsibility
Subparagraph 6.2.3

DELETE the second sentence of Subparagraph 6.2.3 in its entirety and, in lieu thereof, SUBSTITUTE the following new sentence:

[*Substitute:*] "Costs caused by delays, or by improperly timed activities or defective construction shall be borne by the responsible party therefore. Contractor shall indemnify Owner for any costs, damages or payments Owner incurs (including any payments to other contractors, Architect, legal

counsel, agents or consultants) arising from or relating to Work by Contractor that is not in compliance with the Contract Documents. Owner may withhold payments otherwise due to Contractor in the event of such indemnification duty

ADD the following new sentence to the end of Subparagraph 6.2.4:

ARTICLE 7 - CHANGES IN THE WORK

Paragraph 7.1 - General

Subparagraph 7.1.2

REVISE the first part of the first sentence of Subparagraph 7.1.2 to read as follows:

[*Revise:*] "A Change Order shall be based upon agreement among Owner and Contractor; a Construction Change Directive ……."

Subparagraph 7.1.3

DELETE Subparagraph 7.1.3 in its entirety and, in lieu thereof, SUBSTITUTE the following new Subparagraph:

7.1.3 Before any Change Order is prepared, Contractor shall submit to Architect an itemized breakdown of the cost of the proposed Change in the Work. The term "cost" shall be interpreted to mean and include the actual cost of the following:

1. Labor, including foremen.
2. Materials at cost plus applicable taxes entering permanently into the Work.
3. Rental cost of construction plant and equipment, whether rented from Contractor or others.
4. Power and consumable supplies for the operation of power equipment.
5. Liability insurance and bonds.
6. Social security, old age and unemployment contributions.

When determining the labor costs of Work by Change Order, Contractor shall use the actual wage paid to the personnel performing the Work, and if requested by Owner or Architect, at any time during or after the project, Contractor shall provide certified payroll records necessary to evidence those labor costs. Using the actual wage paid to the personnel performing the Work, Contractor shall be entitled to fifteen percent (15%) of the total cost of the above for overhead, profit, supervision and miscellaneous expenses if they perform the Work with their own forces, or to the Subcontractor who performs the Work. In the case where the Work is performed by a subcontractor, Contractor may add five percent (5%) to the Subcontractor's total amount as Contractor's commission. Where Change Orders include both increases and decreases in the Contract Amount, the above fifteen percent (15%) will be allowed on the net increase only.

Paragraph 7.2 - Change Orders

Subparagraph 7.2.1

DELETE Subparagraph 7.2.1 in its entirety and, in lieu thereof, SUBSTITUTE the following new Subparagraph:

7.2.1 A Change Order is a written instrument prepared by Architect and signed by Owner, Contractor and Architect. A Change Order is the only method by which the Contract Sum and/or the Contract Time may be adjusted. A Change Order shall provide for the following: (1) a change in the Work, if any; (2) the amount of the adjustment in the Contract Sum, if any; and (3) the extent of the adjustment in the Contract Time, if any.

ADD the following new Subparagraphs:

7.2.2 Contractor is responsible for submitting accurate cost and pricing data to support its proposals for change orders and other Contract price adjustments under the Contract Documents. Contractor shall certify in writing that to the best of its knowledge and belief, the cost and pricing data submitted is accurate, complete, current and in accordance with the terms of the Contract Documents with respect to pricing of change orders. Contractor shall also certify in writing that he has made reasonable good faith inquiries to appropriate individuals within its organization to confirm that the data submitted is accurate, complete and current. The above-described certification shall be required for all change order requests with a positive or negative value greater than $1,000.00. If it is later determined by audit or by other means that the cost and pricing data submitted is inaccurate, incomplete, not current or not in compliance with the terms of the Contract Documents regarding the pricing of change orders, then an appropriate contract price reduction shall be made.

7.2.3 Contractor shall perform the work of Change Orders only with personnel appropriate for the tasks performed. Should Contractor use overqualified personnel, Contractor shall only be entitled to payment for the work at the wage rate of the appropriate personnel, plus the applicable multipliers noted in 7.1.3.

7.2.4 Any Contractor creating the need for Additional Services by Architect, with respect to a Change Order, shall pay all costs associated with such Additional Services, and Architect shall prepare and present to Owner for approval, a Change Order or Construction Change Directive regarding such costs.

Paragraph 7.3 – Construction Change Directives
Subparagraph 7.3.2

ADD new Sub-subparagraph 7.3.2.1 as follows:

7.3.2.1 Any Contractor creating the need for Additional Services by Architect, with respect to a Construction Change Directive, shall pay all costs associated with such Additional Services, and Architect shall prepare and present to Owner for approval, a Change Order or Construction Change Directive regarding such costs.

ARTICLE 8 - TIME
Paragraph 8.1 – Definitions
Subparagraph 8.1.3

INSERT after “Architect”, the following:

[*Insert:*] "and approved by Owner"

Paragraph 8.2 – Progress and Completion
Subparagraph 8.2.2

DELETE the word "knowingly" from the first line.

Paragraph 8.3 – Delays and Extensions of Time
Subparagraph 8.3.1

DELETE (3) in its entirety and, in lieu thereof, SUBSTITUTE the following:

[*Substitute:*] "(3) by fire or adverse weather conditions documented in accordance with Section 15.1.6."

DELETE (4) in its entirety and, in lieu thereof, SUBSTITUTE the following:

[*Substitute:*] "(4) by delay authorized by Owner pending a proceeding pursuant to Article 15; or"

ADD the following new sentences to the end of Subparagraph 8.3.1:

[*Add:*] "All claims for extension of time shall be made, in writing, to Architect and Owner no more than seven (7) calendar days after the occurrence of the event causing the delay. If Contractor has caused Project delay, it shall be liable for, among other things, reimbursing Owner for any additional fees to Architect resulting from such delay.

Subparagraph 8.3.3

DELETE Subparagraph 8.3.3 in its entirety and, in lieu thereof, SUBSTITUTE the following:

8.3.3 Contractor recognizes that delays, acceleration or hindrances to the Work may occur. No claim or litigation for increased costs, charges, expenses or damages of any kind shall be filed by Contractor against Owner, Architect or Owner's Representative (or against any of their respective employees or agents) for any delays, acceleration, hindrances, or sequencing of work due to any cause whatsoever, notwithstanding whether such delays are caused by factors within or outside Contractor's control. Contractor's sole remedy for delays, acceleration, hindrances or sequencing of work shall be an extension of the Contract Time pursuant to this Paragraph 8.3. Should Contractor file any claim or litigation for money damages against Owner, Architect or Owner's Representative (including their employees or agents) in violation of this provision, such contractor shall provide indemnification for any costs incurred in the defense against such claim or litigation, including all fees by attorneys and experts, plus 10% interest per annum on all such costs from the date of occurrence of such costs up to the date of payment.

ADD new Paragraph 8.4 as follows:

Paragraph 8.4 – Liquidated Damages for Delays

8.4.1 **The amount of Liquidated Damages shall be $500 per day.**

8.4.2 The damages incurred by Owner due to Contractor's failure to complete the Work, (or any phase thereof, designated in the Project Schedule) by the Contract Time or the Specific Dates, including any extensions thereof under the Contract Documents, shall be in the amount set forth in the Contract Documents for each consecutive calendar day beyond each deadline for which Contractor shall fail to complete the Work or designated phase thereof.

8.4.3 Contractor agrees that the daily amount of liquidated damages provided in the Contract Documents shall not be considered a penalty, and further agrees not to challenge the lawfulness of such daily amount. The daily amount shall compensate Owner for Owner's inability to use or otherwise have available, Project or any phase thereof for its intended purpose by the Dates set forth in the Contract Documents. The assessment of liquidated damages shall not preclude Owner from additional recovery to which it is entitled under the Contract Documents or by law.

8.4.4 If, during the course of Contractor's performance of the Work, Contractor shall fail to complete the Work, or portions thereof, in accordance with Specific Dates or the Contract Time, Owner may retain the estimated amount of liquidated damages for which Contractor shall be liable to Owner under the Contract Documents, from amounts which become payable or are otherwise certified as payable to Contractor under the Contract Documents.

8.4.5 In the event that the Work must be conducted beyond the normal working hours specified or if the Project is not completed within the specified duration, Contractors shall indemnify Owner for any costs, damages or payments incurred by Owner, including payments to Architect, Clerk-of-the Works, or legal counsel.

8.4.6 If Contractor files any claim or litigation challenging an assessment of liquidated damages, or the daily or total amount of liquidated damages assessed, and does not prevail completely in such challenge, Contractor shall be liable to Owner for all costs incurred by Owner in defending against the challenge, including all fees of attorneys, architects and other consultants, and all time incurred by Owner's staff and administrators based on the burdened hourly compensation rates of Owner's employees.

ARTICLE 9 - PAYMENTS AND COMPLETION
Paragraph 9.1 Contract Sum
Subparagraph 9.1.2

ADD the following new Sub-subparagraphs:

9.1.2.1 Owner reserves the right to accept or reject any and all Unit Prices stipulated on the Bid Form.

9.1.2.2 If quantities originally contemplated are materially changed so that application of a unit price will cause a substantial inequity to Owner or Contractor, Owner reserves

the right to equitably adjust the Unit Price or to require that the work be performed on a time and material basis.

Paragraph 9.2 – Schedule of Values

ADD new Subparagraph 9.2.1 as follows:

9.2.1 Refer to Division 1 Section, "Applications for Payment" for requirements regarding the schedule of values.

ADD new Subparagraph 9.2.2 as follows:

9.2.2 The Schedule of Values shall be prepared in such a manner that each major item of Work and each subcontracted item of Work is shown as a line item on AIA Document G703, Application and Certificate for Payment Continuation Sheet. Each major item of Work shall be further broken down into separate line items for work done in each area of the building, site and each phase of construction. Each work item shall be broken down into separate line items for material and labor. Each line item shall include quantities and unit prices in such detail as required by Architect.

Paragraph 9.3 - Applications for Payment
Subparagraph 9.3.1

DELETE Subparagraph 9.3.1 in its entirety and, in lieu thereof, SUBSTITUTE the following new Subparagraph:

9.3.1 At least fifteen (15) days before the date established for each progress payment, Contractor shall submit to Architect an itemized Application for Payment for Work completed in accordance with the Contract Documents. Such application shall be notarized and supported by such data substantiating Contractor's right to payment as Owner or Architect may require, such as copies of requisitions, and releases and waiver of liens from subcontractors and suppliers and reflecting retainage.

Notwithstanding the language in §9.10.5 or any other section hereof, before Owner shall have any obligation to release any payments for Work completed to Contractor, Contractor shall deliver an executed and notarized "Partial Waiver and Release of Mechanics Lien Claims" in the form provided. The partial waiver of liens shall waive Contractor's right to file a lien against the Property or Owner for an amount equal to the payment received by Contractor at that time.

Contractor shall obtain and post a bond guaranteeing payment for labor and materials provided by subcontractors in an amount, form and a surety acceptable to Owner.

Contractor acknowledges that Owner may file with the Office of the Prothonotary of Fluvanna County, the relevant provisions of the Contract containing the total amount of the Contract price and Contractor acknowledges that it is aware of the total Contract price.

Contractor hereby agrees that it will defend, indemnify and hold harmless Owner from and against any mechanics' lien or claim filed by any subcontractor by reason of Contractor's failure to pay the Subcontractor any amount owed to such Subcontractor. Contractor shall prevent the filing of any mechanics' lien, or should a lien be filed, Contractor shall undertake any and all action necessary to remove said lien. Any failure of Contractor in any of its obligations in this §9.3.1 shall constitute a material breach of this Contract. Furthermore, Contractor shall be obligated to pay Owner all of Owner's costs incurred in defending or removing any such mechanics' lien whether filed by Contractor or any subcontractor. This shall include payment of all of Owner's attorney's fees, whether incurred in removing or challenging any mechanics' lien claim filed by Contractor or any subcontractor, or in enforcing Contractor's obligations hereunder.

Owner shall retain five percent (5%) of all amounts due Contractor until the Work is fifty percent (50%) completed. When the Work is fifty percent (50%) completed, at the sole discretion of Owner, one-half of the amount retained by Owner may be returned to Contractor, provided Contractor provides written consent of surety to such reduction in retainage to Owner along with its Application for Payment, provided Architect approved the application and reduction of retainage, and further provided that Contractor is making satisfactory progress and there is no specific cause for greater withholding.

The retained percentage will be paid on with the final Payment or as otherwise provided hereafter. In the event a dispute arises between Owner and Contractor, which dispute is based upon increased costs claimed by Contractor occasioned by damages or other actions of another contractor, additional retainage, in the sum of one and one half times the amount of any possible liability, may be withheld until such time as a final resolution is agreed to by all parties directly or indirectly involved, unless Contractor causing the additional claim furnishes an additional bond satisfactory to Owner to indemnify Owner against the claim.

The full Contract retainage may be reinstated if the manner of completion of the Work and its progress do not remain satisfactory to Owner or Architect or if Surety withholds its consent or for other good and sufficient reasons.

ADD new Sub-subparagraph 9.3.1.3 as follows:

9.3.1.3 Refer to Division 1 Section "Applications for Payment" for additional requirements regarding applications for payment.

Paragraph 9.4 - Certificates for Payment
Subparagraph 9.4.2

DELETE the words "the quality of" from the third line.

CHANGE the words "an evaluation" to "future evaluations" in the fifth line.

DELETE the words "upon Substantial Completion" from the sixth line.

Paragraph 9.5 - Decisions to Withhold Certification
Subparagraph 9.5.1

DELETE the first sentence of Subparagraph 9.5.1 and, in lieu thereof, SUBSTITUTE it with the following:

[*Substitute:*] "Architect shall not certify payment and shall withhold a Certificate for Payment in whole or in part to the extent necessary to protect Owner."

REVISE the following Sub-subparagraphs as follows:

9.5.1.2 DELETE the word "reasonable".
9.5.1.4 DELETE the word "reasonable".
9.5.1.6 DELETE the word "reasonable".
9.5.1.7 DELETE the word "repeated".

ADD the following new Sub-subparagraphs:

9.5.1.8 Unsatisfactory prosecution of the Work in accordance with the Contract Documents.
9.5.1.9 Failure to comply with any statute, ordinance regulation or other legal requirement.
9.5.1.10 Failure to submit progress schedule updates as required by the Contract Documents.
9.5.1.11 Failure to submit wage certification as required by the Contract Documents.
9.5.1.12 Failure to submit a Schedule of Values that is acceptable to Architect.

Paragraph 9.6 – Progress Payments
Subparagraph 9.6.1

ADD "and Owner has approved" AFTER "the Architect has issued," AND DELETE "and shall so notify Architect."

Subparagraph 9.6.7

DELETE Subparagraph 9.6.7 in its entirety.

Paragraph 9.7 – Failure of Payment

DELETE Subparagraph 9.7 and, in lieu thereof, SUBSTITUTE the following new Subparagraph:

9.7 If Owner does not pay Contractor within thirty (30) days after the date established in the Contract Documents, the amount certified by Architect and approved by Owner or awarded by dispute resolution, then Contractor may, upon seven additional days' written notice to Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract time shall be extended appropriately .

Paragraph 9.8 – Substantial Completion
Subparagraph 9.8.1
DELETE Subparagraph 9.8.1 in its entirety and, in lieu thereof, SUBSTITUTE it with the following:

9.8.1 Substantial Completion of Project shall be deemed to occur when Architect determines and Owner approves that the Work, or designated phase thereof, is sufficiently complete in accordance with the Contract Documents so Owner can occupy or utilize the Work for

its intended use, and in addition, all requirements of the Contract Documents for Substantial Completion have been fulfilled.

Subparagraph 9.8.2

DELETE the words "prior to final payment." from Subparagraph 9.8.2 and, in lieu thereof, SUBSTITUTE them with the following:

[*Substitute:*] "within 30 days of the date of Substantial Completion."

ADD new Sub-subparagraph 9.8.2.1 as follows:

9.8.2.1 Definition: Contractor's comprehensive list of items to be completed or corrected shall be referred to as the "Punch List." The Punch List shall be prepared by Contractor on the form provided in Division 1 Section "Contract Closeout", or in an electronic format acceptable to Architect, (i.e., Bluebeam, PlanGrid, etc,)

Subparagraph 9.8.4

ADD after "that shall" in the first sentence "upon approval by Owner" AND ADD at the end of the subparagraph "or in the Contract Documents."

Subparagraph 9.8.5

ADD new Sub-subparagraph 9.8.5.1 as follows:

9.8.5.1 Owner's retainage upon Substantial Completion shall be the greater of (a) 5% of the Contract Sum adjusted by Change Orders, or (b) the amount necessary to protect Owner's interests, a minimum of 150% of Architect's estimated cost to complete or correct Work at the time of Substantial Completion.

Paragraph 9.10 - Final Completion and Final Payment
Subparagraph 9.10.2

ADD after the words "shall become due until" in the first sentence, "Owner approves such payment and"

ADD new Subsections (7) and (8) to the end of the first sentence:

[*Add:*] "(7) Final as-built prints of record drawings marked by Contractor with record information as set forth in the Contract Documents, and (8) A final sworn statement from Contractor duly executed and acknowledged showing all subcontractors to be fully paid and similar final sworn statements from subcontractors and, where appropriate, from sub-subcontractors.

Subparagraph 9.10.3

DELETE Subparagraph 9.10.3 in its entirety.

Subparagraph 9.10.4

DELETE Subparagraph 9.10.4 in its entirety and, in lieu thereof, SUBSTITUTE the following:

[*Substitute:*] "The making of final payment by Owner shall not constitute a waiver or release of any claim by Owner."

Subparagraph 9.10.4

ADD the following new Sub-subparagraphs:

9.10.4.5 Latent failures of Contractor to comply with the requirements of the Contract Documents.

9.10.4.6 Architect's fees resulting from re-inspections due to Contractor's failure to satisfactorily, fully and finally complete the Work or legal and accounting costs and expenses arising therefrom.

9.10.4.7 Architectural fees for services (60) days after the date of Substantial Completion shall be borne by the responsible contractor.

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

Paragraph 10.2 - Safety of Persons and Property

Subparagraph 10.2.1

ADD the word "all" after the word "take" in the first line.

Subparagraph 10.2.5

DELETE "(other than damage or loss insured under property insurance required by the Contract Documents)"

ADD new Subparagraph 10.2.9 as follows:

10.2.9 Contractor shall promptly report in writing to Owner and Architect all accidents, other than minor accidents for which no medical treatment is required, arising out of, or in connection with the Work which cause death, personal injury or property damage, giving full details and statements of any witnesses whether or not Owner has actual knowledge of the accident. In addition, if death or serious personal injuries or serious damage are caused, the accident shall be reported immediately by telephone or messenger to Owner and Architect.

ARTICLE 11 - INSURANCE AND BONDS

DELETE All Paragraphs for Article 11 in their entirety, and in lieu thereof, ADD the following:

11.1 Contractor's Liability Insurance

11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

11.1.1.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;

11.1.1.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

11.1.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

11.1.1.4 Claims for damages insured by usual personal injury liability coverage;

11.1.1.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

11.1.1.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

11.1.1.7 Claims for bodily injury or property damage arising out of completed operations; and

11.1.1.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

11.1.2 The insurance required by Fluvanna County shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents. Where Owner's and Contractor's/Subcontractor's policies each apply, Contractor's/Subcontractor's policies shall be considered primary.

11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by Fluvanna County shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been

given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Fluvanna County. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

11.2 Owner's Liability Insurance: The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

11.3 Property Insurance

11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner and Architect, the Contractor, Subcontractors and Sub-subcontractors in the Project.

11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change

Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

11.3.1.3 Contractor or contractors making the claim shall be responsible for paying all costs not covered because of any deductibles required by the insurer or insurers underwriting the builder's risk policy defined in Paragraph 11.3.1. The amount of the deductible for the builder's risk policy is $5,000, which shall be on a per occurrence basis.

11.3.1.4 Owner's builder's risk policy will cover a claim for stored materials, or materials in transit, up to a maximum value of $250,000. Within 60 days of award of the Contract, Contractor shall be responsible to advise Owner in writing if this amount is insufficient to protect Owner against this potential risk, so that Owner can revise their policy accordingly. If Contractor fails to notify Owner in writing, the amount stated above shall be deemed to be sufficient.

11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

11.3.1.6 Owner shall limit the deductible for the builder's risk policy defined in this Paragraph 11.3.1.

11.3.2 Boiler and Machinery Insurance:

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

11.3.3 Loss of Use Insurance

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused. The Owner's loss of use damages are limited to the amount paid under the Loss of Use policy.

11.3.3.1 The Contractor and all subcontractors shall be named as additional insureds on the Owner's Loss of Use policy.

11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner . The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

11.3.9 If required in writing by a party in interest, the Owner shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

11.3.10 The Owner shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

11.4 Performance Bond and Payment Bond

11.4.1 The Contractor shall provide bonds in accordance with the provisions of the Virginia Public Procurement Act and in so doing shall provide:

(a) A Performance Bond at one hundred percent (100%) of the Contact amount, conditioned upon the faithful performance of the Contractor in accordance with the plans, specifications and conditions of the Contract. Such bond shall be solely for the protection of the Owner or assignee as authorized in accordance with the provisions of Paragraph 13.2.1 herein.

(b) A Payment Bond at one hundred percent (100%) of the Contract amount. Such bond shall be solely for the protection of claimants supplying labor or materials to the Contractor or to any of their Subcontractors in the prosecution of the Work provided for in the Contract Documents and shall be conditioned for the prompt payment of all such material furnished or labor supplied or performed in the prosecution of the Work. "Labor or Materials" shall include public utility services and reasonable rentals of equipment, but only for periods when the equipment rented is actually used at the site.

(c) A Maintenance Bond providing additional coverage in the full amount of the Contract Sum insuring against defective or inferior materials or workmanship which may develop during the period of one (1) year from the date of Final Completion of the Project.

(d) Each of such bonds required by the Contract Documents shall be executed by one or more surety companies legally authorized to do business in the Commonwealth of Virginia and not otherwise objectionable to the Owner. The surety of whom the Contractor has purchased bonds shall have an "A-" or better rating, plus a financial

rating of VI or better with the A. M. Best's Company (Key Rating Guide – Latest Edition) and listed in the Department of Treasury Circular 570, with a capacity which meets or exceeds the contract amount. The bond shall be payable to the Owner or assignee as provided for in Paragraph 13.2.1

Both a Performance Bond and Payment Bond shall be required as specified under Article 7 of the Supplementary Instructions to Bidders.

11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK
Paragraph 12.2 - Correction of Work

Subparagraph 12.2.2 After Substantial Completion
Sub-subparagraph 12.2.2.1

DELETE the following from the first sentence and, in lieu thereof, SUBSTITUTE the following:

[*Delete:*] "if, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties"

[*Substitute:*] "if, within one (1) year after the date of Final Completion of the Work or within one (1) year from the date of Partial Occupancy or Use of designated phases thereof (whichever shall first occur) or after the date for commencement of warranties"

DELETE sub-subparagraph 12.2.2.3 in its entirety and, in lieu thereof, SUBSTITUTE the following new sub-subparagraph:

12.2.2.3 In the event any Work, material or equipment is replaced or repaired as a consequence of latent defects or failure to meet the terms of the Contract Documents, all warranties with respect to such Work, material or equipment replaced or repaired shall continue following repair or replacement of such Work, material or equipment for an additional period equivalent to the original period of warranty for such Work, material or equipment.

ARTICLE 13 - MISCELLANEOUS PROVISIONS
Paragraph 13.1 – Governing Law

DELETE the remainder of the sentence after the word "located".

REPLACE "the Federal Arbitration Act" with "unless the parties mutually agree otherwise, the rules of the American Arbitration Association"

Subparagraph 13.3.2

REPLACE “Owner, Architect or Contractor” with “Owner or Architect”

Paragraph 13.4 - Tests and Inspections
Subparagraph 13.4.1

DELETE Subparagraph 13.4.1 in its entirety and, in lieu thereof, SUBSTITUTE the following new subparagraph:

13.4.1 If the Contract Documents or any laws, statutes, ordinances, building codes, rules, regulations or orders of any governmental body or public or quasi-public authority having jurisdiction over the work or the site of the Project require any portion of the Work to be inspected, tested or approved, Contractor shall give Architect and Owner timely notice thereof so Architect and Owner may observe such inspection, test or approval.

Subparagraph 13.5 – Interest

DELETE Subparagraph 13.5 in its entirety.

ADD new Paragraph 13.6 as follows

Paragraph 13.6 Tax Credits

13.6 The Project, or part or all of the Project or Work, may qualify for tax benefits arising from or related to the energy efficiency, energy efficiency rating, or energy efficiency score assigned to the Project or Work by the relevant taxing authority. These tax benefits include, without limitation, Internal Revenue Code §179.D and other federal, state or local tax benefits, as established by those authorities having jurisdiction over such benefits (hereinafter the “Tax Benefits”). These Tax Benefits may take various forms, including without limitation, accelerated depreciation for commercial, multifamily, and publically owned facilities. The Tax Benefits may be assignable by Owner to third parties, as provided for by the statutes, rules and regulations governing such Tax Benefits. Notwithstanding any other language contained in any of the Contract Documents, no Contractor or subcontractor shall, under any circumstances, apply for, request, receive, accept or retain any Tax Benefit arising from or related to the Project, Work, or any part of the Project or Work.

Paragraph 13.7 – Time Limits on Claims
Subparagraph 13.7

DELETE the remainder of the first sentence after the word “Contract” in line two.

Paragraph 13.7 - Time Limits on Claims

DELETE Paragraph 13.7 in its entirety and, in lieu thereof, SUBSTITUTE the following new Paragraph:

13.7 As between Owner and Contractor, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued as provided by the laws of the Commonwealth of Virginia. Nothing herein shall be deemed to have

caused any applicable statute of limitations to commence to run or any alleged cause of action to have accrued in the event of any latent defect upon actual discovered until after the issuance of the final certificate for payment. Any applicable statute of limitations shall commence on any cause of action related to an alleged latent defect upon actual discovery of such latent defect. Owner reserves all rights and privileges applicable to it pursuant to the doctrine of *nullum tempus occurrit regi.*

ADD new Paragraph 13.8 as follows:

Paragraph 13.8 Tax Credits

13.8 The Project, or part or all of the Project or Work, may qualify for tax benefits arising from or related to the energy efficiency, energy efficiency rating, or energy efficiency score assigned to the Project or Work by the relevant taxing authority. These tax benefits include, without limitation, Internal Revenue Code §179.D and other federal, state or local tax benefits, as established by those authorities having jurisdiction over such benefits (hereinafter the "Tax Benefits"). These Tax Benefits may take various forms, including without limitation, accelerated depreciation for commercial, multifamily, and publically owned facilities. The Tax Benefits may be assignable by Owner to third parties, as provided for by the statutes, rules and regulations governing such Tax Benefits. Notwithstanding any other language contained in any of the Contract Documents, no Contractor or subcontractor shall, under any circumstances, apply for, request, receive, accept or retain any Tax Benefit arising from or related to the Project, Work, or any part of the Project or Work.

ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT

Paragraph 14.1 - Termination by the Contractor

DELETE Paragraph 14.1 in its entirety.

Paragraph 14.2 - Termination by the Owner for Cause
Subparagraph 14.2.1

DELETE Subparagraph 14.2.1 in its entirety and, in lieu thereof, SUBSTITUTE the following:

14.2.1 Owner may terminate the Contract if Contractor:

.1 shall institute proceedings or consent to proceedings requesting relief or arrangement under the Federal Bankruptcy Code or any similar or applicable federal or state law; or if a petition under any federal or state bankruptcy or insolvency law is filed against Contractor and such petition is not dismissed within sixty (60) days from the date of said filing; or if Contractor admits in writing, its inability to pay its debts generally as they become due, or if it makes a general assignment for the benefit of its creditors, or if a receiver, liquidator, trustee or assignee is appointed on account of its bankruptcy or insolvency; or if a receiver of all or any substantial portion of Contractor's properties is appointed.

.2 abandons the Work; or if it fails, except in cases for which an extension of time is provided, to prosecute promptly and diligently the Work or to supply enough properly skilled workers or proper materials for the Work;

.3 submits an Application for Payment, sworn statement, affidavit or document of any nature whatsoever which is intentionally falsified;

.4 fails to make prompt payment to subcontractors or for materials or labor or otherwise breaches their obligations under any subcontract with a subcontractor; or if a materialman's lien or notice of lien is filed against any party of the Work or the site of the Project and not promptly bonded or insured over by Contractor in a manner satisfactory to Owner;

.5 disregards any laws, statutes, ordinances, rules, regulations or orders of any governmental body or public or quasi-public authority having jurisdiction of the Work or the site of the Project;

.6 otherwise violates any provision of the Contract Documents; then Owner, upon the occurrence of the events described in clauses .1 through .5 above, without prejudice to any right or remedy available to Owner under the Contract Documents or at law or in equity may, after giving Contractor and its surety under the Performance Bond and under the Labor and Material Payment Bond, if any, seven (7) days written notice, terminate the employment of Contractor and, in accordance with the Uniform Commercial Code, may enforce a Security Agreement by taking possession of and using all or any part of Contractor's materials, equipment, supplies and other property of every kind used by Contractor in the performance of the Work in the completion of the Work. If requested by Owner, Contractor shall remove any part or all of its equipment, machinery and supplies from the site of the Project within seven (7) days from the date of such request, and in the event of Contractor's failure to do so, Owner shall have the right to remove or store such equipment, machinery and supplies at Contractor's expense. In case of such termination, Contractor shall not be entitled to receive any further payment for Work performed by the Contract through the date of termination. Owner's right to terminate Owner-Contractor Agreement pursuant to this Subparagraph 14.2.1 shall be in addition to and not in limitation of any rights or remedies existing hereunder or pursuant hereto or at law or in equity.

Subparagraph 14.2.4

DELETE Subparagraph 14.2.4 in its entirety and, in lieu thereof, SUBSTITUTE the following new Subparagraph 14.2.4:

14.2.4 If the unpaid balance of the Contract Sum exceeds all costs to Owner of completing the Work, then Contractor shall be paid for all Work performed by Contractor to the date of termination. If such costs to Owner of completing the Work exceed such unpaid balance, Contractor shall pay the difference to Owner upon Owner's demand. The costs to Owner of completing the Work shall include, but not be limited to, the cost of any additional architectural, legal, managerial and administrative services required thereby, any costs incurred in retaining another contractor or other subcontractors, any additional interest or fees which Owner must pay by reason of a delay in completion of the Work, attorneys' fees and expenses and any other damage, costs and expenses

Owner may incur by reason of completing the Work. The amount, if any, to be paid to Contractor shall be certified by Architect upon application, in the manner provided in Paragraph 9.4, and this obligation for payment shall survive the termination of the Contract.

Paragraph 14.3 - Suspension by Owner for Convenience
Subparagraph 14.3.1

ADD the following new sentence to the end of Subparagraph 14.3.1:

[*Add:*] Any suspension by Owner for convenience does not constitute grounds for termination by Contractor under Section 14.1.

Subparagraph 14.4.3

DELETE the remainder of the subparagraph after the words "for Work properly executed."

ADD new Paragraph 14.5 as follows:

Paragraph 14.5 Indemnification

14.5 Contractor and each subcontractor shall indemnify and hold harmless, Owner, its officers, directors, agents, and employees, Architect and its officers, directors, agents and employees, and each of them, as "indemnitee", from and against any and all fines, penalties, losses, costs, damages, injuries, expenses, claims, liens, encumbrances and/or liabilities (individually and collectively referred to herein as "liabilities") arising out of, or resulting from (a) any claim for any service or goods allegedly infringed, including without limitation any patent, copyright, trademark, service mark, trade secret or other legally-protected proprietary right; and (b) the Work as described in the Contract Documents, including, but not limited to, any claim of injury (including death) to persons or damage to property, and contamination of, or any adverse impact upon the environment, except to the extent that any such claim is finally found by the court or arbitration entity by which such claims are finally resolved, to have arisen from the willful misconduct of the indemnitee. A finding of "willful misconduct" as against one indemnitee shall not nullify the indemnification provided to any other indemnitee who is not found to have performed any willful misconduct. As used herein, "willful misconduct" shall mean gross negligence or any intentional criminal act. Owner shall notify Contractor of any suit or legal proceeding asserting a claim for liabilities. Contractor and subcontractors shall, at no cost to any indemnitee, defend and/or settle such suit or legal proceeding, or judgment, including any appellate proceeding, asserting a claim for liabilities. Contractor and subcontractors shall pay any costs and legal fees incurred by any indemnitee in connection with any liabilities, whether or not litigation is actually commenced, and shall keep indemnities informed as to the progress of the defense. If requested by an indemnitee, Contractor and subcontractors shall afford indemnities the opportunity to participate in the defense or settlement of any claim. With regard to any claim of infringement as referred to herein, Contractor and Subcontractors shall procure the right to continue using the services or goods, or at the indemnities' option, replace or modify the services or goods to make them non-infringing services or goods.

ARTICLE 15 – CLAIMS AND DISPUTES

Paragraph 15.1 - Claims

Subparagraph 15.1.1 - Definition

ADD the following new sentence to the end of Subparagraph 15.1.1:

[*Add:*] All Claims as defined in §15.1.1, and any other claim or dispute between Contractor and Owner or Architect, including without limitation those claims set forth in §15.3, shall be governed by this Article 15.

Subparagraph 15.1.2 – Time Limits on Claims

DELETE the remainder of the first sentence after the word "Agreement" in the third line.

Subparagraph 15.1.2 - Time Limits on Claims

DELETE Subparagraph 15.1.2 in its entirety and, in lieu thereof, SUBSTITUTE the following new Paragraph:

15.1.2 As between Owner and Contractor, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued as provided by the laws of the Commonwealth of Virginia. Nothing herein shall be deemed to have caused any applicable statute of limitations to commence to run or any alleged cause of action to have accrued in the event of any latent defect upon actual discovered until after the issuance of the final certificate for payment. Any applicable statute of limitations shall commence on any cause of action related to an alleged latent defect upon actual discovery of such latent defect. Owner reserves all rights and privileges applicable to it pursuant to the doctrine of *nullum tempus occurrit regi.*

Subparagraph 15.1.3 – Notice of Claims

Sub-subparagraph 15.1.3.1

DELETE ", where the condition giving rise to the claim is first discovered prior to expiration of the period of correction of the Work set forth in Section 12.2.2," from the first sentence.

CHANGE "either party" to "Contractor" in the second sentence.

CHANGE "claimant" to "Contractor" in the last sentence.

Sub-subparagraph 15.1.3.2

DELETE Sub-subparagraph 15.1.3.2 in its entirety.

Subparagraph 15.1.5 – Claims for Additional Time

ADD the following new Sub-subparagraphs:

15.1.5.3 In planning the construction schedule within the agreed Contract Time, it shall be assumed that Contractor has anticipated the amount of adverse weather conditions normal to the site of the Work for the season or seasons of the year involved. Only those weather delays attributable to other than normal weather conditions will be considered.

15.1.5.4 The following Standard Baseline of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the baseline for monthly weather time evaluations. "Standard Baseline" is defined as the normal number of calendar days for each month during which construction activity exposed to weather conditions is expected to be prevented and suspended by cause of adverse weather. "Adverse Weather" is defined as the occurrence of one or more of the following conditions within a twenty-four (24) hour day that prevents construction activity exposed to the weather conditions or access to the site:

1. Precipitation (rain, snow, or ice) in excess of 1/10 inch liquid measure.
2. Temperatures that did not rise above that required for the day's construction activity, if such temperature requirement is specified or accepted as standard industry practice.
3. Sustained wind in excess of 25 mph.

15.1.5.5 Contractor's Construction Schedule must reflect the following anticipated adverse weather delays in all weather dependent activities.

Standard Baseline

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
14	7	7	8	8	7	4	5	4	4	5	7

15.1.5.6 Upon acknowledgement of the Notice to Proceed and continuing throughout the Contract, Contractor will record in a daily log the occurrence of adverse weather and resultant impact to normally scheduled Work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of Contractor's scheduled work day in order to constitute an adverse weather delay day. The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in a previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in sub-subparagraph 15.1.5.5 above, Architect will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a no-cost Change Order for additional days, to be executed by Owner, Architect and Contractor. This no-cost Change Order shall be the sole remedy for delays associated with weather.

Subparagraph 15.1.7 – Waiver of Claims for Consequential Damages

DELETE Subparagraph 15.1.7, including both sub-subparagraphs, in its entirety, and in lieu thereof, SUBSTITUTE the following subparagraph:

15.1.7 Contractor waives Claims against Owner for consequential damages arising out of or relating to this Contract, including but not limited to waiving any claims for damages incurred by Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit.

Subparagraph 15.1.8 – Owner as a Contracting Body

ADD new Subparagraph 15.1.8 as follows:

15.1.8 Contractor agrees and acknowledges that Owner is a “contracting body” under the Public Works Contractors’ Bond Law of 1967 (the “Bond Law”), and the Work on the Project is public construction and not subject to the filing of Mechanics Liens, and further agrees to provide and specify in its subcontracts with subcontractors for their acknowledgment that their sole remedy against Owner exists only under the provisions of the Bond Law and in accordance with the Payment Bond.

Paragraph 15.2 – Initial Decision

Subparagraph 15.2.1

Due to the new modified language for Article 11, in first sentence of subparagraph 15.2.1 REPLACE reference to Section 11.5 to Section 11.3.

Paragraph 15.2 – Initial Decision
Subparagraph 15.2.1

DELETE the last sentence of Subparagraph 15.2.1 in its entirety.

Subparagraph 15.2.2

After the word "compromise" in the third line, DELETE the remainder of the subparagraph and, in lieu thereof, SUBSTITUTE with the following: ", (5) request additional time to decide the Claim, or (6) advise the parties that the Initial Decision Maker is unable to resolve the Claim. If none of the foregoing actions are taken timely with regard to a Claim by Contractor, the Claim shall be deemed to be denied. If none of the foregoing actions are taken timely with regard to a Claim by Owner, the Claim shall be deemed to be granted."

Subparagraph 15.2.4

ADD the following to the end of the subparagraph: "Any failure by Contractor to timely provide requested information shall not delay a decision on the Claim."

Subparagraph 15.2.5

REPLACE "subject to mediation" with "subject to mediation upon agreement of all parties involved in the dispute"

ADD the following to the end of the subparagraph: "pursuant to this Article 15."

Subparagraph 15.2.6

DELETE Subparagraph 15.2.6, along with its sub-subparagraph 15.2.6.1, in its entirety.

Subparagraph 15.2.7

DELETE Subparagraph 15.2.7 in its entirety.

Subparagraph 15.2.8

ADD new Sub-subparagraph 15.2.8.1 as follows:

15.2.8.1 Contractor agrees and acknowledges that Owner is a “contracting body” under the Public Works Contractors’ Bond Law of 1967 (the “Bond Law”), and the Work on the Project is public construction and not subject to the filing of Mechanics Liens, and further agrees to provide and specify in its subcontracts with subcontractors for their acknowledgment that their sole remedy against Owner exists only under the provisions of the Bond Law and in accordance with the Payment Bond.

Paragraph 15.3 - MEDIATION
Subparagraph 15.3.1

DELETE Subparagraph 15.3.1 in its entirety, and in lieu thereof, SUBSTITUTE the following new Subparagraph:

15.3.1 "Any claim, dispute or other matter in question arising out of or related to the Contract Documents shall be subject to mediation only if all involved parties agree to pursue mediation."

Subparagraph 15.3.2

DELETE Subparagraph 15.3.2 in its entirety.

Subparagraph 15.3.4

ADD the following at the beginning of Subparagraph 15.3.4: "If all parties involved in a dispute agree to mediate,"

ADD the following new Subparagraph:

15.3.5 Owner shall have the right, at any time after any Claim is raised against Owner, to waive mediation or arbitration, and such election shall be binding on Contractor, and may be made by Owner at any time prior to the entry of a final award by the Arbitrator. In such event, a Claim arising under this Agreement shall be subject to a bench trial in the General District Court of Fluvanna County, and the parties waive the right to a jury in such proceeding. If any claim is brought by any Contractor as against Architect only, Architect shall have the right, at any time after any Claim is raised against Architect, to waive mediation or arbitration, and such election shall be binding on Contractor, and such election may be made by Architect at any time prior to the entry of a final award by the Arbitrator. In such event, any such Claim shall be subject to a bench trial in the General District Court of Fluvanna County, and the parties waive the right to a jury in such proceeding.

Paragraph 15.4 – Arbitration

DELETE Paragraph 15.4, including all subparagraphs and sub-subparagraphs of 15.4, except as noted below under 15.4.4.2 and 15.4.4.3.

Subparagraph 15.4.4 – Consolidation and Joinder

DELETE sub-subparagraphs 15.4.4.2 and 15.4.4.3 in their entirety, and in lieu thereof, SUBSTITUTE them with the following new sub-subparagraphs.

15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in binding dispute resolution, provided that the party sought to be joined consents in writing to such joinder.

15.4.4.3 Owner and Contractor grant to any person or entity made a party to binding dispute resolution conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as Owner and Contractor under this Agreement.

Paragraph 15.4 – Arbitration

DELETE Paragraph 15.4, including all subparagraphs and sub-subparagraphs of 15.4, in its entirety and, in lieu thereof, SUBSTITUTE the following:

15.4 Dispute Resolution

15.4.1 Controversies and Claims. Any controversy or claim arising out of or related to the Contract or the breach thereof, or the Work or the Project shall be resolved through binding arbitration at the option of Owner or otherwise through non-jury trial proceedings in the County of Fluvanna General District Court. Contractor, for itself and each Subcontractor, hereby (a) waives any right which may exist to a jury trial and (b) hereby agrees that all trials be heard by a judge sitting without a jury.

15.4.2 If Owner elects arbitration it must do so either before initiating litigation or within 30 days of service or original process of litigation upon Owner. Owner's demand for arbitration must be filed in writing with the American Arbitration Association and with any other party to be included in the arbitration. All parties necessary for resolution of the dispute in controversy shall be included in the arbitration. The Construction Industry Arbitration Rules of the American Arbitration Association then in effect shall apply to the arbitration, except for rules on discovery where the following sub-paragraph shall apply.

15.4.3 In any arbitration proceeding commenced pursuant to this Agreement, the parties shall be entitled to conduct pre-hearing discovery for a period of ninety (90) days, which discovery may include depositions, written requests for the inspection and reproduction of relevant documents or tangible things. Responses to written interrogations and document requests shall be served within thirty (30) days of service thereof. With respect to expert testimony and discovery related thereto. The arbitrator(s) shall have the authority to issue appropriate orders to enforce the parties' entitlement to discovery hereunder and, upon disobedience of any such order, may prohibit the disobedient party from introducing in evidence designated documents, thing or testimony.

15.4.4. Should any Contractor bring a claim against Owner or Architect, then, unless Contractor prevails on such Claim against Owner or Architect, Contractor shall be liable to Owner and Architect for all of Owner's and Architect's costs in having all such claims dismissed, or in defending all such claims, or both. These costs shall include all of Owner's or Architect's costs, including without limitation personnel costs, attorney fees, expert fees, fees of Architect and Owner's Representative, travel expenses, and the like.

Paragraph 15.4 – Arbitration

ADD the following new Sub-sub paragraphs as follows:

15.4.1.2 In any arbitration proceeding commenced pursuant to this Paragraph 15.4, the parties shall be entitled to conduct pre-hearing discovery for a period of ninety (90) days, which discovery may include depositions, written interrogations not to exceed forty (40) in number (inclusive of subparts) and written requests for the inspection and reproduction of relevant documents or tangible things. Responses to written interrogations and document requests shall be served within thirty (30) days of service thereof. With respect to expert testimony and discovery related thereto. The arbitrator(s) shall have the authority to issue appropriate orders to enforce the parties' entitlement to discovery hereunder and, upon disobedience of any such order, may prohibit the disobedient party from introducing in evidence designated documents, things, or testimony.

15.4.1.3 The award rendered by the arbitrator(s) shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

15.4.1.4 Contractor acknowledges that the mediation and arbitration procedures outlined in paragraphs 15.3 and 15.4 hereof shall be Contractor's exclusive remedies with regard to claims against Owner or Architect, subject to Owner's and Architect's rights to elect to forego mediation or arbitration.

15.4.1.5 Should any Contractor bring a claim against Owner or Architect, then, unless the fact finder finds that Contractor had a good faith basis for the claim against Owner or Architect, Contractor shall be liable to Owner and Architect for all of Owner's and Architect's costs in having all such claims dismissed, or in defending all such claims, or both. These costs shall include all of Owner's or Architect's costs, including without limitation personnel costs, attorney's fees, expert fees, travel expenses, and the like.

ADD new Paragraph 15.5 as follows:

15.5 - Scheduling and Completion

15.5.1 By execution of the Agreement, Contractor agrees to the following:

.1 Owner and Architect are not responsible for delays arising from or related to any act or omission of Contractor. Owner and Architect are not responsible for any costs or damages arising from or related to Contractor's coordination and scheduling of its Work. Owner and Architect are not liable for any costs or damages suffered by Contractor arising from or related to Contractor's coordination of its Work. Contractor hereby waives and releases and indemnifies Owner and Architect from any liability and damages arising from or related to coordination by Contractor of the Work.

.2 Architect and Owner and their representatives shall not be liable to Contractor for any increased costs or damages for defective work. These costs shall include all of Owner's or Architect's costs, including without limitation personnel costs, attorney's fees, expert fees, travel expenses, and the like.

.3 It is agreed by Contractor that no dispute shall delay completion of the Work, which shall be continued by Contractor pending final resolution of a claim, including without limitation, judicial proceedings.

.4 It is agreed by the parties to this Contract that the intent of this Paragraph 15.5.1 is to benefit Owner and Architect, and Owner's interests, and that the provisions of the Contract Documents.

.5 Contractor specifically releases, foregoes and waives any claims against Owner or Architect for extended overhead, delay damages, "impact" damages, loss of efficiency, loss of productivity, lost profit, or any other similar form of loss, damage or compensation.

15.5.2 Claims Related to Project Delay, Acceleration, Hindrances, Loss or Productivity or Similar Damages

As stated above in Subparagraphs §3.3.4, §6.1.3 and §8.3.3, Contractor shall not pursue any claim for money damages against Owner, Architect, Owner's Representative (or their respective directors, employees or agents) in the event of any project delay, acceleration, hindrances, loss of productivity or similar damages

ADD new Paragraph 15.6 as follows:

15.6 – Jurisdiction and Venue for Claims and Disputes

15.6 This Agreement shall be construed and interpreted under and in accordance with the laws of the Commonwealth of Virginia. Any action or proceeding between the parties hereto arising out of this Agreement shall be brought in the State Courts of the Commonwealth of Virginia, specifically the General District Court of Fluvanna County, pursuant to the Rules of Civil Procedure, and the parties hereby consent to such jurisdiction and venue.

END OF SECTION 000750

SECTION 01 0200 – GENERAL SITEWORK REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SITEWORK LAYOUT

A. Monuments and Benchmarks

1. Maintain all monuments, property corners, bench marks and other reference points.
2. If these are disturbed or destroyed during construction operations, have them replaced by a surveyor licensed in the Commonwealth of Virginia. This replacement shall be at no additional expense to the Contract.

B. Laying out the Work.

1. Locate all existing bench marks and other reference points.
2. Protect these points throughout construction.
3. Layout work utilizing these reference points.

C. Record Drawings

1. Maintain a record of the horizontal and vertical locations of all underground utilities and piping, both newly installed and existing encountered.
2. Maintain a record of any variations of the work.
3. Record Drawings shall be certified by a Land Surveyor registered in the Commonwealth of Virginia.
4. Maintain record drawings throughout construction, recording information as work is performed. Record Drawings shall be available for periodic inspection during the course of the project.
5. Submit final, complete record drawings at Substantial Completion.

1.3 EASEMENTS

A. Verify the acquisition of all off-site easements and Rights-of-Way prior to the start of off-site construction. This may be done by contacting the Engineer.

B. Restore all off-site easements to the condition existing prior to the start of work.

1.4 MAINTENANCE OF TRAFFIC

A. Maintain vehicular and pedestrian traffic across the frontage of this project. Comply with all applicable safety requirements.

1.5 CORRELATION OF CONSTRUCTION DOCUMENTS

A. Review construction documents thoroughly prior to the start of construction.

B. Report any conflict or discrepancy discovered in the Construction Documents to the Engineer prior to the start of construction.

C. Report any conflict or discrepancy discovered between the Construction Documents and state and local governmental regulations to the Engineer prior to the start of construction.

1.6 PROJECT CONDITIONS

A. The conditions existing at the time of inspection for bidding purposes will be maintained by the Owner to the extent practical. However, minor variations may occur due to natural occurrences prior to the start of clearing work.

B. The location of existing underground utilities indicated is approximate only. Field locate all existing underground utilities in the area of work, regardless of whether or not they are indicated. Call “Miss Utility” prior to the start of demolition work for assistance in the location of existing underground utilities.

C. Should charted, uncharted or incorrectly charted utilities be encountered during demolition, contact the Engineer immediately for instructions. Cooperate with Owner and utility companies to keep services and facilities in operation.

1.7 SCHEDULING

A. See Final Site Plan for scheduling of site related items.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.1 PROJECT CLEAN UP

A. Clean site as construction progresses. Do not allow trash or other waste materials to accumulate.

B. Prior to requesting the punch-list inspection, clean the site to the following requirements:

1. Power wash all walks and pavements.
2. The remainder of the site shall be broom clean.
3. Remove all trash and debris.

3.2 EXISTING FACILITIES

A. Preserve existing signs, markers, guardrails, fences and other amenities in their original condition unless written permission is obtained for their removal and replacement.

B. Replace damaged items at no additional cost to the Contract.

END OF SECTION 01 0200

SECTION 012500 - SUBSTITUTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Submittals" specifies requirements for submitting the Contractor's Construction Schedule and the Submittal Schedule.

1.3 DEFINITIONS

A. The Definitions in this Article do not change or modify the meaning of other terms used throughout the Contract Documents.

B. Substitution: Products considered to be able to perform the same function but that do not necessarily have the same design, arrangement, details, utility requirements and/or dimensions, etc.

C. Approved Equal: Products of equivalent design, arrangement, details, utility requirements and/or dimensions, etc., produced by a manufacturer not specifically listed in the “Manufacturers” Article of a Specification Section.

1. Unless otherwise noted, Approved Equal products may be included in the Bid without additional approval by the Architect.

D. The following are not considered to be requests for substitution:

1. Revisions to the Contract Documents requested by the Owner or the Architect
2. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities having jurisdiction

1.4 SUBSTITUTIONS

A. Substitution Request: The Architect will consider requests for substitutions if received within 60 days AFTER the Notice to Proceed. Requests received more than 60 days after the Notice to Proceed may be considered or rejected at the sole discretion of the Architect. The Architect

will only consider requests for substitution submitted by the Contractor. No substitution requests will be considered from manufacturer's representatives or product vendors unless submitted through the Contractor. **No substitution requests will be considered during the bid period. Bids shall be based on products from one of the manufacturers specified or an "approved equal" product.**

1. Transmit three (3) copies of each request for substitution for consideration. Requests shall be on the Substitution Request Form found at the end of this Section. Requests not meeting this procedural requirement will be returned with **no action taken.**
2. Identify the product to be substituted in each request. Include the related Specification Section and Drawing number. Only one substitution request will be considered per Substitution Request Form.
3. Respond to and attach all of the following items to the Substitution Request Form:

    a. Coordination information, including a list of changes or modifications needed to other parts of the Work to accommodate the proposed substitution.
    b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability and aesthetic effect
    c. Product data, including drawings and descriptions of products
    d. Samples, where applicable or requested
    e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on the overall Contract Time.
    f. Cost information, including a proposal of the net change, if any in the Contract Sum. Substitutions requests submitted more than 60 days after Notice to Proceed must be accompanied by a credit proposal.
    g. The Contractor's certification that the proposed substitution conforms to all requirements of the Contract Documents in every respect and is appropriate for the application indicated.
    h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
    i. The Contractor's Certification that all costs of other Prime Contractors which are covered by the substitution will be borne by the substituting Contractor.

4. Architect's Action: The Architect will notify the Contractor of acceptance or rejection of the substitution within two (2) weeks of receipt of the substitution request. If necessary, the Architect will request additional information or documentation for evaluation within one (1) week of receipt of a request.

    a. Use the product specified if the Architect cannot make a decision on the use of a proposed substitute within the time allocated. Following acceptance of the substitution, the Contractor shall submit related information and product data in accordance with Division 1 Section "Submittals".
    b. No claim for additional cost or time will be considered as a result of time for considering substitutions by the Contractor.

B. Conditions for Consideration: The Architect will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as solely determined

by the Architect. Requests will be returned with **no action taken** if none of the following conditions are satisfied.

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents.
3. The specified product cannot be provided within the Contract Time. The Architect will not consider a substitution request if the specified product cannot be provided as a result of the Contractor's failure to pursue the Work promptly.
4. The requested substitution offers the Owner a substantial advantage, in cost, time, or energy conservation.
5. The specified product cannot receive necessary approval by a governing authority.
6. The specified product cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
7. The specified product cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.
8. The specified product cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.

C. Conditions for Acceptance: Following evaluation by the Architect and in accordance with a Change Order, the Contractor may make a substitution only with the consent of the Owner.

END OF SECTION 012500

SUBSTITUTION REQUEST FORM
(Attach to all requests for substitution)

PROJECT NAME AND NUMBER

_____

ARCHITECT 

Crabtree, Rohrbaugh & Associates - Architects
250 West Main Street, Suite 200
Charlottesville, VA 22902
Maryland • Pennsylvania • Virginia • West Virginia

SECTION	PARAGRAPH	SPECIFIED ITEM
_____	_____	_____

PROPOSED SUBSTITUTION

_____

The attached includes product data, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request. Applicable portions of the data are clearly identified.

The attached data also includes a description of changes to the Contract Documents which the requested substitution will require for its proper installation.

The Contractor certifies that the following paragraphs, unless modified on attachments, are correct:

1. The requested substitution does not affect the dimensions shown on the Drawings.
2. The requested substitution does not change the building design, including engineering design or detailing.
3. The requested substitution has no adverse effect (including additional scope of work or cost increase) on any other subtrades of the Work, on the Contractor's Construction Schedule or any specified warranty requirements.
4. Maintenance and service parts will be locally available for the requested substitution.
5. The requested substitution offers the Owner a substantial advantage, in cost, time, or energy conservation.

The Contractor further certifies that the function, appearance, quality and warranty of the requested substitution are equivalent or superior to those of the specified item.

CONTRACTOR'S CERTIFICATION:

Signature: _____ Date:_____

Firm: _____

Address: _____

Proposed Credit: $_____

Attachments:

SECTION 012600 - MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing contract modifications.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Submittals" for requirements for the Contractor's Construction Schedule.
2. Division 1 Section "Substitutions" for administrative procedures for handling requests for substitutions.

1.3 MINOR CHANGES IN THE WORK

A. The Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time.

1.4 CHANGE ORDER PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1 Proposal requests issued by the Architect are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.
2 Within 14 calendar days of receipt of a proposal request, submit a detailed estimate of costs necessary to execute the change to the Architect for the Owner's review.

a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
b. Include the costs of labor and supervision DIRECTLY attributable to the requested change. The Contractor’s proposal MUST include hours and applicable rates.
c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

d. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

1) Perform a Time Impact Analysis to demonstrate that the adjustment to Contract Time is the net due to Contractor, and takes into account any contribution Contractor, or other Contractors, may have had.

a) Additional Contract Time will be approved only if either the critical path is extended and the date of Substantial Completion is delayed, or a new critical path replaces the previous critical path and the date of Substantial Completion is delayed.
b) Use available float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposal Requests: When latent or unforseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a detailed request for a change to the Architect.

1 Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
2 Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
3 Include the costs of labor and supervision DIRECTLY attributable to the requested change. The Contractor's proposal MUST include hours and applicable rates.
4 Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
5 Comply with requirements in Division 1 Section "Substitutions" if the proposed change requires substitution of one product or system for a product or system specified.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: When the Owner and the Contractor disagree on the terms of a Proposal Request, the Architect may issue a Construction Change Directive. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1 The Construction Change Directive contains a complete description of the change in the Work. It also designates the method to be followed to determine a change in the Contract Sum or Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.6 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Proposal Request, the Architect will issue a Change Order for signatures of the Owner and the Contractor.

END OF SECTION 012600

SECTION 012700 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Field verify existing conditions prior to proceeding with cutting and patching. Notify the Architect in writing of any conditions that are significantly different from those indicated on the Drawings.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section “Project Coordination” for procedures for coordinating cutting and patching with other construction activities, and for required coordination drawings.
2. Division 1 Section "Selective Demolition" for demolition of selected portions of the building.
3. Division 1 Section “Project Meetings” for meeting procedures for the required Cutting and Patching Conference.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair Work required to restore surfaces to original conditions after installation of other Work.

1.4 GENERAL

A. Build sleeves and anchors into the Work for the proper engagement of the Work.

B. Coordinate and provide chases, openings and recesses in new Work to avoid cutting and patching to the greatest extent possible.

C. Perform all cutting necessary to install Work. Cutting of structural members will not be permitted except by written permission of the Architect.

D. Repair at own expense, all surfaces cut into or damaged as a result of Work.

E. All cutting and patching that is unnecessary, excessive or carelessly done, and cutting of new construction made necessary by ill-timed Work shall be repaired at own expense. All such repairing shall be accomplished by skilled mechanics of the proper trade and to the satisfaction of the Architect.

1.5 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least seven (7) days prior to the required Cutting and Patching Conference described below, requesting approval to proceed. Include the following information:

1. Describe the extent of cutting and patching, show how it will be performed, and indicate why it cannot be avoided.
2. Describe anticipated results or changes to in-place construction. Include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
3. List products to be used and firms or entities that will perform the Work.
4. Indicate dates when cutting and patching will be performed.
5. List utility services and mechanical and electrical systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Means and methods of all cutting and patching Work shall be the sole responsibility of the Contractor.
8. Obtain approval of the cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory Work.

1.6 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers
3. Mechanical systems, piping and ducts.
4. Fire protection systems
5. Control systems.

6. Communication systems.
7. Conveying systems
8. Electrical wiring systems.
9. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include, but are not limited, to the following:

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior storefront construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise and vibration control elements and systems.

D. Visual Requirements: Do not cut and patch construction exposed on the exterior, in occupied spaces, or in other exposed to view locations in a manner, in the Architect's sole opinion, that results in visual evidence of cutting and patching or that would otherwise reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Meet at the Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review the previously submitted Cutting and Patching Proposal and areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding with Work.

1.7 WARRANTY

A. Warranties: Remove, replace, patch and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the greatest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that in the Architect's opinion, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Utility Services and Mechanical/Electrical Systems: Where services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled mechanics and workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete cutting and patching operations without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Cut or drill finished surfaces from the exposed or finished side into concealed surfaces.

3. Cut concrete and masonry using a cutting machine such as an abrasive saw or a diamond-core drill.
4. For excavating and backfilling, comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. For mechanical and electrical services, cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with seams that are invisible. Provide materials and comply with installation requirements specified in other Sections.

1. Test and inspect patched areas after completion to demonstrate integrity of installation.
2. Restore exposed finishes of patched areas and extend finish into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces. Provide a sound, even surface of uniform color and appearance.

    a. Where patching occurs in a smooth, painted surface, extend final paint coat over entire unbroken surface containing the patch.
    b. Clean and properly prepare surfaces, piping, conduit, and similar features before applying paint or other finishing materials.
    c. Restore damaged pipe covering to its original condition.

D. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty and similar materials.

END OF SECTION 012700

SECTION 012800 - FIELD ENGINEERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. General: This Section specifies administrative and procedural requirements for field-engineering services including, but not limited to, the following:

1. Professional surveying services

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Project Coordination" for procedures for coordinating field engineering with other construction activities.

1.3 QUALITY ASSURANCE

A. Surveyor Qualifications: Engage a land surveyor registered in Virginia to perform required land-surveying services.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify layout information shown on the Drawings in relation to the property survey and existing benchmarks before proceeding to lay out the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.

1. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points or requirements to relocate reference points because of necessary changes in grades or locations.
2. Promptly replace lost or destroyed Project control points. Base replacements on the original survey control points.

B. Establish and maintain a minimum of two (2) permanent benchmarks on the site, referenced to data established by survey control points.

1. Record benchmark locations with horizontal and vertical data on Project Record Documents.

C. Existing Utilities and Equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, including private utilities, and other construction. If the location of known or suspected underground utilities cannot be verified, notify the Owner and Architect.

1. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping.

3.2 PERFORMANCE

A. Work from lines and levels established by the property survey. Establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale drawings to determine dimensions.

1. Advise entities engaged in construction activities of marked lines and levels provided for their use.
2. As construction proceeds, check every major element for line, level, and plumb.

B. Surveyor's Log: Maintain a surveyor's log of control and other survey work. Make this log available for reference.

1. Record deviations from required lines and levels, and advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.
2. Upon completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles and elevations of construction and sitework.

C. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels, and control lines and levels required for mechanical and electrical work.

E. Existing Utilities: Furnish information necessary to adjust, move or relocate existing structures, utility poles, lines, services or other appurtenances located in or affected by construction. Coordinate with local authorities having jurisdiction. END OF SECTION 012800

SECTION 012900 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Division 0 Section “Supplementary General Conditions” for requirements related to Payments and Completion.
2. Division 1 Section “Submittals” for the Contractor's Construction Schedule and the Submittal Schedule.
3. Division 1 Section “Modification Procedures” for administrative procedures for handling changes to the Contract.

1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

a. Contractor's Construction Schedule.
b. Application for Payment forms, including Continuation Sheets.
c. List of subcontractors.
d. List of products.
e. List of principal suppliers and fabricators.
f. Schedule of submittals.

2. Submit the Schedule of Values to the Architect at the earliest possible date but no later than 7 days before the date scheduled for submittal of the initial Application for Payment.
3. Subschedules: Where Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one line item for each specification section.

1. Identification: Include the following project identification on the Schedule of Values:

   a. Project name and location.
   b. Name of the Architect.
   c. Project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related specification section and division.
   b. Description of work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value.

      1) Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items.

4. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site (if permitted by Owner). Include requirements for insurance and bonded warehousing, if required.

6. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Application for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.

B. Payment-Application Times: Draft applications for progress payments shall be presented to the Architect no later than the 25th of each month. The Architect will comment and return to the Contractor for final submission no later than the first of the following month. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment-Application Forms: Use AIA Document G702 and Continuation Sheets G703 as the form for Applications for Payment.

D. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to the Architect by a method ensuring receipt within 24 hours.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to the Architect.

F. Initial Application for Payment: Administrative actions and/or submittals that must precede or coincide with submittal of the initial Application for Payment, include the following:

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values.
4. Contractor's Construction Schedule (preliminary if not final).
5. Schedule of principal products.
6. List of Contractor's staff assignments.

G. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.

1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
2. Administrative actions and/or submittals that shall precede or coincide with this application include:

a. Occupancy permits and similar approvals.
b. Warranties (guarantees) and maintenance agreements.
c. Test/adjust/balance records.
d. Maintenance instructions.

e. Startup performance reports.
f. Changeover information related to Owner's occupancy, use, operation, and maintenance.
g. Final cleaning.
h. Application for reduction of retainage and consent of surety.
i. Advice on shifting insurance coverages.
j. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

H. Final Payment Application: Administrative actions and/or submittals that must precede or coincide with submittal of the final Application for Payment include the following:

1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Ensure that unsettled claims will be settled.
4. Ensure that incomplete Work is not accepted and will be completed without undue delay.
5. Transmittal of required Project construction records to the Owner.
6. Removal of temporary facilities and services.
7. Removal of surplus materials, rubbish, and similar elements.
8. Change of door locks to Owner's access.

END OF SECTION 012900

SECTION 013100 – PROJECT COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and supervisory requirements necessary for coordinating construction operations on the Project.

B. The Contractor shall be responsible for coordination.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Field Engineering" specifies procedures for field-engineering services, including establishment of benchmarks and control pointsDivision 1 Section "Project Meetings" for progress meetings, coordination meetings, and preinstallation conferences.
3. Division 1 Section "Submittals" for preparing and submitting the Contractor's Construction Schedule.
4. Division 1 Section "Contract Closeout" for coordinating contract closeout procedures.
5. Division 4 Section “Unit Masonry Assemblies” for Masonry Preinstallation Shop Drawing requirements.
6. Division 21 through 28 Sections for specific coordination drawing requirements for mechanical and electrical installations.

1.3 GENERAL PROJECT COORDINATION PROCEDURES

A. The Contractor shall coordinate its construction activities with those of subcontractors and installers and other entities involved to assure efficient and orderly installation of each part of the Work. The Contractor shall coordinate its operations with operations included under different sections of the Specifications that depend on each other for proper installation, connection, and operation.

1. The Contractor shall schedule its construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Where availability of space is limited, the Contractor shall coordinate installation of different components with subcontractors and installers to assure maximum accessibility for required maintenance, service, and repair.

3. The Contractor shall make adequate provisions to accommodate items scheduled for later installation.

B. The Contractor shall advise the Owner and Architect of overall coordination progress. When necessary, such as in congested spaces, the Contractor shall meet with the Owner and Architect and subcontractors and installers involved to resolve critical coordination issues.

1.4 CONSERVATION

A. The Contractor shall coordinate construction activities to assure that operations are carried out with consideration given to conservation of energy, water and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into the Work.

1.5 COORDINATION DRAWINGS

A. Prepare coordination drawings where careful coordination is needed for installation of products and materials. Prepare coordination drawings where limited space availability necessitates efficient installation of different components.

B. Coordination drawings shall be completed **within 60 calendar days of the date of Notice to Proceed**. The Contractor shall include preparation of coordination drawings in their Contract Price and shall indicate the value of this effort as a line item on their Schedule of Values.

1. Refer to Division 21 through 28 Sections for specific coordination drawing requirements for mechanical and electrical installations.
2. The HVAC scope of work shall be used to initiate the coordination drawings. The Contractor shall produce ¼" scale drawings, by building section, in electronic format. Electronic media, in the format and to the terms specified in Paragraph 3.12 of Section 000750 Supplementary General Conditions, is available from the Architect. This media will include walls, partitions, structural elements, finished floor elevations, ductwork, piping, and equipment locations and layout. The coordination drawings shall include all other trades for inclusion, layout and interface of all relative equipment, material and penetrations associated with the Work
3. Upon resolution of all interference issues, the Contractor shall issue a set of final coordination drawings to all entities involved in the Work and to the Owner and Architect.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to its full-time on site Project Superintendent, the Contractor shall provide other administrative and supervisory personnel as required for proper performance of the Work. Include special personnel required for coordination.

B. Project Coordinator: The Contractor shall provide a Project Coordinator, experienced in administration and supervision of building construction, including mechanical and electrical work.

1. Construction activities requiring coordination by the Project Coordinator include, but are not limited to, the following:

a. Scheduling and sequencing of the Work
b. Cutting and patching
c. Selections for compatibility
d. Coordination drawings
e. Inspections and tests
f. Temporary services and facilities
g. Daily project clean up activities

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 GENERAL COORDINATION PROVISIONS

A. Inspection of Conditions: The Contractor shall require the installer of each major component to inspect both the substrate and conditions under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 CLEANING AND PROTECTION

A. Clean and protect construction in progress and adjoining materials in place during handling and installation. Apply protective covering where required to assure protection from damage or deterioration until Substantial Completion.

B. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

C. Limiting Exposures: The Contractor shall supervise its construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Thermal shock
2. Excessively high or low humidity
3. Air contamination or pollution
4. Water or ice
5. Solvents

6. Chemicals
7. Light
8. Radiation
9. Puncture
10. Abrasion
11. Heavy traffic
12. Soiling, staining, and corrosion
13. Bacteria
14. Rodent and insect infestation
15. Combustion
16. Electrical current
17. High-speed operation
18. Improper lubrication
19. Unusual wear or other misuse
20. Contact between incompatible materials
21. Destructive testing
22. Misalignment
23. Excessive weathering
24. Unprotected storage
25. Improper shipping or handling
26. Theft
27. Vandalism

Any Work subjected to such exposures shall be tested, corrected and/or replaced at the expense of the Contractor, in accordance with Division 0 Section “General Conditions of the Contract for Construction”.

D. The Contractor shall provide daily project clean up of the work site.

END OF SECTION 013100

SECTION 013150 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:

1. Preconstruction conferences
2. Preinstallation conferences
3. Progress meetings
4. Coordination meetings

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Project Coordination" for procedures for coordinating project meetings with other construction activities.
2. Division 1 Section "Submittals" for submitting the Contractor's Construction Schedule.

1.3 PRECONSTRUCTION CONFERENCE

A. Within 15 calendar days of the date of Notice to Proceed, the Architect shall schedule and conduct a Preconstruction Conference at a time convenient to the Owner. Hold The Preconstruction Conference will be held at the Project Site or another convenient location. The purpose of this meeting will be to review the responsibilities and other requirements of the Contractor.

B. Attendees: Authorized representatives of the Owner, Architect and their consultants, the Contractor and its Superintendent, major subcontractors, manufacturers and suppliers. All participants at the Preconstruction Conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance including the following:

1. Construction schedule
2. Critical work sequencing
3. Designation of responsible personnel
4. Procedures for processing field decisions and Change Orders
5. Procedures for processing Applications for Payment

6. Distribution of Contract Documents
7. Submittal of Shop Drawings, Product Data, and Samples
8. Preparation of record documents
9. Use of the premises
10. Parking availability
11. Office, work, and storage areas
12. Equipment deliveries and priorities
13. Safety procedures
14. First aid
15. Security
16. Daily clean up activities
17. Working hours

1.4 PREINSTALLATION CONFERENCES

A. The Contractor shall conduct a preinstallation conference at the Project Site before each construction activity that requires coordination with other construction and as required by specific specification Sections.

B. Attendees: The Installer and representatives of manufacturers and fabricators involved in, or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Architect of scheduled meeting dates.

1. Review the progress of other construction activities and preparations for the particular activity under consideration at each preinstallation conference, including requirements for the following:

a. Contract Documents
b. Options
c. Related Change Orders
d. Purchases
e. Deliveries
f. Shop Drawings, Product Data, and quality-control samples
g. Review of mockups
h. Possible conflicts
i. Compatibility problems
j. Time schedules
k. Weather limitations
l. Manufacturer's recommendations
m. Warranty requirements
n. Compatibility of materials
o. Acceptability of substrates
p. Temporary facilities
q. Space and access limitations
r. Governing regulations
s. Safety

t. Inspecting and testing requirements
u. Required performance results
v. Recording requirements
w. Protection

2. Record significant discussions and agreements and disagreements of each conference, and the approved schedule. Promptly distribute a record of the meeting to everyone concerned, including the Owner and the Architect.
3. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.5 PROGRESS MEETINGS

A. The Architect shall conduct progress meetings at the Project Site at bi-weekly intervals, unless otherwise needed.

B. Attendees: In addition to representatives of the Owner and the Architect, **it is mandatory that the Contractor be represented at all Progress Meetings. Key subcontractors relevant to the ongoing Work shall also attend Progress Meetings.** All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.

1. Contractor's Construction Schedule: Review construction progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.
2. Review the present and future needs of each entity present, including the following:

a. Interface requirements
b. Time
c. Sequences
d. Status of submittals
e. Deliveries
f. Off-site fabrication problems
g. Access
h. Site utilization
i. Temporary facilities and services
j. Hours of work
k. Hazards and risks
l. Daily clean up activities
m. Quality and work standards
n. Change Orders
o. Documentation of information for payment requests

D. Reporting: Minutes will be distributed by the Architect at least 3 calendar days prior to the next meeting to each party present and to parties who should have been present.

1. Schedule Updating: Refer to Division 1 Section “Construction Progress Documentation” for requirements. Issue the revised schedule concurrently with the report of each meeting.

1.6 COORDINATION MEETINGS

A. The Contractor shall conduct coordination meetings a minimum of once every two weeks. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special preinstallation meetings. Record meeting minutes and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting. In addition, the Owner and Architect shall recieve copies of these meeting minutes.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 013150

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Owner’s Preliminary Project Phasing Narrative
2. Contractor's Construction Schedule
3. Daily construction reports
4. Field condition reports
5. Special reports

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section “Project Coordination”
2. Division 1 Section "Project Meetings" for submitting and distributing meeting and conference minutes
3. Division 1 Section "Quality Requirements" for submitting a schedule of tests and inspections
4. Division 1 Section "Project Record Documents" for submitting Project Record Documents at Project closeout
5. Division 1 Section “Submittals” for procedural requirements regarding the Submittal Schedule
6. Division 1 Section “Temporary Facilities & Controls” for the various stages of Construction relative to temporary heat which must be identified on the Contractor’s Construction Schedule.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish dates.

2. Predecessor activity is an activity that must be completed before a given activity can be started.

B. Critical Path Method (CPM): A method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.

C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.

1. Float is not for the exclusive use or benefit of either the Owner or the Contractor. Extensions of the time to interim milestone dates or the Contract Completion Date, under the Contract, will be granted only to the extent that equitable time adjustment to the activity or activities affected by the Contract Modification or delay, exceeds the total float of the affected or subsequent paths and extends any interim milestone date or the Contract Completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

G. Major Area: A story of construction, a separate building, or a similar significant construction element.

H. Milestone: A key or critical point in time for reference or measurement.

I. Network Diagram: A graphic diagram of a network schedule showing activities and activity relationships.

1.4 SUBMITTALS

A. Qualification Data: For firms and persons specified in "Quality Assurance" Article and in-house scheduling personnel to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.

B. Preliminary Construction Schedule: Submit one (1) copy in an acceptable format as determined by the Architect.

C. Contractor’s Construction Schedule: Submit one (1) paper Gantt Chart and one (1) electronic copy in its native format.

D. CPM Reports: The Contractor's Construction Schedule shall be a CPM Schedule. Concurrent with the CPM Schedule, submit three (3) printed copies of each of the following computer-generated reports. The format for each activity in the reports shall contain an activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date and total float.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.

E. Daily Construction Reports: Submit two (2) copies at weekly intervals.

F. Field Condition Reports: Submit two (2) copies at time of discovery of differing conditions.

G. Special Reports: Submit two (2) copies at time of unusual event.

1.5 QUALITY ASSURANCE

A. Scheduling Professional Qualifications: The Contractor’s Construction Schedule shall be composed and maintained by an individual having been employed for at least five years primarily as a CPM scheduler or an individual certified as a Planning and Scheduling Professional (PSP) by the Association for the Advancement of Cost Engineering (AACE). Documentation supporting compliance with these requirements shall be supplied to the Architect for review and acceptance.

B. Prescheduling Conference: Conduct conference at the Project site to comply with requirements in Division 1 Section "Project Meetings". Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Discuss constraints, including phasing, work stages, area separations and interim milestones.
2. Review delivery dates for Owner-furnished products.
3. Review time required for review of submittals and resubmittals.
4. Review requirements for tests and inspections by independent testing and inspecting agencies.
5. Review time required for completion and startup procedures.
6. Review and finalize the list of construction activities to be included in the schedule.
7. Review submittal requirements and procedures.
8. Review procedures for updating schedules.

1.6 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities.

B. Coordinate the Contractor's Construction Schedule with the Schedule of Values, List of Subcontracts, Submittal Schedule, Progress Reports, Applications for Payment and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. The Work under the Contract Documents shall be planned, scheduled, executed, reported and accomplished using the Critical Path Method, in work days (excluding legal holidays). The provisions of the General Requirements are to be followed in scheduling construction activities.

B. The primary objectives of the requirements of this Section are: (1) to insure adequate planning and execution of the Work by the Contractor by having a schedule of construction activities for the Contractor and Subcontractors in initial form covering the first 120 days of construction within thirty (30) days of the Notice to Proceed and in final form within seventy-five (75) days of the Notice to Proceed; (2) to assist the Contractor in evaluating progress of the Work; (3) to provide for optimum coordination by the Contractor of their trades and Subcontractors; and (4) to permit the timely prediction or detection of events or occurrences which may affect the timely prosecution of the Work.

C. The Contractor is responsible for determining the sequence and logic of activities, the time estimates of the detailed construction activities and the means, methods, techniques and procedures to be employed with regard to the Work. The Contractor's Construction Schedule shall represent the Contractor's best judgment of how they shall prosecute the Work in compliance with the requirements of the Contract Documents. The Contractor shall ensure that the Contractor's Construction Schedule is current and accurate and is properly and timely monitored, updated and revised as Project conditions and the Contract Documents may require.

D. The Contractor shall consult with their major subcontractors relating to the preparation of their construction plan and the Contractor's Construction Schedule. Major subcontractors shall receive copies of those portions of the Contractor's Construction Schedule which relate to their Work and shall be continually advised of any updates or revisions to the Contractor's Construction Schedule as the Work progresses. When the Contractor submits their Construction Schedule or makes any proposed updates or revisions to such Schedule, it shall be concluded by the Owner that the Contractor has consulted with and has the concurrence of their major subcontractors. The Contractor shall be solely responsible for ensuring that all subcontractors comply with the requirements of the Contractor's Construction Schedule for their portions of the Work.

E. The Contractor shall include data relating to activities, durations and sequences as part of the Contractor's draft of the Construction Schedule. This data shall reflect the Contractor's actual construction plan for the Project, and shall fully comply with all requirements of the Contract Documents.

F. It is understood and agreed that the Contractor's Construction Schedule is to represent the Contractor's best plan and estimate for the Work; however, the Contractor acknowledges that the Contractor's Construction Schedule may have to be revised from time-to-time as the Project proceeds. The Contractor further acknowledges and agrees that the Owner does not guarantee that: (1) The Contractor can start Work activities on the "early start" or "late start" dates or complete Work activities on the "early finish" or "late finish" dates shown in the schedule, or as same may be updated or revised; or (2) The Contractor can proceed at all times in the sequence established by the Contractor's Construction Schedule, or that the Contractor can rely upon the utilization of only the resources and manpower they initially plan for the performance of the Work. Any changes, modifications or adjustments made by the Contractor to the Contractor's Construction Schedule shall be in full compliance with all requirements of the Contract Documents.

G. The Contractor acknowledges and agrees that their Contractor's Construction Schedule must be flexible in order to accommodate and allow for proper coordination.

H. The review of the Contractor's Construction Schedule or any other schedule or plan of construction of the Contractor, does not constitute an agreement by the Owner of any start or finish date in the schedule or specific durations or sequences for activities of the Contractor; further, nothing herein shall be construed as modifying or changing, or excusing the performance of the Contractor of required portions of the Work by the Completion Dates as set forth in the Contract Documents.

I. The Completion Dates set forth in the Contract Documents represent only the major items of Work and may or may not include interface dates with the construction activities of others. Completion Dates are Contract requirements and are the essence of the Contract Documents and to the coordination of the Work by the Contractor. Completion Dates represent the latest allowable completion time for those portions of the Work to which each Completion Date relates. The Completion Dates are not intended to be a complete listing of all Work under the Contract Documents.

J. Unless otherwise specifically provided in the Contract Documents, and in particular the General Requirements, the Contractor acknowledges that the Owner and Architect have contemplated in their planning and in any preliminary schedule that may have been prepared and made available to the Bidders, and in their budgeting for professional services, that the Work shall be performed on a 5-day work week basis, utilizing a single 8-hour shift per day. The Owner shall have the sole discretion of approving or rejecting a variance in the work week, number of shifts, or shift length. Unless otherwise agreed to by the Owner, the Contractor shall bear the cost of, and pay the Owner, for additional staff and supervisory personnel and inspectors of any authority having jurisdiction of the Work, necessary to support any variance in the contemplated work week, number of shifts or shift length.

1.8 POST AWARD ACTIVITIES

A. Upon receipt by the Contractor of the Notice to Proceed, and until the Contractor's Construction Schedule is completed, the Contractor shall do the following.

1. Within thirty (30) days of the Notice to Proceed, complete an Preliminary Construction Schedule governing the first 120 days of construction.
2. Within seventy-five (75) days of the Notice to Proceed, complete a Final Construction Schedule governing the Work.

1.9 CONSTRUCTION SCHEDULE CONTENT

A. The Contractor's Construction Schedule shall consist of a detailed CPM Schedule of all Work activities of the Project. The Schedule shall include, but not be limited to, the following information: (1) Project name; (2) completed Work ready for use by the Owner, etc.; (3) activities relating to different areas of responsibility, such as subcontracted Work which is distinctly separate from that being done by the Contractor directly; (4) different categories of Work as distinguished by craft or crew requirements; (5) different categories of Work as distinguished by equipment requirements; (6) different categories of Work as distinguished by materials; (7) distinct and identifiable subdivisions of Work such as structural slabs, beams, columns; (8) location of Work within the Project that necessitates different times or crews to perform; (9) outage schedules for existing utility services that shall be interrupted during the performance of the Work; (10) acquisition and installation of equipment and materials supplied and/or installed by the Owner; (11) material to be stored on site; and (12) dates for completion of Work.

B. For all major equipment and materials to be fabricated or supplied for the Project, the Contractor's Construction Schedule shall show a sequence of activities including: (1) preparation of Shop Drawings, Samples and all required Submittals as set forth in these specifications; (2) a reasonable time for review of Shop Drawings, Samples, and Submittals or such time as specified in the Contract Documents; (3) shop fabrication, delivery, and storage; (4) erection or installation; and (5) testing of equipment and materials.

C. The Contractor's Construction Schedule shall clearly indicate the dates of the various stages of construction relative to temporary heat, as defined in Part 3 Paragraph "Temporary Heat" of Division 1 Section "Temporary Facilities & Controls".

D. The Gantt Chart shall include the early dates and total float for each activity. There shall be no negative float in the baseline schedule.

E. All activity durations shall be given in calendar days. No activity shall have a duration of more than twenty (20) days.

1.10 UPDATING OF CONSTRUCTION SCHEDULE/PROGRESS REPORTS

A. On a monthly basis the Contractor shall prepare the Contractor's report of actual progress. Said report shall set forth up-to-date and accurate progress data, shall be based upon the Contractor's best judgment and shall be prepared by the Contractor in consultation with all subcontractors.

B. The progress report of the Contractor shall show the activities, or portions of activities, completed during the reporting period, the actual start and finish dates for these activities,

remaining durations and/or estimated dates for completion of Work for activities currently in progress.

C. The Contractor shall submit a written report with the updated progress analysis which shall include, but not be limited to, a description of problem areas, current and anticipated delaying factors and their impact, explanations of corrective actions taken or planned, any newly planned activities or changes in sequence, and proposed logic for a recovery schedule, if required, as further described herein. The report shall also include: (1) a narrative describing actual Work accomplished during the reporting period; (2) a list of major construction equipment used on the Project during the reporting period and any construction equipment idle during the reporting period; (3) the total number of personnel by craft actually engaged in the Work during the reporting period, with such total stated separately as to office, supervisory, and field personnel; (4) a manpower and equipment forecast for the succeeding thirty (30) days, stating such total as to office, supervisory and field personnel; (5) a list of Contractor-supplied materials and equipment, indicating current availability and anticipated job site delivery dates; and (6) changes or additions to the Contractor's supervisory personnel, if any, since the preceding progress report.

D. The Contractor understands and agrees that the submission and approval of progress updates and the receipt of progress reports are an integral part and basic element of the Applications for Payment; and that the Contractor shall not be entitled to any progress payment under the Contract Documents until, in the sole discretion of the Owner, the Contractor has fully complied with the requirements of this Section.

E. The Contractor shall be solely responsible for expediting the delivery of all materials and equipment to be furnished by or to them so that the progress of construction shall be maintained according to the currently approved Contractor’s Construction Schedule for the Work. The Contractor shall notify the Owner in writing, and in a timely and reasonable manner, whenever the Contractor determines or anticipates that the delivery date of any material or equipment to be furnished by the Contractor shall be later than the delivery date indicated by the Contractor’s Construction Schedule, or required consistent with the completion requirements of the Contract Documents, subject to schedule updates as herein provided.

F. The Contractor shall ensure that off site activities do not control the critical path of the Contractor’s Construction Schedule and instead, that the critical path only relates to activities on the site.

1.11 RECOVERY SCHEDULE.

A. Should the updated Contractor’s Construction Schedule, at any time during the Contractor's performance, show, in the sole opinion of the Owner that the Contractor is fourteen (14) or more days behind schedule for any Completion Date, or should the Contractor be required to undertake actions as provided for in these specifications, the Contractor shall prepare a recovery schedule at no additional cost to the Owner (unless the Owner is solely responsible for the event or occurrence which has caused the schedule slippage) explaining and displaying how the Contractor intends to reschedule their Work in order to regain compliance with the Contractor’s Construction Schedule during the immediate subsequent pay period.

B. If the Contractor believes that all of the time can be recovered during the subsequent pay period, the Contractor shall be permitted to prepare a recovery schedule as set forth below. However, if the Contractor believes it shall take more than thirty (30) days to recover all of the lost time, they shall prepare a revision to the Contractor's Construction Schedule and comply with all of the requirements of a schedule revision as set forth in this Paragraph 1.12 and Paragraph 1.13.

1. The Contractor shall prepare a limited duration recovery schedule, incorporating the best available information from Subcontractors and others which shall permit a return to the Construction Schedule at the earliest possible time. The Contractor shall prepare a recovery schedule to the same level of detail as the Construction Schedule for a maximum duration of one month.
2. Within two (2) days after submission by the Contractor of a recovery schedule, the Contractor shall participate in a conference with the Owner, to review and evaluate the recovery schedule. Within two (2) days of the conference, the Contractor shall submit the revisions necessitated by the review for the Owner's review and approval. The Contractor shall use the approved recovery schedule as their plan for returning to the Contractor's Construction Schedule.
3. The Contractor shall confer continuously with the Owner to assess the effectiveness of the recovery schedule. As a result of this conference:

    a. If the Owner determines the Contractor is still behind schedule, the Owner shall direct the Contractor to prepare a schedule revision and comply with all of the requirements of a schedule revision as stated herein and the other requirements of the Contract Documents; provided, however, that nothing herein shall limit in any way the rights and remedies of the Owner as provided elsewhere in the Contract Documents; or
    b. If the Owner determines the Contractor has successfully complied with the provisions of the recovery schedule, the Owner shall direct the Contractor to return to the use of the approved Contractor's Construction Schedule.

1.12 SCHEDULE REVISIONS

A. Should the Contractor desire to or be otherwise required under the Contract Documents to make modifications or changes in their method of operation, their sequence of Work or the durations of the activities in the Contractor's Construction Schedule, they shall do so in accordance with the requirements of this Paragraph and the Contract Documents. Revisions to the approved Contractor's Construction Schedule must be presented to and reviewed by the Owner.

B. The Contractor shall submit requests for revisions to the Contractor's Construction Schedule to the Owner, together with written rationale for revisions and description of logic for rescheduling Work and maintaining the Completion Dates listed in the Contract Documents. Proposed revisions acceptable shall be incorporated into the next update of the Contractor's Construction Schedule. The Contractor shall pay the Owner for costs incurred by the Lead Contractor for the revisions.

C. In all instances where a revision to the Contractor's Construction Schedule will affect the construction activities of other Prime Contractors, prior to submission by the Contractor of their proposed schedule revisions, they shall meet with and gain written approval of each of the Prime Contractors to make the revisions which shall be evidenced by the signatures of said Prime Contractors on the proposed schedule revisions. If accepted, the revisions, shall be binding upon the Contractor and all Prime Contractors on the Project.

1.13 FLOAT TIME

A. Float or slack time associated with one chain of activities is defined as the amount of time between the earliest start date and latest start date or between the earliest finish date and latest finish date for such activities, as calculated as part of the Contractor's Construction Schedule. The Contractor agrees that there shall be no basis for any modification of the Completion Date or dates or an extension of the Contract Time, or a claim for additional compensation as a result of any Project problem, Change Order or delay which only results in the loss of available positive float on the Contractor's Construction Schedule.

1.14 SCHEDULE OF INSPECTIONS AND TESTS

A. Prepare a schedule of inspections, tests, and similar services required by the Contract Documents. Submit the schedule within 10 days of the date established for commencement of the Work.

B. The schedule shall be in tabular form and shall include, but not be limited to, the following:

1. Specification Section number
2. Description of the test
3. Identification of applicable standards
4. Identification of test methods
5. Number of tests required
6. Time schedule or time span for tests
7. Entity responsible for performing tests
8. Requirements for taking samples.
9. Unique characteristics of each service

C. Distribute the schedule to the Owner, Architect, and each party involved in performance of portions of the Work where inspections and tests are required.

1.15 REPORTS

A. Daily Construction Reports: Prepare Daily Construction Reports recording the following information concerning events at the Project site:

1. List of subcontractors at Project site
2. Approximate count of personnel at Project site
3. High and low temperatures and general weather conditions

4. Accidents
5. Meetings and significant decisions
6. Unusual events (refer to special reports)
7. Stoppages, delays, shortages, and losses
8. Meter readings and similar recordings
9. Emergency procedures
10. Orders and requests of authorities having jurisdiction
11. Change Orders received and implemented
12. Construction Change Directives received
13. Services connected and disconnected
14. Equipment or system tests and startups
15. Partial Completions and occupancies
16. Substantial Completions authorized

B. Field Correction Reports: When the need to take corrective action that requires a departure from the Contract Documents arises, prepare a detailed report. Include a statement describing the problem and recommended changes. Indicate reasons the Contract Documents cannot be followed. Submit a copy to the Architect immediately.

C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

D. Material Location Reports: At weekly intervals, prepare a comprehensive list of materials delivered to and stored at the site. The list shall be cumulative, showing materials previously reported plus items recently delivered. Include with the list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from the site. Submit copies of the list to the Architect at weekly intervals.

1.16 SPECIAL REPORTS

A. General: Submit Special Reports directly to the Owner within one day of an occurrence. Distribute copies of reports to parties affected by the occurrence and to the Architect.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at the Project site, whether or not related directly to the Work, prepare and submit a Special Report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise the Owner in advance when these events are known or predictable.

PART 2 - PRODUCTS (Not Applicable)
PART 3 - EXECUTION (Not Applicable)

END OF SECTION 013200

SECTION 013300 - SUBMITTALS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Submittals required for performance of the Work, including the following:

1. Shop Drawings
2. Product Data
3. Samples
4. Quality Assurance Submittals
5. Submittals Schedule

B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

1. Permits
2. Applications for Payment, along with Initial Statement of Contract Value
3. Performance and Payment Bonds
4. Insurance certificates
5. List of subcontractors

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section “Substitutions” specifies procedural requirements for handling requests for substitutions made after award of the Contract.
3. Division 1 Section “Project Coordination” specifies requirements governing preparation and submittal of required Coordination Drawings.
4. Division 1 Section “Project Meetings” specifies requirements for submittal and distribution of meeting and conference minutes.
5. Division 1 Section “Construction Progress Documentation” specifies requirements for Submittal Schedules.
6. Division 1 Section “Quality Requirements” specifies requirements for submittal of inspection and test reports.
7. Division 1 Section “Warranties” specifies requirements for Submittal of warranties at project closeout.
8. Division 1 Section “Project Record Documents” specifies requirements for submittal of Project Record Documents at project closeout.

1.3 DEFINITIONS

A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.

1. Preparation of Coordination Drawings is specified in Division 1 Section “Project Coordination” and may include components previously shown in detail on Submittals.

B. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.

C. Mockups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.

D. For Specification sections listing manufacturer’s products that include the phrases “but are not limited to the following” or “approved equal”, the Contractor shall be responsible to provide certification that the submitted product complies with the specified product. Include this certification with the Submittal. Final approval of a product submitted as an “equal” shall be solely by the Architect.

1.4 SUBMITTAL PROCEDURES

A. **All Submittals shall be processed electronically through email.** This serves as a collaborative environment which expedites and organizes the review process. The Owner will pay the fees associated to aquire the use of a license for the project. **Each Submittal is to include a SINGLE item or element of construction only. A Submittal Cover Sheet, on the attached form shall be completed, signed and certified by the Contractor for EACH Submittal. The Architect will not accept Submittals including multiple items or elements of construction. Submittals not meeting this procedure requirement may be returned with No Action Taken. No extension of Contract Time will be authorized due to failure to comply with this procedure.**

B. Coordination: Coordinate preparation and processing of Submittals with performance of construction activities. Transmit each Submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each Submittal with fabrication, purchasing, testing, delivery, other Submittals and related activities that require sequential activity.
2. Coordinate transmittal of different types of Submittals for related elements of the Work so processing will not be delayed by the need to review Submittals concurrently for coordination.

a. The Architect reserves the right to withhold action on a Submittal requiring coordination with other Submittals until all related Submittals are received.

b. Be advised that all interior finishes will be reviewed together and finally determined after receipt of all shop drawings, product data and samples which pertain to the interior finish color selections and related equipment.

3. To avoid the need to delay installation as a result of the time required to process Submittals, allow sufficient time for Submittal review, including time for resubmittals.

a. Allow a minimum of five (5) working days for review. Additional time may be required for further review and/or coordination with consultants and subsequent Submittals as determined by the Architect.
b. If a resubmittal is necessary, process the same as the original Submittal.
c. No extension of Contract Time will be authorized because of failure to transmit Submittals to the Architect sufficiently in advance of the Work to permit processing.

C. Submittal Preparation: The Architect will not accept Submittals received without the attached 'Submittal Cover Sheet'. The Contractor shall stamp the 'Submittal Cover Sheet' with an action stamp. The Contractor shall mark the stamp appropriately to indicate the action taken. **Submittals shall be pre-reviewed by the Contractor PRIOR to submittal to the Architect for review.** See Paragraph 1.6.C.1 of this Section for additional information.

1. Use the 'Submittal Cover Sheet' attached at the end of this Section for all Submittals.
2. Complete all information required on the 'Submittal Cover Sheet'. Failure to do so may result in return of the Submittal with No Action Taken. No extension of Contract Time will be authorized because of failure to comply with this procedure.

D. Contractor's Transmittal: The Architect will not accept Submittals received from sources other than the Contractor.

1.5 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit three copies of the Submittal Schedule to the Architect. Arrange the following information in a tabular format:

1. Scheduled date for first Submittal
2. Specification Section number and title
3. Submittal category (action or informational)
4. Name of Subcontractor
5. Description of the Work covered
6. Scheduled date for final release or approval

B. Submit the Submittal Schedule, arranged in chronological order by dates required by the Contractor's Construction Schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication and delivery when establishing dates.

1. Coordinate the Submittal Schedule with the List of Subcontractors, the Schedule of Values and Contractor's Construction Schedule.

2. Initial Submittal: Submit an Initial Submittal Schedule concurrently with the Initial Construction Schedule. Include Submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture, fabrication or delivery.
3. Final Submittal: Submit a Final Submittal Schedule concurrently with the Final Contractor's Construction Schedule. Include all remaining Submittals. All Submittals are required to be submitted by the Contractor within ninety (90) days of the date of Notice to Proceed.

C. Distribution: Following response to the initial Submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the project meeting room and field office.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

D. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.6 SUBMITTALS

A. Shop Drawings:

1. Submit newly prepared information drawn accurately and to scale. Highlight, circle or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
2. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:

    a. Dimensions
    b. Identification of products and materials included by sheet and detail number
    c. Notation of dimensions established by field measurement
    d. Submit Shop Drawings electronically through the construction administration software for the Architect's review.
    e. The Architect will return Submittals electronically and indicate action taken.
    f. Maintain a complete set of Shop Drawings on site during construction.
    g. Maintain a set of marked up Shop Drawings as part of the project record documents to be turned over to the Owner at Contract Closeout.
    h. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

B. Product data

1. Collect and assemble Product Data into a single Submittal for each element or system of construction. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves.
2. Mark each copy to show applicable choices and options. Where printed Product Data includes information on product options that are not required or are not being used, mark Product Data to indicate the applicable products and information. Include the following information:

    a. Manufacturer's printed recommendations
    b. Compliance with trade association standards
    c. Compliance with recognized testing agency standards
    d. Application of testing agency labels and seals
    e. Notation of dimensions verified by field measurement
    f. Notation of coordination requirements
    g. Submit Product Data electronically through the construction administration software for the Architect's review.
    h. The Architect will return Product Data electronically and indicate action taken.
    i. Maintain a complete set of Product Data on site during construction.
    j. Maintain a set of marked up Product Data as part of the project record documents to be turned over to Owner at Contract Closeout.
    k. Do not use Product Data without an appropriate final stamp indicating action taken.

C. Action Stamp: **The Contractor will thoroughly review and stamp Submittals** with their action stamp. The Contractor shall mark the stamp appropriately to indicate the action taken.

    1. Contractor’s review notations and action stamp shall be applied with **GREEN** color ink

D. Distribution: Furnish final approved Submittals to installers, subcontractors, suppliers, manufacturers, fabricators, and all others required for performance of construction activities.

1.7 SAMPLES

A. Where required by individual specification sections, submit full-size, fully fabricated Samples cured and finished as specified and physically identical to the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, physical material samples, color range sets or swatches showing color, texture, and pattern.

    1. Mount or display Samples in a manner to facilitate review of qualities indicated. Prepare Samples to match the Architect's sample or in accordance with the product specifications. Include the following:

a. Specification Section number and reference
b. Generic description of the Sample
c. Sample source
d. Product name or name of the manufacturer
e. Compliance with recognized standards
f. Availability and delivery time

2. Submit Samples for review of size, kind, color, pattern and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final Submittal and the actual component as delivered and installed.

   a. Where variation in color, pattern, texture or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.
   b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
   c. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.

3. Submit a full set of choices where Samples are submitted for selection of color, pattern, texture or similar characteristics from a range of choices as specifed.
4. The Architect will review and return preliminary Submittals with the Architect's notation, indicating selection and other action.

1.8 QUALITY ASSURANCE SUBMITTALS

A. Submit Quality Control Submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports and other quality control submittals as required under other Sections of the Specifications.

B. Certifications: Where other Sections of the Specifications require certification that a product, material or installation complies with specified requirements, submit a certification from the manufacturer certifying compliance with the specified requirements. The Architect reserves the right to require this certification to be notorized.

   1. The Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 1 Section "Quality Requirements."

1.9 ARCHITECT'S ACTION

A. Except for submittals for the record or information, where action and return is required, the Architect will review each Submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Architect will stamp each Submittal with a uniform action stamp. The Architect's review notations and action stamp shall be applied with **RED** color ink. The Architect will mark the stamp to indicate the action taken, as follows:

1. NO EXCEPTION TAKEN: The Work covered by the Submittal may proceed without further submittal, provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
2. EXCEPTION(S) NOTED: The Work covered by the Submittal may proceed provided it complies with notations or corrections on the Submittal and requirements of the Contract Documents. Final payment depends on that compliance.
3. SUBMIT SPECIFIED: Do not proceed with Work covered by the Submittal, including purchasing, fabrication, delivery or other activity. Prepare a new Submittal indicating specified material; resubmit without delay.
4. REVISE & RESUBMIT: Do not proceed with Work covered by the Submittal, including purchasing, fabrication, delivery or other activity. Revise or prepare a new Submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
5. REJECTED: Do not proceed with Work covered by the Submittal, including purchasing, fabrication, delivery or other activity. Do not resubmit a revised copy; prepare a new Submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

C. Unsolicited Submittals: The Architect will take no action on unsolicited submittals.

END OF SECTION 013300

SUBMITTAL COVER SHEET

(Attach to each copy of each submittal)

PROJECT NAME & NUMBER _____

ARCHITECT:

Crabtree, Rohrbaugh & Associates - Architects
250 West Main Street, Suite 200
Charlottesville, VA 22902
Maryland • Pennsylvania • Virginia • West Virginia

_____

ENGINEER: _____

CONTRACTOR: _____

SUBCONTRACTOR/SUPPLIER: _____

MANUFACTURER: _____

ITEM SUBMITTED: _____ SUBMITTAL NO. _____

SPECIFICATION SECTION NO. _____ PARAGRAPH NO. _____

DRAWING REFERENCE _____ DETAIL NO. _____

CERTIFICATION: (Circle One)

A. Certified to comply with Drawings and Specifications.

B. Certified to comply with Drawings and Specifications except as noted on Contractor attachment(s)

_____

Signature: Subcontractor/Supplier Date Signature: Contractor Date

Contractor's Action Stamp Here

Architect's Action Stamp Here

SUBMITTAL DEVIATION SHEET

(Attach this sheet behind Submittal Cover Sheet)

PROJECT NAME AND NUMBER: _____

ARCHITECT: 

Crabtree, Rohrbaugh & Associates - Architects
250 West Main Street, Suite 200
Charlottesville, VA 22902
Maryland • Pennsylvania • Virginia • West Virginia

ENGINEER: _____

CONTRACTOR: _____

SUBCONTRACTOR/SUPPLIER: _____

PRODUCT SPECIFIED: _____

SPECIFICATION SECTION NO. _____ PARAGRAPH NO. _____

DRAWING REFERENCE _____ DETAIL NO. _____

DESCRIPTION OF DEVIATION: _____

Signature: Subcontractor/Supplier Date Signature: Contractor Date

ARCHITECT/ENGINEER REMARKS:

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with the requirements of the Contract Document.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit the Contractor's quality-control procedures that facilitate compliance with the requirements of the Contract Document.
3. Requirements for the Contractor to provide quality-control services required by the Architect, Owner or authorities having jurisdiction are not limited by the provisions of this Section.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections
2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities
3. Divisions 2 through 33 Sections for specific test and inspection requirements

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions and procedures performed before and during execution of the Work to guard against defects and deficiencies and to ensure that proposed construction complies with Project requirements.

B. Quality-Control Services: Tests, inspections, procedures and related actions during and after execution of the Work to evaluate that completed construction complies with Project

requirements. Services do not include contract enforcement activities performed by the Architect.

C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation. Samples are not mockups.

D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of the Contractor by the Contract Documents, provide products and systems complying with the specific performance and design criteria indicated.

1. If the criteria indicated is not sufficient to perform the services or certifications required, submit a written request for additional information to the Architect.

1.5 REGULATORY REQUIREMENTS

A. Copies of Regulations: Obtain copies of applicable regulations and retain at the Project site to be available for reference by parties who have a reasonable need.

1.6 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to the Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with the performance and design criteria indicated. Include a list of codes, loads and other factors used in performing these services.

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title
2. Description of test and inspection
3. Identification of applicable standards
4. Identification of test and inspection methods
5. Number of tests and inspections required

6. Time schedule or time span for tests and inspections
7. Entity responsible for performing tests and inspections
8. Requirements for obtaining samples
9. Unique characteristics of each quality-control service

D. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue
2. Project title and number
3. Name, address, and telephone number of testing agency
4. Dates and locations of samples and tests or inspections
5. Names of individuals making tests and inspections
6. Description of the Work and test and inspection method
7. Identification of product and Specification Section
8. Complete test or inspection data
9. Test and inspection results and an interpretation of test results
10. Ambient conditions at the time of sample taking and testing and inspecting
11. Comments or professional opinion on whether tested or inspected Work complies with the requirements of the Contract Documents
12. Name and signature of laboratory inspector
13. Recommendations on retesting and re-inspecting

E. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by the manufacturer to inspect the installation of the manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is qualified and legally licensed to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those

performed for installations of the system, assembly or product that are similar to those indicated for this Project in material, design and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy the qualification requirements indicated and shall be engaged for the activities indicated.

1. The requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.

G. Testing Agency Qualifications: An agency with the experience and capability to conduct the testing and inspecting indicated, as documented by ASTM E 548, and that specializes in the types of tests and inspections to be performed.

H. Preconstruction Testing: A qualified testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.

1. Contractor responsibilities include the following:

a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of the product to comply with performance requirements.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Fabricate and install test assemblies using installers who will perform the same tasks for this Project.
d. When testing is complete, remove assemblies; do not reuse materials on the Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to the Architect, with copy to the Contractor. Interpret tests and inspections and state in each report whether the tested and inspected work complies with or deviates from the requirements of the Contract Documents.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by the Architect.
2. Notify the Architect at least seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain the Architect's approval of mockups before starting work, fabrication, or construction.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

1.8 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as the Owner's responsibility, the Owner will engage a qualified testing agency to perform these services.

1. The Owner will furnish the Contractor with the names, addresses and telephone numbers of the testing agencies engaged and a description of the types of testing and inspecting each is engaged to perform.
2. The Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the requirements of the Contract Documents will be charged to the Contractor.

B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.

1. Where services are indicated as the Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. The Contractor shall not employ the same entity engaged by the Owner, unless agreed to in writing by the Owner.

2. Notify testing agencies at least 24 hours in advance of the time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as the Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by the Contractor, which are not required by the Contract Documents, are the Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Special Tests and Inspections: The Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of the Owner.

1. Testing agency will notify the Architect and the Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
2. Testing agency will submit a certified written report of each test, inspection and similar quality-control service to the Architect, with copy to the Contractor and to authorities having jurisdiction.
3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the requirements of the Contract Documents.
5. Testing agency will retest and reinspect corrected work. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the requirements of the Contract Documents will be charged to the Contractor.

D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were the Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with the requirements established by the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with the Architect and the Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify the Architect and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
3. Submit a certified written report, in duplicate, of each test, inspection and similar quality-control service through the Contractor.
4. Do not release, revoke, alter or increase the requirements of the Contract Documents or approve or accept any portion of the Work.
5. Do not perform any duties of the Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work
2. Incidental labor and facilities necessary to facilitate tests and inspections
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples
4. Facilities for storage and field-curing of test samples
5. Delivery of samples to testing agencies
6. Preliminary design mix proposed for use for material mixes that require control by the testing agency.
7. Security and protection for samples and for testing and inspecting equipment at the Project site.

H. Coordination: Coordinate the sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid the necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit the schedule within 30 days of the date established for the Notice to Proceed.

1. Distribution: Distribute the schedule to the Owner, the Architect, the testing agencies and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with the installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are the Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014100 – SAFETY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. General: This Section specifies the required safety procedures for this Project.

B. It is recognized that the safety of all personnel is the responsibility of the Contractor. It is the contractual obligation of the Contractor to adhere to all requirements of the Occupational Health and Safety Act (OSHA), as well as Local and State safety rules and regulations. The Contractor shall assure the safety of their personnel by providing all protection and safety devices, covers, etc. as they relate to the safe conduct of their work in accordance with all Local, State and Federal regulations

C. Responsibilities of the Contractor shall be as follows:

1. Inspect and maintain safe working conditions on the jobsite.
2. Maintain a competent person on site at all times designated to make safety inspections and to serve as the designated representative in charge of safety during an inspection by OSHA.
3. The Contractor's responsibilities and corresponding authority is as defined in the General Conditions of the Contract for Construction.
4. Provide regular and periodic safety inspections and reports by an independent safety consultant. Inspections and reports shall be performed at least once every three months.
5. Provide a safety representative who is trained in First Aid and CPR.
6. Separation of students and faculty from workers will be required to the greatest extent possible.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.1 ACCIDENTS

A. The Contractor shall notify the Owner of any personal injury at the project site that could require medical treatment. Also, any damage to property arising in connection with the Contractor's performance should be brought to the attention of the Owner as promptly as possible after the occurrence of such injury or damage, but no more than 24 hours after the

occurrence. Within 48 hours of such occurrence, the Contractor shall furnish to the Owner a complete written report of such injury or damage. Accident Reports shall include specific actions taken by the Contractor to preclude recurrence of similar incidents.

3.2 EMERGENCY DATA

A. The Contractor shall provide the Owner with the following emergency data prior to beginning work at the project site:

1. Emergency care facility to be utilized, including address and telephone number
2. Insurance company and local agent/name, address and telephone number
3. Detailed description of corporation or company safety program
4. Employees qualified in type of first aid; list employee and associated skills
5. Detailed description of specifically tailored job site safety program
6. Identify corporate and job site safety officer
7. Submit weekly TOOL BOX SAFETY TALK program/meeting minutes including:

    a. Day of week
    b. Time of day
    c. Location
    d. Attendance record
    e. Agenda
    f. Unsafe items previously discussed and date of correction
    g. Identify on-site personnel with First Aid training

8. All applicable MSDS Program sheets. (Include numbered pages and Table of Contents)
9. Submit completed hazardous substance survey form
10. Review project “Emergency Response Plan” with the Owner

3.3 SAFETY AGREEMENT

A. The Contractor shall review and comply with the following Safety Agreement before beginning work:

1. As the Contractor under this Contract, you have, by accepting this Contract, obligated yourself to conduct all your operations within this Safety Agreement.
2. The Contractor agrees that the prevention of accidents to employees engaged in the Work under this Agreement is the responsibility of the Contractor.
3. The Contractor agrees to comply with all laws, regulations and codes concerning safety as shall be applicable to the Work and to the safety standards established during the progress of the Work. When so ordered, the Contractor agrees to stop any part of the Work which any applicable agency may deem unsafe, until corrective measures satisfactory to the Owner and in accordance with the applicable Federal and/or State regulations have been taken and further agrees to make no claim for damages growing out of such stoppages. Should the Contractor neglect to adopt such corrective measures, the Owner may elect to hire an entity, perform the corrections and deduct the cost from

payments due or to become due the Contractor. Failure on the part of the Owner to stop unsafe practices shall in no way relieve the Contractor of their responsibility.

4. The Contractor realizes that an effective accident prevention program is to the mutual benefit the Contractor through improved employee and public relations and through increased efficiency and production.
5. Your attention is directed, but not limited to the following items:

3.4 HOUSEKEEPING

A. Indiscriminate accumulations of debris, waste or scrap in work areas will not be permitted. (Areas will be designated for storage or disposal). All materials, tools and equipment must be stored in an orderly manner in designated areas.

3.5 PERSONAL PROTECTION EQUIPMENT

A. Contractors must furnish their employees with the proper type of personal protective equipment as required by the operations being performed, including, but not necessarily limited to the following:

1. Hard Hats must be furnished to employees and worn at ALL times when on the project, whether or not an overhead hazard exists or what state of construction the project may be in.
2. The Owner requires that appropriate attire be worn at all times while employees are working on-site. Appropriate attire shall be as deemed necessary by the Owner and in accordance with all applicable OSHA regulations.

3.6 SAFETY MEETINGS

A. The Contractor is required to conduct, and all employees are required to attend Tool Box type safety meetings once a week. The meetings may be presided over by either the Contractor's foreman or another competent representative designated by the Contractor.

3.7 FIRE PROTECTION

A. The Contractor must supply approved fire extinguishers for emergency use within his own immediate area of operation, including the Contractor's office, tool and storage enclosures.

3.8 TREATMENT OF INJURIES

A. The Contractor shall require that all employees injured (no matter how slight) while working on the project, report immediately for First Aid treatment. The Contractor shall maintain adequate First Aid facilities in the field.

3.9 COOPERATION

A. Any deviation from this course of action will be called to the attention of the Contractor for immediate correction.

3.10 INSTALLED SAFETY APPARATUS

A. The Contractor is responsible for the installation of any safety apparatus required to perform the work of this project.

3.11 WEAPONS POLICY

A. All persons are prohibited from carrying, possessing or storing a handgun, firearm, or weapon of any kind while on the Project site, regardless of whether the person has registered the weapon or is licensed to carry a concealed weapon. Failure to abide by all terms and conditions of this policy may result in discipline up to and including termination. Further, carrying any weapon onto the Owner's property in violation of this policy will be considered an act of criminal trespass and possession of a weapon will be grounds for immediate removal of the person from the Project site, and may result in prosecution.

3.12 LISTENING DEVICES

A. The playing of radios or any other type of personal listening devices, using any type of speaker, including, but not limited to, headphones and ear buds, will not be permitted on this Project.

3.13 TOBACCO PRODUCTS

A. Smoking or the use of any tobacco products and vapor pens included on any school district-owned property is a violation of both District policy and state law. Violators caught smoking or using tobacco products will be removed from the Project and prosecuted to the fullest extent of the law.

3.14 DRUGS AND ALCOHOL

A. Any personnel caught possessing or using/consuming illegal drugs or alcoholic beverages on any part of school district-owned property will be removed from the Project and will be prosecuted to the fullest extent of the law.

END OF SECTION 014100

SECTION 015000 - TEMPORARY FACILITIES & CONTROLS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection.

B. Temporary utilities include, but are not limited to, the following:

1. Temporary water service and distribution
2. Temporary electrical power service and light
3. Storm facilities and sanitary sewer

C. Support facilities include, but are not limited to, the following:

1. Field offices and storage sheds
2. Temporary roads and paving
3. Dewatering facilities
4. Temporary enclosures
5. Hoists
6. Temporary project identification signs and bulletin boards
7. Waste disposal services
8. Rodent and pest control
9. Construction aids and miscellaneous services and facilities
10. Temporary heat
11. Ventilation
12. Sanitary facilities, including drinking water

D. Security and protection facilities include, but are not limited to, the following:

1. Temporary Fire Protection
2. Barricades, warning signs, and lights
3. Sidewalk bridges
4. Enclosure fencing for the site
5. Environmental protection

1.3 RESPONSIBILITIES

A. The Contractor is responsible for the following:

1. Installation, operation, maintenance, and removal of each temporary facility, as well as the costs and use charges associated with each facility unless noted otherwise.
2. Temporary electric power service and distribution. Prior to temporary utility availability, provide trucked in service.
3. Temporary lighting.
4. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting.
5. Multi-phase power service or power requirements in excess of 120-V, single phase, temporary power. Electric service for welding.
6. Temporary enclosure of the building.
7. Temporary heat, ventilation, humidity control.
8. Temporary toilets, including disposable supplies.
9. Containerized bottled-water drinking-water units.
10. Temporary water service. Prior to temporary utility availability, provide trucked in service.
11. Dewatering, including ice and snow removal of the building pad and in areas of foundation excavation and for all general construction activities.
12. Temporary roads and paving required to complete construction activities.
13. All hoisting requirements for construction activities
14. Continuous removal and disposal of general construction waste and debris generated by construction activities.
15. Collection and proper disposal of hazardous, dangerous, unsanitary or other harmful waste material.
16. Secure enclosure and lockup.
17. Secure lockup of tools, materials and equipment.
18. Construction aids and miscellaneous services and facilities.
19. Job trailer or field office.
20. Storage and fabrication sheds or trailers.
21. Temporary safety facilities.
22. Temporary construction identification signs and temporary site directional signage.
23. Rodent and pest control.
24. Barricades, warning signs and lights for construction activities.
25. Enclosure fence as required by construction activities. Refer to site drawings for extent.
26. Environmental protection for construction activities.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect unless specifically noted otherwise. The Owner will not accept the Contractor's cost or use charges for temporary services or facilities as a basis of claim for an adjustment in the Contract Sum or the Contract Time.

B. Water Service: The Owner will pay water service use charges, for all metered water used by all

entities engaged in construction activities at the Project Site.

C. Electric Power Service: The Owner will pay electric power service use charges, for all metered electric power used by all entities engaged in construction activities at the Project Site. The Owner's electric service is not permitted to be used for temporary heat.

D. Fuel for Temporary Heat: As described in the Temporary Heat paragraph.

1.5 SUBMITTALS

A. Temporary Utilities: The Contractor shall submit reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Within 15 days of the date established for submittal of the Contractor's Construction Schedule, the Contractor shall submit a schedule indicating implementation and termination dates of each temporary utility for which the Contractor is responsible.

1.6 QUALITY ASSURANCE

A. Regulations: The Contractor shall comply with industry standards and with applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building code requirements
2. Health and safety regulations
3. Utility company regulations
4. Police, fire department and rescue squad rules
5. Environmental protection regulations

B. Standards: The Contractor shall comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities".

1. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

A. Temporary Utilities: The Contractor shall prepare a schedule indicating dates for implementation and termination of each temporary utility for which the Contractor is responsible. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary services to use of permanent services.

1. Temporary Use of Permanent Facilities: The Contractor shall assume responsibility for its operation, maintenance and protection during use as a construction facility prior to the Owner's acceptance, regardless of previously assigned responsibilities. The Contractor shall make permanent facilities available in accordance with the approved Contractor's Construction Schedule.
2. Warranty Period: The Warranty Period for the entire project shall begin on the date of Substantial Completion, regardless of the start-up date for use as a temporary or permanent facility, including but not limited to materials and equipment.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: The Contractor shall provide new materials. If acceptable to the Owner or Architect, undamaged, previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Lumber and Plywood: Comply with the requirements of Division 6 Section "Rough Carpentry".

1. For job-built temporary offices, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
2. For signs and directory boards, provide exterior-type, Grade BB, high-density concrete form grade overlay plywood of sizes and thicknesses indicated.
3. For fences and vision barriers, provide minimum 3/8-inch thick exterior plywood.
4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch thick exterior plywood.

C. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

D. Water: Provide potable water approved by local health authorities.

E. Open-Mesh Fencing (Driven Posts): Provide 0.12-inch thick, galvanized 2-inch chain-link fabric fencing 6 feet high with galvanized steel pipe posts, 1-1/2 inches I.D. for line posts and 2-1/2 inches I.D. for corner posts.

F. Open-Mesh Fencing (Portable): Provide 0.12-inch thick, galvanized 2-inch chain-link fabric fencing 6 feet high on portable frames with self-standing T-foot posts

2.2 EQUIPMENT

A. General: The Contractor shall provide new equipment. If acceptable to the Owner or Architect, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for the use intended.

B. Water Hoses: Provide 3/4-inch heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at point of hose discharge.

C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher voltage outlets. Provide 120-V, single phase, ground-fault outlets at 100' on center in corridor areas and spaces larger than 800 square feet. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.

D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

E. Lamps and Light Fixtures: Provide general service lamps of wattage required for adequate illumination. At a minimum, install weatherproof sockets complete with lamps at 20' on center in all corridor areas, circulation areas and all spaces over 400 square feet. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.

F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.

G. Temporary Offices: The Contractor shall provide its own prefabricated or mobile units with lockable entrances, operable windows and serviceable finishes.

1. The Contractor, if their temporary office trailer is not sufficiently sized to accommodate the needs of regular job conferences, shall provide and maintain, in addition to their job trailer, a meeting trailer for such use, for the duration of the Project. The meeting trailer shall be complete with a heating and air-conditioning unit capable of maintaining a temperature range of between 70ºF and 75ºF year round.

2. The General Contractor shall provide all required electrical and plumbing. Use charges for all metered electrical and water will be paid by the Owner.
3. Provide daily housekeeping services, provide snow removal services and relocate the field office trailer to a secondary location should the original location serve to impede the progress and/or completion of the Project.

H. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar non-absorbent material.

I. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent and size required by location and class of fire exposure.

J. First Aid Supplies: Comply with regulations of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use qualified personnel for the installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. The Contractor shall provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.

1. Arrange with the utility company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

B. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

C. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters and main distribution switch gear.

1. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 V, ac 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

D. Temporary Lighting: When an overhead floor or roof deck has been installed, provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system.

E. Temporary Heat: As described in the Temporary Heat paragraph below.

F. Heating Facilities: As described in the Temporary Heat paragraph below.

G. Sanitary Facilities: Sanitary facilities include temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

1. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.

H. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.

1. Provide separate facilities for male and female personnel.

I. Environmental Protection: In addition to the provisions indicated on the drawings, provide earthen embankments and similar barriers in and around excavations and sub-grade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

3.3 TEMPORARY HEAT

A. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations, or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient conditions required and minimize consumption of energy.

1. Provide temporary heat at varying stages of the Project to allow construction operations to proceed in an orderly, sequential manner.

2. Temporary heat shall be initiated and maintained to allow the performance of Work for which a particular minimum ambient temperature must be maintained to meet the criteria described in individual sections of the technical specifications and as set forth by manufacturer’s recommendations.
3. Temporary heat shall be provided to ensure that construction activities conform with the Contractor’s Construction Schedule and to the scheduling sequence established by the Lead Contractor and as further directed by the Architect.
4. The term “building enclosure” refers to a level of completion of the building, or a designated portion thereof, that consists of the following:

a. Construction of roof structure, roof, insulation and roofing membrane
b. Construction of back-up masonry or exterior metal studs with exterior sheathing
c. Temporary enclosure of exterior wall openings. Refer to the “Temporary Enclosures” paragraph below for additional information.

B. Heating Facilities: Except where use of the permanent system is authorized, provide properly vented, self-contained LP gas or natural gas heaters with individual space thermostatic control.

1. Use of gasoline, oil or kerosene fueled space heaters is prohibited.

3.4 SUPPORT FACILITIES INSTALLATION

A. Storage and Fabrication Facilities: Install storage and fabrication sheds or mobile trailers, sized, furnished and equipped to accommodate materials and equipment involved. Facilities may be open shelters or fully enclosed.

B. Drinking Water Facilities: Provide containerized tap dispenser bottled water type drinking water units, including disposable paper supply.

C. Dewatering Facilities and Drains: Maintain the site, excavations and construction free of water, ice and snow.

D. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Install tarpaulins securely, with non-combustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
3. Close openings through floor or roof decks and horizontal surfaces with load bearing wood framed construction.

E. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

F. Project Identification and Temporary Signs: Prepare project identification and other signs of the size indicated; install where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative treated wood or steel. Do not permit installation of unauthorized signs.

1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.

G. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F. Handle hazardous, dangerous or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

H. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

I. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access. If not indicated on the drawings, verify temporary facility locations with the Owner prior to installation.

1. Maintain support facilities until near Substantial Completion.

J. Temporary Roads: Construct and maintain temporary roads to support the required loading adequately and to withstand exposure to traffic during the construction period. To the greatest extent possible, locate temporary roads, storage areas and parking where the same permanent facilities will be located.

1. Paving: Comply with Project specifications for construction and maintenance of temporary paving.
2. Coordinate temporary paving development with sub-grade grading, compaction, installation and stabilization of sub-base and installation of base and finish courses of permanent paving.
3. Install temporary paving to minimize the need to rework the installations and result in permanent roads and paved areas without damage or deterioration when occupied by the Owner.
4. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. General: Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Architect.

B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10, "Standard for Portable Fire Extinguishers," and NFPA 241, "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.

2. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
3. Provide supervision of welding operations, combustion-type temporary heating units and similar sources of fire ignition.

C. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

D. Storage of Flammable and Combustible Materials and Liquids: Comply with NFPA 241, “Standard for Safeguarding Construction, Alterations, and Demolition Operations” and NFPA 30, “Flammable and Combustible Liquid Code”

1. Storage: Store flammable and combustible materials and liquids in weathertight, ventilated and secure facilities outside of the building. Provide temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire and losses.

E. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.

F. Enclosure Fence: When excavation begins, install a lockable entrance gate and post "No Trespassing" signs at 50' on center around the site perimeter.

G. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.

1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

H. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid using tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons, homes or businesses near the site.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in the use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Owner requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of the Contractor. The Owner reserves the right to take possession of project identification signs.
2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.
3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:

    a. Replace air filters and clean inside of ductwork and housings.
    b. Replace significantly worn parts and parts subject to unusual operating conditions.
    c. Replace lamps burned out or noticeably dimmed by hours of use.

END OF SECTION 015000

SECTION 017200 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents.

B. Project Record Documents required include the following:

1. Copies of Record Drawings
2. Record Samples

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Submittals" specifies general requirements for preparing and submitting Project Record Documents
2. Division 1 Section “Operation and Maintenance Data” specifies requirements regarding submittal of operation and maintenance manuals.
3. Division 1 Section "Contract Closeout" specifies general closeout requirements.
4. Divisions 2 through 33 Sections for specific Project Record Document requirements.

D. Maintenance of Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition. Make documents and samples available at all times for the Architect's inspections.

1.3 RECORD DRAWINGS

A. Markup Procedures: During construction, maintain a set of black-line white prints of Contract Drawings and Shop Drawings for Project Record Document purposes. Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the Architect's reference during normal working hours.

1. Mark these Drawings to show the actual installation where the installation varies from the installation shown originally. Give particular attention to information on concealed

elements that would be difficult to identify or measure and record later. Items required to be marked include, but are not limited to, the following:

a. Dimensional changes to the Drawings
b. Revisions to details shown on the Drawings
c. Depths of foundations below the first floor
d. Locations and depths of underground utilities
e. Revisions to routing of piping and conduits
f. Revisions to electrical circuitry
g. Actual equipment locations
h. Duct size and routing
i. Locations of concealed internal utilities
j. Changes made by Change Order or Construction Change Directive
k. Changes made following the Architect's written orders
l. Details not on the original Contract Drawings

2. Mark record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.
3. Mark record sets with red erasable colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
4. Mark important additional information that was either shown schematically or omitted from original Drawings.
5. Note Construction Change Directive numbers, alternate numbers, change-order numbers, and similar identification.

B. Responsibility for Markup: The Contractor shall prepare the record drawings.

1. Accurately record information in an understandable drawing technique.
2. Record data as soon as possible after obtaining it. Record and check the markup prior to enclosing concealed installations.
3. At the time of Substantial Completion, submit record drawings to the Architect for the Owner's records. Organize the drawings into sets and bind and label the sets for the Owner's continued use.

C. Copies and Distribution: Print 3 black-line prints of each drawing, whether or not changes and additional information were recorded. Organize the copies into manageable sets. Bind each set with durable-paper cover sheets. Include appropriate identification, including titles, dates, and other information on the cover sheets.

1. Organize and bind the original marked-up set of prints that were maintained during the construction period in the same manner.
2. Organize print sets. Place these sets in durable tube-type drawing containers with end caps. Mark the end cap of each container with suitable identification.
3. Submit the marked-up record set and three (3) copy sets to the Architect for the Owner's records; the Architect will retain one (1) copy set.

1.4 RECORD SAMPLE SUBMITTAL

A. Immediately prior to the date of Substantial Completion, meet with the Owner at the Project site to determine which of the samples maintained during the construction period shall be transmitted to the Owner for record purposes. Comply with the Architect's instructions for packaging, identification marking, and delivery to the Owner's sample storage space. Dispose of other Samples in a manner specified for disposing surplus and waste materials.

1.5 MISCELLANEOUS RECORD SUBMITTALS

A. Refer to Individual Specification Sections in Divisions 2 through 33 for additional record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the Architect for the Owner's records.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 RECORDING

A. Post changes and modifications to the Documents as they occur. Do not wait until the end of the Project.

END OF SECTION 017200

SECTION 017700 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Contract closeout including, but not limited to, the following:

1. Inspection procedures

B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 33.

C. Related Sections: The following Sections contain requirements that relate to this Section.

1. Division 1 Section “Final Cleaning” for additional information regarding project closeout, cleaning and punch list requirements.

D. In the event that Additional Services by the Architect are made necessary by the actions of the Contractor, such as failure to meet Substantial Completion or Final Acceptance of the Work within the time frames required by the Contract Documents, the Contractor’s responsibility for costs of the Architect as defined throughout this Section shall be calculated to the hourly rates noted in the Architect’s Agreement with the Owner. Costs shall be deducted from the Contractor’s final payment without Change Order.

1.3 CONTRACTOR’S PUNCH LIST AND TIME FOR COMPLETION

A. General: The Contractor’s Punch List is a comprehensive list of observed items requiring completion or correction, prepared by the Contractor for their Work.

B. Using the Punch List Form attached to the end of this Section, or in an electronic format acceptable to the Architect, (i.e. Bluebeam, PlanGrid, etc.), list the location, the date, a description of the item and the Contractor responsible for the item. Upon request by the Contractor, this Punch List Form can be provided in MS Excel format.

C. Except for items whose completion is delayed under circumstances as determined acceptable solely by the Architect, it is a requirement of the Project that ALL Punch List items, from both the Contractor’s and the Architect’s Punch Lists, be completed or corrected by the Contractor within 30 days of the date established by the Architect for Substantial Completion.

1. Except as noted above, if the Project is not finally accepted by the Architect within 30 days of the date established for Substantial Completion, or if additional and repeated site visits or meetings are required to assure Final Acceptance, all costs incurred by the Architect, both direct and indirect, shall be chargeable to the Contractor. Refer to Paragraph 1.2.D above.

1.4 SUBSTANTIAL COMPLETION

A. Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete and clean in accordance with the requirements of the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

B. Preliminary Procedures: Before requesting inspection for a Certificate of Substantial Completion, complete all of the following tasks. List ALL exceptions in the request.

1. In the Application for Payment that first follows the date Substantial Completion is claimed, show 100% completion for the portions of the Work claimed as substantially complete.

    a. Include supporting documentation for completion as indicated in the Contract Documents and a statement showing an accounting of changes to the Contract Sum.
    b. If 100% completion cannot be shown, include a Punch List of incomplete items, the value of the incomplete construction and reasons the Work is not complete.

2. Advise the Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Submit record drawings, maintenance manuals, damage or settlement surveys, property surveys and similar final record information.
6. Deliver tools, spare parts, extra stock, and similar items.
7. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
9. Complete final cleanup requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred, exposed finishes.

C. Contractor Punch List Requirements: When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, and before the Architect will inspect the Work or issue a Certificate of Substantial Completion, the Contractor shall submit a Punch List for review of observed items requiring completion or correction prior to final payment. Failure to include an item does not alter the responsibility of

the Contractor to complete all Work in accordance with the requirements of the Contract Documents.

1. If the Project is not defined as phased construction in the Contract Documents and the Contractor requests that a portion of the Project be inspected by the Architect to be deemed substantially complete, the Architect's costs, both direct and indirect, related to said inspection by the Architect shall be the responsibility of the Contractor. Refer to Paragraph 1.2.D above.

D. Inspection Procedures: Upon request by the Contractor for inspection and receipt of the Contractor's Punch List, the Architect will either proceed with the inspection to determine whether the Work or designated portion thereof is substantially complete or advise the Contractor of unfulfilled requirements. If the Architect's inspection discloses any item, whether or not included on the Contractor's Punch List, which is not sufficiently complete in accordance with the requirements of the Contract Documents to allow the Owner to occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion by the Architect, complete or correct such item upon notification by the Architect.

1. The Architect will prepare the Certificate of Substantial Completion following successful inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

2. If reinspection is necessary to assure Substantial Completion, all costs incurred by the Architect, both direct and indirect, shall be chargeable to the Contractor. Refer to Paragraph 1.2.D above. Following successful reinspection, the Architect will prepare a Certificate of Substantial Completion. If the Work is still not substantially complete, the Architect will advise the Contractor of its obligations that have not been fulfilled and which are still required for Substantial Completion.

    a. If necessary, the reinspection will be repeated. If this additional reinspection is required, all costs incurred by the Architect, both direct and indirect, shall be chargeable to the Contractor. Refer to Paragraph 1.2.D above.
    b. Results of the completed inspection will form the basis of requirements for Final Acceptance.

1.5 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection and final payment, complete all of the following tasks. List ALL exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Submit a copy of the Contractor's Punch List of items to be completed or corrected, prepared at the time of Substantial Completion, endorsed, and dated by the Contractor.

This copy of the Contractor's Punch List shall state that each item has been completed or otherwise resolved for acceptance.

4. Submit consent of surety to final payment.
5. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Final Inspection Procedures: Upon receipt of the endorsed copy of the Contractor's Punch List and a request for final inspection, the Architect will either proceed with the inspection or advise the Contractor of unfulfilled requirements.

1. The Architect will either endorse and date the completed Contractor's Punch List following final inspection, or advise the Contractor of construction that must be completed or corrected before Final Acceptance.
2. If reinspection is necessary to assure Final Acceptance, all costs incurred by the Architect, both direct and indirect, shall be chargeable to the Contractor. Refer to Paragraph 1.2.D above. If the Work is still not finally complete, the Architect will advise the Contractor of its obligations that have not been fulfilled and which are still required for Final Acceptance.

a. If necessary, the reinspection will be repeated. If this additional reinspection is required, all costs incurred by the Architect, both direct and indirect, shall be chargeable to the Contractor. Refer to Paragraph 1.2.D above.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.1 CLOSEOUT PROCEDURES

A. Operation and Maintenance Instructions: Arrange for the Installer of each piece of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in the proper operation and maintenance of the installed equipment. Provide instruction by manufacturer's representatives if installers are not experienced in the operation and maintenance procedures. Include a detailed review of the following items:

1. Maintenance manuals
2. Record documents
3. Spare parts and materials
4. Tools
5. Lubricants
6. Fuels
7. Identification systems
8. Control sequences
9. Hazards
10. Cleaning
11. Warranties and bonds

12. Maintenance agreements and similar continuing commitments

B. As part of the instruction for operating equipment, demonstrate the following procedures:

1. Startup
2. Shutdown
3. Emergency operations
4. Noise and vibration adjustments
5. Safety procedures
6. Economy and efficiency adjustments
7. Effective energy utilization

3.2 CONTRACT REQUIREMENT AND CLOSEOUT CHECK LIST

A. Information: The attached Contract and Closeout Check List is a summary of the items required for Substantial Completion.

END OF SECTION 017700

SECTION 017800 - FINAL CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for final cleaning at Substantial Completion.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Temporary Facilities & Controls" specifies general cleanup and waste removal requirements.
2. Division 1 Section "Contract Closeout" specifies general contract closeout requirements.
3. Special cleaning requirements for specific construction elements are included in appropriate Sections of Divisions 2 through 33.

C. Environmental Requirements: Conduct cleaning and waste-disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.

1. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinners, in storm or sanitary drains.
2. Burning or burying of debris, rubbish or other waste material on the premises is not permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final-cleaning services. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

B. Complete the following cleaning operations **before** requesting inspection for Substantial Completion for the Project or a portion of the Project.

1. Clean the Project Site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and foreign substances.
2. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
3. Remove petrochemical spills, stains, and other foreign deposits.
4. Remove tools, construction equipment, machinery, and surplus material from the site.
5. Remove snow and ice to provide safe access to the building.
6. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
7. Remove debris and surface dust from limited access spaces including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
8. Broom clean concrete floors in unoccupied spaces.
9. Vacuum clean carpet and similar soft surfaces removing debris and excess nap. Shampoo, if required.
10. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
11. Remove all non-permanent labels.
12. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    a. Do not paint over "UL" and similar labels including mechanical and electrical nameplates.

13. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
14. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

15. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers and grills.
16. Clean ducts, blowers and coils if units were operated without filters during construction.
17. Clean food-service equipment to a sanitary condition, ready and acceptable for its intended use.
18. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.
19. Leave the Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects and other pests. Comply with regulations of local authorities.

D. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.

E. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of lawfully.

1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the Owner.

END OF SECTION 017800

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for operation and maintenance manuals, including the following:

1. Preparing and submitting operation and maintenance manuals for building operating systems and equipment.
2. Preparing and submitting instruction manuals covering the care, preservation, and maintenance of architectural products and finishes.
3. Instruction of the Owner's operating personnel in the operation and maintenance of building systems and equipment.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Submittals" specifies preparation of Shop Drawings and Product Data.
2. Division 1 Section "Contract Closeout" specifies general closeout requirements.
3. Appropriate Sections of Divisions 2 through 33 specify special operation and maintenance data requirements for specific pieces of equipment or building operating systems.

1.3 QUALITY ASSURANCE

A. Maintenance Manual Preparation: In preparation of maintenance manuals, use personnel thoroughly trained and experienced in operation and maintenance of the equipment or system involved.

1. Where maintenance manuals require written instructions, use personnel skilled in technical writing where necessary for communication of essential data.
2. Where maintenance manuals require drawings or diagrams, use draftsmen capable of preparing drawings clearly in an understandable format.

B. Instructions for the Owner's Personnel: Use experienced instructors thoroughly trained and experienced in operation and maintenance of equipment or system involved to instruct the Owner's operation and maintenance personnel.

1.4 SUBMITTALS

A. Submittal Schedule: Comply with the following schedule for submitting operation and maintenance manuals:

1. **Before Substantial Completion**, when each installation that requires operation and maintenance manuals is nominally complete, submit two (2) draft copies of each manual to the Architect for review. Include a complete index or table of contents of each manual.

    a. The Architect will return one (1) copy of the draft with comments within 15 days of receipt.

2. Submit one (1) copy of data in final form **at least 15 days before final inspection**. The Architect will return this copy within 15 days after final inspection, with comments.
3. After final inspection, make corrections or modifications to comply with the Architect's comments. Submit the specified number of copies of each approved manual to the Architect **within 15 days of receipt of the Architect's comments**.

B. Form of Submittal: Prepare operation and maintenance manuals in the form of an instructional manual for use by the Owner's operating personnel. Organize into suitable sets of manageable size. Where possible, assemble instructions for similar equipment into a single binder.

1. Binders: For each manual, provide heavy-duty, commercial-quality, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to receive 8-1/2-by-11- inch paper. Provide a clear plastic sleeve on the spine to hold labels describing contents. Provide pockets in the covers to receive folded sheets.

    a. Where two (2) or more binders are necessary to accommodate data, correlate data in each binder into related groupings according to the Project Manual table of contents. Cross-reference other binders where necessary to provide essential information for proper operation or maintenance of the piece of equipment or system.
    b. Identify each binder on the front and the spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and the subject matter covered. Indicate volume number for multiple volume sets of manuals.

2. Dividers: Provide heavy paper dividers with celluloid-covered tabs for each separate Section. Mark each tab to indicate contents. Provide a typed description of the product and major parts of equipment included in the Section on each divider.
3. Protective Plastic Jackets: Provide protective, transparent, plastic jackets designed to enclose diagnostic software for computerized electronic equipment.
4. Text Material: Where maintenance manuals require written material, use the manufacturer's standard printed material. If manufacturer's standard printed material is not available, provide specially prepared data, neatly typewritten, on 8-1/2-by-11-inch white bond paper.
5. Drawings: Where maintenance manuals require drawings or diagrams, provide reinforced, punched binder tabs on drawings and bind in with text.

a. Where oversize drawings are necessary, fold drawings to the same size as text pages and use as a foldout.
b. If drawings are too large to be used practically as a foldout, place the drawings, neatly folded, in front or rear pocket of binder. Insert a typewritten page indicating drawing title, description of contents and drawing location at the appropriate location in the manual.

1.5 MANUAL CONTENT

A. In each manual, include information specified in the individual Specification Section and the following information for each major component of building equipment and its controls:

1. General system or equipment description
2. Design factors and assumptions
3. Copies of applicable Shop Drawings and Product Data
4. System or equipment identification, including:

    a. Name of manufacturer
    b. Model number
    c. Serial number of each component

5. Operating instructions
6. Emergency instructions
7. Wiring diagrams
8. Inspection and test procedures
9. Maintenance procedures and schedules
10. Precautions against improper use and maintenance
11. Copies of warranties
12. Repair instructions including spare parts listing
13. Sources of required maintenance materials and related services
14. Manual index

B. Organize each manual into separate Sections for each piece of related equipment. As a minimum, each manual shall contain a title page; a table of contents; copies of Product Data, supplemented by Drawings and written text and copies of each warranty, bond and service contract issued.

1. Title Page: Provide a title page in a transparent, plastic envelope as the first sheet of each manual. Provide the following information:

    a. Subject matter covered by the manual
    b. Name and address of the Project
    c. Date of submittal
    d. Name, address, and telephone number of the Contractor
    e. Name and address of the Architect
    f. Cross-reference to related systems in other operation and maintenance manuals

2. Table of Contents: After the title page, include a typewritten table of contents for each volume, arranged systematically according to the Project Manual format. Include a list of each product included, identified by product name or other appropriate identifying symbol and indexed to the content of the volume.

    a. Where a system requires more than one volume to accommodate data, provide a comprehensive table of contents for all volumes in each volume of the set.

3. General Information: Provide a General Information section immediately following the table of contents listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the subcontractor or installer and the maintenance contractor. Clearly delineate the extent of responsibility of each of these entities. Include a local source for replacement parts and equipment.
4. Product Data: Where the manuals include manufacturer's standard printed data, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where the Project includes more than one item in a tabular format, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation, and delete references to information that is not applicable.
5. Written Text: Prepare written text to provide necessary information where manufacturer's standard printed data is not available, and the information is necessary for proper operation and maintenance of equipment or systems. Prepare written text where it is necessary to provide additional information or to supplement data included in the manual. Organize text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each operation or maintenance procedure.
6. Drawings: Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems or to provide control or flow diagrams. Coordinate these drawings with information contained in project record drawings to assure correct illustration of the completed installation.

    a. Do not use original project record documents as part of operation and maintenance manuals.

7. Warranties, Bonds, and Service Contracts: Provide a copy of each warranty, bond, or service contract in the appropriate manual for the information of the Owner's operating personnel. Provide written data outlining procedures to follow in the event of product failure. List circumstances and conditions that would affect validity of the warranty or bond.

1.6 MATERIAL AND FINISHES MAINTENANCE MANUAL

A. Submit three (3) copies of each manual, in final form, on materials and finishes to the Architect for distribution. Provide one section for architectural products, including applied materials and finishes. Provide a second section for products designed for moisture protection and products exposed to the weather.

1. Refer to individual Specification Sections for additional requirements on the care and maintenance of materials and finishes.

B. Architectural Products: Provide manufacturer's data and instructions on the care and maintenance of architectural products, including applied materials and finishes.

1. Manufacturer's Data: Provide complete information on architectural products, including the following, as applicable:

a. Manufacturer's catalog number
b. Size
c. Material composition
d. Color
e. Texture
f. Reordering information for specially manufactured products

2. Care and Maintenance Instructions: Provide information on the care and maintenance, including manufacturer's recommendations for types of cleaning agents to be used and methods of cleaning. Provide information on cleaning agents and methods that could prove detrimental to the product. Include the manufacturer's recommended schedule for cleaning and maintenance.

C. Moisture Protection and Products Exposed to Weather: Provide complete manufacturer's data with instructions on inspection, maintenance and repair of products exposed to the weather or designed for moisture-protection purposes.

1. Manufacturer's Data: Provide manufacturer's data giving detailed information, including the following, as applicable:

a. Applicable standards
b. Chemical composition
c. Installation details
d. Inspection procedures
e. Maintenance information
f. Repair procedures

D. Schedule: Provide complete information in the materials and finishes manual on products specified in the following Sections:

1. Face Brick and Masonry: Division 4 Section “Unit Masonry Assemblies”
2. Metal Wall Panels: Division 7 Section “Metal Wall Panels”
3. Finish Hardware: Division 8 Section “Door Hardware”
4. Carpet: Division 9 Section “Carpet”
5. Ceramic Tile: Division 9 Section “Tiling”
6. Wood Flooring: Division 9 Section “Wood Athletic Flooring”

1.7 EQUIPMENT AND SYSTEMS MAINTENANCE MANUAL

A. Submit six (6) copies of each manual, in final form, on equipment and systems to the Architect for distribution. Provide separate manuals for each unit of equipment, each operating system and each electric and electronic system.

1. Refer to individual Specification Sections for additional requirements on the operation and maintenance of the various pieces of equipment and operating systems.

B. Equipment and Systems: Provide the following information for each piece of equipment, each building operating system and each electric or electronic system.

1. Description: Provide a complete description of each unit and related component parts, including the following:

a. Equipment or system function
b. Operating characteristics
c. Limiting conditions
d. Performance curves
e. Engineering data and tests
f. Complete nomenclature and number of replacement parts

2. Manufacturer's Information: For each manufacturer of a component part or piece of equipment, provide the following:

a. Printed operation and maintenance instructions
b. Assembly drawings and diagrams required for maintenance
c. List of items recommended to be stocked as spare parts

3. Maintenance Procedures: Provide information detailing essential maintenance procedures, including the following:

a. Routine operations
b. Troubleshooting guide
c. Disassembly, repair, and reassembly
d. Alignment, adjusting, and checking

4. Operating Procedures: Provide information on equipment and system operating procedures, including the following:

a. Startup procedures
b. Equipment or system break-in
c. Routine and normal operating instructions
d. Regulation and control procedures
e. Instructions on stopping
f. Shutdown and emergency instructions

g. Summer and winter operating instructions
h. Required sequences for electric or electronic systems
i. Special operating instructions

5. Servicing Schedule: Provide a schedule of routine servicing and lubrication requirements, including a list of required lubricants for equipment with moving parts.
6. Controls: Provide a description of the sequence of operation and as-installed control diagrams by the control manufacturer for systems requiring controls.
7. Coordination Drawings: Provide each Contractor's Coordination Drawings.

    a. Provide as-installed, color-coded, piping diagrams, where required for identification.

8. Valve Tags: Provide charts of valve-tag numbers, with the location and function of each valve.
9. Circuit Directories: For electric and electronic systems, provide complete circuit directories of panelboards, including the following:

    a. Electric service
    b. Controls
    c. Communication

1.8 INSTRUCTIONS FOR THE OWNER'S PERSONNEL

A. **Prior to final inspection**, instruct the Owner's personnel in the operation, adjustment, and maintenance of products, equipment and systems. Provide instruction at mutually agreed upon times.

    1. For equipment that requires seasonal operation, provide similar instruction during other seasons.
    2. Use the operation and maintenance manuals for each piece of equipment or system as the basis of instruction. Review contents in detail to explain all aspects of operation and maintenance.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 017823

SECTION 017900 - WARRANTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1. Refer to the General Conditions of the Contract for Construction for terms of the Contractor's period for correction of the Work.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Submittals" specifies procedures for submitting warranties.
2. Division 1 Section "Contract Closeout" specifies contract closeout procedures.
3. Divisions 2 through 33 Sections for specific requirements for warranties and special warranties on products and installations specified to be warranted.
4. Certifications and other commitments and agreements for continuing services to the Owner are specified elsewhere in the Contract Documents.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers and subcontractors required to countersign special warranties with the Contractor.

1.3 DEFINITIONS

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with the requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with the requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.5 SUBMITTALS

A. Submit written warranties to the Architect **prior to the date certified for Substantial Completion.** If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion of the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within 15 days of completion of that designated portion of the Work.

B. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

C. Form of Submittal: At Final Completion compile two (2) copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

D. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name and the name of the Contractor.
3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 017900

FLUVANNA COUNTY, VA
FLUVANNA COUNTY MULTIPURPOSE ROOM ADDITIONS AND RENOVATIONS

VOLUME 2
DIVISIONS 2 - 12
TECHNICAL MANUAL

IFB#2021-01

Crabtree, Rohrbaugh & Associates - Architects
250 W Main St Charlottesville, VA 22902

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SECTION 02 4113 - SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of existing asphalt and/or concrete pavement, concrete and/or asphalt walks, curbs and gutters, and other exterior site items indicated or not indicated which interfere with the Work.
2. Removal and/or relocation of existing underground utilities.
3. Removal and disposal of existing sanitary sewer pipe, water pipe, storm drainage pipe and appurtenances indicated. Filling of existing pipes to be abandoned in place.
4. Removal and replacement of fencing and playground equipment.
5. Removal and relocation of existing light poles.

1.3 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.

C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

D. Existing to Remain: Protect items indicated to remain against damage and soiling. When permitted by the Owner, items may be removed to a suitable, protected storage location and then cleaned and reinstalled in their original locations.

1.4 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, remove demolished materials from the site with further disposition at the Contractor's option.

B. Storage or sale of removed items or materials on-site will not be permitted.

C. Historical items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner, which may be encountered, remain the Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.

1.5 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by the Work.

B. Record drawings at Project closeout.

1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

C. Proposed dust-control measures.

D. Schedule of selective demolition activities indicating the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
2. Interruption of utility services.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Detailed sequence of selective demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
6. Locations of temporary partitions and means of egress.

E. Inventory of items to be removed and salvaged or turned over to Owner.

F. Landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: All work shall comply with Federal, State and Local laws and regulations concerning hauling and disposal of demolition debris.

B. Notify the proper agencies prior to the start of work and obtain all necessary permits for this work.

1.7 PROJECT CONDITIONS

A. Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner to the extent practical. However, minor variations may occur due to Owner's removal and salvage operations prior to the start of demolition work.

B. The location of existing underground utilities indicated is approximate only. Field locate all existing underground utilities in the area of work, regardless of whether or not they are indicated. Call "Miss Utility" prior to the start of demolition work for assistance in the location of existing underground utilities.

C. Should charted, uncharted or incorrectly charted utilities be encountered during demolition, contact the Engineer immediately for instructions. Cooperate with Owner and utility companies to keep services and facilities in operation.

D. Do not interrupt existing utilities serving facilities occupied and used by the Owner and others, except when permitted in writing by the Owner. Provide acceptable temporary utility service as required to maintain Owner's operations.

1.8 SCHEDULING

A. Owner will occupy portions of the building immediately adjacent to the Work. Conduct selective demolition so that the Owner's operations will not be disrupted. Provide not less than 72 hours notice to Owner of activities that will affect Owner's operations.

B. Arrange selective demolition schedule so as not to interfere with Owner's on-site operations.

C. Notify and coordinate any required relocation and/or removal of existing underground utilities, poles, meters or other above ground appurtenances with the appropriate utility company (i.e. power, telephone, cable and natural gas/propane) prior to the start of selective demolition work.

1.9 PAYMENT FOR UTILITY REMOVAL / RELOCATIONS

A. Electric Service – The Owner will pay for the relocation

B. Phone Service – The Owner will pay for the relocation

C. Cable Television – The Owner will pay for the relocation

D. Fiber Optic Lines – The Owner will pay for the relocation

1.10 USE OF EXPLOSIVES

A. Do not use explosives to perform selective site demolition work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Call “Miss Utility” prior to the start of demolition work for assistance in the location of existing underground utilities. Field locate all existing underground utilities in the area of work, regardless of whether or not they are indicated.

B. Should uncharted or incorrectly charted existing utilities be identified, contact the Engineer immediately for instructions. Provide a scale drawing with the location of the uncharted or incorrectly charted utilities for use by the Engineer in preparing additional direction.

C. Verify that utilities indicated as removed, abandoned and/or relocated have been disconnected and capped.

D. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

E. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged and turned over to the Owner.

3.2 PROTECTION OF PERSONS AND PROPERTY

A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
2. Protect existing site improvements, appurtenances, and landscaping to remain.

D. Barricade areas of demolition occurring as part of this work, and post with warning lights as required by authorities having jurisdiction.

E. Protect structures, buildings, utilities, walks, pavements, existing vegetation and other facilities to remain from damage caused by settlement, lateral movement, undermining, washout and other hazards created by demolition operations.

3.3 POLLUTION CONTROLS

A. Perform all work in accordance with the requirements of the latest edition of the Virginia Erosion and Sediment Control Handbook and those of the local Erosion Control official.

B. Clean adjacent structures and improvements of dust, dirt, and debris caused by the Work. Return adjacent areas to condition existing before start of selective demolition.

3.4 DEMOLITION OF EXISTING FACILITIES

A. Electric Service

1. Coordinate the removal and/or relocation of existing utilities with Power Company.
2. Contact Power Company Representative to arrange for required removal and/or relocation of existing service.

B. Phone Service

1. Coordinate the removal and/or relocation of existing utilities with Phone Company.
2. Contact Phone Company Representative to arrange for required removal and/or relocation of existing service.

C. Cable Television

1. Coordinate the removal and/or relocation of existing utilities with Cable Company.
2. Contact Cable Company Representative to arrange for required removal and/or relocation of existing service.

D. Fiber Optic Lines

1. Coordinate the removal and/or relocation of existing utilities with Fiber Optic Company.
2. Contact Fiber Optic Company Representative to arrange for required removal and/or relocation of existing service.

E. Utilities

1. Coordinate the removal and/or relocation of existing utilities with the appropriate utility companies.
2. Remove existing utilities as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and to local jurisdictional codes.
3. Provide adequate means of support and protection during demolition and other construction operations for existing utilities that are to remain in place. Repair utilities damaged by construction operations to the satisfaction of the utility owner.

F. Asphalt Pavement

1. Remove asphalt concrete pavement by sawcutting to the full depth of the pavement. Provide neat sawcuts at the limits of pavement removal indicated.

G. Concrete Pavement, Walks and Curbs

1. Remove concrete pavement and walks to the nearest joint. Sawcut concrete if joints are not present adjacent to the area of demolition.
2. Sawcut concrete along straight lines to a depth of not less than 2 inches. Break out remainder of concrete, provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or sawcut entirely through concrete.

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3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Do not burn demolished materials or debris.

C. Transport and legally dispose of demolished materials off of Owner's property.

3.6 CLEANUP AND REPAIR

A. Upon completion of demolition work remove all tools, equipment and demolition materials from site. Remove demolition work area protection and leave areas clean.

B. Repair any demolition performed in excess of that required. Return elements of construction and surfaces to remain to the condition existing prior to the start of construction. Repair adjacent construction or surfaces soiled or damaged by demolition work.

END OF SECTION 02 4113

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of a building or structure.
2. Salvage of existing items to be reused or recycled.

B. Related Sections include the following:

1. Division 1 Section "Summary of Work" for use of premises, and phasing, and Owner-occupancy requirements.
2. Division 1 Section "Temporary Facilities & Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities and environmental-protection measures for selective demolition operations.
3. Division 1 Section "Cutting and Patching" for cutting and patching procedures for selective demolition operations.
4. Divisions 15 and 16 for demolishing, cutting, patching, or relocating mechanical and electrical items.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to the Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner that may be encountered during selective demolition remain the Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.
   1. Before demolition and throughout construction, all Prime Contractors shall be responsible to review with the Owner's, all items being removed by their trades. All items designated during this review to remain the Owner's property, shall be maintained in good condition and turned over to the Owner.
   2. GC alternate is to demolish the mezzanine in the warehouse and to neatly stack all columns at a location on the site to be determined by the Owner. All other mezzanine debris is to be removed from the site by the contractor.

1.5 SUBMITTALS

A. Qualification Data: For Contractor.

B. Schedule of Selective Demolition Activities: Indicate the following:

   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Locations of proposed dust and noise-control temporary partitions and means of egress.
   5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
   6. Means of protection for items to remain and items in path of waste removal from the building.

Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

C. Pre-demolition Photographs or Recordings: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

D. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that specializes in demolition work similar in material and extent to that indicated for this Project.

B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.7 PROJECT CONDITIONS

A. The Owner will occupy portions of the building immediately adjacent to the selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

1. Comply with requirements specified in Division 1 Section "Summary of Work."

B. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner as far as is practical.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Architect and Owner. The Owner will remove the hazardous materials under a separate contract, or request a proposal to remove the hazardous materials.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

F. All Contractors shall be responsible for verification of all existing building dimensions and conditions, including finishes and materials, systems shown and designated as existing on the Contract Drawings prior to starting demolition and construction. Any discrepancies in information indicated on the Contract drawings shall be directed in writing to the attention of the Architect prior to the start of demolition and construction. Verification of clearances

required for all new equipment, piping, ductwork and related components shall be the Contractor's responsibility.

G. All Contractors shall patch, repair or replace all existing finishes and materials disturbed or damaged during demolition. All repair or replacement shall match adjacent existing and/or new finishes and materials as indicated.

H. See Architectural, Structural, Mechanical, Electrical and Plumbing drawings for demolition work required. Coordinate all Work by other Contractors, including, but not limited to, capping and disconnection of building services.

I. Existing conditions as appear in these Contract Documents may vary with actual conditions because of undocumented work performed by Owner's staff and by other contractors.

J. All Contractors shall be responsible for verification of all demolition conditions related to accepted Alternate bids, including finishes and materials, systems shown and designated as existing or new on the Contract Drawings prior to starting of demolition and construction. Any discrepancies in information indicated on the Contract Drawings shall be directed in writing to the attention of Architect prior to starting demolition and construction.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine the extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.

E. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, or preconstruction videotapes.

1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproductions.

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

1. Comply with requirements for existing services/systems interruptions specified in Division 1 Section "Summary of Work."

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. The Owner will arrange to shut off indicated services/systems when requested by the Contractor. The Contractor may make these arrangements if approved by the Owner.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition, provide temporary services/systems that bypass the area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

    a. Where an entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities & Controls"

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective `demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities & Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Reuse of Building Elements: Do not demolish building elements beyond what is indicated in the Contract Documents without Architect's approval.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.

3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site.
5. Protect items from damage during storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Cut concrete at junctures with construction to remain, using power-driven saw. Neatly trim openings to dimensions indicated.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.

1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

E. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Refer to Division 7 Sections for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories as indicated in the demolition and renovation notes.

F. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

G. Refer to the drawings for additional demolition work if any for each room or building component.

H. Prepare existing remaining substrates to receive new finishes as indicated on the finish schedule. Preparation of substrates shall be in conformance with the installation requirements of each new finish.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders and vapor barriers.
12. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.9 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.

D. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 36, smooth, galvanized steel bars, cut true to length with ends square and free of burrs.

B. Zinc Repair Material: ASTM A 780/A 780M.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I/II.
2. Fly Ash: ASTM C 618, Class F.

3. Slag Cement: ASTM C 989/C 989M, Grade 120.
4. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal, typical.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

F. Water: ASTM C 94/C 94M.

2.5 FIBER REINFORCEMENT

A. Synthetic Micro-Fiber: Fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches long.

1. Available Products

a. Fibrillated Fibers:

1) Euclid Chemical Company; Fiberstrand F.
2) Grace Construction Products, W.R. Grace & Co.; Grace Fibers.
3) Propex Concrete Systems; Fibermesh, 300.

B. Synthetic Macro-Fiber: Polyolefin macro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1 to 2-1/4 inches long.

1. Available Products

a. Grace Construction Products: Strux 90/40
b. Propex Concrete Systems: Fibermesh 650
c. Euclid Chemical Company: TUF-Strand SF

2.6 VAPOR RETARDERS AND BARRIERS

A. Vapor Retarder: A 10 mil vapor retarder with a permeability of 0.04 perms or lower when tested in accordance with ASTM E 96; meeting or exceeding the requirement of ASTM E 1745 Class A; and wherein the vapor retarder component (plastic) is no less than 10 mils thick in accordance with ACI 302.1 R-96, and consists of multi-layer extruded virgin polyolefin plastic. Ungraded polyethylene sheet is not acceptable. Include companion joint tape, mastic, and accessory materials.

1. Available products include:

    a. Stego Wrap “10A” (10 mil) by Stego Industries LLC.
    b. Griffolyn 10 Mil Green by Reef Industries.
    c. Perminator 10 by W.R. Meadows

B. Vapor Barrier: A 15 mil vapor barrier with a water vapor transmission rate (WVTR) of 0.008 grains/h-sq. ft. or lower when tested in accordance with ASTM E 96; meeting or exceeding the requirement of ASTM E 1745 Class A; and wherein the vapor barrier component (plastic) is no less than 15 mils thick in accordance with ACI 302.1 R-96, and consists of multi-layer extruded virgin polyolefin plastic. Ungraded polyethylene sheet is not acceptable. Include companion joint tape, mastic, and accessory materials.

1. Available products include:

    a. Stego Wrap Vapor Barrier (15 mil) by Stego Industries LLC.
    b. Perminator 15 by W.R. Meadows
    c. Griffolyn 15 Mil Green by Reef Industries

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A

2.8 RELATED MATERIALS

A. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.9 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.

2. Slag Cement: 50 percent.
3. Silica Fume: 10 percent.
4. Limit total percentage of portland cement substitutes to 50 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement, typical.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use high-range water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. All normal weight concrete except slabs-on-grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: As indicated at 28 days.
2. Slump Limit: 5 inches, 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
3. Air Content:

    a. At exterior exposed conditions. 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
    b. All other conditions: No air entrainment required.

B. Slabs-on-Grade :: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: As indicated at 28 days.
2. Slump Limit: 5 inches, 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
3. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

2.12 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORING AND RESHORING INSTALLATION

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR-RETARDER AND VAPOR BARRIER INSTALLATION

A. Sheet Vapor Retarders and Vapor Barriers: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.6 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install bond-breaking polyethylene strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend bond-breaking polyethylene strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width bond-breaking polyethylene strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install bond-breaking polyethylene strips in lengths as long as practicable. Where more than one length is required, overlap pieces a minimum of six inches.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless withheld at the plant as indicated on delivery ticket and approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.

2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish or to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.11 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
3. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except

without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Post-installed anchor installation.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.

a. Cast and laboratory cure one set of six 4 x 8 cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M.

   a. 4 x 8 Specimens: Test two laboratory-cured specimens at 7 days and one set of three specimens at 28 days. Test one specimen at 56 days if required.
   b. A compressive-strength test shall be the average compressive strength from a set of specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

END OF SECTION 033000

SECTION 042000 - UNIT MASONRY (ASSEMBLIES)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Concrete masonry units.
2. Modular Face brick.
3. Mortar and grout.
4. Reinforcing steel.
5. Masonry joint reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Miscellaneous masonry accessories.

B. Related Sections include the following:

1. Division 3 Section “Cast-In-Place Concrete”
2. Division 5 Section “Structural Steel Framing”
3. Division 5 Section “Cold Formed Metal Framing”
4. Division 7 Section “Composite Sheet Waterproofing”
5. Division 7 Section "Sheet Metal Flashing and Trim"
6. Division 7 Section “Joint Sealants”
7. Division 8 Section “Steel Doors and Frames”

1.3 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops the following net-area compressive strengths (f'm) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1. For Concrete Unit Masonry: 2000 psi (MPa).

1.1 SUBMITTALS

A. Product Data: For each different masonry unit, accessory, and other manufactured product specified, to comply with requirements in Division 1 Section “Submittals”.

B. Pre-installation Coordination Drawings: In accordance with Division 1 Section “Project Coordination”, prepare drawings to coordinate the unit masonry assemblies with the Work of other trades. Coordination drawings shall be reviewed by all Prime Contractors at the Masonry Pre-Installation Conference. Coordination items include, but are not limited to the following:

1. Sizes and locations of all masonry openings, coordinated with items installed by other trades, both interior and exterior, i.e., louvers, grilles, doors and windows, scuppers, etc. At a minimum, coordination drawings must show ALL required openings through the finished exterior building masonry.
2. Locations of all expansion and control joints.
3. Locations of all in-wall rainwater conductors and outlets through the wall.
4. Locations of all piped sleeves and other foundation penetrations.

C. Shop Drawings: In accordance with Division 1 Section “Submittals”, prepare and submit shop drawings including details of the following, at a scale of not less than 3” = 1’-0”.

1. Locations and types of lintels.
2. Indicate required horizontal and vertical reinforcing and horizontal masonry bond beams.
3. Fabricated flashing details, sections and installation methods including, but not limited to, through-wall base flashings, sill flashings, head flashings, low roof/high wall flashings, cap flashings, corner flashings, end dam flashings, stepped flashings and 2-piece flashing assemblies.
4. Locations and detailed methods of attachment to supporting structural items and systems.
5. Submit details and installation methods incorporating special shape units.
6. Submit documentation of constructability issues related to design, installation methods, applicable building codes, fire-rating and/or compatibility conditions. Accompany documentation with the most recent Technical Standards published by the International Masonry Institute, National Concrete Masonry Association, Brick Industry Association and the product manufacturer’s printed recommendations.

D. Samples for Initial Selection of the following:

1. Unit masonry samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required. Submit face brick to show range of colors, texture and mortar types for matching existing brick. Submit concrete masonry samples to illustrate texture.
2. Colored mortar samples showing the full range of colors available.

E. Samples for Verification: For the following:

1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.

2. Colored mortar samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label samples to indicate types and amounts of pigments used.
3. Weeps/vents in color to match mortar color.
4. Accessories embedded in the masonry.

F. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.

G. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

H. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:

1. Each type of masonry unit required.

a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units and gross-area compressive strength of clay bricks.

2. Mortar complying with ASTM C270.
3. Grout mixes complying with compressive strength requirements of ASTM C476. Include description of type and proportions of grout ingredients.
4. Submit concrete mix design for filling masonry cells and bond beams. Use concrete mix having a 28-day compressive strength of 3000 psi.

I. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Each type of masonry unit required.

a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
b. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.

2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
4. Each material and grade indicated for reinforcing bars.

5. Each type and size of joint reinforcement.
6. Each type and size of anchor, tie, and metal accessory.

J. Hot and Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with hot and cold-weather requirements.

1.2 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1093 to conduct the testing indicated, as documented according to ASTM E548.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, through one source from a single manufacturer and manufacturing plant.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

D. Testing Service: Owner to engage a qualified independent testing agency to perform tests in compliance with applicable codes.

E. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per Applicable Code by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

F. Sample Panels: Prior to installation of above grade unit masonry, build sample panels, using single wythe veneer materials selected for the completed Work. Build sample panels for each type of veneer masonry in sizes approximately 48 inches long by 48 inches high by full unit thickness.

1. Locate panels in the locations indicated or, if not indicated, as directed by Architect.
2. Clean exposed faces of panels with masonry cleaner indicated.
3. Protect approved sample panels from the elements with weather-resistant membrane.
4. Maintain sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels, unless such deviations are specifically approved by Architect in writing.
    b. Demolish and remove sample panels when directed.

G. Mockup Panels: Prior to installation of above grade unit masonry, allowing sufficient time for construction and approval, build mockup panels, using materials and products indicated for the

completed Work, to verify selections made under sample Submittals and to demonstrate aesthetic effects. Build mockup panels for each type of unit masonry assembly in sizes of full assembly thickness by approximately 72 inches long by 72 inches high or larger to accommodate all necessary components.

1. Notify Architect seven days in advance of dates and times when mockups will be constructed.
2. Locate mockups in the locations indicated or, if not indicated, as directed by Architect.
3. Provide masonry opening with installed aluminum window frame, steel lintel, sill and associated blocking, air-barrier and flashing as detailed in the drawings and as specified in this Section.
4. Include metal coping, roof edge fascia, gutters, *thru-wall* overflow roof scupper and associated blocking and fasteners as detailed in the drawings and as specified in Division 7 Section "Sheet Metal Flashing and Trim."
5. Omit portions of veneer, sill, coping, fascia and aluminum frame in order to provide viewable *"cut-away"* areas and items of construction ordinarily hidden behind finished wall construction. Coordinate with Architect prior to Mockup Panel construction.
6. Build mockups for the following types of unit masonry assemblies in sizes required by full assembly thickness, including face veneer, cavity, backup and accessories. Include a sealant-filled vertical joint at least 16 inches long in each mockup.

    a. Exposed unit masonry veneer with unit masonry backup assembly.
    b. Exposed unit masonry veneer with metal stud backup assembly.
    c. Other assemblies incorporating unit masonry backup and claddings as specified in related sections including but not limited to, metal panel systems and exterior insulation finish system.
    d. Sealants as specified in Division 7 Section "Joint Sealants.

7. Clean exposed faces of mockups with masonry cleaner as indicated.
8. Protect accepted mockups from the elements with weather-resistant membrane.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Approval of mockup panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; incorporation of specified and detailed products and accessories and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.

11. Demolish and remove mockups only when directed by Architect.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Coordination."

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

1. Protect concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.4 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost

or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 50 deg F (4 deg C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning. Follow manufacturer's recommendations for minimum temperature.

E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

1. When ambient temperature exceeds 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. General: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
2. Provide bullnose units for ALL INTERIOR outside corners.
3. Provide single score units where indicated.

B. Concrete Masonry Units: ASTM C90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi (MPa).
2. Weight Classification: Normal weight.
3. Size (Width): Manufactured to the following dimensions:

a. 4 inches nominal; 3-5/8 inches actual.
b. 6 inches nominal; 5-5/8 inches actual.
c. 8 inches nominal; 7-5/8 inches actual.
d. 10 inches nominal; 9-5/8 inches actual.
e. 12 inches nominal; 11-5/8 inches actual.
f. 14 inches nominal; 13-5/8 inches actual.
g. 16 inches nominal; 15-5/8 inches actual.

4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

2.2 BRICK

A. General: Provide shapes indicated and as follows for each form of brick required:

1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.

B. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.

1. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

C. Face Brick: ASTM C216, Grade SW, Type FBS, and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
2. Initial Rate of Absorption: Less than 20 g/30 sq. in. per minute when tested per ASTM C67.
3. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated "not effloresced."
4. Surface Coloring: Brick with surface coloring, other than flashed or sand-finished brick, shall withstand 50 cycles of freezing and thawing per ASTM C67 with no observable difference in the applied finish when viewed from 10 feet.
5. Size: Manufactured to the following actual dimensions:

    a. Engineer Modular: 3-1/2 to 3-5/8 inches thick by 2-3/4” inches high by 7-5/8 inches long.

6. Color and Texture: As a minimum standard of quality, this specification is based on the products indicated below:

    a. Provide a face brick and to match the existing administration building face brick in style and pattern.

7. Manufacturers: Available Products: Subject to compliance with requirements, product that may be incorporated into the Work include, but are not limited to, the following:

    a. Glen-Gery Corp.
    b. Redland Brick, Inc.
    c. Endicott, Inc.
    d. General Shale, Inc.
    e. U. S. Brick

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C207, Type S.

D. Aggregate for Mortar: ASTM C144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

1. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

E. Aggregate for Grout: ASTM C404.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar

G. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer as that used in the concrete masonry units (Section 2.C.5.a).

H. Water: Potable.

I. Available Products: Subject to compliance with requirements and suitability as reviewed by the Engineer, products that may be incorporated into the Work include, but are not limited to, the following:

1. Colored Portland Cement-Lime Mix:

a. Eaglebond; Blue Circle Cement.
b. Color Mortar Blend; Glen-Gery Corporation.
c. Rainbow Mortamix Custom Color Cement/Lime; Holnam, Inc.
d. Centurion Colorbond PL; Lafarge Corporation.
e. Lehigh Custom Color Portland/Lime; Lehigh Portland Cement Co.
f. Riverton Portland Cement Lime Custom Color; Riverton Corporation (The).

2. Mortar Pigments:

a. True Tone Mortar Colors; Davis Colors.
b. Centurion Pigments; Lafarge Corporation.
c. SGS Mortar Colors; Solomon Grind-Chem Services, Inc.

3. Water-Repellent Admixture:

a. Dry-Block Mortar Admixture; W. R. Grace & Co., Construction Products Division.
b. Mortar Tite; Addiment Inc.
c. Rheopel; Master Builders.

2.4 REINFORCING STEEL

A. Uncoated Steel Reinforcing Bars: ASTM A615; Grade 60.

2.5 MASONRY JOINT REINFORCEMENT

A. General: ASTM A951 and as follows:

1. Hot-dip galvanized, carbon-steel wire for both interior and exterior walls.
2. Wire Size for Side Rods: W1.7 or 0.148 inch diameter unless otherwise noted.
3. Wire Size for Cross Rods: W1.7 or 0.148 diameter unless otherwise noted.
4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.

B. For multi-wythe masonry, provide types as follows:

1. Adjustable (2-piece) type with single pair of side rods and cross ties spaced not more than 16 inches o.c. and with separate adjustable veneer ties engaging the cross ties. Crossties are either U-shaped with eyes or rectangular. Space side rods for embedment within each face shell of backup wythe and size adjustable ties to extend at least halfway through outer wythe but with at least 5/8-inch cover on outside face. Unless otherwise indicated, install in first and second courses above finished floor and in alternating back-up masonry courses thereafter.

    a. Use where indicated and where horizontal joints of facing wythe do not align (1-1/4 inches or less) with those of backup wythe.
    b. Use where facing wythe is of different material than backup wythe.
    c. Provide #270 Adjustable Ladder Eye-Wire Anchor System by Hohmann & Barnard, Inc., or equal product.

2. Adjustable (3-piece) type with ladder type reinforcement at back-up wythe which includes an extended cross rod. A vertical rod is hooked onto the extended cross rod and extends down to and behind the cross rod of the next lower truss type unit. An adjustable vee tie is hooked around the vertical rod for placement into the mortar joint of the face veneer.

    a. Use where indicated and where horizontal joints of facing wythe do not align (greater than 1-1/4 inches) with those of the back-up wythe.
    b. Provide Tie-HVR Anchor System by Hohmann & Barnard, Inc., or equal product.

2.6 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, and as required by Building Code Requirements for Masonry Structures; use of hot-dipped galvanized ties and anchors in exterior wall construction.

B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A82; with ASTM A153, Class B-2 coating.

C. Galvanized Steel Sheet: ASTM A653, G60, commercial-quality, steel sheet zinc coated by hot-dip process on continuous lines before fabrication.

D. Steel Sheet, Galvanized after Fabrication: ASTM A366 cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A153.

E. Steel Plates, Shapes, and Bars: ASTM A36. Plates, shapes, and bars exposed to weather shall be hot-dipped galvanized after fabrication.

2.7 ADJUSTABLE ANCHORS FOR CONNECTING TO STEEL FRAME OR LINTELS

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section: Crimped 1/4 inch diameter, hot-dip galvanized steel wire anchor section for welding to steel.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25 inch diameter, hot-dip galvanized steel wire.

2.8 ANCHORS FOR CONNECTING TO SUBSTRATES

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. X-Seal® Veneer Anchors with VBT-Vee Byna-Tie by Hohmann & Barnard, Inc., or equal product.

2. X-Seal® Anchor shall be coordinated to details and/or conditions for the appropriate length to accommodate cavity width from face of rigid insulation to the masonry veneer and to include the appropriate connection interface to the anchor substrate, pronged legs to match insulation thickness so that prongs abut the steel studs, and/or at masonry the face of the substrates. Provide appropriate stainless steel self-drilling self-tapping screws and gasketed seal tape by Hohmann & Barnard, Inc., or equal product.

3. 2-Seal Byna-Lok Wire Tie shall be coordinated to details and conditions for metal stud wall construction for the appropriate length to accommodate cavity width from face of rigid insulation face to the masonry veneer and to include the insulation thickness and sheathing thickness so that the anchor barrel abuts the metal studs. The anchor barrel has a dual-barrel #12 self-drilling shaft with factory-installed EPDM washers to seal both the face of the insulation and the air barrier. The Byna-Lok Wire Tie is 9 gauge or 3/16 wire, anchors spaced at 16 inches x 16 inches directly into metal studs by Hohmann & Barnard, Inc., or equal product.

4. Veneer Anchors #345-SV at sill blocking and #345-BT at jamb blocking spaced and secured at 16 inches o.c. horizontally and vertically. Coordinate details and/or conditions for the appropriate length to accommodate cavity width from face of rigid insulation and/or wood blockings and/or concrete masonry back-up face to the masonry veneer and to include the appropriate connection interface to the anchor substrate. Provide

appropriate stainless steel self-drilling self-tapping screws. Hohmann & Barnard, Inc., or equal product.

2.9 JOINT STABILIZATION ANCHORS

A. General: Provide stabilization anchors in horizontal joints of masonry units across the joint between walls at T-shape wall intersections as follows:

1. Use either a manufactured steel joint stabilizing anchor consisting of two steel rods, connected together on each side of masonry joint by sliding plate assemblies or 1-1/2 inch x ¼ inch x 32 inch steel strap anchor with 3 inch (90 degree) right-angle bent ends at masonry shear walls.
2. Anchors to be embedded in grout-filled cores of hollow concrete masonry units.
3. 16 inches o.c. vertical spacing.
4. Finish: Mill galvanized or hot-dip galvanized to comply with ASTM A153.

2.10 ADJUSTABLE MASONRY-VENEER ANCHORS

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment through rigid insulation to wood or metal studs, and as follows:

1. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

B. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:

1. Anchor Section: Gasketed sheet metal plate with screw holes top and bottom; top and bottom ends bent to form pronged legs to penetrate insulation/sheathing and contact studs or concrete masonry unit face; and raised rib-stiffened strap stamped into center to provide a slot between strap and plate for connection of wire tie.

    a. Plate 1-1/4 inches wide by 6 inches long with strap 5/8 inch wide by 6 inches long; slot clearance formed between face of plate and back of strap shall not exceed diameter of wire tie by more than 1/32 inch.
    b. Provide anchor manufacturer's standard, self-adhering, gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating sheathing at pronged legs and screw holes.

C. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Screw-Attached, Masonry-Veneer Anchors:

    a. X-Seal with box tie with drip and X-Seal Tape, by Hohmann & Barnard, Inc., or equal product.

2.11 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron inserts of type and size indicated.

B. Anchor Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A153, Class C; of diameter and length indicated and in the following configurations:

1. Headed bolts.
2. Nonheaded bolts, bent in manner indicated.

C. Postinstalled Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Type: Chemical anchors.
2. Type: Expansion anchors.
3. Type: Undercut anchors.
4. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
5. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.

2.12 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Fabrications listed in Unit Masonry Assemblies take precedence over Division 7 Materials. Fabricate from the following metal complying with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim" and below:
1. Fabricate through-wall metal flashing embedded in masonry from Type 304 26 gauge (.018 inches thick) Stainless Steel, formed to shape indicated.
2. Fabricate metal expansion-joint waterstop from Type 304 26 gauge (.018 inches thick) Stainless Steel, formed to shape indicated.
3. Fabricate Stainless Steel Drip Plate from Type 304 26 gauge (.018 inches thick) Stainless Steel, furnished with a smooth, factory-formed hemmed edge. Width: 3-inches
4. Fabricate Copper Drip Plate from 20 ounce per square foot Sheet Copper, furnished with a smooth, factory-formed hemmed edge. Width: 3-inches

B. Concealed Flashing: For flashing partly exposed to the exterior, use metal flashing specified above. For flashing not exposed to the exterior, use the following, unless otherwise indicated:

1. EPDM: Ethylene Propylene Diene Terpoymer synthetic rubber. Flexible 40 mil elastomeric rubber membrane. Minimum width as detailed.

C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Sheet Metal Flashing and Trim."

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by the flashing manufacturer for bonding flashing sheets to each other and to substrates.

E. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include the following:

1. Pre-fabricated Metal Flashing:

a. Cheney Flashing; Cheney Flashing Company, Inc.
b. Sandell

2. EPDM Flashing, flexible membrane:

a. Carlisle Pre-Kleened EPDM; Carlisle Coatings & Waterproofing, Incorporated.
b. Firestone Flashgard Thru-Wall Flashing; Firestone Building Products Co.
c. H & B Epra-Max EPDM Thru-Wall Flashing; Hohmann & Barnard, Inc.

2.13 MISCELLANEOUS MASONRY ACCESSORIES/MATERIALS

A. Available Products: Subject to compliance with requirements, materials that may be incorporated into the Work include the following:

1. For substitution products, refer to Division 1 Section “Substitutions”

B. Compressible Expansion Material: Closed cell neoprene sponge with sensitive adhesive on one side ASTM D1056 Grade 2A1.

Products: Provide one of the following:

1. Hohmann & Barnard, Inc., NS-Neoprene Sponge
2. Dur-O-Wal, D/A 2015
3. Sandell Mfg. Co., Inc.

C. Compressible Exterior Expansion Joint Filler: Silicone faced acrylic-impregnated expanding foam sealant and closed-cell foam sealant system. ASTM E283-04, compressible up to 50 percent; of width and thickness indicated. Color as selected by Architect, from full range of standard and special colors.

Products: Provide the following:

1. Colorseal, Emseal Joint Systems, Ltd.

D. Preformed Control-Joint Gaskets: Styrene-Butadiene-Rubber Compound designed to fit standard sash block and to maintain lateral stability in masonry wall. ASTM D2000, Designation M2AA-805.

Products: Provide one of the following:

1. Hohmann & Barnard, Inc.
2. Dur-O-Wal
3. Sandell Mfg. Co., Inc.

E. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D226, Type I (No. 15 asphalt felt).

F. Sill Weep: At brick sills weeps shall be installed as detailed vertically at 16 inches o.c. centered upon the length of the sill. At precast sills weeps shall be installed as detailed horizontally on top of the metal drip plate at 16 inches o.c. centered upon the length of the sill. Install per manufacturers printed instructions.

Products: Provide the following:

1. Hohmann & Barnard, Inc., 341 W/S Weep

    a. Medium density polyethylene tested in conformance with ASTM D2244, D638 and D746.
    b. 3/8 inch O.D. x 4 inch long with extended 4 inch wicks and brass or stainless steel screen to match color of drip plate.
    c. Lay extended wicks horizontally in opposite directions.

G. Cavity Drainage Material: Free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings. Use standard thickness products in compliance with manufacturer's gap tolerance between cavity substrate surfaces.

Products: Provide one of the following:

1. Mortar Net; Mortar Net USA, Ltd.
2. Mortar Trap, Hohmann & Barnard, Inc. (Basis of Design)

H. Cavity Weep: Free-draining. Color as selected by Architect, from full range of standard and special colors.

Products: Provide one of the following:

1. Mortar Net Weep Vents, Mortar Net USA, Ltd.
2. Mortar Trap, Hohmann & Barnard, Inc.

    a. Height of weep shall match the height of the specified masonry veneer (up to 4 inch nominal) as indicated in Products. Use the 4 inch nominal height weep at 8 inches or higher masonry veneer units.
    b. Color as selected to match associated mortar.
    c. Made from polyester mesh.

3. Hohmann & Barnard, Inc., QV-Quadro-Vent

    a. Polypropylene tested in conformance with ASTM D2240, D790B, D638 and D1238B.
    b. Honeycomb design.
    c. Color as selected to match associated mortar.
    d. Size according to associated masonry veneer units.

I. Cavity Vent: Free-draining. Color as selected by Architect from full range of standard and special colors.

Products: Provide one of the following:

1. Mortar Net Weep Vents, Mortar Net USA, Ltd.
2. Mortar Trap Weep Vents, Hohmann & Barnard, Inc.

    a. Height of weep shall match the height of the specified masonry veneer (up to 4 inch nominal) as indicated in Products. Use the 4 inch nominal height weep at 8 inches or higher masonry veneer units.
    b. Color as selected by Architect to match associated mortar.
    c. Made from polyester mesh.

3. Hohmann & Barnard, Inc., QV-Quadro-Vent

    a. Polypropylene tested in conformance with ASTM D2240, D790B, D638 and D1238B.
    b. Honeycomb design.
    c. Color as selected to match associated mortar.
    d. Size according to associated masonry veneer units.

J. Stud Wall Cavity Wall Flashing Termination Bar: 304 stainless steel 1 inch x 1/8 inch x 8 foot long bar with foam-tite seal, bar punched to accept fasteners at 8 inches o.c., secure into each stud. Hohmann & Barnard, Inc. termination bar T2 with FTS Foam-Tite Seal, or equal product.

K. Cavity Air Barrier (installed over C.M.U.): Continuous single component, asphalt free, fluid applied vapor permeable self-sealing elastomeric air barrier membrane which permits moisture vapor to escape through the membrane while remaining resistant to water and air penetration ASTM E2178, ASTM E96 and ASTM E2357. Apply over C.M.U. at 60 square foot (25 mils wet) per gallon. Must be compatible with contacted surfaces and materials including cavity insulation.

Products: Subject to compliance with requirements:

1. Basis of Design: Enviro-Barrier VP™, Sandell Moisture Protection Systems by Hohmann & Barnard, Inc.

Materials that may be incorporated into the Work include, but are not limited to, the following:

1. Air Bloc 31MR – Manufactured by Henry Company
2. Perm-A-Barrier VP – Manufactured by WR Grace
3. Fire Resist Barritech VP – Manufactured by Carlisle Coatings & Waterproofing

L. Vapor Retarder (Installed over C.M.U. below exterior grade or interior floor slab elevation changes only and/or where noted or detailed): Continuous fluid applied membrane, asphalt based non-fibered emulsion-type damproofing which permits moisture vapor to escape through the film membrane while remaining resistant to water and air penetration ASTM D1187, ASTM D1227, E2178, ASTM E96, and ASTM E2357. Must be compatible with contacted surfaces and materials including cavity insulation.

Products: Provide the following subject to compliance with requirements. Materials that may be incorporated into the Work include, but are not limited to, the following:

1. Karnak, 100AF Non-filtered Emulsion Damproofing, Karnak Corporation

2. Sealmastic, Non-fibered Emulsion Damproofing, W.R. Meadow

M. Cavity Air Barrier Accessories (installed over C.M.U. and Gypsum Sheathing) for use in detailing transitions between dissimilar materials, cracks and voids, window and door openings, etc.

Available Products: Subject to compliance with requirements:

1. Enviro-Barrier™ Mastic, gun grade mastic, Sandell Moisture Protection Systems by Hohmann & Barnard, Inc.
2. Stretch-X-Seal Membrane, a flexible self-sealing adhesive backed with release liner, transition membrane flashing and sill tape, Sandell Moisture Protection Systems, by Hohmann & Barnard, Inc.
3. Spray-Tape™, a water based single component self-sealing spray or brush applied detail flashing for air barriers applied at 100 square foot (60 mils wet), a minimum of 3 inches around the opening and a minimum of 3 inches into the opening, Sandell Moisture Protection Systems, by Hohmann & Barnard, Inc.

Materials that may be incorporated into the Work include, but are not limited to, the following:

1. Accessories – Manufactured by Henry Company
2. Accessories – Manufactured by WR Grace
3. Accessories – Manufactured by Carlisle Coatings & Waterproofing

N. Cavity Insulation (Installed over C.M.U.): 16 inches x 96 inches square-edged extruded-polystyrene board. ASTM C578, Type IV, compressive strength 25 p.s.i. with manufacturer's standard board joint sealing system.

Products: Provide one of the following:

1. Foamular 250, Owens-Corning Co.
2. Cavitymate or Scoreboard, Dow Chemical Co.

O. Insulation Inserts: (installed in cores of C.M.U.) as indicated on the drawings. Insert in each C.M.U. core individually molded expanded polystyrene with a minimum density of 1.3 pounds per cubic foot, thermal resistance of 5.0 per inch of thickness at 75 degrees. ASTM C578 Standard Type X.

1. ICON Universal Inserts, as produced by Concrete Block Insulating Systems, Inc. or equal product.

P. Gypsum Sheathing: Gypsum sheathing for wall cavity assemblies takes precedence over Division 6 materials. Gypsum sheathing conforming with ASTM C1177 and ASTM E84 with glass mats both sides and long edges, water-resistant treated core. Subject to compliance with requirements of the following:

1. Dens-Glass Gold Sheathing, Georgia-Pacific.

2.14 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned. Follow brick manufacturer's recommendations for cleaning solution for each brick type.

1. Available Products: Subject to compliance with requirements, products that may be used to clean unit masonry surfaces include, but are not limited to, the following:

a. Cleaners for Red and Light-Colored Brick Not Subject to Metallic Staining with Mortar Not Subject to Bleaching:

1) 202 New Masonry Detergent; Diedrich Technologies, Inc.
2) Sure Klean No. 600 Detergent; ProSoCo, Inc.

b. Cleaners for Red and Dark-Colored Brick Not Subject to Metallic Staining:

1) 200 Lime Solv; Diedrich Technologies, Inc.
2) Sure Klean No. 101 Lime Solvent; ProSoCo., Inc.

c. Cleaners for Brick Subject to Metallic Staining:

1) 202V Vana-Stop; Diedrich Technologies, Inc.
2) Sure Klean Vana Trol; ProSoCo, Inc.

2.15 MORTAR AND GROUT MIXES

A. General: Do not use calcium chloride. The use of admixtures shall not be considered unless their suitability is reviewed by the Engineer and demonstrated by laboratory test results simulating the conditions that warrant the desired use of the admixture.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification.

1. Limit cementitious materials in mortar to portland cement and hydrated lime.
2. For masonry below grade, foundation walls, retaining walls in contact with earth, and where indicated, use Type M or S mortar one (1) part portland cement, (1/4) part Type S hydrated lime and (3-3/4) parts sand, with minimum 28-day compressive strength of 2500 psi.
3. For above grade exterior brick and non-load bearing partitions use Type N mortar (1) part portland cement, (1) part hydrated lime Type S and (6) parts sand.
4. For exterior above grade and load bearing clay brick and manufactured stone use Type S mortar.
5. For interior and exterior tuck pointing use Type N mortar. For restoration work it is important for the masonry contractor to review the existing masonry and submit for approval the appropriate type mortar.

6. For new brick veneer above grade use Type N mortar.
7. For natural stone masonry use Type M mortar.

D. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Limit pigments to the following percentages of cement content by weight:

1. For mineral-oxide pigments and portland cement-lime mortar, not more than 10 percent.
2. For carbon-black pigment and portland cement-lime mortar, not more than 2 percent.
3. For mineral-oxide pigments and mortar cement mortar, not more than 5 percent.
4. For carbon-black pigment and mortar cement mortar, not more than 1 percent.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates combined with selected cementitious materials.

1. Mix to match Architect's sample.

F. Grout for Unit Masonry:

1. Use either pea gravel cement concrete or grout confirming to ASTM C476 with a minimum 28-day compressive strength of 3000 psi.
2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143.

2.16 SOURCE QUALITY CONTROL

A. Brick Tests: For each type and grade of brick indicated, meet the requirements in the “Brick” Paragraph of this Section. Units will be tested according to ASTM C67.

B. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, meet the requirements in the “Concrete Masonry Units” Paragraph of this Section. Units will be tested according to ASTM C140.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2 INSTALLATION, GENERAL

A. Unit Masonry Assemblies shall be installed in accordance with Contract Documents, most recent technical standards published by International Masonry Institute, National Concrete Masonry Association, Brick Industry Association and the product manufacturer's printed recommendations.

B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single wythe walls to the actual widths of masonry units, using units of widths indicated.

C. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.

D. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.

E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

F. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

    1. Mix units from several pallets or cubes as they are placed.

G. Wetting of Clay Brick: Wet clay brick 3 to 24 hours before laying if the initial rate of absorption exceeds 20 g/30 sq. in. per minute when tested per ASTM C67. Allow units to absorb water so they are damp but not wet at the time of laying.

H. ***No conduit or pipe shall be installed vertically or horizontally in the cavity***, except for items such as wall hydrants, electrical fixtures, etc., for which penetrations shall be horizontal, perpendicular through cavity, located directly at the intended item.

I. Install air barrier systems per manufacturer's recommended printed procedures.

J. Install insulation board systems per manufacturer's recommended printed procedures.

K. In lieu of field formed flashing corners and end dams, preformed stainless steel corners and end dams may be used at the contractor's option. All products shall be compatible with the flashing system and shall be installed per the manufacturer's recommended printed procedures in addition to the sealing requirements described in the specification.

L. Install insulation per manufacturer's printed procedures.

M. Install single wythe masonry flashing per manufacturer's printed procedures.

3.3 CONSTRUCTION TOLERANCES

A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:

B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.

C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.

D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.

E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

1. One-third running bond at utility size face brick with vertical joint in each course centered on units in courses above and below.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

F. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.

G. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

H. Entire courses and/or individual units of irregular surface faced masonry (i.e., split face) shall be turned smooth side out in locations as directed by Architect during Preinstallation Conference.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.

B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and compress into place. Do not deeply furrow bed joints or slush head joints.

1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.

C. Set stone trim units in full bed of mortar with vertical joints slushed full. Fill dowel, anchor, and similar holes solid. Wet stone-joint surface thoroughly before setting; for soiled stone surfaces, clean bedding and exposed surfaces with fiber brush and soap powder and rinse thoroughly with clear water.

D. Site wall copings or caps (including stone, concrete and masonry) to be set on EPDM flashing. Extend EPDM flashing from a point of 1 inch behind the exterior face of the outer wythe of masonry for the full width of the wall to a point 1 inch behind the exterior face of the outer wythe behind the exterior face of the outer with of masonry on the opposite wall face. Seal laps between lengths of flashing with lap sealant, overlap 2 inches to 3 inches. Provide water-tight seal around anchors using flashing manufacturer's recommended products. Tool exposed joints to a point 3/8 inch below face of coping or cap material. Apply continuous sealant bead in tooled joints. Sealant to match site wall mortar color. Adhere metal drip plate with elastomeric sealant or manufacturer's approved bonded tape creating a ¼ inch drip plate. Seal laps between lengths of flashing with lap sealant, overlap minimum. 4 inches. Seal laps between lengths of drip plate with lap sealant, overlap minimum 4 inches. Provide positive drainage to weeps where bottom of flashing turns out to outer wythe.

E. Sill Units (including stone, concrete and masonry): Tool exposed joints to a point 3/8 inch below face of material. Apply continuous sealant bead in tooled joints. Sealant to match mortar color. At brick sills tool exposed joints to match adjacent joints. Tool joints between weeps.

F. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.

G. Collar Joints in Clay Tile Masonry: After each course is laid, fill the vertical, longitudinal joint between wythes solidly with grout at exterior walls, except cavity walls, and solidly with mortar at interior walls and partitions.

3.6 BONDING OF MULTIWYTHE MASONRY

A. Use masonry joint reinforcement installed in horizontal mortar joints to bond wythes together.

B. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.

1. Provide continuity with masonry joint reinforcement at corners by using prefabricated "L" units as well as masonry bonding.

C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

1. Provide continuity with masonry joint reinforcement by using prefabricated "T" units.

3.7 CAVITIES

A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints of back-up wall wythes facing cavities flush.

B. Installing Cavity-Wall Insulation: Apply rectangular grid adhesive on inside face of insulation boards. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Seal or tape all insulation board joints, crack and gaps, piping and conduit penetrations with materials compatible with insulation and masonry.

2. All insulation board joints and penetrations shall be sealed with manufacturers standard joint sealant systems to meet the air barrier requirements of ASTM E2357 Assembly test and the International Code Council (ICC-ES) Evaluation Report ESR-2142.

C. Wall Assembly for ASTM C578 polystyrene foam plastic insulation board shall meet the requirements of NFPA 285 Wall Assembly.

3.8 MASONRY JOINT REINFORCEMENT

A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.

a. Reinforcement above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

D. At all flashing locations, reinforcement shall not interrupt the flashing.

3.9 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Anchor masonry to structural members with flexible channel slot anchors embedded in masonry joints and attached to the structure. Provide a 1-inch space in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
2. Space anchors at the location of the slotted channel anchor assembly on the structure member.

3.10 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry as detailed on the drawings or by one of the following approved methods:

1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake joints in exposed faces. Maximum distance between C.M.U. ***control joints shall not exceed distances as indicated on Structural Drawings***.
2. Install preformed control-joint gaskets designed to fit sash block
3. Submit for approval a method as recommended by recent technical standards published by Industry standards as noted in section 3.2.A.

C. Form building expansion joints in exterior masonry veneer as follows:

1. Form open joint of width indicated; install compressible exterior expansion joint filler as per manufacturers' recommendation. Keep joint free and clear of mortar. Locations as indicated on drawings.

D. Build in pressure-relieving expansion joints where indicated; construct joints by installing compressible expansion material.

3.11 LINTELS

A. Install lintels where indicated.

B. Provide lintels at all masonry wall openings greater than 12 inches wide. Refer to Structural drawings and Lintel Schedule.

3.12 FLASHING, WEEPS, AND VENTS

A. General: Install continuous embedded flashing and weeps in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer. Adhere all flashing to steel angles.

C. Install flashing as follows:

1a. At thru-wall base flashing conditions and masonry relieving angles at composite masonry walls, including cavity walls, extend EPDM flashing from a point of 1 inch behind the exterior face of the outer wythe of masonry, through the outer wythe, turned up a minimum of 16 inches behind the insulation over the air barrier system and into the inner wythe 1-1/2 inches. Install air barrier behind the flashing. Adhere metal drip plate with elastomeric sealant or manufacturer's approved bonding tape creating a ¼ inch drip plate. Seal laps between lengths of flashing with lap sealant, overlap minimum 4 inches. Seal laps between lengths of drip plate with lap sealant, overlap minimum 4 inches. Provide positive drainage to weeps where bottom of flashing turns out to outer wythe. Install backer rod and sealant under drip plate at masonry relieving angle conditions.

1b. At thru-wall base flashing conditions and masonry relieving angles at metal stud masonry veneer walls extend EPDM flashing from a point of 1-inch behind the exterior face of the outer wythe of masonry, through the outer wythe, turned up a minimum of 16 inches on the exterior face of the sheathing over the air barrier system and secure with metal termination bar and continuous elastomeric sealant, secure into each metal stud. Install air barrier behind the flashing. Adhere metal drip plate with elastomeric sealant or manufacturer's approved bonding tape crating a ¼ inch drip plate. Seal the top of the EPDM flashing to the sheathing in accordance with flashing manufacturer's recommended termination seal system. Seal the air barrier to the EPDM flashing with the membrane manufacturer's flashing tape. Seal laps between lengths of flashing with lap sealant, overlap minimum 4 inches. Seal laps between lengths of drip plate with lap

sealant, overlap minimum 4 inches. Install backer rod and sealant under drip plate at masonry relieving angle conditions.

1c. At masonry opening (i.e. window) sill flashing conditions, extend EPDM flashing from a point of 1 inch behind the exterior face of the outer wythe of masonry, through the outer wythe, turned up vertically and continuing horizontally below window frame sill to meet angle flashing stop. Flashing to extend vertically in joint between window frame and vertical leg of angle flashing stop, terminating just below top edge. Flashing to be concealed below joint sealant. Seal laps between lengths of flashing with lap sealant, overlap minimum 4 inches. Extend flashing at sill ends and turn up not less than 2 inches to form a pan. Install air barrier behind the flashing. Adhere metal drip plate with elastomeric sealant or manufacturer's approved bonding tape creating a ¼ inch drip plate. Seal laps between lengths of flashing with lap sealant, overlap minimum 4 inches. Seal laps between lengths of drip plate with lap sealant, overlap minimum 4 inches. Provide positive drainage to weeps where bottom of flashing turns out to outer wythe. At precast sills install weep material horizontally on top of the metal drip plate at 16 inches o.c. At brick sills install sill weeps vertically at 16 inches o.c. Center the weeps upon the length of the sill and tool the joints. At wood blocking sills provide Hohmann & Barnard, Inc. #345 SV and at wood blocking jambs provide Hohmann & Barnard, Inc. #345-BT veneer anchors as indicated in the details. Space and secure anchors horizontally and vertically at 16 inches o.c.

2. At lintels and shelf angles, extend EPDM flashing a minimum of 4 inches into masonry at each end or to cover the extent of the lintel, which is greater. At heads and sills, extend flashing at ends and turn flashing up not less than 2 inches to form a pan. Extend EPDM flashing from a point of 1 inch behind the exterior face of the outer wythe of masonry, through the outer wythe, turned up a minimum of 16 inches behind the insulation over the air barrier system and into the inner wythe 1-1/2 inches. Install air barrier behind the flashing. Adhere metal drip plate with elastomeric sealant or manufacturer's approved bonding tape creating a ¼ inch drip plate. Seal laps between lengths of flashing with lap sealant, overlap minimum 4 inches. Seal laps between lengths of drip plate with lap sealant, overlap minimum 4 inches. Provide positive drainage to weeps where bottom of flashing turns out to outer wythe. Install backer rod and sealant under drip plate at masonry relieving angle conditions.

3a. At low roof to high wall conditions, composite masonry walls, including cavity walls, install a (two piece interlocking type) 26 gauge stainless steel sheet flashing through the outer wythe of masonry. Turn up embedded piece a minimum of 2 inches, flush with inner wythe of masonry at cavity to form a pan (Behind insulation). Overlap ends of stainless steel flashing a minimum of 6 inches and seal lap with elastomeric sealant. Extend EPDM flashing from a point 1 inch behind exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 16 inches (behind insulation) over the air barrier system and into the inner wythe 1-1/2 inches. Install air barrier behind the flashing. Seal lap between stainless steel flashing and EPDM flashing with elastomeric sealant. Install interlocking piece of flashing over roof termination as indicated on drawing.

3b. At low roof to high wall conditions, at metal stud masonry veneer walls, install a (two piece interlocking type) 26 gauge stainless steel sheet flashing through the outer wythe of masonry. Turn up embedded piece a minimum of 2 inches, flush with inner wythe of masonry at cavity to form a pan (behind insulation). Overlap ends of stainless steel flashing a minimum of 6 inches and seal lap with elastomeric sealant. Extend EPDM flashing from a point 1 inch behind exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 16 inches on the exterior face of the sheathing over

the air barrier system and secure with metal termination bar and continuous elastomeric sealant, secure into each metal stud. Install air barrier behind the flashing. Seal the lap between stainless steel flashing and EPDM flashing with elastomeric sealant. Install interlocking piece of flashing over roof termination as indicated on drawing. Seal the top of the EPDM flashing to the sheathing in accordance with flashing manufacturer's recommended termination seal system. Seal the air barrier to the EPDM flashing with the membrane manufacturer's flashing tape.

D. Install cavity weeps, cavity vents, sill sweeps and cavity drainage material in the head joints in exterior wythes of masonry as indicated on drawing and as follows:

1. Space cavity weeps at minimum 24 inches o.c., 16 inches o.c. at 16 inches long masonry units.
2. Space cavity vents at minimum 48 inches o.c.
3. Install continuous sill weep material horizontally on top of flashing.
4. Place continuous cavity drainage material immediately above flashing in cavities.
5. Test weep with water poured into cavity to insure draining water freely comes out of each weep hole.

E. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.13 AIR BARRIER SYSTEM

A. Apply cavity air barrier system on the entire exterior face of the inner wythe of masonry (behind insulation board) to form a monolithic membrane on the cavity wall. Air barrier accessories shall be installed as detailed and/or required by system manufacturer over all dissimilar material transitions such as wood blocking, structural framing, cracks and voids, door and window openings and any other construction element that will prevent a continuous monolithic membrane. Follow manufacturers recommended installation procedures. System shall meet the requirements of the International Energy Conservation Code (IECC) ASTM E2357 Air Assembly Test.

3.14 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.

1. Construct formwork to conform to shape, line, and dimensions shown. Make the formwork sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

1. Comply with requirements of ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.15 FIELD QUALITY CONTROL

A. Contractor shall engage a qualified independent testing agency to perform field quality-control testing indicated below.

B. Testing Frequency: Tests and Evaluations listed in this Article will be performed during construction for each 35,000 bricks or 5,700 concrete masonry units Testing requirements for mortar and grout may be deleted if prism testing is retained.

C. Mortar properties will be tested per ASTM C780.

D. Grout will be sampled and tested for compressive strength per ASTM C1019.

E. Prism-Test Method: For each type of structural masonry wall construction indicated, masonry prisms will be tested per ASTM C1314, and as follows:

1. Prepare 1 set of prisms for testing at 7 days and 1 set for testing at 28 days.

F. Test weeps. Allow masonry 12 hours setting time before test. Test to be done in 10’ lengths of cavity.

3.16 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
5. Clean brick by the bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20, using job-mixed detergent solution.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.

3.17 MASONRY WASTE DISPOSAL

A. Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042000

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Requirements:
1. Section 053100 "Steel Decking" for field installation of shear connectors through deck.
2. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other steel items not defined as structural steel.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator, and testing agency.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Tension-control, high-strength, bolt-nut-washer assemblies.
3. Shear stud connectors.
4. Deformed bar anchors.
5. Shop primers.
6. Nonshrink grout.

F. Survey of existing conditions.

G. Source quality-control reports.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD or the fabricator shall employ an approved independent inspection or quality control agency to conduct periodic, in-plant inspections at the fabricator's plant, at a frequency that will assure the fabricator's conformance to the requirements of the inspection agency's approved quality control program.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE or the installer shall employ

an approved independent inspection or quality control agency to conduct periodic inspections of the installer’s work, at a frequency that will assure the installer's conformance to the requirements of the inspection agency's approved quality control program..

C. Fabricator and Erector Quality Control Programs shall adhere to the minimum requirements of Chapter N of AISC 360-10.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

E. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 360.
3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles , S-Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade C, structural tubing.

E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.

1. Finish: Black except where indicated to be galvanized.

F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain.

E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

F. Headed Anchor Rods: ASTM F 1554-Grade 36, Grade 55 (weldable) and Grade 105 as indicated.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436, Type 1, hardened carbon steel.
4. Finish: Plain.

G. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Washers: ASTM F 436, Type 1, hardened carbon steel.
3. Finish: Plain.

H. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

J. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.3 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

B. Galvanizing Repair Paint: ASTM A 780/A 780M.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."

F. Shear Connectors and Deformed Bar Anchors: Prepare steel surfaces as recommended by manufacturer of shear connectors and deformed bar anchors. Use automatic end welding of headed-stud shear connectors and deformed bar anchors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.

2. Baseplate Holes: Cut, drill, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened unless noted otherwise.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.
6. Surfaces enclosed in interior construction.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Provide plate washers at anchor rods as indicated and in accordance with minimum sizes contained in Table 14-2 of AISC Manual of Steel Construction.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in

permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors and Deformed Bar Anchors: Prepare steel surfaces as recommended by manufacturer of shear connectors and deformed bar anchors. Use automatic end welding of headed-stud shear connectors and deformed bar anchors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened unless noted otherwise.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. All testing and inspections of Structural Steel Framing and Architecturally Exposed Structural Steel shall be done in conformance with IBC 2012, Section 17 and AISC 360-10, Chapter N.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

E. In addition to visual inspection, test and inspect field-welded shear connectors and deformed bar anchors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector or deformed bar anchor.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors or deformed bar anchors if weld fracture occurs on those already tested.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 051200

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Roof deck.
2. Acoustical roof deck.
3. Acoustical cellular roof deck.
4. Composite floor deck.
5. Noncomposite form deck.

B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.

1.3 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

C. Product Certificates: For each type of steel deck, signed by product manufacturer.

D. Welding certificates.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Acoustical roof deck.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

C. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 ROOF DECK

A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 50, G60 zinc coating. Provide Grade 40 minimum at 3” deep deck.
2. Galvanized and Shop-Primed Steel Sheet: Provide at areas to receive field paint. ASTM A 653/A 653M, Structural Steel (SS), Grade 50, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer. Provide Grade 40 minimum at 3” deep deck.

a. Color: Manufacturer's standard.

3. Deck Profile: As indicated.
4. Profile Depth: As indicated.
5. Design Uncoated-Steel Thickness: As indicated.

6. Span Condition: Triple span or more.
7. Side Laps: Overlapped.

2.2 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 12 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 30 for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.

I. Galvanizing Repair Paint: ASTM A 780 for roof deck welds after welds have been inspected by Special Inspector.

J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.

B. Locate deck bundles to prevent overloading of supporting members.

C. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

D. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld or mechanically fasten cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds and mechanical fasteners will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on top surface of roof deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions. This applies at all roof deck welds.

B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Load-bearing wall framing.
2. Interior non-load bearing wall framing exceeding height limitations of standard, nonstructural metal framing.
3. Floor joist framing.
4. Roof rafter framing.
5. Ceiling joist framing.
6. Soffit framing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product certificates: For each type of code-compliance certification for studs and tracks.

C. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Miscellaneous structural clips and accessories.

D. Evaluation Reports: For non-standard cold-formed steel framing, post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

B. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Cold-Formed Steel Framing Design Standards:

1. Floor and Roof Systems: AISI S210.
2. Wall Studs: AISI S211.
3. Headers: AISI S212.
4. Lateral Design: AISI S213.

B. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 COLD-FORMED STEEL FRAMING, GENERAL

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: ST33H for 18 and 20 gage studs, ST50H for 16 gage studs and thicker.
2. Coating: G60.

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 50, Class 1.
2. Coating: G90.

C. Vertical Deflection Clips: Manufacturer's standard bypass and head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Clark Dietrich Building Systems
2. The Steel Network, Inc.
3. Simpson Strong-Tie Co., Inc.

2.3 FLOOR JOIST FRAMING

A. Steel Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated, **unpunched,** with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1-5/8 inches, minimum.

2.4 ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1-5/8 inches, minimum.

2.5 CEILING JOIST FRAMING

A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, **unpunched** with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Flange Width: 1-5/8 inches, minimum.

2.6 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Flange Width: 1-5/8 inches, minimum.

2.7 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.8 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Rods: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or

equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.

C. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

2.10 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

    1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

    1. Anchor Spacing: as indicated on structural drawings.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

    1. Stud Spacing: as indicated on structural drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced vertically 60 inches on-center maximum unless noted otherwise. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 EXTERIOR NON-LOAD-BEARING WALL FRAMING INSTALLATION.

A. Also applies to interior non-load bearing wall framing that exceeds height limitations of standard, nonstructural metal

B. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

C. Fasten both flanges of studs to bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches maximum

D. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

E. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Connect vertical deflection clips or vertically slotted single deflected track to bypassing or infill studs and anchor to building structure.

F. Install horizontal bridging in wall studs, spaced vertically in rows indicated but not more than 60 inches apart. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space joists not more than 2 inches from abutting walls, and as follows:

1. Joist Spacing: 16”

D. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated.

1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals indicated. Fasten bridging at each joist intersection as follows:

1. Joist-Track Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
2. Combination Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.7 FIELD QUALITY CONTROL

A. Testing and Inspections: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports. Coordinate timing of periodic testing and inspections of the following:
1. Connections using self-drilling, self-tapping screws.
2. Size, steel grade, flange width, spacing, and material thickness of members.

B. Testing agency will report test results promptly and in writing to Contractor and Architect.

C. Remove and replace work where test results indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 061000 ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking, cants, and nailers.
4. Wood furring and grounds.
5. Sheathing
6. Plywood backing panels.
7. Fire-retardant blocking and Plywood

1.3 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. RIS: Redwood Inspection Service.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
4. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency

certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

3. Interior Type: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

C. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

D. Application: Treat all rough carpentry blocking & plywood where indicated on the construction documents.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: Construction, Stud, or No. 3 grade, any species.

2.5 MISCELLANEOUS LUMBER

General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.

B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber of any species.

C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine; No. 2 grade; SPIB.
2. Hem-fir or hem-fir (north); Standard or No. 3 Common grade; NLGA, WCLIB, or WWPA.
3. Eastern softwoods; No. 2 Common grade; NeLMA.
4. Northern species; No. 2 Common grade; NLGA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD BACKING PANELS

A. Electrical, Phone and Data Equipment Backing Panels: DOC PS 1, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153 or Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Install plywood backing panels by fastening to studs or masonry; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

D. Shear Wall Panels: Install shear wall panels to comply with manufacturer's written instructions.

E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, tv brackets, trim, and other equipment shown on the drawings as Owner furnished equipment.

F. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

I. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring as indicated.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 064023 – INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Custom plastic laminate casework.

B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes installed in architectural woodwork.

C. Samples for Verification:

1. Plastic laminates, 3-inches by 5-inches for each type, color, pattern, and surface finish.
2. Qualification Data: For Installer and fabricator.

D. Product Certificates: For each type of product, signed by product manufacturer.

E. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Fabricator of products or Certified participant in AWI's Quality Certification Program.

C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide AWI Quality Certification Program labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

1. Hardwood Plywood: HPVA HP-1
2. Particleboard: ANSI A208.1, Grade M-2

D. Thermoset Decorative Overlay: Particleboard complying with ANSI A208.1, Grade M-2, or medium-density fiberboard complying with ANSI A208.2, Grade MD, with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include, but are not limited to, the following:

a. Wilsonart International
b. Formica Corporation

2.2 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

C. Adhesives, General: Adhesives shall not contain urea formaldehyde.

D. Adhesive for Bonding Plastic Laminate: Resorcinol

2.3 FABRICATION, GENERAL

A. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
2. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.

C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

D. Shop-cut openings to maximum extent possible to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.5 PLASTIC-LAMINATE CABINETS (PLAM2)

A. Grade: Custom

B. AWI Type of Cabinet Construction: Flush overlay

C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: Grade HGS
2. Vertical Surfaces: Grade HGS
3. Body Edges: Grade HGS

D. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate,
    a. Edges of Plastic-Laminate Shelves: Grade HGS
    b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS

2. Drawer Sides and Backs: Thermoset decorative panels.
3. Drawer Bottoms: Thermoset decorative panels.

E. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

F. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

G. Door and Drawer Edging: Grade HGS

H. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. Manufacturer: Formica
2. Color: 8906-58 Danish Maple

2.6 PLASTIC-LAMINATE COUNTERTOPS (PLAM1)

A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.

B. Quality Standard: Comply with WIC Section 16.

C. Grade: Custom.

D. High-Pressure Decorative Laminate Grade: HGS.

E. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. Manufacturer: Wilsonart
2. Color: 4845-60 Twilight Zephyr

F. Grain Direction: Parallel to cabinet fronts.

G. Edge Treatment: Same as laminate classing on horizontal surfaces.

H. Core Material: Particleboard.

I. Core Material at Sinks: Exterior-grade plywood & glue.

2.8 CABINET HARDWARE AND ACCESSORIES

1. General: Provide cabinet hardware and accessory materials for a complete installation of architectural woodwork, except for items specified in Division 8 Section "Door Hardware."
2. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.
3. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, self-closing
4. Pulls: 4-inch wire drawer pulls. Provide pulls by Doug Mocket as follows: No. DP57B - 4-5/32". Finish: Satin Stainless Steel on all sides.
5. Catches: Magnetic, BHMA A156.9, B03141.
6. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
7. Shelf Rests: BHMA A156.9, B04013; metal.
8. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, BHMA A156.9, B05091 and rated for the following loads:

    a. Box Drawer Slides: 100 lbf.

9. Exposed Hardware Finishes: Complying with BHMA A156.18 for BHMA finish number indicated.

    a. General: Brushed Stainless Steel

10. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.6 FASTENERS AND ANCHORS

A. Screws: Select material, type, size, and finish required for each use. Comply with FS FF-S-111 for applicable requirements. For metal framing supports, provide screws as recommended by metal framing manufacturer.

B. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements. Provide any type of non-corrosive nail for exterior woodwork.

C. Anchors: Select material, type, size, and finish required by each substrate for secure anchorage. Provide non-ferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion-resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete or masonry work for subsequent woodwork anchorage.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

   1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023

SECTION 064216 – WOOD PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Reclaimed Solid Wood Paneling (WD).

B. Related Requirements:

1. Division 6 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing paneling and that are concealed within other construction before paneling installation.
2. Division 9 Section “Gypsum Board Assemblies.”

1.3 DEFINITIONS

A. Paneling includes wood furring, blocking, and shims for installing paneling, unless concealed within other construction before paneling installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTALS

A. Product Data: For each type of product, including panel products, adhesives, aluminum trim and finishing materials and processes.

B. Shop Drawings: Show location of paneling, large-scale details, attachment devices, trim and other components. Include dimensioned plans and elevations.

1. Show details full size.
2. Show locations and sizes of furring and blocking, including concealed blocking specified in other Sections.
3. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

4. Apply WI Certified Compliance Program label to first page of Shop Drawings.

C. Samples for Verification:

1. Veneer-faced panel products for transparent finish, 8 by 10 inches, for each species and cut. Include at least one face-veneer seam and finish as specified.

D. Manufacturer's recommended maintenance procedures.

E. Qualification Data: For Installer and Fabricator.

F. Product Certificates: For each type of product.

G. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

A. Fabricator and Installer Qualifications: Shop that employs skilled workers who custom-fabricate, and install, products similar to those required for this Project and whose products have a record of successful in-service performance.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups of typical paneling as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver paneling until painting and similar operations that could damage paneling have been completed in installation areas. If paneling must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install paneling until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where paneling is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support paneling by field measurements before being enclosed and indicate measurements on Shop Drawings.

C. Established Dimensions: Where paneling is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that paneling can be installed as indicated.

1.10 WARRANTY

A. All products shall be warranted to be free of defects for a period of one year after installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

2.2 RECLAIMED SOLID WOOD PANELING (WD)

A. Manufacturer: TerraMai

B. Wood Species: Reclaimed American Black Walnut Engineered Flooring & Paneling (*Juglans nigra*).

C. Construction: Reclaimed walnut wear layer at 1/8-inch thick over an FSC-certified substrate. S4S with square-edge tongue-and-groove profile. Three-ply, single strip construction. Tongue & groove profile with micro-bevel. End-matched.

D. Character: Quartered select, vertical-grain.

E. Dimensions: 9/16-inch thick by 5-inch wide by 1 ft to 7 ft random lengths.

F. Finish: Prefinished with a Zero-VOC clear oil finish.

G. Adhesives, General: Adhesives shall not contain urea formaldehyde.

2.3 FABRICATION

A. Paneling Grade: Provide Premium grade paneling complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Complete fabrication, including assembly and finishing, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times paneling fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

D. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. All panels shall be allowed to equalize to the moisture and temperature in the room environment prior to installation. To ensure product performance, a temperature range of 60-80 deg F and a humidity range of 35-55% must be maintained during storage, installation and product life cycle.

B. Before installing paneling, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Install all materials in strict accordance with the manufacturer’s installation instructions.

B. Avoid contamination of the panel faces with adhesives, solvents or cleaners during installation.

C. Install paneling level, plumb, true, and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches. Install with no

more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.

1. For flush paneling with revealed joints, install with variations in reveal width, alignment of top and bottom edges, and flushness between adjacent panels not exceeding 1/32 inch.

D. Anchor paneling to supporting substrate with concealed clips. Do not use face fastening.

E. Complete finishing work specified in this Section to extent not completed at shop or before installation of paneling.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective paneling, where possible, to eliminate defects; where not possible to repair, replace paneling. Adjust for uniform appearance.

B. Clean paneling on exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064216

SECTION 072100 BUILDING INSULATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, Division 0 - Bidding and Contract Requirements and Division 1 General Requirements apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Insulation under slabs-on-grade.
2. Cavity wall insulation.
3. Concealed building insulation.
4. Safing insulation.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 4 Section "Unit Masonry Assemblies" for insulation installed in cavity walls and masonry cells.
2. Division 9 Section for insulation in Gypsum Wallboard Assemblies.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of insulation product specified.

C. Product test reports from and based on tests performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.

D. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence compliance of foam-plastic insulations with building code in effect for Project.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering insulation products that may be incorporated in the work include, but are not limited to, the following:

1. Extruded-Polystyrene Board Insulation: (Cavity Wall)

    a. Amoco Foam Products Company.
    b. Dow Chemical Co.
    c. UC Industries, Inc.; Owens-Corning Co.

2. Polyisocyanurate Board Insulation: (Roof Insulation)

    a. Johns Manville
    b. NRG Barriers, Inc.

3. Glass-Fiber Insulation:

    a. CertainTeed Corporation.
    b. Knauf Fiber Glass GmbH.
    c. Owens-Corning Fiberglas Corporation.
    d. Schuller International, Inc.

2.2 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

B. Extruded-Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as blowing agent to comply with ASTM C 578 for type and with other requirements indicated below:

1. Type IV, 1.60-lb/cu. ft. minimum density, unless otherwise indicated.
2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.
3. Recycled Content: Not less than 50 percent blend of postconsumer and recovered polystyrene resins.

C. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation with core formed by using hydrochlorofluorocarbons as blowing agent and faced on both sides with aluminum foil to comply with referenced standards and with other requirements indicated below:

1. Federal Standard: FS HH-I-1972/1, Class 1 (nonreinforced core) or 2 (reinforced core).
2. ASTM Standard: ASTM C 1289, Type I, Class 1 or 2.
3. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively, based on tests performed on unfaced core on thicknesses up to 4 inches.
4. Thermal Resistivity: 7.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

D. Unfaced, Flexible Glass-Fiber Sound Attenuation Insulation combining glass fibers with thermosetting resin binders to comply with ASTM C 665, Type I; or with ASTM E 136, Type I.

2.3 SAFING INSULATION AND ACCESSORIES

A. Slag-Wool-Fiber Board Safing Insulation: Semirigid boards designed for use as fire stop at openings between edge of slab and exterior wall panels, produced by combining slag-wool fibers with thermosetting resin binders to comply with ASTM C612, Type IA and IB; nominal density of 4 lb/cu. Ft.; passing ASTM E 136 for combustion characteristics; thermal resistivity of 4 deg F x h x sq. ft./BTU x in. at 75 deg F.

B. Caulking Compound: Material approved by manufacturer of safing insulation for sealing joint between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.

C. Safing Clips: Galvanized steel safing clips approved by manufacturer of saving insulation for holding safing insulation in place.

2.4 VAPOR RETARDERS

A. Polyethylene Vapor Retarder: ASTM D 4397, Class A, 10 mils thick, with maximum permeance rating of 0.13 perm.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Reinforced-Polyethylene Vapor Retarders:

a. DURA-SKRIM 6WW; Raven Industries, Inc.
b. Griffolyn T-65; Reef Industries, Inc., Griffolyn Div.

2.5 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

2.6 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation, of thickness indicated, securely in position indicated with self-locking washer in place; and complying with the following requirements:

1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches in diameter, length to suit depth of insulation indicated.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

1. Where spindles will be exposed to human contact after installation, protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

D. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Adhesively Attached, Spindle-Type Anchors:

a. TACTOO Insul-Hangers; AGM Industries, Inc.
b. Spindle Type Gemco Hangers; Gemco.

2. Insulation-Retaining Washers:

a. RC150; AGM Industries, Inc.
b. SC150; AGM Industries, Inc.
c. Dome-Cap; Gemco.
d. R-150; Gemco.
e. S-150; Gemco.

3. Anchor Adhesives:

a. TACTOO Adhesive; AGM Industries, Inc.
b. Tuff Bond Hanger Adhesive; Gemco.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

A. On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

B. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to written instructions of insulation manufacturer.

3.5 INSTALLATION OF CAVITY WALL INSULATION

1. Refer to Division 4 Section “Unit Masonry”.

3.6 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

D. Set reflective, foil-faced units with not less than 0.75-inch air space in front of foil as indicated.

E. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

1. Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.Revise below to indicate type of concrete substrate, such as architectural precast concrete panels or cast-in-place concrete walls.

3.7 NOT USED

3.8 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than 2 wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

C. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.

D. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.

E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

F. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.9 PROTECTION

A. General: Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 074113 - STANDING SEAM ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY.

A. Work described in this section includes pre-formed metal roofing system complete with clips, perimeter and penetration flashing, closures, gutters, and downspouts.

B. Related work specified elsewhere:

1. Structural steel.
2. Steel joists.
3. Metal roof decks.
4. Wood roof decks.
5. Metal fabrications.
6. Rough carpentry.
7. Flashing and sheet metal. (Not roof panel related).
8. Air barrier and vapor retarder.
9. Thermal insulation.
10. Sealants.

1.3 DEFINITIONS

A. American Architectural Manufacturer Association (AAMA):

1. AAMA 501.1-05: Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.
2. AAMA 621-96: Voluntary/Standard Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates

B. American Iron and Steel Institute (AISI):

1. S100-07: 2007 Edition of the North American Specification for the Design of Cold-Formed Steel Structural Members.

C. American Society of Civil Engineers (ASCE):

1. ASCE 7-05: Minimum Design Loads for Buildings and Other Structures.

D. American Society for Testing and Materials (ASTM):

1. A653-03: Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. A755–03: Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
3. A792-03: Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
4. B209-02a: Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
5. D1056-00: Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
6. D3575-00e1: Standard Test Methods for Flexible Cellular Materials made from Olefin Polymers.
7. E1514-98(2003) Standard Specification for Structural Standing Seam Steel Roof Panels.
8. E1592-01: Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
9. E1637-98(2003) Standard Specifications for Structural Standing Seam Aluminum Roof Panel Systems.
10. E1646-95(2003): Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
11. E1680-95(2003): Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
12. E1886-02: Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
13. E1996-09 Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
14. E2140-01: Standard Test Method for Water Penetration of Metal Roof Panels Systems by Static Water Pressure Head.

E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

1. Architectural Sheet Metal Manual, 6th edition.

F. Underwriters Laboratory (UL):

1. UL 580, 4th Ed.: Standard for Tests for Uplift Resistance of Roof Assemblies.
2. UL 790, 7th Ed.: Standard for Tests for Fire Resistance of Roof Covering Materials.

G. National Association of Architectural Metal Manufacturers (NAAMM)

1. Metal Finishes Manual for Architectural and Metal Products

1.4 DESIGN AND PERFORMANCE CRITERIA.

A. Thermal Expansion and Contraction.

1. Completed metal roofing and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, or reducing performance ability.

2. The design temperature differential shall be not less than 220 degrees Fahrenheit.

3. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.

B. Uniform Wind Uplift Load Capacity.

1. Installed roof system shall withstand negative wind uplift pressures complying with the following criteria.

a. Design Code: ASCE 7, Method 2 for Components and Cladding.

b. Safety Factor: As determined in accordance with AISI S100 section D6.2.1, but in no instance shall the safety factor be taken to be less than 1.67 for any roof or wall zone. The provisions of Section D6.2.1a of Appendix A shall NOT be applicable for this project.

2. The ultimate capacity of the panel system shall be determined based on performance testing in accordance with ASTM E1592. The allowable load carrying capacity shall be calculated in accordance with AISI S100 section D6.2.1, except the provisions of Section D6.2.1a of Appendix A shall NOT be applicable for this project.

C. Uniform Positive Load Capacity.

1. Uniform positive load capacity shall be determined in accordance with AISI S100.

2. The installed roof system shall be capable of resisting each of the following positive uniform roof loads: Roof Live Load of 20 psf; Roof Snow Load of 50 psf.

3. Installed roof system shall carry positive uniform design loads with a maximum system deflection of L/180 as measured at the rib (web) of the panel.

D. Wind Uplift Classification: The panel system shall be listed as a Class 90 windstorm rated system, as determined by UL 580.

E. Fire Resistance Classification: The panel system shall be listed as a Class A Roof Covering, as determined by UL 790.

F. Air infiltration: The panel system shall be tested in accordance with ASTM E1680, and meet or exceed the following performance requirements:

Pressure	Area Leakage Rate
1.57 PSF	0.0030 cfm/sq.ft.
6.24 PSF	0.0045 cfm/sq.ft.
20.0 PSF	0.0060 cfm/sq.ft.

G. Static air pressure water infiltration: The panel system shall be tested in accordance with ASTM E1646, and meet or exceed the following performance requirements:

Pressure	Result
6.2 Gal/Hr per S.F. and Static Air Pressure of 20.0 psf for 15 minutes	No Leakage

H. Static water pressure head water infiltration.

1. The panel system shall be tested in accordance with ASTM E2140, and pass with no leakage. The test specimen must include a panel end lap condition and successfully withstand being submerged under 6" of water for 6 hours.

I. Dynamic pressure water penetration.

1. The panel system shall be tested in accordance with AAMA 501.1, and pass with no water penetration, other than condensation, when exposed to 8" per hour of dynamic rain and 70 mph wind velocities for not less than five (5) minutes duration.

J. Missile Impact Test and Cyclic Wind Pressure Test.

1. The panel system shall be tested in accordance with ASTM E1886. The tested system shall be of identical profile and material type as the specified panel for this project; thicker gauge and/or narrow width panels than those tested will be acceptable. The anchor clip spacing for this project shall be based on E1592 requirements, but shall not exceed that of the E1886 test report.

1.5 SUBMITTALS.

A. Shop drawings: Show roof panel system with flashings and accessories in plan view; sections and details. Include metal thicknesses and finishes, panel lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations. Indicate relationships with adjacent and interfacing work. Shop drawings to be prepared by metal roof panel manufacturer and sealed by a professional engineer registered in the state of the project location.

B. Financial Certification: Provide the building owner with a signed and notarized (sealed) affidavit by an officer of the panel system manufacturer which confirms a current minimum corporate asset-to-liability ratio of not less than 3:1 for the panel manufacturer, or its parent corporation. Financial support information and affidavit must be dated within 30 days prior to the product submittal.

C. Design Test Reports.

1. Submit copies of design test reports for each of the performance testing standards listed in specification article 1.4.

2. Test reports shall be performed by independent, accredited testing laboratories, and shall bear the seal of a registered professional engineer.

D. Warranty: Provide unexecuted specimen warranty documents for each warranty as required in specification article 1.10.

E. Samples.

1. Submit sample of panel section, at least 6" x 6" showing seam profile and also a sample of color selected.

2. Submit sample of panel clip, gable clip, batten seam cap with sealant, and preformed metal and foam closures.

1.6 QUALITY CRITERIA/INSTALLER QUALIFICATIONS.

A. Engage an experienced metal roofing contractor (erector) to install standing seam system who has a minimum of three (3) years experience specializing in the installation of structural standing seam metal roof systems.

B. Contractor must be certified by manufacturer specified as a supplier of standing seam system and obtain written certification from manufacturer that installer is approved for installation of the specified system.

C. Successful contractor must obtain all components of roof system from a single manufacturer. Any secondary products that are required which cannot be supplied by the specified manufacturer must be recommended and approved in writing by primary manufacturer prior to bidding.

D. Fabricator/Installer shall submit work experience and evidence of adequate financial responsibility. Architect reserves the right to inspect fabrication facilities in determining qualifications.

1.7 DELIVERY, STORAGE, AND HANDLING.

A. Inspect materials upon delivery.

B. Handle materials to prevent damage.

C. Store materials off ground providing for drainage; under cover providing for air circulation; and protected from any debris.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of decks, purlins, rafters, parapets, walls, and other adjoining work to provide a leak proof, secure, and noncorrosive installation.

1.10 WARRANTIES

A. Endorse and forward to owner the following warranties:

1. Single Source manufacturer's roof system weathertight warranty including roof panels, wall panels, fascia, trim flashing, penetrations, and other materials integral to the roof system, against leaks for a period of 25 years. Any contractor and/or installer warranties shall be in addition to manufacturer's warranty and shall not limit or delay manufacturer's warranty.

2. The warranty shall not place any limitations on wind speed, up to a maximum design wind speed as given in Article 1.4 of this specification.

3. Manufacturer's standard 20 year finish warranty covering checking, crazing, peeling, chalking, fading, and adhesion of the prepainted sheet metal materials.

4. Installer's 3 year warranty covering roof panel system installation and watertightness.

B. Warranties shall commence on date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Berridge Manufacturing Co
2. Merchant & Evans, Inc.
3. Petersen Aluminum Corp.
4. IMETCO
5. CECO Systems

2.1 ROOFING SHEET MATERIALS

A. Painted, metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755/A755M.

1. Recycled Content: Provide steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is at least 70 percent.

2. 24 gauge, Zinc-Coated (Galvanized) Steel Sheet, as per ASTM A653: G90 (Z275) coating designation; structural quality, grade 40 ksi (275 MPa).

3. Texture: Smooth surface.

4. Exposed Coil-Coated Finish:

    a. 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Manufacturers' approved applicator to prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    b. Coating system shall provide nominal 1.0 mil (0.025 mm) dry film thickness, consisting of primer and color coat.

    c. Color shall be selected from manufacturers full range of colors.

5. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

B. Panel Sealants:

1. Seam Cap Sealant: Factory applied hot melt, high viscosity, pressure sensitive adhesive with high heat resistance.

2. Sealant Tape: Non-curing, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1-inch- (13-mm-) wide and 1/16-inch- (3-mm-) thick.

3. Exposed Sealant: ASTM C 920; elastomeric tripolymer, polyurethane, or other advanced polymer sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.

4. Concealed Sealant: ASTM C 1311: Butyl-Based, Solvent-Release, One-Part Sealant.

2.2 FIELD-INSTALLED THERMAL INSULATION

A. Refer to Division 07 Section "Thermal Insulation."

2.3 SUBSTRATE BOARD

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M.

1. Type and Thickness: Regular, 1/2 inch (13 mm)

2. The top surface of the substrate board shall be pre-primed to provide for adhesion of the self-adhering underlayment material.

3. Product: Subject to compliance with requirements, provide Dens-Dek Prime by Georgia-Pacific Corporation.

B. Substrate-Board Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FMG 4470, designed for fastening substrate board to substrate.

2.4 UNDERLAYMENT MATERIALS

A. Self-Adhering with reinforcing scrim, High-Temperature Sheet: 50-mils- (1.3-mm-) thick minimum, consisting of slip-resisting top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied.

1. Thermal Stability: Stable after testing at 250 deg F (121 deg C); ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
3. Seams shall be lapped in accordance with manufacturer's recommendations.
4. Underlayment shall be approved for 90 days (minimum) of exposure to UV and weather penetrations.
5. Products: Subject to compliance with requirements, provide one of the following:
    a. Aqua Block UDL by IMETCO of Norcross, GA.

2.5 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C645, cold-formed metallic-coated steel sheet, ASTM A653, G90 (Z275) hot-dip galvanized.

2.6 MISCELLANEOUS MATERIALS

A. Concealed fasteners: Corrosion resistant steel screws, #10 minimum diameter x length appropriate for substrate, hex washer head or pancake head. Use self-drilling, self-tapping for metal substrate or A-point for plywood substrate.

B. Exposed fasteners: 3xx series stainless steel screws (cadmium or zinc coatings are not acceptable) with neoprene sealing washer, or 1/8-inch- (3-mm-) diameter stainless steel rivets.

2.7 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.

B. Vertical-Rib, Standing-Seam Metal Roof Panels with separate mechanically field crimped batten seam cap: Formed with vertical ribs at panel edges, pencil beads and an intermediate stiffening rib symmetrically spaced between ribs; designed for 2-direction installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, attaching a separate batten seam cap and mechanically seaming panels together.

1. Basis-of-Design System: Panel shall be IMETCO Series 300 (S300) roof panel system as manufactured by Innovative Metals Company, Inc. (IMETCO), Norcross, Georgia, telephone 1-800-646-3826:

2. Material: Zinc-coated (galvanized) steel sheet, 0.023-inch (0.56-mm) nominal thickness. See 2.1 for finishes and color selection.

3. Characteristics:

   a. The same panel profile from a single manufacturer shall be used for ALL standing seam roof areas.

   b. Configuration: Standing seams incorporating mechanically interlocked, concealed anchor clips which allow unlimited thermal movement.

      1) Profile of panel shall have two stiffening beads positioned 1-½" (38 mm) from the vertical seam and one raised stiffening rib centered in the panel.

      2) Exposed fasteners, screws and/or roof mastic are unacceptable and will be rejected. System configuration only allows for exposed fasteners at panel overlap (if required and approved by architect) and trim details (as per manufacturer's guidelines).

      3) Panels must be furnished in continuous lengths from ridge to eave with no overlaps unless approved by architect.

   c. Seam must be 2-3/8" (60 mm) minimum height for added strength for negative pressures and must have symmetrical design. Integral, asymmetrical seams are not acceptable.

   d. Site Formed Panels: Bidder will not be allowed to supply panels formed at the job-site on portable rollformers; metal panels must be factory pre-manufactured and engineered for this project.

   e. Site Formed Panels: Panels in excess of shippable length shall be formed on-site. Site formed panels shall meet each of the following requirements:

      1) Panels shall be formed on heavy duty factory type rollformers with no fewer than 16 forming stations to improve quality and minimize oil canning.

      2) Panels shall be of identical profile and characteristics as factory formed panels and specimens used as the basis of performance tests.

      3) Sealant shall be factory applied in a separate factory formed snap on cap. Site/field applied seam sealant is unacceptable. Seam caps may be shipped in 45 feet (11.4 m) or less length and lap spliced over full length panels in accordance with manufacturer's system details.

4) Site rollforming equipment shall be owned and maintained by the panel manufacturer and operated by the panel manufacturer's trained full time experienced technician. The installer must provide additional personnel to handle raw materials and finished product as necessary.

f. Concealed Standard Anchor Clips: Clips must be 16 gauge (1.4 mm) galvanized steel ONE (1) piece clip with projecting legs for additional panel alignment and provision for unlimited thermal movement in each direction along the longitudinal dimension.

1) Two-piece clips are NOT acceptable.

2) Clip design must isolate sealant in panel cap from clip to insure that no sealant damage occurs from the clip during expansion and contraction.

3) Clip must maintain a clearance of a minimum of 3/8" (9.5 mm) between panel and substrate for proper ventilation to help prevent condensation on underside of panel and eliminate the contact of panel fastener head to panel.

g. Seam cap: Snap-on cap shall be a minimum of 1-inch- (25-mm-) wide "T" shaped of continuous length up to 45 feet (11.4 m) according to job conditions and field seamed by means of manufacturer's standard seaming machine.

1) Cap shall be designed to receive two (2) beads of hot applied, high viscosity, pressure sensitive adhesive with high heat resistance during manufacturing which will not come in contact with the anchor clip.

2) In all cases, seam caps shall be factory formed to insure quality and precision in the process of sealant application.

h. Standing Seam Panel Width: 18" (nominal).

i. Stiffening ribs: Located in flat of panel to minimize oil canning and telegraphing of structural members.

j. Replaceability: Panels shall be of a symmetrical design with mechanically seamed cap configuration such that individual panels may be removable for replacement without removing adjacent panels and installation may proceed in both directions simultaneously.

k. Panel ends shall be folded up 90 degrees at ridge, headwall, and hip conditions, where applicable. No metal shall be cut or otherwise perforated at the folded end.

2.8 ACCESSORIES

A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.

2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips meeting ASTM D1056 and/or D3575; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

3. Gable anchor clips: 16 gauge (1.4 mm) galvanized steel

B. Flashing and Trim: Formed from same material and gauge as roof panels, prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

C. Gutters: Formed from same material roof panels. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 10-foot- (3-m-) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced per SMACNA's recommendation based on gauge and stretch-out, fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match [metal roof panels] [roof fascia and rake trim].

1. Gutter Hangers: External gutter supports shall be 2-inch- (50-mm-) wide x ¼-inch- (6-mm-) thick formed aluminum, and shall be spaced at no greater than 36" (0.9m) on center. External supports shall be post-painted with a matching full-strength 70 percent PVDF finish and warranted by the panel manufacturer for same term as specified for material finishes.

2. Gutter Straps: Internal gutter straps shall be 1-inch- (25-mm-) wide x 1/8-inch- (3-mm-) thick formed aluminum, and shall be spaced at no greater than 36" (0.9m) on center. Internal straps shall be post-painted with a matching full-strength 70 percent PVDF finish and warranted by the panel manufacturer for same term as specified for material finishes.

D. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- (3-m-) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual". Finish downspouts to match gutters.

1. Downspout Brackets: Where detailed, surface mounted downspout protection guards shall be fabricated from ¼-inch- (6-mm-) thick formed aluminum, and shall be post-painted with a matching full-strength 70 percent PVDF finish and warranted by the panel manufacturer for same term as specified for material finishes.

E. Roof Curbs: Fabricated from same material as roof panels, minimum and welded top box and integral full-length cricket. Fabricate curb subframing of minimum 0.0598-inch- (1.5-mm-) thick, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads, of size and height indicated. Finish roof curbs to match metal roof panels.

2.9 SNOW GUARDS

A. Snow Guards: Prefabricated, noncorrosive units designed to be installed without penetrating metal roof panels, and complete with predrilled holes, clamps, or hooks for anchoring. Snow guards shall be illustrated with the panel manufacturer's installation drawings, and shall be designed to resist the sliding force of snow in accordance with the requirements of ASCE-7. Confirming calculations shall be provided by the panel manufacturer.

1. Surface-Mounted, Metal, Stop-Type Snow Guards: Extruded-aluminum stops designed for attachment to pan surface of metal roof panel using construction adhesive. Surface-mounted show guards shall be non-penetrating and shall be post-painted with a matching full-strength 70 percent PVDF finish and warranted by the panel manufacturer for same term as specified for material finishes.

   a. Products: Subject to compliance with requirements, provide Extruded Aluminum Painted Snow Guard.

   b. Adhesive: Snow Guards shall be adhered to the metal panels with Sure Bond SB-120 construction adhesive. Apply in accordance with manufacturer's recommendations at a rate of 1.5 ounces (44 ml) minimum per snow guard.

2. Seam-Mounted, Bar-Type Snow Guards: Extruded Aluminum rods or bars held in place by aluminum clamps attached to vertical ribs of standing-seam metal roof panels.

   a. Aluminum Finish: Mill finish.

   b. Products: Subject to compliance with requirements, provide Metal Roof Innovations, Ltd.; S-5! ColorGard®

2.10 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal roof batten seam cap with factory-installed hot melt, high viscosity, pressure sensitive adhesive with high heat resistance, in a manner that will seal weathertight.

D. Form flashing components from full single width sheet in minimum 10'-0" (3 m) sections. Provide mitered corners, joined using closed end pop rivets and butyl-based, solvent released one-part sealant.

E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2. Sealed Joints: Form nonexpanding but movable joints in metal to accommodate butyl-based sealant to comply with SMACNA standards.

3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

4. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

2.11 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - PREPERATION & EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.

B. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

C. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

D. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

E. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

1. Soffit Framing: Wire tie furring channels to supports, as required to comply with requirements for assemblies indicated.

C. Establish straight, side and crosswise benchmarks

D. Use proper size and length fastener for strength requirements. Approximately 5/16 inch (8 mm) is allowable for maximum fastener head size beneath the panel.

E. Rectangular roofs shall be checked for square and straightness. Gable ends may not be straight; set a true line for the gable clips and flashing with string line.

F. Measure the roof lengthwise to confirm panel lengths, overhangs, coverage of flashings at eaves and ridges and verify clearances for thermal movement.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply over entire roof surface, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (150 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm Roll laps with roller. Cover underlayment within 90 days.

B. Install flashings to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."

3.4 STANDING SEAM METAL ROOF PANEL INSTALLATION

A. All details will be shown on in accordance with approved shop drawings and manufacturer's product data.

B. Installation of Roof Panels: Roof panels can be installed by starting from one end and working towards the opposite end. Due to the symmetrical design of the specified panel system, it is also acceptable to start from the middle of the roof and work toward each end.

1. A stainless steel rivet shall be secured through the anchor reveal of the panel leg and extend into the arms of the panel clip located at the ridge of the system. This is done at each arm of the clip along the ridge. The panel is then anchored at both sides of the clip.

    a. Be sure to capture all drilling debris during this operation with a rag or cloth placed on the panels at the drilling operation.

    b. Panels are not securely attached to the roof until fixed to the anchor clip. To avoid damage and injury, all panels shall be fixed to the anchor clip immediately as they are installed.

    c. The seam caps shall be shipped with two (2) beads of factory applied hot melt sealant located inside the caps. To install the caps, hook one side of the cap over the panel edge and rotate over the opposite panel leg. For ease of installation, start at one end of the panel and work toward the opposite end.

    d. A hand crimping tool is used to crimp the cap around the top of two adjacent panels.

    e. Caps shall then be permanently seamed with manufacturers mechanical seamer.

C. Isolate dissimilar metals and masonry or concrete from metals with bituminous coating. Use gasketed fasteners where required to prevent corrosive action between fastener, substrate, and panels.

D. Limit exposed fasteners to extent indicated on contract drawings.

E. Seal laps and joints in accordance with roofing system manufacturer's product data.

F. Coordinate flashing and sheet metal work to provide weathertight conditions at roof terminations. Fabricate and install in accordance with standards of SMACNA Manual.

G. Provide for temperature expansion/contraction movement of panels at roof penetrations and roof mounted equipment in accordance with system manufacturer's product data and design calculations.

H. Installed system shall be true to line and plane and free of dents, and physical defects. In light gauge panels with wide flat surfaces, some oil canning may be present. Oil canning does not affect the finish or structural integrity of the panel and is therefore not cause for rejection.

I. At joints in linear sheet metal items, set sheet metal items in two ¼-inch- (6-mm-) beads of butyl sealant. Extend sealant over all metal surfaces. Mate components for positive seal. Allow no sealant to migrate onto exposed surfaces.

J. Remove damaged work and replace with new, undamaged components.

K. Touch up exposed fasteners using paint furnished by roofing panel manufacturer and matching exposed panel surface finish.

L. Clean exposed surfaces of roofing and accessories after completion of installation. Leave in clean condition at date of substantial completion. Touch up minor abrasions and scratches in finish.

3.5 SNOW GUARD INSTALLATION

A. Stop-Type Snow Guards: Attach snow guards to metal roof panels with adhesive, sealant, or adhesive tape, as recommended by manufacturer. Do not use fasteners that will penetrate metal roof panels.

B. Bar-Type Snow Guards: Attach bar supports to vertical ribs of standing-seam metal roof panels with clamps or set screws. Do not use fasteners that will penetrate metal roof panels.

1. Provide 2 rows of snow guard, spaced 3 feet apart, beginning 18 inches up from gutter.

3.6 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113

SECTION 075323 - EPDM MEMBRANE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Fully adhered membrane-roofing system.
2. Fully adhered roof insulation

B. Related sections include the following:

1. Division 6 Section “Rough Carpentry” for wood nailers, curbs, and blocking.
2. Division 7 Section “Sheet Metal Flashing and Trim” for flashings and counterflashing.
3. Division 7 Section “Joint Sealants”.

1.3 SUBMITTALS

A. General: Submit the following.

B. Product data, installation instructions, and general recommendations from manufacturer of single-ply membrane system for types of roofing required. Include data substantiating that materials comply with requirements.

C. Pre-roofing conference records.

D. Test data for pullout resistance of fastening system.

E. Certification that materials comply with local VOC limitations.

1.4 QUALITY ASSURANCE

A. Manufacturer: Obtain primary single-ply membrane roofing from a single manufacturer. Provide secondary materials as recommended by manufacturer of primary materials.

B. Installer: Engage an experienced Installer that has specialized in installing roofing systems similar to those required for this Project. Installer must be licensed by manufacturer of primary roofing material.

1. Work associated with single-ply membrane roofing, including (but not limited to)

insulation, flashing, and membrane sheet joint sealers, is to be performed by Installer of this Work.

C. Manufacturer's Technical Representative Qualifications: An authorized full-time employee representative of manufacturer experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.

D. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing and inspection indicated, as documented according to ASTM E 548.

1. Inspection personnel shall be certified as a Registered Roof Observer by the Roof Consultants Institute, and shall be experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.

E. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

F. UL Listing: Provide labeled materials that have been tested and listed by UL in "Building Materials Directory" or by other nationally recognized testing laboratory for Class A rated materials/system.

1. The complete installation, including flashing, spacing of fasteners, etc…, shall comply with all FMRC Class 1 fire rated system requirements.

1.5 PROJECT CONDITIONS

A. Weather: Proceed with roofing work when existing and forecasted weather conditions permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.

B. Substrate Conditions: Do not begin roofing installation until substrates have been inspected and are determined to be in satisfactory condition.

1.6 WARRANTY

A. Manufacturer's Warranty: Submit executed copy of single-ply membrane manufacturer's "Limited Service Warranty" agreement including flashing endorsement, signed by an authorized representative of manufacturer. Provide form that was published with product literature as of date of Contract Documents.

B. Warranty Period: 20 years from date of Substantial Completion.

C. Manufacturer will provide, at no cost to owner, the following services in Years 2, 5, 10 and 15:

1. Inspection by a Technical Service Representative and delivery of a written inspection report documenting roof conditions.
2. Preventative maintenance and necessary repairs, including splits, tears, or breaks in the roof membrane system and flashings which threaten the integrity of the roof system and are not exempt from coverage due to neglect, negligence, vandalism, or other exclusion.
3. General rooftop housekeeping and clean-up, subject to limits, but generally including removal of incidental debris.

D. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

E. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 GENERAL

A. Performance: Provide roofing materials identified to be of generic type indicated and tested to show compliance with required performances.

B. Compatibility: Provide products recommended by manufacturers to be fully compatible with indicated substrates. Provide separation materials as required to eliminate contact between incompatible materials.

2.2 EPDM MEMBRANE

A. General: Ethylene propylene diene monomers formed into uniform, flexible sheets, complying with ASTM D 4637, Type 1.

GENERAL CONSTRUCTION BASE BID

1. Thickness: 60 mils,
2. Exposed Face Color: Black
3. Warranty: 20 years

B. Fully adhered EPDM Membrane: Manufacturer's standard installation.

C. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but not necessarily limited to, the following:

1. Carlisle Syntec Systems
2. Firestone Building Products
3. Versico Roofing Systems

2.3 AUXILIARY MATERIALS

A. Sheet Seaming System: Manufacturer's standard materials for sealing lapped joints, including edge sealer to cover exposed spliced edges as recommended by membrane manufacturer.

B. Flashing Accessories: Types recommended by membrane manufacturer, including adhesive tapes, flashing cements, and sealants.

C. Flashing Material: Manufacturer's standard system compatible with single-ply membrane.

D. Slip Sheet: Type recommended by membrane manufacturer for protecting membrane from incompatible substrates.

E. Membrane Adhesive: As recommended by membrane manufacturer for particular substrate and project conditions, formulated to withstand minimum 60-psf uplift force.

1. Provide adhesives that comply with local requirements limiting amounts of volatile organic compounds.

2.4 INSULATING MATERIALS

A. General: Provide insulating materials to comply with requirements indicated for materials and with referenced standards in sizes to fit applications indicated, selected from manufacturer's standard thickness', widths, and lengths.

1. Provide tapered boards where indicated for sloping to drain. Fabricate with a taper of 1/8" per foot, unless otherwise indicated.

B. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation with core formed by using hydrochlorofluorocarbons as blowing agent, to comply with referenced standards and with other requirements indicated below:

1. Federal Standard: FS HH-I-1972/1, Class 1 (nonreinforced core) or 2 (reinforced core).
2. ASTM Standard: ASTM C 1289, Type I, Class 1 or 2.
3. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively, based on tests performed on unfaced core on thicknesses up to 4 inches.
4. Thermal Resistivity: 7.2 deg F x h x sq. ft./Btu x in. at 75 deg F. Provide insulation in minimum thickness as required to achieve an insulating value of R-24.

2.5 AUXILIARY INSULATION MATERIALS

A. Adhesive for Bonding Insulation: Type recommended by insulation manufacturer and complying with fire-resistance requirements.

B. Mastic Sealer: Type recommended by insulation manufacturer for bonding edge joints and filling voids.

C. Mechanical Anchors: Corrosion-resistant type as recommended by insulation manufacturer for deck type and complying with fire and insurance wind-uplift rating requirements.

1. Provide system tested and approved for I-72 wind-uplift rating.

PART 3 - EXECUTION

3.1 PREPARING SUBSTRATE

A. General: Comply with manufacturers' instructions to prepare substrate to receive single-ply membrane system.

1. Verify that penetrations and blocking are in place and secured and that roof drains are properly clamped into position.

B. Clean substrate of dust, debris, and other substances detrimental to single-ply system installation. Remove sharp projections.

C. Install flashings, and accessory items as shown and as recommended by manufacturer.

D. Prime substrate where recommended by manufacturer of materials being installed.

E. Prevent compounds from entering and clogging drains and conductors and from spilling or migrating onto surfaces of other work.

3.2 INSTALLING INSULATION

A. General: Extend insulation full thickness in two layers, or in multiple layers over entire surface to be insulated, cutting and fitting tightly around obstructions. Form crickets, saddles, and tapered areas with additional material as shown and as required for proper drainage or membrane.

1. Stagger joints in one direction for each course. For multiple layers, stagger joints in both directions between courses with no gaps, to form a complete thermal envelope. Insulation shall be no less than 4" thick in any area on the roof.
2. Provide tapered units to suit drainage pattern indicated.

B. Do not install more insulation in a day than can be covered with membrane before end of day or before start of inclement weather.

C. Provide protection sheet between insulation and membrane when recommended by membrane manufacturer.

D. Perimeter and Corner Attachment: Fully adhere at all locations.

3.3 INSTALLATION, GENERAL

A. Install roofing system in accordance with manufacturer's recommendations.

B. Install roofing membrane, base flashings, and component materials in compliance with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system as as listed in FMG's "Approval Guide" for fire/windstorm classification indicated. Comply with recommendations in FMG Loss Prevention Data Sheet 1-49.

C. Install roofing system in accordance with the following NRCA Manual Plates and NRCA recommendations; modify as required to comply with requirements of FMG references above:

1. Base Flashing at Parapet Wall: Plates BUR-1 and BUR-1S. Install single ply CSPE flashing in lieu of multiple ply flashing.
2. Perimeter Edge, Raised: Plates BUR- and BUR-2S.
3. Gutter at Draining Edge: Plates BUR-22 and BUR-22S.
4. Curb Detail at Rooftop HVAC Units, Premanufactured: Plates BUR-12 and BUR-12S.
5. Curb Detail at Rooftop HVAC Units, Job-Built, Wood: Plates BUR-13 and BUR-13S.

6. Curb Detail at Skylight, Roof Hatch, and Smoke Vents: Plates 14 and 14S
7. Penetration, Structural Member: Plates BUR-14 and BUR-14S.
8. Penetration, Sheet Metal Enclosure: Plates 15 and 15S
9. Penetration, Stack Flashing: Plates BUR-17 and BUR-17S.
10. Penetration, Pocket: Plates BUR-19 and BUR-19S.
11. Roof Drain: Plates BUR-20 and BUR-22S.

3.4 INSTALLING MEMBRANE

A. Install EPDM sheet over area to receive roofing according to roofing system manufacturer's written instructions. Unroll sheet and allow to relax for a minimum of 30 minutes.

B. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

D. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing sheet in place with clamping ring.

E. Adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

F. Apply roofing membrane with side laps shingled with slope of roof deck.

G. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.

1. Apply a continuous bead of in-seam sealant before closing splice if required by membrane roofing system manufacturer.

H. Repair tears, voids, and lapped seams in roofing that does not meet requirements.

3.5 FLASHING INSTALLATION

A. Install sheet flashings and performed flashing accessories and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of flashing sheet at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or

uncured sheet flashing as recommended by manufacturer.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing termination's.

E. Terminate and seal top of sheet flashings.

F. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Technical Representative: Contractor will engage a qualified manufacturer's technical representative acceptable to Owner for a minimum of one (1) full-time day per 40 hour work week on site to perform roof tests and inspections and to prepare test reports.

B. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency acceptable to Owner for a minimum of one (1) full-time day per 40 hour work week on site to perform roof tests and inspections and to prepare test reports.

C. Test Cuts: Before flood coating and surfacing built-up roofing membrane, test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:

1. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.
2. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."

D. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.

1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

E. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 PROTECTING ROOFING

A. After completing roofing (including associated work), institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. At the end of

the construction period, or at a time when remaining construction will in no way affect or endanger roofing, make a final inspection of roofing and prepare a written report to Owner, describing nature and extent of deterioration or damage found.

B. Repair or replace (as required) deteriorated or defective work found at the time of final inspection to a condition free of damage and deterioration at the time of Substantial Completion and according to the requirements of the specified warranty.

END OF SECTION

SECTION 076150 – METAL SOFFIT SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Aluminum soffit panels.

B. Related Sections include the following:
1. Division 7 Section "Sheet Metal Flashing and Trim" for flashing not part of roofing and other sheet metal work.

1.3 PERFORMANCE REQUIREMENTS

A. Install sheet metal roofing capable of withstanding normal thermal movement, wind loading, structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior.

1.4 SUBMITTALS

A. Product Data: For each product indicated. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: Show details for forming, joining, and securing metal roofing, and for pattern of seams. Show expansion-joint details and waterproof connections to adjoining work and at obstructions and penetrations.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for metal roofing with color-coated finishes.

D. Samples for Verification: 12-inch- (300-mm-) square specimens of metal roofing material with specified finishes applied. Where finishes involve normal color and texture variations, include Sample sets of 2 or more units showing the full range of variations expected.

E. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project

names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed sheet metal roofing similar in material, design, forming method, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Industry Standard: Unless otherwise shown or specified, comply with the Sheet Metal and Air Conditioning Contractors National Association's (SMACNA) "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown.

C. Wind-Uplift Resistance: Provide assemblies that meet requirements of UL 580 for Class 90 wind-uplift resistance.

1. Maintain current certification of UL follow-up program for field-rolled panels on field-forming equipment.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver metal coils, panels, and other materials so they will not be damaged or deformed. Package roofing materials for protection against transportation damage.

B. Handling: Exercise care in unloading, storing, and erecting roofing materials to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store metal roof coils and panels to ensure dryness. Do not store coils or panels in contact with other materials that might cause staining, denting, or other surface damage.

1.7 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Finish Warranty: Submit a written warranty executed by the manufacturer covering failure of the factory-applied exterior finish on metal soffit system within the specified warranty period and agreeing to repair finish or replace sheet metal roofing that evidences finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

C. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Berridge Manufacturing Co.
   2. Merchant & Evans, Inc.
   3. Petersen Aluminum Corp.

2.2 SOFFIT SHEET METALS

A. Aluminum Sheets: ASTM B 209 (ASTM B 209M) for Alclad alloy 3003 or 3004 with temper as required to suit forming operations and finish indicated.

   1. Surface: Smooth, flat.
   2. Thickness: 0.032 inch (0.8 mm), unless otherwise indicated.
   3. High-Performance Organic Coating Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.

      a. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 1402.
      b. Color and Gloss: to be selected by Architect from manufacturers full range of colors.

2.3 FABRICATION

A. Fabricate soffit system to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks, true to line and levels indicated, and with exposed edges folded back to form hems.

B. Sealant Joints: Where movable, nonexpansion-type joints are indicated or required to produce weathertight seams, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

C. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with bituminous coating or other permanent separation as recommended by manufacturer or fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements indicated for conditions affecting performance of sheet metal roofing. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate metal roofing with rain drainage work, flashing, trim, and construction of decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

B. Promptly remove protective film, if any, from exposed surfaces of metal roofing. Strip with care to avoid damage to finish.

3.3 INSTALLATION, GENERAL

A. Install soffit system to comply with manufacturer's written instructions, unless otherwise indicated.

B. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating, by applying rubberized-asphalt underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.

C. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

3.4 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

3.5 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure metal roofing is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 076100

SECTION 076200 SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes sheet metal flashing and trim in the following categories:

1. Roof drain flashing.
2. Exposed trim and fascia.
3. Metal flashing.
4. Reglets.
5. Roof expansion joint covers.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 4 Section “Unit Masonry Assemblies” for through-wall flashing and other integral masonry flashings specified as part of masonry work.
2. Division 7 Section "Joint Sealants" for elastomeric sealants.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

B. Fabricate and install flashings at roof edges to comply with recommendations of FM Loss Prevention Data Sheet 1-49 for the following wind zone:

1. Wind Zone 2: Wind pressures of 31 to 45 psf.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.

C. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

D. Samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.

1. 8-inch- square Samples of specified sheet materials to be exposed as finished surfaces.
2. 12-inch- long Samples of factory-fabricated products exposed as finished Work. Provide complete with specified factory finish.

E. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.6 PROJECT CONDITIONS

A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

PART 2 - PRODUCTS

2.1 METALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:

1. Anodized Finish for sheet metal flashing: Apply the following coil-anodized finish:

a. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

2. High-Performance Organic Coating Finish for exposed trim and fascia: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.

a. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 1402.

b. Color and Gloss: to be selected by Architect from manufacturers full range of colors.

B. Galvanized Steel Sheet (for work not exposed to view): ASTM A 526, G 90, commercial quality, or ASTM A 527, G 90, lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper, mill phosphatized where indicated for painting; not less than 0.0396 inch thick, unless otherwise indicated.

C. Aluminum-Zinc Alloy-Coated Steel Sheet (for work not exposed to view): ASTM A 792, Class AZ-50 coating, Grade 40 or to suit project conditions, with 55 percent aluminum, not less than 0.0396 inch thick, unless otherwise indicated.

2.2 REGLETS

A. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.

B. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.

C. Surface-mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, with channel for sealant at top edge.

D. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.

E. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.

1. Material: Aluminum, 0.024 inch thick.

F. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Fry Reglet Corporation.
2. Hickman: W.P. Hickman Co.
3. Keystone Flashing Company.

2.3 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Solder: ASTM B 32, Grade Sn50, used with rosin flux.

B. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

C. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coat.

D. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

E. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants."

F. Epoxy Seam Sealer: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.

G. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.

H. Paper Slip Sheet: 5-lb/square red rosin, sized building paper conforming to FS UU-B-790, Type I, Style 1b.

I. Polyethylene Underlayment: ASTM D 4397, minimum 6-mil- thick black polyethylene film, resistant to decay when tested according to ASTM E 154.

J. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

K. Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based.

2.4 FABRICATION, GENERAL

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

D. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

E. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion

provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

G. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.

1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.5 SHEET METAL FABRICATIONS

A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.

B. Roof Drain Flashing: Fabricate from the following material:

1. Lead-coated Copper: 12 oz./sq. ft.

C. Exposed Trim and Fasciae: Fabricate from the following material:

1. Aluminum: 0.050 inch thick.

D. Base Flashing: Fabricate from the following material:

1. Aluminum: 0.040 inch thick.

E. Scuppers & Counterflashing: Fabricate from the following material:

1. Aluminum: 0.0320 inch thick.

F. Flashing Receivers: Fabricate from the following material:

1. Aluminum: 0.0320 inch thick.

G. Drip Edges: Fabricate from the following material:

1. Aluminum: 0.0320 inch thick.

H. Eave Flashing: Fabricate from the following material:

1. Aluminum: 0.0320 inch thick.

I. Equipment Support Flashing: Fabricate from the following material:

1. Lead-coated Copper: 16 oz./sq. ft.

J. Overhead-Piping Safety Pans: Fabricate from the following material:

1. Galvanized Steel: 0.0396 inch thick.

K. Roof Penetration Flashing: Fabricate from the following material:

1. Lead-coated Copper: 16 oz./sq. ft.

L. Roof Expansion Joint Cover: Fabricate from the following material:

1. Aluminum: 0.040 inch thick.

M. Roof-to-Wall Expansion Joint Cover: Fabricate from the following material:

PART 3 - EXECUTION

5.1 EXAMINATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

5.2 INSTALLATION

A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.

D. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

E. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches, except where pretinned surface would show in finished Work.

1. Do not solder the following metals:

    a. Aluminum.
    b. Coil-coated galvanized steel sheet.

2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

1. Use joint adhesive for nonmoving joints specified not to be soldered.

G. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

H. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

1. Underlayment: Where installing stainless steel or aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper and a course of polyethylene underlayment.
2. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.

I. Install reglets to receive counterflashing according to the following requirements:

1. Where reglets are shown in masonry, furnish reglets for installation under Division 4 Section "Unit Masonry."

J. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches and bed with sealant.

K. Roof Drainage System: Install drainage items fabricated from sheet metal, with straps, adhesives and anchors recommended by SMACNA's Manual or the manufacturer, to drain roof in the most efficient manner. Coordinate roof drain flashing installation with roof drainage system installation. Coordinate flashing and sheet metal items for steep-sloped roofs with roofing installation.

L. Overhead-Piping Safety Pans: Suspend pans from pipe and install drain line to plumbing waste or drain line.

M. Equipment Support Flashing: Coordinate equipment support flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.

N. Roof Penetration Flashing: Coordinate roof penetration flashing installation with roofing and installation of items penetrating roof.

1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.

2. Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.

5.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION 076200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes:

1. Exterior sealants.
2. Exterior EIFS sealants.
3. Exterior and interior traffic sealants.
4. Interior sealants.
5. Interior food contact sealants.
6. Interior sanitary sealants.
7. Exterior and interior water immersed sealants.
8. Metal lap joint sealants.
9. Threshold and sheet metal bedding sealants.
10. Joint accessories.
11. Security sealants.

B. Related Sections include the following:

1. Division 4 Section "Unit Masonry Assemblies" for masonry control and expansion joint fillers and gaskets.
2. Division 8 Section "Glazing" for glazing sealants.
3. Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
4. Division 9 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

1.3 SUBMITTALS

A. Shop Drawing:

1. Submit a Sealant Schedule, and related details, indicating specific installation and interface between sealants and building materials for each type of joint sealant and joint backing material used in this specification. Use SAME reference designations as indicated in this Specification for preparation of the Joint Sealant Schedule in Part 3.6.

Submittals are subject to the requirements of Division 1 Specification Section "Submittals."

B. Product Data:

1. For each joint-sealant product indicated.

C. Samples:

1. Submit standard cured color samples and charts for each sealant type illustrating full range of standard and custom colors.

D. Manufacturer's Certificate:

1. Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
2. For manufacturer's products that include the phrase, "but are not limited to the following," the Contractor shall be responsible to provide certification that the submittal product complies with the specified product. This certification is subject to the requirements of Division 1 Specification Section "Submittals," Part 1, Definitions.

E. Qualifications Data:

1. For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified. Provide SWRI (Sealant, Waterproofing and Restoration Institute) Validation Certificate.

F. Compatibility and Adhesion from sealant manufacturer indicating the following:

1. Building materials forming joint and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
3. Preconstruction Compatibility and Adhesion Field Test for each sealant and building material.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Submit recommended inspection intervals.
2. Submit instructions for repairing and replacing failed sealed joints.

1.5 QUALITY ASSURANCE

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project. Provide SWRI (Sealant, Waterproofing and Restoration Institute) Validation Certificate.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer’s written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
3. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in

addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
2. Disintegration of joint substrates from natural causes exceeding design specifications.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience for the following sealant types:

1. Multi-component sealants cure by chemical reaction. Cure times are predictable depending on atmospheric temperature. Silicone sealant cure is not affected by temperature, however, frost and moisture at bond line will impair adhesion.
2. Single component sealants cure by reaction with moisture. Cure times will vary depending on atmospheric humidity and temperature.
3. Fast cure (FC) sealants provide lesser cure times than corresponding standard cure products. Longer cure times will permit more accumulation of dust and other air-borne contamination on surface of sealant, potentially causing apparent color change.
4. Sealant Types are M – Multi-Component and S – Single Component.
5. Sealant Grades are P – Pourable or Self-Leveling used for horizontal traffic joints and NS – Non-Sag or Gunnable used for vertical and non-traffic joints.
6. Sealant Classes are 25, 50, and 100/50 (extension/compression) representing movement capability in percent of joint width. Joint movement is based on the relative percentage of installed width. Design to a minimum of 4 times anticipated movement to accommodate design tolerances and expected movement based on coefficient of thermal expansion.
7. Sealant Uses are T – Traffic, NT – Non-Traffic, I – Immersion, M – Mortar, A – Aluminum, and O – Other. Use O includes color anodized aluminum, metals other than aluminum, painted surfaces, brick, stone, tile, and wood for example.
8. Immersion rated sealant applications require primer.

B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food; provide products that comply with 21 CFR 177.2600.

E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range of standard and custom colors.

2.2 URETHANE SEALANT TYPES – For exterior or interior use.

A. **U1** - Multi-Component, Non-Sag, Urethane: ASTM C920, Type M, Grade NS, Class 50; Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Pecora Corporation; Dynatrol II.
2. Polymeric Systems, Inc.; PSI-270.
3. Tremco, Inc.; Dymeric 240 FC.

B. **U2** - Multi-Component, Traffic-Grade Urethane: ASTM C920, Type M, Grade NS, Class 50; Uses T, Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

1. Polymeric Systems, Inc.; PSI-270
2. Tremco, Inc.; Dymeric 240 FC.

C. **U3** - Single-Component, Non-Sag Urethane: ASTM C920, Type S, Grade NS, Class 100/50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Sika Corporation, Construction Products Division; Sikaflex-15LM.
2. Tremco, Inc.; Dymonic FC

D. **U4** - Single-Component, Non-Sag Urethane: ASTM C920, Type S, Grade NS, Class 25, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Pecora Corporation; Dynatrol I-XL.
2. Sika Corporation, Construction Products Division; Sikaflex-1a.

3. Tremco, Inc.; Dymonic or Fulkem 116.

E. **U5** - Single-Component, Pourable, Traffic-Grade Urethane: ASTM C920, Type S, Grade P, Class 25, Uses T. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Pecora Corporation; Urexpan NR-201.
2. Tremco, Inc; Vulkem 45SSL.
3. Sika Corporation, Construction Products Division; Sikaflex-1CSL.

F. **U6** - Immersible, Single Component, Pourable, Traffic-Grade Urethane: ASTM C 920, Type S, Grade P, Class 25, Uses T and I. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Sika Corporation, Construction Products Division; Sikaflex-1CSL.
2. Tremco, Inc.; Vulkem 45 SSL.

G. **U7** - Immersible, Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C920. Type M, Grade P, Class 25, for Use T and I. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. LymTal International, Inc.; Iso-Flex 880GB.
2. May National Associates, Inc.; Bondaflex PUR 2 SL.
3. Tremco, Inc.; Vulkem 245

2.3 SILICONE SEALANT TYPES – For exterior or interior use.

A. **S1** - Single-Component, Non-Staining, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to the following:

1. Dow Corning Corporation; 756SMS, 791, 795 or 995.
2. Tremco, Inc.; Spectrem 3.
3. Pecora Corporation; 864, 895 or 898.

B. **S2** - Single Component, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 100/50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Dow Corning Corporation; 790
2. Pecora Corporation; 301NS, 311NS.
3. Tremco, Inc.; Spectrem 1.

C. **S3** - Single Component, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Dow Corning Corporation; 791, 795 or 995.

2. Pecora Corporation; 864, 895 or 898.
3. Tremco, Inc.; Spectrem 2, Proglaze SSG.

D. **S-4** - Single Component, Field-Tintable, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

a. Pecora Corporation; 890 FTS.
b. Tremco, Inc.; Spectrem 4TS.

E. **S5** - Mildew-resistant, Single Component, Acid-Curing Silicone: ASTM C920, Type S, Grade NS, Class 25, uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. BASF Building Systems; Omniplus
2. Dow Corning Corporation; 786 Mildew Resistant.
3. Tremco, Inc.; Tremsil 200 Sanitary.

2.4 LATEX SEALANT TYPES – For Interior Use Only

A. **L1** – Acrylic Latex or Siliconized Acrylic Latex, ASTM C834, Type OP, Grade NF. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. BASF Building Systems; Sonolac.
2. Pecora Corporation; AC-20+.
3. Tremco, Inc.; Tremflex 834.

B. **L2** - Acoustical Joint Sealant for Exposed and Concealed Joints: ASTM C1311 Manufacturer's standard Non-sag, paintable, no staining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Tremco, Inc.; Acoustical Sealant.
2. Pecora Corporation; AC-20 FTR, AIS-919.
3. USG Corporation; SHEETROCK Acoustical Sealant.

2.5 SOLVENT-RELEASE-CURING-JOINT SEALANTS:

A. **B1** - Butyl-Rubber-Based Joint Sealant: ASTM C 1311. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following.

1. Tremco, Inc.; Tremco Butyl Sealant.
2. Bostik, Inc.; Chem-Calk 300.

3. Pecora Corporation; BC-158.

2.6 PREFORMED JOINT SEALANTS – For exterior or interior applications per manufacturer's standards.

A. **PF1** - Preformed Silicone Joint Sealants: Manufacturer's standard sealant consisting of procured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Dow Corning Corporation; 123 Silicone Seal
2. Pecora Corporation; Sil-Span
3. Tremco, Inc.; Simple Seal.

B. **PF2** - Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu.ft. (160 kg/cu.m) and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Tremco, Inc.; illbruk illmod 600.
2. EMSEAL Joint Systems, Ltd.; Emseal 25V.
3. School International, Inc.; Sealtite, Sealtite 50N.

2.7 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASATM C 1330, of type indicated below and size and density to control sealant depth and otherwise contribute to producing optimum sealant performance, paired to the sealant type. List the type on the Sealant Schedule.

1. **Type C**: Closed-cell material with a surface skin.
2. **Type O**: Open-cell material.

    a. Bostik, Inc.
    b. Pecora Corporation
    c. Tremco, Inc.

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant back materials, free of oil residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include, but are not limited to, the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.

4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous surfaces include, but are not limited to, the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

    1. Do not leave gaps between ends of sealant backings.
    2. Do not stretch, twist, puncture, or tear sealant backings.
    3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques to comply with the following and at the same time backings are installed:

    1. Place sealants so they directly contact and fully wet joint substrates.
    2. Completely fill recesses in each joint configuration.
    3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint profile where indicated per Figure 8B in ASTM C1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch (10 mm). Hold edge of sealant bead ¼ inch (6 mm) inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

I. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

Sealant types should be selected from the available listed products in Part 2 of this specification section. These sealants shall be indicated on the submittal schedule, using the same reference designation as indicated in Part 1.3.A. of this specification section.

A. Exterior or Interior Sealant Joints

1. Applications:

   a. Control and expansion joints in cast-in-place concrete.
   b. Joints between [architectural] [structural] precast concrete units.
   c. Control and expansion joints in unit masonry.
   d. Control and expansion joints in stone masonry.
   e. Butt joints between metal panels.
   f. Joints between different materials listed above.
   g. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
   h. Control and expansion joints in soffits and overhead surfaces.

2. Other exterior joints in vertical surfaces and non-traffic horizontal surfaces for which no other sealant is specified

B. Interior Food Contact Sealant Joints.

1. Applications:

   a. Joints in kitchen counter tops and work surfaces.
   b. Joints between food service equipment and surrounding construction.
   c. Other interior joints where incidental food contact may occur.

C. Interior Sanitary Sealant Joints.

1. Applications:

   a. Joints in toilet room and bathroom counter tops.
   b. Joints between plumbing fixtures and adjacent materials.
   c. Joints between locker room lockers and adjacent materials.
   d. Joints between food service equipment and surrounding construction.

e. Other interior joints in wet areas where needed to limit mold and mildew growth.

D. Immersed Sealant Joints.

1. Applications:

a. Joints in fountains and water features.
b. Joints in swimming pools.
c. Joints in vertical and horizontal surfaces of other potable water storage structures.

E. Metal Lap and Bedding Sealant Joints.

1. Applications:

a. Concealed lap and hook joints in sheet metal flashing and trim.
b. Bedding joints under metal thresholds and saddles.
c. Bedding joints between sheet metal flashing and other materials.

F. Preformed Joint Sealants:

1. Applications:

a. Control and expansion joints in cast-in-place concrete.
b. Joints between [architectural] [structural] precast concrete units.
c. Control and expansion joints in unit masonry.
d. Control and expansion joints in stone masonry.
e. Butt joints between metal panels.
f. Joints between different materials listed above.
g. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
h. Control and expansion joints in soffits and overhead surfaces.
i. Other exterior joints in vertical surfaces and non-traffic horizontal surfaces for which no other sealant is specified.
j. Joints between EIFS and other materials.

G. Interior Prison Security Sealants:

1. Applications:

a. Control and expansion joints on exposed interior surfaces of exterior walls, and at inmate/secure areas.
b. Perimeter joints on exposed interior surfaces of exterior openings.
c. Joints on precast walls, ceiling, and floor joints at inmate/secure areas.
d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, and similar openings, and at inmate/secure areas.
e. Other interior joints in vertical surfaces and non-traffic horizontal surfaces subject to movement for which no other sealant is specified, and at inmate/secure areas.
f. Joints between plumbing fixtures and adjacent materials at inmate/secure areas.

g. Joints between locker room lockers and adjacent materials.

END OF SECTION 079200

SECTION 081100 STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Standard hollow-metal steel doors.
2. Standard hollow-metal steel frames.
3. Borrow-lite frames and transom frames.
4. Fire-rated door and frame assemblies.

B. Related Sections include the following:

1. Division 4 Section "Unit Masonry Assemblies" for building anchors into and grouting standard steel frames in masonry construction.
2. Division 8 Section "Glazing" for glazed lites in standard steel doors and frames.
3. Division 8 Sections for “Door Hardware” for standard steel doors.
4. Division 9 Section “Painting” for field painting standard steel doors and frames.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance and temperature-rise ratings, and finishes for each type of steel door and frame specified.

B. Shop Drawings: In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details.
3. Frame details for each frame type, including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.

6. Details of anchorages, accessories, joints, and connections.
7. Details of glazing frames and stops showing glazing.
8. Details of conduit and preparations for electrified door hardware and controls.
9. Details of removable transoms and supports.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.

D. Oversize Construction Certification: For standard steel door assemblies required to be fire rated and exceeding limitations of labeled assemblies; include statement that doors comply with requirements of design, materials, and construction but have not been subjected to fire test.

E. Product Test Reports: Based on evaluation of comprehensive fire tests performed by a qualified testing agency, for each type of standard steel door and frame.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.

C. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.

D. Fire-Rated Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.

1. Test Pressure: Test according to NFPA 252 or UL 10C. After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches (1000 mm) or less above the sill.
2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-protection-rated door assemblies except for size.
3. Temperature-Rise Rating: At exit enclosures, provide doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.

E. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (102-mm-) high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.

1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating standard steel frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate installation of anchorages for standard steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Amweld Building Products, LLC.

2. Ceco Door Products. (**Trio-E Series – Basis of Design**)
3. CURRIES Company.
4. Republic Builders Products Company.
5. Steelcraft.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A60 (ZF120) zinc-iron-alloy (galvannealed) coating designation.

D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized.

E. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.

F. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.

G. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching standard steel door frames of type indicated.

H. Grout: Comply with Division 4 Section "Unit Masonry Assemblies."

I. Grout: Comply with ASTM C 476, with a slump of 4 inches (102 mm) for standard steel door frames built into concrete or masonry, as measured according to ASTM C 143/C 143M.

J. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. (96- to 192-kg/cu. m) density; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion characteristics.

K. Glazing: Comply with requirements in Division 8 Section "Glazing."

L. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD STEEL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.

1. Design: Flush Panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.

    a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
    b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than **4.0 deg F x h x sq. ft./Btu (0.704 K x sq. m/W)** when tested according to ASTM C 1363. Injected polyurethane foam core has superior insulation characteristics with U-factor of .29 (Cecco Door Products -Trio-E Series, Basis of Design)

        1) Locations: Exterior doors and interior doors where indicated.

3. Vertical Edges for Single-Acting Doors: Beveled edge

    a. Beveled Edge: 1/8 inch in 2 inches (3 mm in 50 mm).

4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch (54-mm) radius.
5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from galvaneal steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 3 (Seamless). 16 Gage
2. Construct doors with vertical steel stiffeners spaced 6” on center. Tack weld rib ends together and to top and bottom channels. Spot weld ribs to door face sheets at 6” on center.

C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior door requirements. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless). 18 Gage.

D. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:

1. Hinges: Minimum 7 gage mortised for 4 ½" or 5" longer than hinge, secured by not less than 6 spot welds. Drilled and tapped for fasteners in accordance with ANSI A156.7. Alternately, provide 14 gauge continuous hinge rail.
2. Pivots: Minimum 0.167 inch (4.2 mm) thick by 1-1/2 inches (38 mm) wide by 6 inches (152 mm) longer than hinge, secured by not less than 6 spot welds.
3. Lock Face, Closers, and Concealed Holders: Minimum 0.067 inch (1.7 mm) thick.
4. All Other Surface-Mounted Hardware: Minimum 0.067 inch (1.7 mm) thick.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD STEEL FRAMES

A. General: Comply with ANSI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped and welded face corners and seamless face joints. Galvanealed steel finish.
2. Frames shall be thermally-broken
3. Frames for Level 3 Steel Doors: 14 gauge.

C. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.

1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
2. Frames for Level 2 Steel Doors: 16 gauge.
3. Frames for Wood Doors: 16 gauge
4. Frames for Borrowed Lights: 16 gauge.

D. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:

1. Hinges: Minimum 7 gage mortised for 4 ½" or 5" longer than hinge, secured by not less than 6 spot welds. Drilled and tapped for fasteners in accordance with ANSI A156.7. Alternately, provide 14 gauge continuous hinge rail.
2. Pivots: Minimum 0.167 inch (4.2 mm) thick by 1-1/2 inches (38 mm) wide by 6 inches (152 mm) longer than hinge, secured by not less than 6 spot welds.
3. Lock Face, Closers, and Concealed Holders: Minimum 0.067 inch (1.7 mm) thick.
4. All Other Surface-Mounted Hardware: Minimum 0.067 inch (1.7 mm) thick.

E. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.

F. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
3. Compression Type for Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-(9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

G. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (50-mm) height adjustment. Terminate bottom of frames at finish floor surface.

H. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

I. Plaster Guards: Formed from same material as frames, not less than 0.016-inch (0.4-mm) thick.

2.5 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with standard steel frames, minimum 5/8 inch (16 mm) high, unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as frames in which they are installed.

2.6 FABRICATION

A. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Standard Steel Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Provide flush top caps and seal joints in top edges of doors against water penetration. Thresholds at exterior doors shall also be thermally broken (by Pemko or approved equal)
2. Glazed Lites: Factory cut openings in doors.

C. Standard Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight and Transom Frames: Provide closed tubular members with no visible face seams or joints; fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
4. Plaster Guards: Weld guards to frame at back of hardware mortises in frames installed in concrete or masonry.
5. Where installed in masonry, leave vertical mullions in frames open at top for grouting.
6. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
7. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

        1) Two anchors per jamb up to 60 inches (1524 mm) in height.
        2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) in height.
        3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) in height.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof more than 120 inches (3048 mm) in height.

    b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

        1) Three anchors per jamb up to 60 inches (1524 mm) in height.
        2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) in height.
        3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) in height.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof more than 96 inches (2438 mm) in height.
        5) Two anchors per head for frames more than 42 inches (1066 mm) wide and mounted in metal-stud partitions.

    c. Compression Type: Not less than two anchors in each jamb.

d. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

8. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
2. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of doors and frames.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.7 STEEL FINISHES

A. General: Comply with ANSI A250.10 "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames" for recommendations for applying and designating finishes.

1. Finish standard steel door and frames after assembly.

B. Metallic-Coated Steel Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

C. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils (0.018 mm).

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

2. Apply electrostatically primer coat on all exterior doors prior to arrival at the site.

3. **All** frames and doors shall be painted prior to installation of glass inserts in order to eliminate exposed unpainted finishes visible through the glass.

E. **All** exterior steel doors and hollow metal frames shall be Galvanealled Steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of standard steel doors and frames.

1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory.

B. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Standard Steel Frames: Install standard steel frames for doors and other openings, of size and profile indicated. Comply with SDI 105.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 4 Section "Unit Masonry Assemblies."

5. Concrete Walls: Solidly fill space between frames and concrete with grout. Install grout in lifts and take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
9. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Standard Steel Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

    1. Non-Fire-Rated Standard Steel Doors:

        a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
        b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
        c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
        d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

    2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
    3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with standard steel door and frame manufacturer's written instructions.

    1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c., and not more than 2 inches (50 mm) o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.

B. Clean grout and other bonding material off standard steel doors and frames immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

D. Galvannealed Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081110

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections include the following:

1. Division 8 Section “Door Hardware” for hardware requirements.
2. Division 8 Section "Glazing" for glass view panels in flush wood doors.

1.3 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications**.**

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate doors to be factory finished and finish requirements.
4. Indicate fire ratings for fire doors.

C. Door Schedule: Use **SAME** reference designations indicated on Drawings in preparing schedule for doors and frames.

D. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:

1. Faces of Factory-Finished Doors: Show the full range of colors available for stained finishes.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

B. Quality Standard: Comply with WDMA Architectural Woodwork Quality Standards Illustrated.

1. Provide WDMA Quality Certification Labels or a WDMA letter of licensing for Project indicating that doors comply with requirements of grades specified.

2. When requested, provide evidence that the installer has successful experience completing projects of similar scope and with products as specified herein.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist), or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:

a. Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, only the following manufacturers' products may be incorporated into the Work:

1. Flush Wood Doors:
   a. Algoma Hardwoods Inc.
   b. Eggers Industries; Architectural Door Division.
   c. Lambton
   d. Marshfield.
   e. Oshkosh
   f. Graham
   g. VT Industries

B. Manufacturers other than those listed above will not be accepted – no substitutions will be allowed.

2.2 DOOR CONSTRUCTION, GENERAL

A. Doors for Transparent Finish:

1. Grade: Premium, with Grade A faces.
2. Species and Cut: Maple, plain sliced.
3. Veneer flitch match: Book match, running match.
4. Pair Match: Provide for doors hung in same opening or separated only by mullions.
5. Stiles: Same species as faces or a compatible species.

2.3 SOLID-CORE DOORS

A. Particleboard Cores: Comply with the following requirements:

1. Particleboard: ANSI A208.1, Grade LD-2, 32 lb. density.
2. Blocking: Provide solid wood blocking in particleboard-core doors for installation of hardware.

B. Interior Veneer-Faced Doors:

1. Core: Particleboard.
2. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed and then veneered or laminated in a one-step hot press method.

C. Fire-Rated Doors:

1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated.

2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated for installation of hardware.

    a. Doors with exit devices provide top rail, bottom rail and 5 x 10 right and left lock blocks.

3. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.
4. Pairs: Furnish formed-steel edges and astragals with intumescent seals for pairs of fire-rated doors, unless otherwise indicated.

    a. Finish steel edges and astragals with baked enamel.

5. Pairs with Surface Mounted Panic Devices: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals.

6. Intumescent Seals For Fire Rated Doors: Category “A” doors with concealed intumescent.

2.4 LIGHT FRAMES

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.
3. At 20-minute, fire-rated, wood-core doors, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire rating indicated. Include concealed metal glazing clips where required for opening size and fire rating indicated.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

    1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Premachine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

1. Light Openings: Trim openings with moldings of material and profile indicated.

2.6 FACTORY FINISHING

A. General: Comply with WDMA Architectural Woodwork Quality Standards Illustrated for factory finishing.

B. Finish doors at factory.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: WDMA System TR-6 catalyzed polyurethane, or UV cured polyurethane.
3. Staining: None
4. Effect: Open-grain finish.
5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects, and replace at no cost to Owner.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 084213 - ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Exterior and Interior Entrance Systems.
2. Exterior Storefront Systems.
3. Exterior Storefront Systems with Operable Venting Units (with Screens).

B. Related sections include the following:

1. Division 7 Section "Joint Sealants" for joint sealants installed as part of aluminum entrance and storefront systems.
2. Division 8 Section "Glazing."
3. Division 8 Section "Door Hardware."."
4. Division 16 Electrical for power wiring requirements for electric locks.

1.3 SYSTEM DESCRIPTION

A. General: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:

1. Air infiltration and water penetration exceeding specified limits.
2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Glazing: Physically and thermally isolate glazing from framing members.

C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.

D. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads

for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.

1. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch, whichever is smaller, unless otherwise indicated.
2. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.

    a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
    b. Duration: As required by design wind velocity; fastest 1 mile (1.609 km) of wind for relevant exposure category.

E. Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.

1. Provide a minimum 1/8-inch clearance between members and top of glazing or other fixed part immediately below.
2. Provide a minimum 1/16-inch clearance between members and operable windows and doors.

F. Live Loads: Provide entrance and storefront systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.

G. Air Infiltration: Provide entrance and storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft.

H. Water Penetration: Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. Water leakage is defined as follows:

1. Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

I. Thermal Movements: Provide entrance and storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

J. Structural-Support Movement: Provide entrance and storefront systems that accommodate structural movements including, but not limited to, sway and deflection.

K. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.

L. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.63 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.1.

M. Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.4 SUBMITTALS

A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: For entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.

1. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.
2. Refer to Division 8 Section “Door Hardware” for hardware not supplied with entrance and storefront systems.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

D. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

E. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

F. Sealant Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating that materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with sealants; include joint sealant manufacturers' written interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.

1. Engineering Responsibility: Prepare data for entrance and storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Testing Agency Qualifications: Demonstrate to Architect's satisfaction, based on Architect's evaluation of criteria conforming to ASTM E 699, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Source Limitations: Obtain each type of entrance and storefront system through one source from a single manufacturer.

D. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sight lines and relationships to one another and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.

1. Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code--Aluminum."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating systems without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

1.7 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or

workmanship within the specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including, but not limited to, excessive deflection.
2. Adhesive sealant failures.
3. Cohesive sealant failures.
4. Failure of system to meet performance requirements.
5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
6. Failure of operating components to function normally.
7. Water leakage through fixed glazing and frame areas.

C. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Kawneer Company, Inc. 2” x 4-1/2” “Trifab 451T for Exterior Doors, Entrances and Windows & TriFab 450 for Interior Doors and Entrances
2. EFCO Corporation
3. Butler Manufacturing Company; Vistawall Architectural Products.
4. YKK AP America Inc.
5. TRACO

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Steel Reinforcement: Complying with ASTM A 36 for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 for hot-rolled sheet and strip.

C. Glazing as specified in Division 8 Section "Glazing."

D. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system

performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.

E. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.

F. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

G. Sealants and joint fillers for joints at perimeter of entrance and storefront systems as specified in Division 7 Section "Joint Sealants."

2.3 COMPONENTS

A. Doors: Provide manufacturer's standard 1-3/4-inch- thick glazed doors with minimum 0.125-inch- thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.

1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
2. Stile Design: To be Wide Stile, 5-inch nominal width.

B. Framing components: Provide manufacturers standard components to comply with the following level of quality standard:

1. Kawneer Tri-Fab 450 for interior framing and 451T for exterior framing with insulated glass.
2. Venting Units, where indicated to be Kawneer Glassvent.

C. Brackets and Reinforcements: Provide manufacturer’s standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

D. Fasteners and Accessories: Manufacturer’s standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Reinforce members as required to retain fastener threads.
2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

E. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

F. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.

G. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:

1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.
2. Sliding Weather Stripping: Wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing complying with AAMA 701 requirements.

H. Insect Screens: Extruded aluminum frames, 6063-T5 alloy and temper, joined at corners; 18x16 mesh aluminum screen cloth; frames finished to match aluminum windows; splines shall be extruded vinyl, removable to permit re-screening. Provide sliding or hinged wickets for access to operate windows. Wickets shall be framed and trimmed for a tight fit and for durability during handling.

2.4 FABRICATION

A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

1. Fabricate components for screw-spline frame construction.
2. Fabricate components for shear-block frame construction.

B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

C. Prepare components to receive concealed fasteners and anchor and connection devices.

D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

F. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."

G. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

H. Storefront: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

I. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

1. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
2. Interior Doors: Provide ANSI/BHMA A156.16 silencers at stops to prevent metal to metal contact. Provide 3 silencers on strike jamb of single-door frames and 2 silencers on head of double-door frames.

2.5 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

D. Finish: AAMA 612-02 Combined Coatings Color Anodic Finish. Coating thickness of no less than .7 mill (18 microns) Color uniformity shall not differ more than 5 Delta E, in accordance with ASTM D 2244.

1. Color as selected by the Architect from the full range of industry colors and color densities.
2. 10 year warranty on color.

2.6 STEEL PRIMING

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.

B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.

C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 Section "Joint Sealants."

E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.

F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.

1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.

G. Install glazing to comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.

H. Install perimeter sealant to comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.

I. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:

1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet; 1/4 inch over total length.

2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.3 ADJUSTING AND CLEANING

A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.

B. Remove excess sealant and glazing compounds, and dirt from surfaces.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 084100

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Steel Doors and Frames”.
2. Division 08 Section “Flush Wood Doors”.
3. Division 08 Section “Aluminum Storefronts”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building CodSe.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.

b. Complete (risers, point-to-point) access control system block wiring diagrams.
c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Contract Closeout.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
1. Seven years for heavy duty cylindrical (bored) locks and latches.
2. Five years for exit hardware.
3. Twenty five years for manual surface door closer bodies.
4. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

C. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitutions. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity, unless otherwise indicated:

    a. Two Hinges: For doors with heights up to 60 inches.
    b. Three Hinges: For doors with heights 61 to 90 inches.
    c. Four Hinges: For doors with heights 91 to 120 inches.
    d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

    a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
    b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

    a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:

    a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Acceptable Manufacturers:

    a. Bommer Industries (BO).
    b. Hager Companies (HA).
    c. McKinney Products (MK).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Acceptable Manufacturers:

    a. Bommer Industries (BO).
    b. McKinney Products (MK).
    c. Pemko Manufacturing (PE).

2.3 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Acceptable Manufacturers:

    a. Pemko Manufacturing (PE) – EL-CEPT Series.
    b. Securitron (SU) - EL-CEPT Series.
    c. Von Duprin (VD) - EPT-10 Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Acceptable Manufacturers:

    a. McKinney Products (MK) – QC-C Series.

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Acceptable Manufacturers:

    a. Door Controls International (DC).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Acceptable Manufacturers:

    a. Door Controls International (DC).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

C. Door Push Plates and Pulls: ANS/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
2. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
3. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.

4. Acceptable Manufacturers:

    a. Hiawatha, Inc. (HI).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
1. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware. Provide removable core (small or large format) as specified in Hardware Sets.

D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified cylinders employing a utility patented and restricted keyway requiring the use of patented controlled keys. Provide bump resistant, fixed core cylinders as standard with solid recessed cylinder collars. Cylinders are to be factory keyed where permanent keying records will be established and maintained.

1. Provide a 6 pin multi-level master key system comprised of patented controlled keys and security and high security cylinders operated by one (1) key of the highest level.

2. Acceptable Manufacturers:
    a. Corbin Russwin (RU) – Access 3 Series.
    b. Medeco (MC) - X4 Series.
    c. Yale Locks and Hardware (YA) Keymark Series.

E. Keying System: Each type of lock and cylinders to be factory keyed.

1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

F. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

G. Construction Keying: Provide temporary keyed construction cores.

H. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

I. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Acceptable Manufacturers:

a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

P. Electronic Key Management System: Provide an electronic key control system with Stand-alone Plug and Play features including advanced RFID technology. Touchscreen interface with PIN access for keys individually locked in place. Minimum 1,000 system users and 21 iFobs for locking receptors. System shall have a minimum 250,000 audit events screen displayed or ability to be exported via USB port.

1. Acceptable Manufacturers:

a. Medeco (MC).
b. Traka (TA).

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.

1. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.

2. Locks are to be non-handed and fully field reversible.

3. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) – CL3300 Series.
b. Schlage (SC) – ND Series.
c. Yale Locks and Hardware (YA) 5400LN Series.

2.7 STAND ALONE ACCESS CONTROL LOCKING DEVICES

A. Stand Alone Integrated Access Control Lockets: Internal, battery-powered, self-contained ANSI Grade 1, mortise or cylindrical lock consisting of electronically motor driven locking mechanism, integrated keypad, proximity card reader, or keypad/proximity card reader combination, and specified electronic programming accessories. Locks to accept standard, interchangeable (removable) core, security and high security override cylinders. Provide keypad/proximity and proximity only products with a minimum of 2,000 user codes, key override, low-battery detection and warning, LED status indicators, and ability to program at the lock for the functions indicated.

1. Acceptable Manufacturers:

    a. Corbin Russwin Hardware (RU) - Access 800 AC2 Series.
    b. Schlage (SC) - AD200 Series.
    c. Yale Locks and Hardware (YA) - NexTouch Series.

2.8 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
4. Dustproof Strikes: BHMA A156.16.

2.9 ELECTRIC STRIKES

A. Standard Electric Strikes: Heavy duty, cylindrical and mortise lock electric strikes conforming to ANSI/BHMA A156.31, Grade 1, UL listed for both Burglary Resistance and for use on fire rated door assemblies. Stainless steel construction with dual interlocking plunger design tested to exceed 3000 lbs. of static strength and 350 ft-lbs. of dynamic strength. Strikes tested for a minimum 1 million operating cycles. Provide strikes with 12 or 24 VDC capability and supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt

strike monitoring indicating both the position of the latchbolt and locked condition of the strike.

1. Acceptable Manufacturers:

    a. Folger Adam EDC (FO).
    b. HES (HS).

B. Surface Mounted Rim Electric Strikes: Surface mounted rim exit device electric strikes conforming to ANSI/BHMA A156.31, Grade 1, and UL Listed for both Burglary Resistance and for use on fire rated door assemblies. Construction includes internally mounted solenoid with two heavy-duty, stainless steel locking mechanisms operating independently to provide tamper resistance. Strikes tested for a minimum of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike. Strike requires no cutting to the jamb prior to installation.

1. Acceptable Manufacturers:

    a. HES (HS) - 9500/9600 Series.

2.10 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in

hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.

6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.

9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

10. Rail Sizing: Provide exit device rails factory sized for proper door width application.

11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Acceptable Manufacturers:

    a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
    b. Von Duprin (VD) - 35A/98 XP Series.
    c. Yale Locks and Hardware (YA) - 6000 Series.

C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish.

1. Provide keyed removable feature where specified in the Hardware Sets.

2. Provide stabilizers and mounting brackets as required.

3. Provide electrical quick connection wiring options as specified in the hardware sets.

4. Acceptable Manufacturers:

    a. Corbin Russwin Hardware (RU) - 700/900 Series.
    b. Von Duprin (VD) - 9954 Series.
    c. Yale Locks and Hardware (YA) - M200 Series.

2.11 STAND ALONE ELECTRONIC ACCESS CONTROL EXIT DEVICES

A. Stand Alone Integrated Access Control Exit Devices: Internal, battery-powered, self-contained ANSI A156.3, Grade 1 electronic exit device consisting of complete door trim unit with electronically motor driven locking mechanism, integrated keypad, proximity card reader, or keypad/proximity reader combination, and specified electronic programming accessories. Trim to accept standard, interchangeable (removable) core, security and high security override cylinders. Provide keypad/proximity and proximity only products with a minimum of 2,000 user codes, low-battery detection and warning, LED status indicators, and ability to program at the device for the functions indicated.

1. Acceptable Manufacturers:

    a. Corbin Russwin Hardware (RU) - Access 800 AC2 Series.
    b. Schlage (SC) - AD200 Series.

2.12 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt and security type fasteners as required for proper installation.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully

operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Acceptable Manufacturers:

    a. Corbin Russwin Hardware (RU) - DC8000 Series.
    b. Norton Door Controls (NO) - 7500 Series.
    c. Yale Locks and Hardware (YA) - 4400 Series.

2.13 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

    a. Stainless Steel: 300 grade, 050-inch thick.

4. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

5. Acceptable Manufacturers:

    a. Hiawatha, Inc. (HI).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

2.14 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:

    a. Hiawatha, Inc. (HI).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Acceptable Manufacturers:

    a. Rixson Door Controls (RF).
    b. Rockwood Manufacturing (RO).
    c. Sargent Manufacturing (SA).

2.15 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:

1. National Guard Products (NG).
2. Pemko Manufacturing (PE).
3. Reese Enterprises, Inc. (RE).

2.16 ELECTRONIC ACCESSORIES

A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Acceptable Manufacturers:

    a. Sargent Manufacturing (SA) – 3280 Series.
    b. Security Door Controls (SD) - DPS Series.
    c. Securitron (SU) - DPS Series.

B. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Acceptable Manufacturers:

    a. Corbin Russwin Hardware (RU) – 782.
    b. Securitron (SU) - BPS Series.
    c. Von Duprin (VD) - PS.
    d. Yale Locks and Hardware (YA) 782.

2.17 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.18 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

3.9 SCHEDULE OF FINISH HARDWARE:

Manufacturer List

Code	Name
AB	ABH Manufacturing Inc.
BE	Best Access Systems
BEAI	BEA Inc
BEST	BEST
DM	Dorma Door Controls

HID_	HID Global Corporation
JOHN	Johnson Hardware
NA	National Guard
PR	Precision
SD	Stanley Door Closers
ST	Stanley
TR	Trimco

Option List

Code	Description
C	QUICK CONNECT WIRING OPTION
N	Thru-Bolt w/ Flow-Thru
LD	Less Dogging
S3	ANSI Strike Package
SW	Standard Width Cover
TS	TOUCHBAR MONITORING SWITCH
3RO	Prefix option for 2000 Apex Series
CSK	COUNTER SINKING OF KICK and MOP PLATES
MLR	MOTORIZED LATCH RETRACTION
RQE	REQUEST TO EXIT
VIB	Double Visual Indictor Option
S988	STANDARD. STRIKE - NARROW STILE RIM
CA-03	Cylinder Attachment Kit (Rim/SVR Device)
NCA-03	Cylinder Attachment Kit (24/2500 Devices)
P45-180	Drop Plate
EPT Prep	EPT Prep (full mortise)
P45-180D	Drop Plate for Narrow Top Rail
P45HD-110	Spacer Block HD Arm on Rabbet
P45HD-112	Angle Brkt. - Shoe Support HD Arms
B4E-HEAVY-KP	BEVELED 4 EDGES - KICK PLATES
10-24 SSMS/LA	STAINLESS MACHINE SCREWS/LEAD ANCHOR
CORMAX PATENTED KEYING	Cormax Patented Keying

Finish List

Code	Description
AL	Aluminum
626	Satin Chromium Plated
630	Satin Stainless Steel
689	Aluminum Painted
GREY	Grey

BLACK	Black
US26D	Chromium Plated, Dull
US32D	Stainless Steel, Dull

Hardware Sets

SET #01

Doors: A101A

1	Continuous Hinge	661HD UL x EPT x LAR	AL	ST
1	Exit Device	3RO C MLR TS 2103 CA-03 S988	630	PR
1	Rim Cylinder	12E-72 PATD CORMAX PATENTED KEYING	626	BE
3	Battery	Coordinate with Power Supply Requirements		BEST
	NOTE: Battery Back-up for Gateways.			
1	Door Pull	1191-4 N	630	TR
	NOTE: Install on the primary leaf only.			
1	Operator	ED 900 J8 SW	689	DM
	NOTE: Install on primary leaf only.			
1	Overhead Stop	102XSL x size as required	US32D	AB
1	Power Transfer	EPT-12C		PR
2	Actuator	10PBS1 x 10BOX475SQFM Box x 10WRSQ475		BEAI
1	Power Supply	RPSMLR2BB		PR
1	Wire Harness	WH-192P		ST
1	Wire Harness	WH-XXP x LAR		ST
1	Door Position Switch	MC7		DM
1	Proximity Reader	THINLINE II 5395		HID_
1	Wireless Controller w/ PS	WQX-WAC-C-B		BE
1	Door Sweep	C699A x LAR		NA
1	Saddle Threshold	425 x LAR x 10-24 SSMS/LA	AL	NA

NOTE: Frame perimeter weatherstrip to be furnished by the Frame Manufacturer. Electrical contractor to provide power to the door operator and power supplies. The electrician is to provide conduit rough-in to the components as needed. Person presents card for authorized access. Egress is always free. Door is monitored for closed position and held open position. Touch Sense Switch in exit device is to allow for egress without sending alarm of forced open. The exterior actuator switch is controlled by the access control system. Presentation of a valid card retracts the exit device latch and the door can be pulled open or push the actuator switch for the operator to open the door. Card Reader is to be wall mounted.

SET #02

Doors: 101B

2	Continuous Hinge	662HD UL LAR	AL	ST
2	Dummy Bar	671DR-3	630	PR

1	Door Pull	1191-4 x N x Door thickness as req.	630	TR
2	Door Closer	CLD-4551 EDA AVB	689	SD
2	Kick Plate	K0050 10" x 1" LDW x B4E-Heavy x CSK	630	TR
2	Convex Wall Stop	1270CX	626	TR
2	Door Silencers	1229A	GREY	TR

SET #03

Doors: 103, 104, 105, 108

3	Hinges	CB168 4 1/2 X 4 1/2	US26D	ST
1	Lockset	45H-7D15J PATD CORMAX PATENTED KEYING	626	BE
1	Door Closer	CLD-4551 x Regular Arm Mounted	689	SD
1	Kick Plate	K0050 10" x 2" LDW x B4E-Heavy x CSK	630	TR
1	Convex Wall Stop	1270CX	626	TR
1	Smoke Seal	5075B x header x LAR		NA
2	Smoke Seal	5075B x jambs x LAR		NA

SET #04

Doors: 112

1	Continuous Hinge	662HD UL LAR	AL	ST
1	Exit Device	3RO 2101 CD S300	630	PR
1	Mortise Cylinder	1E-74 PATD CORMAX PATENTED KEYING	626	BE
1	Door Closer w/ Offset Shoe	CLD-4551 AVB x P45-113	689	SD
1	Overhead Stop	90X-S x size as required	626	DM
1	Kick Plate	K0050 10" x 2" LDW x B4E-Heavy x CSK	630	TR
3	Door Silencers	1229A	GREY	TR

SET #05

Doors: 111, 113

3	Hinges	CB168 4 1/2 X 4 1/2	US26D	ST
1	Push Plate	1001-9	630	TR
1	Pull Plate	1017-3B	630	TR
1	Door Closer	CLD-4551 x Regular Arm Mounted	689	SD
1	Kick Plate	K0050 x 10" x 2" LDW x CSK x B4E-Heavy-KP	630	TR
1	Overhead Stop	90X S x size as required	626	DM
3	Door Silencers	1229A	GREY	TR

SECTION 088000 – GENERAL GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Interior borrowed lites.
4. Glazed aluminum entrances and storefronts.

B. Related Sections include the following:

1. Division 8 Section "Aluminum Storefront."
2. Division 8 Section "Flush Wood Doors."

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass or fabricated glass as defined in referenced glazing publications.

B. Glazing Fabricators: Firms that produce fabricated glass products from primary glass as defined in referenced glazing publications.

C. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

D. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

E. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the fabricating process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to fabricator’s written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the fabricating process and not to causes other than glass breakage and practices for

maintaining and cleaning laminated glass contrary to fabricator's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

G. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the fabricating process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to fabricator's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300 and ICC's 2006 International Building Code according to the following requirements:

a. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade indicated on Drawings.

1) Wind Design Data: As indicated on the Drawings.
2) Basic Wind Speed: 90 mph
3) Importance Factor: 1.15
4) Exposure Category: C

b. Specified Design Snow Loads: As indicated on Drawings, but not less than snow loads applicable to Project, required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7, "Snow Loads".

c. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.

1) Load Duration: 60 seconds or less.

d. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
e. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
f. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
g. Minimum Glass Thickness for Exterior Lites:

1) Manufacturer's standard to meet wind load criteria, but not less than 6 mm.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

D. Performance Characteristics: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
2. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal ½-inch-wide interspace.
3. Center-of-Glass thermal and optical performance properties shall be based on data and calculations from the current LBNL Windows 5.2 computer program expressed as Btu/sq. ft. x h x deg F.
4. Fenestration Performance: Performance values that take into account the total fenestration (Center-of-Glass and framing members) normally identified with building energy codes such as ASHRAE-IESNA 90.1 and the IECC. Values can also be tested and certified by the National Fenestration Rating Council (NFRC).

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: Provide 12-inch-square samples of each glass product specified.

C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

G. Product Test Reports: From a qualified testing agency, indicating the specified products comply with requirements based on comprehensive testing of standard products. Provide product test reports for each glass product.

H. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations for Monolithic Float Glass: Obtain all monolithic float glass from one source from a single manufacturer.

C. Source Limitations for Insulating Glass: Obtain all insulating-glass units from one source from a single fabricator using the same type of glass and other components for each type of unit indicated.

D. Source Limitations for Laminated Glass: Obtain all laminated glass units from one source from a single fabricator using the same type of glass and other components for each type of unit indicated.

E. Source Limitations for Glazing Accessories: Obtain all glazing accessories from one source from a single manufacturer for each product and installation method indicated.

F. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to the following publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's “Glazing Manual", “Sealant Manual” and “Laminated Glass Design Guide.”
2. SIGMA Publications: SIGMA TM-3000, “Vertical Glazing Guidelines.”
3. IGMA Publication for Insulating Glass: SIGNA TM-3000, “North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use.”
4. IGMA Publication for Sloped Glazing: IGMA TB-3001, “Guidelines for Sloped Glazing.”

H. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:

1. Insulated Glass Certification Council (IGCC)

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.9 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass fabricator agreeing to furnish replacements for insulating-glass units that deteriorate as defined in “Definitions” Article within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Laminated Glass: Written warranty, made out to Owner and signed by laminated-glass fabricator agreeing to furnish replacements for laminated-glass units that deteriorate as defined in “Definitions” Article within specified warranty period indicated below

1. Warranty Period: 5 years from date of Substantial Completion.

D. Manufacturer's Special Warranty for Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass fabricator agreeing to furnish replacements for coated-glass that deteriorates as defined in “Definitions” Article within specified warranty period indicated below. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer’s written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as required by applicable glazing code.

C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes basic-protection testing requirements in ASTM E 1996 for Wind Zone 3 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

2.2 MANUFACTURERS AND FABRICATION

A. Available Products: Subject to compliance with requirements, manufacturers of products that may be incorporated into the Work include, but are not limited to, the following:

1. Monolithic Float Glass

a. PPG Industries, Inc.
b. Guardian Industries, Inc.
c. Pilkington, Inc.
d. ACH (formerly Visteon).

B. Available Fabricators: Subject to compliance with requirements, fabricators of the products specified include, but are not limited to, the following:

1. J. E. Berkowitz, L.P. (800) 257-7827
2. Viracon, Inc.
3. Arch Aluminum, Inc.
4. Oldcastle Glass

2.3 MONOLITHIC FLOAT GLASS

A. Float Glass: ASTM C 1036, Type 1, Class 1 (clear), Class 2 (tinted) transparent glass, flat, Quality q3 (glazing select); class, kind and condition indicated.

2.4 HEAT-TREATED FLOAT GLASS

A. Heat-Treated Float Glass: ASTM C 1048; Type I; Class I (clear), Class 2 (tinted) transparent glass, flat, Quality q3 (glazing select); class, kind, and condition as required by the applicable glazing code.

B. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

1. Flatness Tolerances

a. Roller-Wave or Ripple: Deviation from flatness at any peak shall be targeted not to exceed 0.003" as measured per peak to valley for ¼" (6 mm) thick glass.
b. Bow and Warp: The bow and warp tolerances targeted shall not exceed 1/32" per linear foot.

2.5 INSULATING GLASS

A. Insulating Glass Units – General: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 2190 for Class CBA units and with requirements specified in this Article.

1. Type IG-1 Insulated Glass: Insulated glass units consisting of two lites of clear, annealed glass, separated by a ½-inch sealed air space. Provide insulated units with low "E" coating. For use in the buildings perimeter openings primarily facing North and East. Refer to Schedules for applied use.

a. Basis-of-Design Product: Subject to compliance with requirements, provide units fabricated with "PPG Solarban 60 Clear" with the following characteristics or comparable product:

1) Ultra Violet: 18%
2) Visible Light Transmittance: 70%
3) Total Solar Energy Transmittance: 33%

4) Winter Night-time U Value: .29
5) Summer Day-time U Value: .28
6) Shading Co-efficient: .43
7) Solar Heat Gain Co-efficient: .38
8) Light to Solar Gain: 1.84

b. Insulating Glass Unit Make-up

1) Outboard Lite: "PPG Solarban 60 Clear", ¼-inch thick.
2) Low "E" coating on 2nd. surface.
3) ½-inch thick desiccant filled aluminum spacer.
4) Inboard Lite: ¼-inch thick clear glass.
5) Overall Thickness: 1-inch

2.6 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. Neoprene, ASTM C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rods as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. VOC Content: For Sealants used inside weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, subpart D.

C. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

D. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

E. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

F. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.9 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.5 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 088000

SECTION 092550 GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Nonload-bearing steel framing members for gypsum board assemblies.
2. Gypsum board assemblies attached to steel framing.
3. Gypsum board bonded adhesively to interior concrete and masonry substrates.
4. Metal trim and accessories for finishing gypsum board.
5. Sound Attenuation Blankets

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 4 Section “Unit Masonry Assemblies” for vapor retarder installed over gypsum sheathing.

2. Division 5 Section "Cold-Formed Metal Framing" for load-bearing steel framing.
3. Division 6 Section "Rough Carpentry" for wood framing and furring.

1.3 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 ASSEMBLY PERFORMANCE REQUIREMENTS

A. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings provide materials and construction identical to those of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

B. Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

1.5 ACTION SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

C. Product certificates signed by manufacturers of gypsum board assembly components certifying that their products comply with specified requirements.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer, unless otherwise indicated.

B. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

C. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

D. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:

1. Fire-Resistance Ratings: As indicated by GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1.8 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours before application and continuously after until dry. Do not exceed 95 deg F when using temporary heat sources.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Steel Framing and Furring:

   a. Dale Industries, Inc.
   b. Dietrich Industries, Inc.
   c. Marino/Ware (formerly Marino Industries Corp.).
   d. National Gypsum Co.; Gold Bond Building Products Division.
   e. Unimast, Inc.

2. Gypsum Board and Related Products:

   a. United States Gypsum Co.
   b. National Gypsum Co.; Gold Bond Building Products Division.
   c. Georgia-Pacific Corp.
   d. Domtar Gypsum.

3. Drywall Trims

   a. United States Gypsum Co.
   b. National Gypsum Co.
   c. Georgia Pacific Corp.
   d. Fry Reglet - Heavy Cuty Corner Trim
   e. Amico

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

   a. American Gypsum Co.
   b. BPB America Inc.
   c. Lafarge North America Inc.
   d. National Gypsum Company.
   e. PABCO Gypsum.
   f. Temple.
   g. USG Corporation.

1. Impact Resistant Gypsum Wallboard

   a. SHEETROCK AR Board; United States Gypsum Company.
   b. High Impact 2000; National Gypsum Co.
   c. GyProc Abuse Resistant Gypsum Board; Georgia-Pacific Corp.

2. Gypsum Sheathing (for exterior soffits)

a. “Dens-Glass Gold” by G-P Gypsum Corporation.

3. Moisture Resistant Gypsum Wallboard

a. SHEETROCK Water Resistant Gypsum Panels; United States Gypsum Company.
b. Gold Bond M. R. Board; National Gypsum Co.
c. GyProc Moisture Guard; Georgia-Pacific Corp.

2.2 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

A. General: Provide components complying with ASTM C 754 for conditions indicated.

B. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190 conducted by a qualified independent testing agency.

C. Wire Ties: ASTM A 641, Class 1 zinc coating, soft temper, 0.062 inch thick.

D. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.162-inch diameter.

E. Channels: Cold-rolled steel, 0.0598-inch minimum thickness of base (uncoated) metal and 7/16-inch- wide flanges, and as follows:

1. Carrying Channels: 1-1/2 inches deep, 475 lb/1000 feet, unless otherwise indicated.
2. Furring Channels: 3/4 inch deep, 300 lb/1000 feet, unless otherwise indicated.
3. Finish: ASTM A 653, G 60 hot-dip galvanized coating for framing for exterior soffits and where indicated.

F. Steel Studs for Furring Channels: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: 0.0179 inch, unless otherwise indicated.
2. Depth: 2-1/2 inches, unless otherwise indicated.
3. Protective Coating: ASTM A 653, G 40 hot-dip galvanized coating.
4. Protective Coating: Manufacturer's standard corrosion-resistant coating.

G. Steel Rigid Furring Channels: ASTM C 645, hat shaped, depth of 7/8 inch, and minimum thickness of base (uncoated) metal as follows:

1. Thickness: 0.0179 inch, unless otherwise indicated.
2. Protective Coating: ASTM A 653, G 40 hot-dip galvanized coating.
3. Protective Coating: Manufacturer's standard corrosion-resistant coating.

H. Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568 to form 1/2-inch- deep channel of the following configuration:

1. Single- or Double-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch- wide face connected to flanges by double-slotted or expanded-metal legs (webs).

2.3 STEEL FRAMING FOR WALLS AND PARTITIONS

A. General: Provide steel framing members complying with the following requirements:

1. Protective Coating: Manufacturer's standard corrosion-resistant coating.

B. Steel Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: 0.0179 inch, unless otherwise indicated.
2. Thickness: 0.0312 inch as follows:

a. For head runner, sill runner, jamb, and cripple studs at door and other openings.
b. Where indicated.

3. Depth: 3-5/8 inches, where indicated.
4. Depth: 6-inches where indicated.

C. Deflection Track: Manufacturer's standard top runner designed to prevent cracking of gypsum board applied to interior partitions resulting from deflection of the structure above fabricated from steel sheet complying with ASTM A 653 or ASTM A 568. Thickness as indicated for studs, and width to accommodated depth of studs, and of the following configuration:

1. Top runner with 2-1/2-inch- deep flanges that either have V-shaped offsets that compress when pressure is applied from construction above or have slots 1 inch o.c. that allow fasteners attached to studs through the slots to accommodate structural movement by slipping.

a. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Superior Flex Track System (SFT); Delta Star, Inc.
b. SLP-TRK; Metal-Lite, Inc.

D. Deflection and Firestop Track: Top runner designed to allow partition heads to expand and contract with movement of structure above while maintaining continuity of the assembly. Comply with requirements of ASTM C 645 except configuration, of thickness indicated for

studs and width to accommodate depth of studs indicated with flanges offset at midpoint to accommodate gypsum board thickness.

1. Offset Configuration: Reveal design with offset recessing in from depth of stud.

    a. Available Product: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to:

        a. "Fire Trak"; Fire Trak Corp.

E. Steel Rigid Furring Channels: ASTM C 645, hat shaped, depth and minimum thickness of base (uncoated) metal as follows:

1. Thickness: 0.0179 inch, unless otherwise indicated.
2. Depth: 7/8 inch.

F. Furring Brackets: Serrated-arm type, adjustable, fabricated from corrosion-resistant steel sheet complying with ASTM C 645, minimum thickness of base (uncoated) metal of 0.0329 inch, designed for screw attachment to steel studs and steel rigid furring channels used for furring.

G. Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568 to form 1/2-inch- deep channel of the following configuration:

1. Single- or Double-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch- wide face connected to flanges by double-slotted or expanded-metal legs (webs).

H. Steel Channel Bridging: Cold-rolled steel, 0.0598-inch minimum thickness of base (uncoated) metal and 7/16-inch- wide flanges, 1-1/2 inches deep, 475 lb/1000 feet, unless otherwise indicated.

I. Steel Flat Strap and Backing Plate: Steel sheet for blocking and bracing complying with ASTM A 653 or ASTM A 568, length and width as indicated, and with a minimum base metal (uncoated) thickness as follows:

1. Thickness: 0.0598 inch unless indicated otherwise.

J. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

2.4 GYPSUM BOARD PRODUCTS

A. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.

1. Widths: Provide gypsum board in widths of 48 inches.

B. Gypsum Wallboard: ASTM C 36 and as follows:

1. Type: Regular for vertical surfaces, unless otherwise indicated.
2. Type: Type X where required for fire-resistance-rated assemblies.
3. Type: Sag-resistant type for ceiling surfaces.
4. Type: Proprietary type as required for specific fire-resistance-rated assemblies
5. Type: Abuse Resistant for Vertical Surfaces where indicated.
6. Edges: Tapered.
7. Thickness: 5/8 inch, unless otherwise indicated.

C. Water-Resistant Gypsum Backing Board: ASTM C 630 and as follows:

1. Type: Regular, unless otherwise indicated.
2. Type: Type X where required for fire-resistance-rated assemblies and where indicated.
3. Thickness: 5/8 inch unless otherwise indicated.

D. Glass-Reinforced Gypsum Wallboard: ASTM C 1177. ASTM E 136, ASTM D3273 and as follows:

1. Type: Regular, unless otherwise indicated.
2. Thickness: 5/8” unless otherwise indicated.

2.5 TRIM ACCESSORIES

A. Accessories for Interior Installation: Cornerbead, edge trim, reveals, and control joints complying with ASTM C 1047 and requirements indicated below:

1. Material: Formed metal or plastic, with metal complying with the following requirements:

a. Steel sheet zinc coated by hot-dip process or rolled zinc.
b. Steel sheet zinc coated by hot-dip or electrolytic process, or steel sheet coated with aluminum or rolled zinc.

2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:

a. Heavy duty outside corner trim as manufactured by Fry Reglet for all vertical outside corners in traffic areas.
b. Cornerbead on outside corners, in non-traffic areas.
c. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.
d. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.

e. U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.
f. One-piece control joint formed with V-shaped slot and removable strip covering slot opening.
g. ½" reveal trim and accessories as manufactured by Fry Reglet.

2.6 JOINT TREATMENT MATERIALS

A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

B. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.

C. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

1. Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
2. For topping compound, use sandable formulation.

D. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.

1. Ready-Mixed Formulation: Factory-mixed product.

a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
b. Topping compound formulated for fill (second) and finish (third) coats.
c. All-purpose compound formulated for both taping and topping compounds.

2.7 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

C. Available Products: Subject to compliance with requirements, acoustical sealants that may be incorporated in the Work include, but are not limited to, the following:

1. Acoustical Sealant for Exposed Joints:

a. PL Acoustical Sealant; ChemRex, Inc.; Contech Brands.
b. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
c. SHEETROCK Acoustical Sealant; United States Gypsum Co.

2. Acoustical Sealant for Concealed Joints:

a. BA-98; Pecora Corp.
b. Tremco Acoustical Sealant; Tremco, Inc.

2.8 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.

C. Steel drill screws complying with ASTM C 1002 for the following applications:

1. Fastening gypsum board to steel members less than 0.033 inch thick.

D. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.

E. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.

F. Foam Gaskets: Closed-cell vinyl foam adhesive-backed strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit metal stud size indicated.

G. Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing). All interior gypsum wall board partitions shall be comprised of sound attenuation blankets unless specifically noted otherwise.

1. Mineral-Fiber Type: Fibers manufactured from glass.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

3.3 INSTALLING STEEL FRAMING, GENERAL

A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook."

1. Use steel flat strap and backing plate as blocking and bracing for the support of above listed items.

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.

1. Where building structure abuts ceiling perimeter or penetrates ceiling.
2. Where partition framing and wall furring abut structure, except at floor.

a. Install deflection track top runner to attain lateral support and avoid axial loading.
b. Install deflection and firestop track top runner at fire-resistance-rated assemblies.

a. Attach jamb studs at openings to tracks using manufacturer's standard stud clip.

D. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

3.4 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

A. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members

and hangers to support ceiling loads within performance limits established by referenced standards.

3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Secure flat, angle, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or otherwise fail.
5. Do not attach hangers to steel deck tabs.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

B. Sway-brace suspended steel framing with hangers used for support.

C. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.

1. Wire Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c.

D. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.

E. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

F. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.5 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.

1. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.

B. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at, or within 12 inches above,

suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

1. Cut studs short of full height in accordance with deflection track manufacturer's installation instructions to provide perimeter relief.
2. For STC-rated and fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.

D. Terminate partition framing at, or within 12 inches above, suspended ceilings where indicated.

E. Install steel studs and furring in sizes and at spacings indicated.

1. Single-Layer Construction: Space studs and furring 16 inches o.c., unless otherwise indicated.

F. Install steel studs so flanges point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.

G. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

1. Install 2 studs at each jamb, unless otherwise indicated.
2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint.
3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

H. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

3.6 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

B. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

E. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.

F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Attach gypsum panels to framing provided at openings and cutouts.

H. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

I. Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.

J. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.

1. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

K. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors. Unless detailed otherwise, provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

L. Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

M. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.

1. Space screws a maximum of 12 inches o.c. for vertical applications.

N. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

3.7 GYPSUM BOARD APPLICATION METHODS

A. Single-Layer Application: Install gypsum wallboard panels as follows:

1. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless parallel application is required for fire-resistance-rated assemblies. Use maximum-length panels to minimize end joints.

a. Stagger abutting end joints not less than one framing member in alternate courses of board.

B. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:

1. Fasten with screws.

C. Direct-Bonding to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's recommendations, and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.8 INSTALLING TRIM ACCESSORIES

A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

B. Install cornerbead at external corners. Install heavy duty corner beads at all vertical outside corners.

C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.

1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
2. Install L-bead where edge trim can only be installed after gypsum panels are installed.
3. Install U-bead where indicated.

D. Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.

3.9 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.

C. Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.

D. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

1. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 2 where panels form substrates for tile and where indicated.
3. Level 4 for gypsum board surfaces exposed to view, unless otherwise indicated.

E. Use one of the following joint compound combinations as applicable to the finish levels specified:

1. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Sandable, setting-type joint compound.
2. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.
3. Embedding and First Coat: Ready-mixed, drying-type, all-purpose or taping compound. Fill (Second) Coat: Ready-mixed, drying-type, all-purpose or topping compound. Finish (Third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.

F. Where Level 1 gypsum board finish is indicated, embed tape in joint compound.

G. Where Level 2 gypsum board finish is indicated, embed tape in joint compound and apply a separate first coat of joint compound to tape, fasteners and trim flanges.

H. Where Level 4 gypsum board finish is indicated, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

3.10 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Architect will conduct an above-ceiling observation prior to installation of gypsum board ceilings and report any deficiencies in the Work observed. Do

not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.

1. Notify Architect one week in advance of the date and the time when the Project, or part of the Project, will be ready for an above-ceiling observation.
2. Prior to notifying Architect, complete the following in areas to receive gypsum board ceilings:

    a. Installation of 80 percent of lighting fixtures, powered for operation.
    b. Installation, insulation, and leak and pressure testing of water piping systems.
    c. Installation of air duct systems.
    d. Installation of air devices.
    e. Installation of mechanical system control air tubing.
    f. Installation of ceiling support framing.

3.11 CLEANING AND PROTECTION

A. Promptly remove any residual joint compound from adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 092550

SECTION 093000 – TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Porcelain tile (PT)
2. Metal edge strips.

B. Related Sections:

1. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Division 9 Section “Gypsum Board” for tile backing panels.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, ANSI A108.17, and ANSI 108.19 which are contained in its "Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations with plans and elevation of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples: Samples are NOT required for the initial submittal. Architect/Interior Designer will request tile samples after prior final color selection as needed.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

C. Product Certificates: For each type of product, signed by product manufacturer.

D. Material Test Reports: For each tile-setting and grouting product.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Metal edge strips.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor and wall tile installation. Coordinate location with Owner and Architect.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1and or ANSI 137.3 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.

D. Low-Emitting Materials: Tile flooring systems shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

F. Mounting:
1. For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

a. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.2 TILE PRODUCTS

A. Porcelain Tile - Type One (PT1):

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Garden State Tile (GST)

2. Composition: Porcelain.
3. Size: 12 inches by 24 inches
4. Pattern: Tivoli
5. Finish: Matte
6. Thickness: 8-mm
7. Tile Color: Silver
8. Grout Color: As selected by Architect from manufacturer's full range.
9. Tile Pattern: 1/3 Staggered Bond. Refer to drawings for details.
10. Trim: 4-inch by 24-inch trim at Room 110 only.

B. Porcelain Tile - Type Two (PT2):

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Garden State Tile (GST)

2. Composition: Porcelain.
3. Size: 12 inches by 24 inches
4. Pattern: Tivoli
5. Finish: Matte
6. Thickness: 8-mm
7. Tile Color: White
8. Grout Color: As selected by Architect from manufacturer's full range.
9. Tile Pattern: 1/3 Staggered Bond. Refer to drawings for details.

2.3 SETTING MATERIALS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Laticrete International, Inc.
2. Mapei Corporation.
3. Custom Building Products.

B. Medium-Bed and/or Large N Heavy Tile Mortar, Modified Dry-Set Mortar: Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of 5/8 inch.

1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
2. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.

2.4 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following

   a. Laticrete International, Inc.
   b. Mapei Corporation.
   c. Custom Building Products.

2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.

2.5 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 7 Section "Joint Sealants."

1. Sealants shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
3. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

2.6 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

C. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

D. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal, designed specifically for flooring and wall applications.

2.7 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A 108.01 for installations indicated.
    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 TILE INSTALLATION

A. Comply with latest TCNA's "Handbook for Ceramic Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A 108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of Tile Installation Standards for providing 95 percent mortar coverage:

    a. Tile floors in wet areas.
    b. Tile composed of tiles 8 by 8 inches or larger.
    c. Tile floors consisting of rib-backed tiles.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize

the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Porcelain Floor and Base Tile: 1/8 inch.

G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated and as referenced in both ANSI 108.02 and latest version of TCNA under EJ171. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

H. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

I. Metal Edge Strips: Provide and install Schluter System strips for transitions from tile to adjacent materials on floors and for wall transitions and corner applications.

1. Carpet to Tile Transition: Schiene, Finish: Satin Anodized Aluminum.

2. Outside Corners Wall Transitions: Quadec, Finish: Satin Anodized Aluminum.

3.4 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-Portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

B. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.5 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.6 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Ceramic Tile Installation: TCNA F205; medium mortar on on-ground concrete.

a. Ceramic Tile Type: PT1.
b. Thin-set Mortar: LHT/Medium-bed, modified dry-set mortar.
c. Grout: Polymer-modified sanded grout.

B. Interior Wall Installations, Masonry or Concrete:

1. Ceramic Tile Installation: TCNA W202I; medium mortar on mansonry in accordance with ANSI A118.4 and ANSI A118.1.

a. Ceramic Tile Type: PT1, PT2.
b. Thin-set Mortar: LHT/Medium-bed, modified dry-set mortar.
c. Grout: Polymer-modified sanded grout.

C. Interior Wall Installations, Wood or Metal Studs or Furring:

1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; medium mortar on cementitious backer units or fiber-cement backer board in accordance with ANSI A118.4 and ANSI A118.1.

a. Tile Type: PT1, PT2.
b. Thin-set Mortar: LHT/Medium-bed, modified dry-set mortar.
c. Grout: Polymer-modified sanded grout.

END OF SECTION 093000

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Mineral-based, factory-painted acoustical ceiling panels.
2. Standard exposed grid suspension systems.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which suspension systems will be attached.
3. Size and location of initial access modules for acoustical panels.
4. Items penetrating finished ceiling including, but not limited to, the following:

a. Lighting fixtures.
b. Air outlets and inlets.
c. Speakers.
d. Sprinklers.
e. Access panels.

5. Perimeter moldings.

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.

D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Panels: Full-size panels equal to 2 percent of quantity installed, in each pattern and color provided.
2. Suspension-System Components: Quantity of each exposed component equal 2 percent of quantity installed, in each color and style provided.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
2. Smoke-Developed Index: 50 or less.

C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ACOUSTICAL PANELS, GENERAL

A. Low-Emitting Materials: Acoustical panel ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance unless otherwise indicated.

D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS – TYPE (ACT1)

A. Manufacturers and Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

1. Armstrong World Industries, Inc.; Dune, No. 1853
2. USG, Inc.; Olympia, Micro Panel, No. 4221

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type III, mineral base with painted finish.
2. Color: White.
3. LR: .83
4. NRC: Not less than .50

5. CAC: Not less than 35
6. Edge Detail: Angled Tegular
7. Thickness: 5/8 inch
8. Modular Size: 24 by 24 inches

C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

D. Suspension System Type: Applications and types as indicated on Drawings and Paragraph 2.5, B.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

B. Wire Hangers, Braces, and Ties: Provide the following wire types, based on Project requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.

a. Hanger wire shall be 12 gauge/.105 (Diameter Range: .105-.107); Carbon: C1006; Length: 12 feet; Tensile: 54/62,000 KSI; Breaking Load Minimum: 475 pounds; Breaking Load Maximum: 540 pounds; Safe Load Maximum: 275 pounds; Finish: Hot Dip Galvanized; Galvanize Coating: Class I, in accordance with ASTM-641/A.

2. Stainless-Steel Wire: ASTM A 580, Type 304, nonmagnetic.

a. 1/16” air craft cable shall have a minimum breaking strength of 275 pounds.

3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
4. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A 653, G90 coating designation; with bolted connections and 5/16-inch diameter bolts.

E. Hold-Down Clips: Provide for all air lock and security applications, including vestibules, restrooms and locker rooms, where occurs; provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

2.5 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong World Industries, Inc.
2. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically-zinc-coated, or hot-dip galvanized according to ASTM A 653, not less than G30 (Z90) coating designation; with prefinished 15/16-inch-wide metal caps on flanges.

1. Structural Classification: Intermediate duty system.
2. End Condition of Cross Runners: Butt-edge type.
3. Face Design: Flat, flush.
4. Cap Material: Steel
5. Cap Finish: Painted white.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong World Industries, Inc.
2. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:

1. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 for Alloy and Temper 6063-T5.
2. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C 635 and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

1. Fire-Rated Assembly: If indicated, install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs or any other part of steel deck. Attach hangers to structural members only.

9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Arrange directionally patterned acoustical panels as indicated on Drawings.
2. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
4. Paint cut edges of panel remaining exposed after installation; precisely match color of exposed panel surfaces using coating furnished or recommended in writing for this purpose by acoustical panel manufacturer.
5. Install hold-down clips for all air lock applications, including vestibules, and in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions unless otherwise indicated.
6. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Rubber Wall Base.
2. Rubber Accessory Moldings.
3. Rubber Stair Nosing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: Samples are NOT required for the initial submittal. Architect/Interior Designer will request tile samples prior to final color selection as needed.

C. Product Schedule: For resilient base and accessory products.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. FloorScore Compliance: Resilient base and stair accessories shall comply with requirements of FloorScore certification.

B. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 RUBBER WALL BASE (RB): Where this designation is indicated, provide rubber wall base complying with the following:

1. Products: As follows:
    a. Johnsonite Traditional Wall Base.
    b. Roppe Wall Base.
2. Color and Pattern: 63 Burnt Umber.
3. Style: Cove with top-set toe.
4. Minimum Thickness: 1/8 inch.
5. Height: Provide 4-inch-high indicated as “RB” on the Room Finish Schedule.
6. Lengths: Lengths standard with manufacturer, but not less than 96 feet.
7. Outside Corners: Site-formed.
8. Inside Corners: Site-formed.
9. Surface: Smooth.

2.3 RUBBER MOLDING ACCESSORY

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Johnsonite.
2. Roppe Corporation, USA.

B. Profile and Dimensions:

1. Stair Nosing: RCN-A
2. Transitions: As indicated on drawings.

C. Color: 63 Burnt Umber

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement-based or blended hydraulic-cement-based formulation provided or approved by resilient product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less
2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to manufacturer's written recommendations, but not less stringent than the following:

    a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Miter corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
2. Tightly adhere to substrates throughout length of each piece.

C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096813 – TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Modular carpet tile.
2. Modular entrance mat tile.

B. Related Sections:

1. Division 3 Section “Cast-in-Place Concrete” for moisture vapor reduction admixture.
2. Division 9 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include installation recommendations for each type of substrate.

B. Shop Drawings: Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.

3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 3 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floor covering Installers Association at the Master II certification level.

B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.10 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE (CPT1)

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following Shaw Contract product:

1. Collection: On the Edge
2. Patterns: 59164 Minimal Tile
3. Color: 64555 Verge
4. Size: 18 inches by 36 inches
5. Installation Pattern: Brick
6. Backing: Ecoworx
7. Pattern: Refer to drawings.

2.2 CARPET TILE (CPT2)

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following Shaw Contract product:
   1. Collection: On the Edge
   2. Pattern: 59114 Vertical Edge Tile
   3. Color: 67555 Gun Metal Verge
   4. Size: 18 inches by 36 inches
   5. Installation Pattern: Brick
   6. Backing: Ecoworx
   7. Pattern: Refer to drawings.

2.3 ENTRANCE MAT TILE (EM)

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following Shaw Contract product:

   1. Collection: All Access
   2. Pattern: 5T034 Path Tile
   3. Color: 34549 Lava
   4. Size: 24 inches x 24 inches
   5. Installation Method: Monolithic
   6. Backing: Ecoworx

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation on porous and non-porous surfaces.

   1. Substrates without moisture vapor reduction admixture: Porous Adhesive.
   2. Substrates with moisture vapor reduction admixture: Non-Porous Adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
2. Subfloor finishes comply with requirements specified in Division Section 3 "Cast-in-Place Concrete" for slabs receiving carpet tile.
   a. Porous Adhesives: Existing and suspended slab applications.
   b. Non-Porous Adhesives: New on-grade substrates applications.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. For wood subfloors, where occur, verify the following:

1. Underlayment over subfloor complies with requirements specified in Division Section 6 "Rough Carpentry."
2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

1. Carpet installation shall begin at the center point of the room and work out to the perimeter walls. Installation pattern to be ashlar.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099123 – PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will supply a color selection.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:

a. Architectural woodwork.
b. Acoustical wall panels.
c. Metal toilet enclosures.
d. Metal lockers.
e. Unit kitchens.
f. Elevator entrance doors and frames.
g. Elevator equipment.
h. Light fixtures.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Foundation spaces.
b. Furred areas.
c. Ceiling plenums.
d. Utility tunnels.
e. Pipe spaces.
f. Duct shafts.

g. Elevator shafts.

3. Finished metal surfaces include the following:

a. Anodized aluminum.
b. Stainless steel.
c. Chromium plate.
d. Copper and copper alloys.
e. Bronze and brass.

4. Operating parts include moving parts of operating equipment and the following:

a. Valve and damper operators.
b. Linkages.
c. Sensing devices.
d. Motor and fan shafts.

5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:

1. Division 5 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 5 Section "Structural Steel Framing" for shop priming structural steel.
3. Division 6 Section "Architectural Woodwork" for shop priming interior architectural woodwork.
4. Division 8 Section "Steel Doors and Frames" for factory priming steel doors and frames.
5. Division 9 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

A. Product Data: For each paint system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification. Submit in same format as specification.

2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's).

B. Colors: Match Architect's color selections.

C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Submit 4 sets of samples of each final color and finish.

D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to be demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Certifications:

1. Furnish a letter from the paint manufacturer or their factory representative certifying that the paint system proposed for this project are equal to or better than the specified systems in appearance and performance levels. Submit proof of equivalency for approval including generic type, descriptive information, VOC content, performance data, solids by volume, and recommended film thickness. Submittals not accompanied by this certification will be returned, "REJECTED."

F. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.

1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.

a. Provide mock up of first and second coats of block filler or primer for approval of application.
b. Wall Surfaces: Provide samples on at least 100 sq. ft.
c. Small Areas and Items: Architect will designate items or areas required.

D. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface. Where materials are being applied over previously painted surfaces, apply mock up samples and perform field testing to check for compatibility, adhesion, and film integrity of the new materials to existing painted surfaces. Report in writing any condition that may affect application, appearance, or performance of the specified coating system.

1. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.
2. Final approval of colors will be from benchmark samples.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

C. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.7 PROJECT CONDITIONS

A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.

B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver left-over paint materials to Owner.

1. Quantity: Furnish Owner with extra paint materials in quantities indicated below:

a. Exterior: 2 gallons of each color applied.
b. Interior: 1 case of each color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, provide products from one of the following manufacturers. Sherwin-Williams is the basis of design and establishes the standard of quality required.

B. Manufacturers' Names:

1. Sherwin Williams (SW).
2. Duron.
3. PPG.
4. MAB.
5. Glidden.

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience. Each system should be from the same manufacturer.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish

manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Match Architect's samples.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

C. Where materials are being applied over previously painted surfaces, apply mock up samples and perform field testing to check for compatibility, adhesion, and film integrity of the new materials to existing painted surfaces. Report in writing any condition that may affect application, appearance, or performance of the specified coating system.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning. All surfaces must be clean, dry, and free of all oil, grease, surface contaminants, and substances that could impair adhesion.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

2. All previously coated surfaces shall clean, dry, dull, and in sound condition prior to coating. All loose paints (either visible or not) shall be removed to expose a sound

surface for repainting. All smooth, glossy surfaces shall be abraded to impart a surface profile that will promote adhesion of the subsequent coating system. A test-patch shall be applied prior to a full installation to assure adequate adhesion will be achieved.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
    a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
    b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
    a. Power Tool Clean steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 3.
    b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
    c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
4. Interior Grilles, Louvers and Sprinkler Escutcheons shall be painted in the field to match adjacent material color. Contractor shall prep and prime factory finished items to receive new paint finish in the field.

D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
10. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer over metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.

2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Exposed uninsulated metal piping.
2. Exposed uninsulated plastic piping.
3. Exposed pipe hangers and supports.
4. Tanks that do not have factory-applied final finishes.
5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

G. Electrical items to be painted include, but are not limited to, the following:

1. Switchgear.
2. Panel boards.
3. Electrical equipment that is indicated to have a factory-primed finish for field painting.

H. All interior exposed gypsum wallboard, including any bulkheads and soffits to be painted.

I. All interior and exterior ferrous metal to be painted including any lintels, railings, grilles, and louvers (does not include factory or pre-finished items).

J. All hollow metal doors and frames, interior and exterior, to be painted.

K. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

L. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

M. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting,

holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

N. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

O. Marking and Identification: Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:

1. Be located in accessible concealed floor, floor-ceiling or attic spaces;
2. Be repeated at intervals not exceeding 30 feet measured horizontally along the wall or partition; and
3. Include lettering not less than 0.5 inch in height, incorporating the suggested wording: "FIRE AND/OR SMOKE BARRIER-PROTECT ALL OPENINGS," or other wording.

    a. Exception: Walls in Group R-2 occupancies that do not have a removable decorative ceiling allowing access to the concealed space.

3.4 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:

1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:

    a. Quantitative material analysis.
    b. Abrasion resistance.
    c. Apparent reflectivity.
    d. Flexibility.
    e. Washability.
    f. Absorption.
    g. Accelerated weathering.
    h. Dry opacity.
    i. Accelerated yellowness.
    j. Recoating.
    k. Skinning.
    l. Color retention.
    m. Alkali and mildew resistance.

3. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

B. Pre-installation Meetings:

1. Schedule a conference and inspection to be held on-site before field application of coating systems begins.
2. Conference shall be attended by Contractor, Owner's representative, Engineer, Construction Manager, coating applicators, and a representative of coating material manufacturer.
3. Topics to be discussed at meeting shall include:

    a. A review of Contract Documents and accepted shop drawings shall be made and deviations or differences shall be resolved.
    b. Review items such as environmental conditions, surface conditions, surface preparation, application procedures, and protection following application.
    c. Establish which areas on-site will be available for use as storage areas and working area

4. Pre-construction conference and inspection shall serve to clarify Contract Documents, application requirements and what work should be completed before coating application can begin.
5. Prepare and submit, to parties in attendance, a written report of pre-installation conference report shall be submitted with 3 days following conference.
6. Field Samples:

    a. Provide a full coating system to the required sheen, color, texture, and recommended coverage rates. Simulate finished lighting conditions for reviewing in-place work.

7. The Architect, Construction Manager or Owners Representative will select one room, area, or combination of areas and surfaces and conditions for each type of coating and substrate to be coated. Apply coatings in this room, area, combination of areas and surfaces according to the schedule, or as specified. After finishes are accepted, this room, area or combination of areas and surfaces will serve as the standard of quality and for evaluation of coating systems of similar nature.
8. A manufacturer’s representative shall be available upon request by the General Contractor or Painting subcontractor, to advise applicator on proper application technique and procedures.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 EXTERIOR PAINT SCHEDULE

A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

1. Semi-Gloss Acrylic-Enamel Finish: two finish coats over a rust-inhibitive primer.

a. Primer: Pro Industrial Pro-Cryl Universal Metal Primer, B66-310 series
b. 1st Coat: SW Waterbased Acrolyn 100 Waterbased Urethane Gloss.
c. 2nd Coat: SW Waterbased Acrolyn 100 Waterbased Urethane Gloss.

3.8 INTERIOR PAINT SCHEDULE

A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:

1. Flat Acrylic Finish (Ceiling Application): - Two finish coats over a primer.

a. Primer: ProMar 200 Zero VOC Latex Primer, B28W600.
b. 1st Coat: ProMar 200 Zero VOC Latex Flat, B30W2650 series.
c. 2nd Coat: ProMar 200 Zero VOC Latex Flat, B30W2650 series.

2. Low Luster Acrylic-Enamel Finish (Wall Application): Two finish coats over a primer.

a. Primer: ProMar 200 Zero VOC Latex Primer, B28W600.
b. 1st Coat: ProMar 200 Zero VOC Latex Eg-Shel, B20W2650 series.
c. 2nd Coat: ProMar 200 Zero VOC Latex Eg-Shel, B20W2650 series.

B. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Semi-Gloss Finish: two finish coats over a primer.

a. Primer: Pro Industrial Pro-Cryl Universal Metal Primer, B66-310 series
b. 1st Coat: Pro Industrial Waterbased Catalyzed Epoxy Gloss.
c. 2nd Coat: Pro Industrial Waterbased Catalyzed Epoxy Gloss.

C. Concrete Masonry Units or Existing (Bare) Brick: Provide the following finish systems over primer for wall applications.

1. Semi-Gloss Finish: two finish coats over a primer.

a. Filler: PrepRite Block Filler, B25W25.
b. 1st Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series
c. 2nd Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series

D. Previously Painted Concrete Masonry Units or Brick: Provide the following finish systems over an adhesion promoting primer for wall applications. *Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system.

1. Semi-Gloss Finish: two finish coats over a primer.

    a. Primer: Extreme Bond Interior/Exterior Bonding Primer, B51-150.
    b. 1st Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series.
    c. 2nd Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series.

E. Previously Painted Concrete Masonry Units @ Room 107 Stair: Provide the following finish systems over a water blocking primer for wall applications. *Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system. Follow all manufacturer's written recommendations and remove as much of existing coating as possible to expose as much bare block as possible.

1. Semi-Gloss Finish: two finish coats over two primer coats.

    a. 1st Primer Coat: Loxon Water Blocking Primer/Finish, LX12W0050.
    b. 2nd Primer Coat: Loxon Water Blocking Primer/Finish, LX12W0050.
    c. 1st Finish Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series.
    d. 2nd Finish Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series.

END OF SECTION 099123

SECTION 101100 - VISUAL DISPLAY UNITS

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Porcelain enamel marker boards with aluminum frames.
2. Vinyl-faced cork tack boards with aluminum frames.

1.3 SUBMITTALS

A. Product Data: For each type of visual display board indicated.

B. Shop Drawings: For each type of visual display board required.

1. Include dimensioned elevations. Show location of joints between individual panels where unit dimensions exceed maximum panel length.
2. Include sections of typical trim members.
3. Show anchors, grounds, reinforcement, accessories, layout, and installation details.
4. Where occurs, Contractor shall verify the existing board dimensions to ensure new visual display boards cover extent of existing boards.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and textures available for the following:

1. Markerboards: Actual sections of porcelain enamel finish for each type of marker board required.
2. Vinyl-Faced Cork Tackboards: Samples for each type of vinyl- faced cork tack board indicated.

D. Product Certificates: Signed by manufacturers of tack boards certifying that vinyl-faced materials furnished comply with requirements specified for flame-spread ratings.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is an authorized representative of marker board manufacturer for both installation and maintenance of the type of sliding marker board units required for this Project.

B. Source Limitations: Obtain visual display boards through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of visual display boards and are based on the products indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Fire-Test-Response Characteristics: Provide vinyl- and fabric-faced tackboards with the following surface-burning characteristics as determined by testing assembled materials composed of facings and backings identical to those required in this Section per ASTM E 84 by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify vinyl- and fabric-faced tack boards with appropriate markings of applicable testing and inspecting agency.

1. Flame Spread: 25 or less.
2. Smoke Developed: 10 or less.

E. Field Measurements: Verify field measurements before preparation of Shop Drawings and before fabrication to ensure proper fitting. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.5 WARRANTY

A. Special Warranties: As follows:

1. Writing Surface: Manufacturer’s standard, written, material warranty agreeing at manufacturer’s option to repair or replace the original boards if they do not retain their original writing and erasing qualities, gloss variance, or color consistency under normal usage and maintenance, without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Warranty does not include the cost of removal or reinstallation.

a. Term of Warranty: Limited lifetime warranty.

2. Workmanship and Materials: Manufacturer’s standard, written, material replacement warranty agreeing at manufacturer’s option to repair or replace any products which, under normal usage and maintenance, show defects in workmanship or materials, without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Warranty does not include the cost of removal or reinstallation.

a. Term of Warranty: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Marsh Industries.
2. Claridge Products and Equipment, Inc.
3. AARCO.

2.2 MATERIALS FOR MARKER BOARD PANELS

A. Writing Surface Facing Sheet: Provide "E-3" surface.

1. Enameling grade cold-rolled steel, manufactured from a minimum of 30 percent post-consumer and post-industrial waste, .016 inch thick for all pre-framed boards without joints. All face sheets shall be .025 inch thick for boards with spline joints and have the same content as .016 inch thick face sheets.
2. Writing surfaces shall consist of the following characteristics:

a. All coatings shall contain less than a combined total of less than 0.1 percent of heavy metals cadmium, mercury, hexavalent chromium, and lead.
b. All coatings shall be free of arsenic and antimony as well as volatile organic compounds.
c. Writing surface face sheet shall be 99 percent recyclable.
e. Marker board 80 to 85 percent gloss (low-gloss surface), recommended for projection. Wet cleaning required if used as a marker surface.
f. Facing Sheet Coatings:

1. Face Coat: 1.7 to 2.5 mils minimum thickness enameled ground coat.
2. Cover Coat: 3.0 to 4.0 mils enameled color coat.
3. Back Coat: 1.7 to 2.5 mils enameled minimum ground coat.
4. Firing Temperatures: 1,475 to 1,500 deg F, minimum.

g. Color(s): As selected by the Architect from the manufacturer's range of standard colors.

B. Writing Surface Core:

1. Core: Minimum 7/16-inch thick, particleboard core material complying with requirements of ANSI A208.1, Grade 1-M-1.
2. Backing Sheet: Manufacturer's standard; moisture-blocking backing, 0.015 inch thick; recyclable; factory-laminated to core material.

3. Laminating Adhesive: Manufacturer's standard, moisture-resistant, thermoplastic-type adhesive.

C. Lamination: Factory-machine-type only.

2.3 MATERIALS FOR TACK BOARD PANELS

A. Core: Composed of 100 percent post-consumer and post-industrial waste, or 100 percent naturally-sustainable; 1/4-inch fiberboard laminated to 1/4-inch natural cork.

B. Coverings:

1. 100 percent naturally-sustainable.

a. Provide 1/4-inch-thick, pure-grain natural cork for all tack strips and display rails.

2. Covering Materials: Provide the following, as indicated:

a. Framed Tack Boards:

i. 20-ounce-per-linear-yard, 2-ply, 100 percent recycled polyester with a plain weave pattern.
ii. Mildew-resistant, washable vinyl fabric complying with FS CCC-W-408, Type II, weighing not less than 13 oz./sq. yd, laminated to 1/4-inch thick cork sheet.
iii. Color(s): Provide a minimum of 25 color selections. As selected by the Architect from the manufacturer’s range of standard colors.

2.4 ACCESSORIES

A. A. Metal Trim and Accessories: Fabricate frames and trim of not less than 0.062-inch thick, extruded-aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single-length units with mitered corners. Miter corners to a neat, hairline closure.

a. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.

2. Field-Applied Trim: Manufacturer's standard snap-on trim with no visible fasteners or exposed joints.

a. No joints other than mitered corners allowed. Butt-joint trim is not approved.

2.5 FABRICATION

B. Porcelain Enamel Marker Boards: Laminate facing sheet and backing sheet to core material under pressure with manufacturer's recommended flexible, waterproof adhesive.

C. Assembly: Provide factory-assembled marker board and tack board units, unless field-assembled units are required.

1. Make joints only where total length exceeds maximum manufactured length. Refer to drawings for joint locations.
2. Provide manufacturer's standard mullion trim at joints between marker board and tack boards.

2.6 FINISHES

D. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

E. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

F. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 607.1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examination wall surfaces, with Installer present, for compliance with requirements and other conditions affecting installation of visual display boards.

B. Surfaces to receive marker boards shall be free of dirt, scaling paint, and projections or depressions that would affect smooth, finished surfaces of marker boards.

C. Surfaces to receive tack boards shall be dry and free of substances that would impair the bond between tack boards and substrate.

D. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Deliver factory-built visual display boards completely assembled in one piece without joints, where possible. If dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.

B. Install units in locations and at mounting heights indicated and according to manufacturer's written instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

C. Coordinate Project-site-assembled units with grounds, trim, and accessories. Join parts with a neat, precision fit.

3.3 ADJUSTING AND CLEANING

D. Verify that accessories required for each unit have been properly installed and that operating units function properly.

E. Clean units according to manufacturer's written instructions.

END OF SECTION 101100

SECTION 101423 – PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes Interior Panel Signs.

B. Related Requirements:

1. Division 1 Section "Temporary Facilities & Controls" for temporary Project identification signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: For panel signs, showing fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, layout, reinforcement, accessories, and installation details.

1. Details: Provide message list for each type of sign required, including typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size. Include large-scale details of nomenclature, including layout of room names, room numbers and graphic symbols, as indicated. Elevation details shall be consistent with sign type number on Drawings.
2. Floor Plans: Provide floor plans showing locations of each sign, indicating original room name, room number, and sign type.
3. Signage Schedule: Provide signage schedule in an editable version of Microsoft® Excel® format (.xlsx or .xls) or similar, compatible software. Arrange per building, building floor and building area, in a sequential manner that is consistent with the Drawings. Each room shall consist of a horizontal line of information, which shall intersect with vertical columns, in which applicable information may be input into each cell. Provide the following column heading information, which may be abbreviated as needed, formatted from left to right:

a. Original Room Number: As indicated on Contract Drawings.
b. Original Room Name: As indicated on Contract Drawings.
c. Revised Room Number: Final information to be fabricated; any revisions shall be input by the Architect.

d. Revised Room Name: Final information to be fabricated; any revisions shall be input by the Architect.
e. Sign Type: To cross-reference Shop Drawing elevation details.
f. Sign Size: To indicate overall sign width and height.
g. Accessibility: To include International Symbol of Access (ISA).
h. Female: To include International Symbol for Female Gender.
i. Male: To include International Symbol for Male Gender.
j. Neutral: To include International Symbol for Gender-Neutral.
k. Family: To include International Symbol for Family.
l. Miscellaneous: To include, and make reference to, additional graphic symbols, including, but not limited to, directional arrows, stairs, and fire, as well as other signage features, such as paper inserts and sliding vacant/in use types.
m. Quantity: Indicate number of same panel sign design required for specific room; provide additional lines for rooms that are to have more than one sign, but require different design or sign type.
n. Remarks: For providing additional notes or remarks; by manufacturer (in black font color), Contractor (in green font color) or Architect (in red font color).

4. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.

C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Cast Acrylic Sheet: Manufacturer's color Samples consisting of actual sections or chips of material, including the full range of standard colors, patterns and textures available.
2. Panel Signs: Full-size Sample, not less than 12 inches square, including corners, for verification of basic design.
3. Exposed Accessories: Full-size Sample of each accessory type.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

C. Design Concept: The Drawings indicate profile and dimensional requirements of panel signs. Slight deviations in profiles and dimensions may be approved, as long as such deviations do not drastically change the design concept, as judged by the Architect. The burden of proof of equality is on the Bidder.

1.7 PROJECT CONDITIONS

A. Field Measurements: Whenever possible, and if necessary, take field measurements prior to the preparation of Shop Drawings and fabrication to ensure proper fitting. Show recorded measurements on final Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering panel signage products that may be incorporated in the Work include, but are not limited to, the following:

1. 4Sign Solutions.
2. Best Manufacturing.
3. Bayuk Graphics.
4. iSigns

2.2 FRAMED PANEL SIGNS

A. Cast Acrylic Sheet: ASTM D 4802; non-extruded, non-continuous-cast polymethyl methacrylate monomer (PMMA) or extruded polyvinyl chloride (PVC)-acrylic alloy sheet, Type UVF (UV filtering); in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested according to ASTM D 790, with a minimum allowable continuous service temperature of 176 deg F, and of the following general types:

1. Opaque Sheet: Where sheet material is indicated as "opaque," provide colored, solid acrylic sheet in colors and finishes as selected from the manufacturer's full range of standard colors and textures.
2. Colored Coatings: Use colored coatings, including inks and paints for copy and background colors that are recommended by acrylic manufacturer for optimum adherence to acrylic surface and are non-fading for the application intended.

B. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to and compatible with the sign material and mounting surface.

C. Framed Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

1. Construction: Fabricate smooth, flush panel surfaces, capable of remaining flat with no noticeable distortions, while subjected to installed environmental conditions, within a tolerance of plus or minus 1/16 inch, measured diagonally.
2. Laminated Sign Panels: Permanently laminate face panels to backing sheets of material and thickness indicated using the manufacturer's standard process.
3. Engraved Copy: Machine-engrave letters, numbers, symbols, and other graphic devices into sign panel on the face indicated to produce precisely formed copy, incised to uniform depth. Use high-speed cutters mechanically linked to master templates in a pantographic system or equivalent process capable of producing characters of the style indicated with sharply-formed edges.
    a. Copy Depth: Character, graphic and Braille copy shall be raised 1/32 inch, unless otherwise indicated.
    b. Lettering Style: Upper- and lower-case letters; as selected by Architect from manufacturer’s full range of standard typefaces.
4. Characters and Graphics: Unless otherwise indicated, fabricate signs with 1-inch-high room numbers and 3/4-inch-high room identification lettering. Standard grade Braille shall be located 1/2 inch below copy.
    a. Accessibility Standards: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board’s ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs. All signage shall comply with accessibility requirements, including International Symbol of Access, Braille, and provisions for mounting.
    b. Final room numbering and verbiage designations for all signs shall be approved by Owner prior to fabrication.
5. Edge Condition: Square, non-beveled.
6. Edge Color: Same as background.
7. Frame Material: Plastic
8. Corner Condition: Square, non-rounded.
9. Blank Panels: Where panel signs are indicated or required to be installed on glass sidelites or similar transparent surfaces, provide blank panel signs to the opposite side of the glass, matching size, profile and color, to conceal the adhesives.
10. Extra Signs: Provide an additional quantity of (5) 8”x8” signs.
11. Locations: Refer to drawings for sign types and schedule.

D. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.

1. Signs shall consist of internationally-adopted graphic silhouette symbols indicating entrances to male, female, gender-neutral, and family restrooms, as well as handicapped-accessibility, where occurs.

2. Provide signs at the entrances of all non-accessible restrooms that graphically indicate the directions to the nearest handicapped-accessible restrooms.

E. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:

1. For snap-in changeable inserts beneath removable face sheet, furnish one suction or other device to assist in removing face sheet. Furnish initial changeable insert. Furnish two blank inserts for each sign for Owner's use.
2. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert.

2.3 FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide colors as selected by the Architect from the manufacturer's full range of standard colors and textures.

1. Manufacturer shall offer no less than 25 colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

1. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
2. Verify that anchor inserts are correctly sized and located to accommodate signs.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.

1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance. All signs shall be mounted per accessibility standards, as required by the authorities having jurisdiction.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Mounting Methods: Attach panel signs to surfaces, as follows:

1. Interior Surfaces: Use one of the following methods, as applicable:

   a. Vinyl-covered or Rough Surfaces: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of high-bond adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

   b. Smooth Surfaces: Clean bond-breaking materials from substrate surface and remove loose debris. Apply two-face tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Add silicone sealant as needed. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

3.3 CLEANING AND PROTECTION

A. Remove protective coverings and strippable films as signs are installed. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until substantial completion.

B. Touch up minor nicks and abrasions; otherwise, remove and replaced damaged or deformed signs that do not comply with requirements.

END OF SECTION 101423

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manually-operated roller shades to be applied to exterior windows, as indicated on reflected ceiling plans:

a. Manually operated roller shades with single rollers.

B. Related Requirements:

1. Division 6 Section "Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
2. Division 7 Section "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

C. Samples: For each exposed product and for each color and texture specified.

D. Samples for Initial Selection: For each type and color of shadeband material.

1. Include Samples of accessories involving color selection.

E. Roller-Shade Schedule: Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of shadeband material, signed by product manufacturer.

C. Product Test Reports: For each type of shadeband material, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roller shades to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than 2 units.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following and not limited to:

1. Draper Inc. Manual Flexshade
2. Hunter Douglas Contract. (Equal to Draper)
3. MechoShade Systems, Inc. (Equal to Draper)

B. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Manufacturer's standard.

a. Loop Length: Full length of roller shade.
b. Limit Stops: Provide upper and lower ball stops.
c. Chain-Retainer Type: Chain tensioner, jamb mounted.

B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of inside face of shade
2. Direction of Shadeband Roll: Regular, from back of roller.
3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

E. Shadebands:

1. Shadeband Material: Light-filtering Series
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

a. Type: Enclosed in sealed pocket of shadeband material
b. Color and Finish: As selected by Architect from manufacturer's full range

F. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

   a. Shape: L-shaped
   b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open, but not less than 3 inches.

2. Endcap Covers: To cover exposed endcaps.
3. Installation Accessories Color and Finish: As selected by Architect from manufacturer's full range.
4. Back Covers for Interior Roller Shades: Provide and install back cover for all interior shades.

2.3 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701 Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

1. Source: Mermet, E Screen.
2. Type: Vinyl Coated polyester.
3. Weight: 13.9 oz per yard.
4. Openness Factor: 1 percent.
5. Color: As selected by Architect from manufacturer's full range.

2.4 ROLLER-SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F.

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch plus or minus 1/8 inch.

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4 provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER-SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Hardware shall be mounted to jamb or head of window opening. Mounting to frame is NOT approved.

B. Roller Shade Locations: As indicated on Drawings

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413

MECHANICAL INDEX

SECTION 200100 - GENERAL PROVISIONS - MECHANICAL

1. GENERAL

A. The Advertisement for Bids, Instructions to Bidders, Bidding Requirements, General, Special and Supplementary Conditions, and all other contract documents shall apply to the Contractor's work as well as to each of his Sub-Contractor's work. All manufacturers, suppliers, fabricators, contractors, etc. submitting proposals to any part if for work, services, materials or equipment to be used on or applied to this project are hereby directed to familiarize themselves with all documents pertinent to this Contract. In case of conflict between these General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Engineer for clarification and final determination.

B. Each Proposer shall also be governed by any unit prices and Addenda insofar as they may affect his part of the work or services.

C. The work included in this division consists of the furnishing of all labor, equipment, transportation, excavation, backfill, supplies, material, appurtenances and services necessary for the satisfactory installation of the complete and operating Mechanical System(s) indicated or specified in the Contract Documents.

D. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Mechanical Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and/or specifications, shall be included as part of this Contract.

E. It is not the intent of this section of the specifications to make any Contractor, other than the General Contractor (or Construction Manager, if applicable), responsible to the Owner, Architect and Engineer. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be routed through the General Contractor to the Architect (if applicable), then to the Engineer. Also, this section of the specifications shall not be construed as an attempt to arbitrarily assign responsibility of work, material, equipment or services to a particular trade or Contractor. Unless stated otherwise, the subdivision and assignment of work under the various sections shall be optional.

F. It is the intent of this Contract to deliver to the Owners a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to remove and/or relocate or re-attach any existing or new systems which interfere with new equipment or materials required for the complete installation without additional cost to the Owner.

G. In general, and to the extent possible, all work shall be accomplished without interruption of existing facilities operations. The Contractor shall advise the Owners at least two weeks prior to the interruption of any services or utilities. The Owners shall be advised of the exact time that interruption will occur and the length of time the interruption will last. Failure to comply with

this requirement may result in complete work stoppage by the Contractors involved until a complete schedule of interruptions can be developed.

H. Definitions and Abbreviations

(1) Contractor - Any Contractor whether proposing or working independently or under the supervision of a General Contractor and/or Construction Manager and who installs any type of mechanical work (Controls, Plumbing, HVAC, Sprinkler, Gas Systems, etc.) or, the General Contractor.

(2) Engineer - The Consulting Mechanical-Electrical Engineers either consulting to the Owners, Architect, other Engineers, etc. In this case: CMTA, Inc., Consulting Engineers.

(3) Architect - The Architect of Record for the project.

(4) Furnish - Deliver to the site in good condition and turn over to the Contractor who is to install.

(5) Provide - Furnish and install complete, tested and ready for operation.

(6) Install - Receive and place in satisfactory operation.

(7) Indicated - Listed in the Specifications, shown on the Drawings or Addenda thereto.

(8) Typical - Where indicated repeat this work, method or means each time the same or similar condition occurs whether indicated or not.

(9) Contract Documents - All documents pertinent to the quality and quantity of work to be performed on this project. Includes, but not limited to: Plans, Specifications, Instructions to Bidders, General and Special Conditions, Addenda, Alternates, Lists of Materials, Lists of Sub-Contractors, Unit Prices, Shop Drawings, Field Orders, Change Orders, Cost Breakdowns, Schedules of Value, Periodical Payment Requests, Construction Contract with Owners, etc.

(10) Proposer - Any person, agency or entity submitting a proposal to any person, agency or entity for any part of the work required under this contract.

(11) OSHA - Office of Safety and Health Administration.

(12) IBC - International Building Code.

(13) The Project - All of the work required under this Contract.

(14) NEC - National Electrical Code.

(15) NFPA - National Fire Protection Association.

(16) ASME - American Society of Mechanical Engineers.

(17) AGA - American Gas Association.

(18) SMACNA - Sheet Metal and Air Conditioning Contractors National Association.

(19) ANSI - American National Standards Institute.

(20) ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.

(21) NEMA - National Electrical Manufacturers Association.

(22) UL - Underwriters Laboratories.

(23) ADA - Americans with Disabilities Act.

(24) IMC - International Mechanical Code.

(25) IECC - International Energy Conservation Code.

(26) IFGC - International Fuel Gas Code.

I. Required Notices:

(1) Ten days prior to the submission of a proposal, each proposer shall give written notice to the Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, Proposers signify that they have included the cost of all required items in the proposal and that the Proposer will be responsible for the safe and satisfactory operation of the entire system.

2. INTENT

A. It is the intention of the Contract Documents to call for finished work, tested and ready for operation.

B. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.

3. DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding

with the work. The drawings are not intended to show every item which may be necessary to complete the systems. All proposers shall anticipate that additional items may be required and submit their bid accordingly.

B. The drawings and specifications are intended to supplement each other. No Proposer shall take advantage of conflict between them, or between parts of either. Should this condition exist, the Proposer shall request a clarification not less than twelve days prior to the submission of the proposal so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be final.

C. The drawings and specifications shall be considered to be cooperative and anything appearing in the specifications which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.

D. Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.

E. The Engineer shall reserve the right to make adjustments in location of piping, ductwork, equipment, etc. where such adjustments are in the interest of improving the project.

F. Should conflict or overlap (duplication) of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume that he is to be relieved of the work which is specified under his branch until instructions in writing are received from the Engineer.

G. Unless dimensioned, the mechanical drawings only indicate approximate locations of equipment, piping, ductwork, etc. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to ensure no conflict with other work.

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H. Each Proposer shall review all drawings including Architectural, Mechanical, Electrical, Structural, etc., to ensure that the work he intends to provide does not encroach a conflict with or affect the work of others in any way. Where such effect does occur, it shall be the Proposer's responsibility to satisfactorily eliminate any such encroachment conflict or effect prior to the submission of his proposal. Each Proposer shall in particular ensure that there is adequate space to install his equipment and materials. Failure to do so shall result in the correction of such encroachment conflict or effect of any work awarded the proposer and shall be accomplished fully without expense to others and that they are reasonably accessible for maintenance. Check closely all mechanical and electrical closets, chases, ceiling voids, wall voids, crawl spaces, etc., to ensure adequate spaces.

I. Where on the drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornamentation or other detail is indicated by starting only, such detail shall be

continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.

J. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.

K. Where on the Drawings or Addenda the word typical is used, it shall mean that the work method or means indicated as typical shall be repeated in and each time it occurs whether indicated or not.

L. Special Note: Always check ceiling heights indicated on Architectural Drawings and Schedules and ensure that they may be maintained after all mechanical and electrical equipment is installed. Do not install equipment in the affected area until the conflict is resolved.

4. EXAMINATION OF SITE AND CONDITIONS

A. Each Proposer shall inform himself of all of the conditions under which the work is to be performed, the site of the work, the structure of the ground, above and below grade, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work. Each Proposer shall also fully acquaint himself with all existing conditions as to ingress and egress, distance of haul from supply points, routes for transportation of materials, facilities and services, availability of utilities, etc. His proposal shall cover all expenses or disbursements in connection with such matters and conditions. No allowance will be made for lack of knowledge concerning such conditions after bids are accepted.

5. EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

A. When any Contractor requests approval of materials and/or equipment of different physical size, capacity, function, color, access, it shall be understood that such substitution, if approved, will be made without additional cost to anyone other than the Contractor requesting the change regardless of changes in connections, space requirements, electrical characteristics, electrical services, etc., from that indicated. In all cases where substitutions affect other trades, the Contractor requesting such substitutions shall advise all such Contractors of the change and shall remunerate them for all necessary changes in their work. Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Review of Shop Drawings by the Engineers does not in any way absolve the Contractor of this responsibility.

B. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; any devices, products, materials, fixtures, forms, or types of construction which, in the judgment of the Engineer, are equivalent to those specified are acceptable, provided the

provisions of Paragraph (A) immediately preceding are met. Requested substitutions shall be submitted to the Engineer a minimum of twelve days prior to bids.

C. Wherever any equipment and material is specified exclusively only such items shall be used unless substitution is accepted in writing by the Engineers.

D. Each Proposer shall furnish along with his proposal a list of specified equipment and materials which he is to provide. Where several makes are mentioned in the specifications and the Contractor fails to state which he proposes to furnish, the Engineer shall choose any of the makes mentioned without change in price. Inclusion in this list shall not ensure that the Engineers will approve shop drawings unless the equipment, materials, etc., submitted in shop drawings is satisfactorily comparable to the items specified and/or indicated.

6. SUPERVISION OF WORK

A. The Contractor shall personally supervise the work for which he is responsible or have a competent superintendent, approved by the Engineers, on the work at all times during progress with full authority to act for him.

7. CODES, RULES, PERMITS, FEES, INSPECTIONS, REGULATIONS, ETC.

A. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, inspections and other costs, including all utility connections, meters, meter settings, taps, tap fees, extensions, water and/or sewer system development charge, etc. in connection with his work. He shall also file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments and/or the appropriate municipality or utility company having jurisdiction, whether indicated or specified or not. He shall hire an independent Registered Engineer to witness installations and provide necessary certifications where required by utility companies, municipal agencies or others that have review authority. He shall also obtain all required certificates of inspection for his work and deliver same to the Engineers before request for acceptance and final payment for the work. Ignorance of Codes, Rules, Regulations, Laws, etc. shall not render the Contractor irresponsible for compliance. The Contractor shall also be versed in all Codes, Rules and Regulations pertinent to his part of the work prior to submission of a proposal.

B. The Contractor shall include in his work, without extra cost, any labor, materials, services, apparatus and drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not indicated or specified.

C. All materials furnished and all work installed shall comply with the National Fire Codes of the National Fire Protection Association, with the requirements of local utility companies, or municipalities and with the requirements of all governmental agencies having jurisdiction.

D. All materials and equipment so indicated and all equipment and materials for the electrical portion of the mechanical systems shall bear the approval label of, or shall be listed by the

Underwriters' Laboratories (UL), Incorporated. Each packaged assembly shall be approved as a package. Approval of components of a package shall not be acceptable. Where required by the Code and/or the Authority Having Jurisdiction, provide the services of a field labeling agency to provide a UL label for the entire system in the field under evaluation.

E. All plumbing work is to be constructed and installed in accordance with plans and specifications which have been approved in their entirety and/or reflect any changes requested by the State Department of Health. Plumbing work shall not commence until such plans are in the hands of the Contractor.

F. All Heating, Ventilation and Air Conditioning work shall be accomplished in accordance with the International Mechanical Code (IMC) and amendments thereto, the latest standards recognized by the American Society of Heating, Refrigerating and Air Conditioning and the National Fire Protection Association. Contractor shall secure a permit from the Division of HVAC. Final inspection certificate shall be provided by Contractor and a copy included in Operation and Maintenance Manuals.

G. The Contractor shall furnish three (3) copies of all Final Inspection Certificates obtained to the Engineer when work is complete. Final payment for work will be contingent upon compliance with this requirement.

H. Where minimum code requirements are exceeded in the Design, the Design shall govern.

I. The Contractor shall ensure that his work is accomplished in accord with the OSHA Standards and that he conducts his work and the work of his personnel in accord with same.

J. All work relating to the handicapped shall be in accord with regulations currently enforced by the Department of Housing, Buildings and Construction, State of West Virginia and the American Disabilities Act.

K. All work in conjunction with a natural gas installation shall, in addition to all other Codes, Rules, Regulations, Standards, etc., comply with the requirements of the local gas supplier and/or standards and recommendations of the American Gas Association.

L. All work in relation to domestic water systems shall, in addition to all other Codes, Rules, Regulations and Standards, be in compliance with the requirements of the local water utility company and the adopted edition of the 10 States Standards.

M. All work in relation to the installation of sanitary or storm sewers shall, in addition to all other Codes, Rules, Regulations and Standards, be in compliance with the local agency governing such installations and the adopted edition of the 10 States Standards.

N. All work relating to the handicapped shall be in accord with regulations currently enforced by the Department of Housing, Buildings, and Construction, State of West Virginia and the American Disabilities Act.

8. EQUIPMENT AND PIPING SUPPORT

   A. Each piece of equipment, apparatus, piping, or conduit suspended from the structure or mounted above the floor level shall be provided with suitable structural support, pipe stand, platform or carrier in accordance with the best recognized practice. Such supporting or mounting means shall be provided by the Contractor for all equipment and piping. Exercise extreme care that structural members of building are not overloaded by such equipment. Provide any required additional bracing, cross members, angles, support, etc., as indicated or required by the Structural Engineer. This, in some instances, will require the Contractor to add an angle to a joist to transfer the load to a panel point. If in doubt, contact the Structural Engineer.

9. DUCT AND PIPE MOUNTING HEIGHTS

   A. All exposed or concealed ductwork, piping, etc., shall be held as high as possible unless otherwise noted and coordinated with all other trades. Exposed piping and ductwork shall, insofar as possible, run perpendicular or parallel to the building structure.

10. COST BREAKDOWNS (SCHEDULE OF VALUES)

   A. Within thirty days after acceptance of the Contract, the Contractor shall furnish to the Engineer, one copy of a detailed cost breakdown on each respective area of work. These cost breakdowns shall be made in a format approved by the Engineer. Payments will not be made until satisfactory cost breakdowns are submitted.

11. CORRECTION PERIOD

   A. All equipment, apparatus, materials, and workmanship shall be the best of its respective kind. The Contractor shall replace all parts at his own expense, which are proven defective as described in the General Conditions. The effective date of completion of the work shall be the date of the Architect's or Engineer's Statement of Substantial Completion. Items of equipment which have longer guarantees, as called for in these specifications, shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of final acceptance of the work. The Owner reserves the right to use equipment installed by the Contractor prior to date of final acceptance. Such use of equipment shall not invalidate the guarantee except that the Owner shall be liable for any damage to equipment during this period, due to negligence of his operator or other employees. Refer to other sections for any special or extra warranty requirements.

   B. It is further clarified that all required and specified warranties shall begin on the date of Substantial Completion, not at the time of equipment start-up.

   C. All gas fired heat exchangers shall have 20-year warranty.

D. All compressors shall have five-year warranty.

12. COMPUTER-BASED SYSTEM SOFTWARE

A. For all equipment, controls, hardware, computer-based systems, programmable logic controllers, and other materials provided as a part of the work, software that is installed shall be certified in writing to the Engineer and Owner by the manufacturer and/or writer to be free of programming errors that might affect the functionality of the intended use.

13. CHANGES IN MECHANICAL WORK

REFER TO GENERAL AND SPECIAL CONDITIONS.

14. CLAIMS FOR EXTRA COST

REFER TO GENERAL AND SPECIAL CONDITIONS.

15. SURVEY, MEASUREMENTS AND GRADE

A. The Contractor shall lay out his work and be responsible for all necessary lines, levels, elevations and measurements. He must verify the figures shown on the drawings before laying out the work and will be held responsible for any error resulting from his failure to do so.

B. The Contractor shall base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.

C. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the contract documents, he shall promptly notify the Engineer and shall not proceed with this work until he has received instructions from the Engineer on the disposition of the work.

16. TEMPORARY USE OF EQUIPMENT

A. The permanent heating and plumbing equipment, when installed, may be used for temporary services, with the consent of the Engineers. Should the permanent systems be used for this purpose the Contractors shall make all temporary connections required at their expense. They shall also make any replacement required due to damage wear and tear, etc., leaving the same in "as new" condition.

B. Permission to use the permanent equipment does not relieve the Contractors from the responsibility for any damages to the building construction and/or equipment which might result because of its use.

C. A pre-start-up conference shall be held with the Architect, Owner, General Contractor and the

Mechanical Contractor. Equipment shall not be started until after this meeting.

D. During all phases of construction:

(1) Air Handling Units:

a. At a minimum, four complete sets of filter media are required for each unit. In each unit, install two sets of filter media during construction (more shall be required if construction activities dictate more frequent changes). In each unit, install one set of filter media at substantial completion. Leave one set of filter media in boxes in appropriate mechanical room as a spare set for the Owner. All other filters shall be used by the Contractor during construction. Dispose of all construction filter media.

b. On the outside of all return air openings install a minimum of two sets of fiberglass filter media, such as cheesecloth, to be utilized as pre-filters for the "construction" filters. Install first set upon start-up and then install second set when first set is dirty. Dispose of all dirty construction filters. Change filters as often as necessary to keep units from becoming dirty at no additional cost.

c. At substantial completion of the project the entire unit shall be cleaned to present a like "new" unit for the Owner and all filters shall be replaced with new.

17. TEMPORARY SERVICES

A. The Contractor shall arrange any temporary water, electrical and other services which he may require to accomplish his work. Refer also to General and Special Conditions.

18. RECORD DRAWINGS

A. The Contractor shall ensure that any deviations from the Design are as they occur recorded in red, erasable pencil on record drawings kept at the jobsite. The Engineer shall review the record documents from time to time to ensure compliance with this specification. Compliance shall be a contingency of final payment. Pay particular attention to the location of under floor sanitary and water lines, shut-off valves, cleanouts and other appurtenances important to the maintenance and operation of Mechanical Systems. Also, pay particular attention to Deviations in the Control Systems and all exterior utilities. Keep information in a set of drawings set aside at the job site especially for this purpose. Deliver these record drawings electronically in AutoCAD 2007 format along with the hand marked field set to the Engineer. Electronic bid drawings will be furnished to the Contractor for his use.

19. MATERIALS AND WORKMANSHIP

A. All equipment, materials and articles incorporated in the work shall be new and of comparable quality to that specified. Each Proposer shall determine that the materials and/or equipment he proposes to furnish can be brought into the building(s) and installed within the space available. In certain cases, it may be necessary to remove and replace walls, floors and/or ceilings and this

work shall be the responsibility of the Contractor. All equipment shall be installed so that all parts are readily accessible for inspection, maintenance, replacement of filters, etc. Extra compensation will not be allowed for relocation of equipment for accessibility or for dismantling equipment to obtain entrance into the building(s). Ensure, through coordination, that no other Contractor seals off access to space required for equipment, materials, etc.

B. Materials and equipment, where applicable, shall bear Underwriters' Laboratories label where such a standard has been established.

C. Use extreme care in the selection of equipment and its installation to ensure that noise and vibration are kept at a minimum. The Engineer's determination shall be final and corrections to such discrepancies shall be made at the cost of the Contractor.

D. Each length of pipe, fitting, trap, fixture and device used in the plumbing or drainage systems shall be stamped or indelibly marked with the weight or quality thereof and with the manufacturer's mark or name.

E. All equipment shall bear the manufacturer's name and address. All electrically operated equipment shall bear a data plate indicating required horsepower, voltage, phase and ampacity.

20. COOPERATION AND COORDINATION WITH OTHER TRADES

A. The Contractor shall give full cooperation to all other trades and shall furnish in writing with copies to the Engineer, any information necessary to permit the work of other trades to be installed satisfactorily and with the least possible interference or delay.

B. Where any work is to be installed in close proximity to, or will interfere with work of other trades, each shall cooperate in working out space conditions to make a satisfactory adjustment. If so directed by the Engineer, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than 1/4” = 1'-0”, clearly indicating how his work is to be installed in relation to the work of other trades, or so as not to cause any interference with work of other trades. He shall make the necessary changes in his work to correct the condition without extra charge.

C. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

21. QUALIFICATIONS OF WORKMEN

A. All mechanical work shall be accomplished by qualified workmen competent in the area of work for which they are responsible. Untrained and incompetent workmen, as evidenced by their workmanship, shall be summarily relieved of their responsibilities in areas of incompetency. The Engineer shall reserve the right to determine the quality of workmanship of any workman and unqualified or incompetent workman shall refrain from work in areas not satisfactory to him.

Requests for relief of a workman shall be made through the normal channels of Architect, Contractor, etc.

B. All plumbing work shall be accomplished by Journeymen Plumbers under the direct supervision of a Master Plumber. Proof and Certification may be requested by the Engineer.

C. All sheet metal, insulation and pipe fitting work shall be installed by workmen normally engaged or employed in these respective trades, except where only small amounts of such work are required and are within the competency of workmen directly employed by the Contractor involved.

D. All automatic control systems shall be installed by workmen normally engaged or employed in this type work, except in the case of minor control requirements (residential type furnaces, packaged HVAC equipment with integral controls, etc.) in which case, if a competent workman is the employee of this Contractor, he may be utilized subject to review of his qualifications by the Engineer and after written approval from same.

E. All electrical work shall be installed only by competent workmen under direct supervision of a fully qualified Electrician.

22. CONDUCT OF WORKMEN

A. The Contractor shall be responsible for the conduct of all workmen under his supervision. Misconduct on the part of any workman to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt relief of that workman. The consumption of alcoholic beverages or other intoxicants, narcotics, barbiturates, hallucinogens or debilitating drugs on the job site is strictly forbidden.

23. PROTECTION OF MATERIALS AND EQUIPMENT

A. The Contractor shall be entirely responsible for all material and equipment furnished by him in connection with his work and special care shall be taken to properly protect all parts thereof from physical, sun, and weather damage during the construction period. Such protection shall be by a means acceptable to the manufacturer and Engineer. All rough-in soil, waste, vent and storm piping, ductwork, etc., shall be properly plugged or capped during construction in a manner approved by the Engineer. Equipment damaged, stolen or vandalized while stored on site, either before or after installation, shall be repaired or replaced by the Contractor at his own expense.

24. SCAFFOLDING, RIGGING AND HOISTING

A. The Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for erection and delivery onto the premises of any equipment and apparatus furnished. All such temporary appurtenances shall be set up in strict accord with OSHA Standards and Requirements. Remove same from premises when no longer required.

25. BROKEN LINES AND PROTECTION AGAINST FREEZING

A. No conduits, piping, troughs, etc. carrying water or any other fluid subject to freezing shall be installed in any part of the building where danger of freezing may exist without adequate protection being given by the Contractor whether or not insulation is specified or indicated on the particular piping. All damages resulting from broken and/or leaking lines shall be replaced or repaired at the Contractor's own expense. If in doubt, contact the Engineer. Do not install piping across or near openings to the outside whether they are carrying static or moving fluids or not. Special Note: Insulation on piping does not necessarily ensure that freezing will not occur.

26. CLEANING

A. The Contractor shall, at all times, keep the area of his work presentable to the public and clean of rubbish and debris caused by his operations; and at the completion of the work, shall remove all rubbish, debris, all of his tools, equipment, temporary work and surplus materials from and about the premises, and shall leave the area clean and ready for use. If the Contractor does not attend to such cleaning upon request, the Engineer may cause cleaning to be done by others and charge the cost of same to the Contractor. The Contractor shall be responsible for all damage from fire which originates in, or is propagated by, accumulations of his rubbish or debris.

B. After completion of all work and before final acceptance of the work, the Contractor shall thoroughly clean all equipment and materials and shall remove all foreign matter such as grease, dirt, plaster, labels, stickers, etc., from the exterior of piping, equipment, fixtures and all other associated or adjacent fabrication.

27. CONCRETE WORK

A. The Contractor shall be finally responsible for the provisions of all concrete work required for the installation of any of his systems or equipment. He may, at his option, arrange with the others to provide the work. This option, however, will not relieve the Contractor of his responsibilities relative to dimensions, quality of workmanship, locations, etc. In the absence of other concrete specifications, all concrete related to Mechanical work shall be 3000 psi minimum compression strength at 28 days curing and shall conform to the standards of the American Concrete Institute Publication AC1-318. Heavy equipment shall not be set on pads for at least seven (7) days after pour. Insert 6-inch steel dowel rods into floors to anchor pads.

B. All mechanical equipment (tanks, heaters, chillers, boilers, pumps, air handling units, etc.) shall be set on a minimum of 4” tall concrete pads. Pads shall be taller where required for condensate traps. All concrete pads shall be complete with all pipe sleeves, anchor bolts, reinforcing steel, concrete, etc. as required. Pads larger than 18” in width shall be reinforced with ½” round bars on 6” centers both ways. Bars shall be approximately 3” above the bottom of the pad. All parts of pads and foundations shall be properly rodded or vibrated. If exposed parts of the pads and foundations are rough or show honeycomb after removing forms, all surfaces shall be rubbed to a smooth surface. Chamfer all square edges one-half inch.

C. In general, concrete pads for equipment shall extend four (4) inches beyond the equipment's base dimensions. Where necessary, extend pads 30 inches beyond base or overall dimensions to allow walking and servicing space.

D. Exterior concrete pads shall be four (4) inches minimum above grade and four (4) inches below grade on a tamped four (4) inch dense grade rock base unless otherwise indicated or specified. Surfaces of all foundations and bases shall have a smooth finish with one-half (1/2) inch chamfer on exposed edges.

E. All exterior below grade concrete structures (utility vaults, grease traps, manholes, etc.) shall be provided with exterior waterproofing. Waterproofing shall be hot-fluid applied rubberized-asphalt waterproofing membrane with elastomeric sheets at edges, corners, and terminations of membrane for continuous watertight construction. Apply in layers and reinforce as required to provide uniform seamless membrane minimum 4mm thickness. Also, seal penetrations into and out of the structure watertight. Provide Link-Seal modular seal or equal.

28. NOISE, VIBRATION OR OSCILLATION

A. All work shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Engineer. In case of moving machinery, sound or vibration noticeable outside of room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer shall be corrected in an approved manner by the Contractor at his expense.

B. All equipment subject to vibration and/or oscillation shall be mounted on vibration supports whether indicated or not suitable for the purpose of minimizing noise and vibration transmission, and shall be isolated from external connections such as piping, ducts, etc. by means of flexible connectors, vibration absorbers, or other approved means. Unitary equipment, such as small room heating units, small exhaust fans, etc., shall be rigidly braced and mounted to wall, floor or ceiling as required and tightly gasketed and sealed to mounting surface to prevent air leakage and to obtain quiet operation. Flush and surface mounted equipment such as diffusers, grilles, etc., shall be gasketed and affixed tightly to their mounting surface.

C. The Contractor shall provide supports for all equipment furnished by him. Supports shall be liberally sized and adequate to carry the load of the equipment and the loads of attached equipment, piping, etc. All equipment shall be securely fastened to the structure either directly or indirectly through supporting members by means of bolts or equally effective means. If strength of supporting structural members is questionable, contact Engineers.

29. ACCESSIBILITY

A. The Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of his work. He shall cooperate with all others whose work is in the same space. Such spaces and clearances shall, however, be kept to the minimum size required.

B. The Contractor shall locate and install all equipment so that it may be serviced, and maintained as recommended by the manufacturer. Allow ready access and removal of the entire unit and/or parts such as valves, filters, fan belts, motors, prime shafts, etc.

C. The Contractor shall provide access panels for each concealed valve, control damper or other device requiring service as shown on engineer's plans or as required. Locations of these panels shall be identified in sufficient time to be installed in the normal course of work.

30. RESTORATION OF NEW OR EXISTING SHRUBS, PAVING, SURFACES, ETC.

A. The Contractor shall at his expense restore to their original conditions all paving, curbing, surfaces, drainage ditches, structures, fences, shrubs, existing or new building surfaces and appurtenances, and any other items damaged or removed by his operations. Replacement and repairs shall be in accordance with good construction practice and shall match materials employed in the original construction of the item and shall be to the satisfaction of the Architect and/or Engineer.

31. MAINTENANCE OF EXISTING UTILITIES AND LINES

A. The locations of all piping, conduits, cables, utilities and manholes existing, or otherwise, that comes within the contract construction site, shall be subject to continuous uninterrupted service with no other exception than the Owner of the utilities permission to interrupt same temporarily.

B. Utilities and lines, where known, are indicated on the drawings. Locations and sizes are approximate. Prior to any excavation being performed, the Contractor shall ascertain that no utilities or lines are endangered by new excavation. Exercise extreme caution in all excavation work.

C. If utilities or lines occur in the earth within the construction site, the Contractor shall probe and locate the lines prior to machine excavation or blasting in the respective area. Electromagnetic utility locators and acoustic pipe locators shall be utilized to determine where metallic and non-metallic piping is buried prior to any excavation.

D. Cutting into existing utilities and services where required shall be done in coordination with and only at times designated by the Owner of the utility.

E. The Contractor shall repair to the satisfaction of the Engineer, any surfaces or subsurface improvements damaged during the course of the work, unless such improvement is shown to be abandoned or removed.

F. Machine excavation shall not be permitted with ten feet of electrical lines or lines carrying combustible and/or explosive materials. Hand excavate only.

G. Protect all new or existing lines from damage by traffic, etc. during construction. Repairs or replacement of such damage shall be at the sole expense of the party responsible.

32. SMOKE AND FIRE PROOFING

A. The Contractor shall fire and smoke stop all openings made in fire or smoke rated walls, chases, ceilings and floors in accord with the IBC. Patch all openings around ductwork and piping with appropriate type material to stop smoke at smoke walls and provide commensurate fire rating at fire walls, floors, ceilings, roofs, etc. Back boxes in rated walls shall be a minimum distance apart as allowed by code to maintain the rating. If closer provide rated box or fireproofing in code approved manner.

33. MOTORS

A. Motors shall be built in accordance with the latest standards of NEMA and as specified. Motors shall be tested in accordance with standards of A.S.A. C50, conforming to this and all applicable standards for insulation resistance and dielectric strength.

B. Each motor shall be provided by the equipment supplier, installer or manufacturer with conduit terminal box, and N.E.C. required disconnecting means as specified or required. Three-phase motors shall be provided with external thermal overload protection in their starter units. Single-phase motors shall be provided with thermal overload protection, integral to their windings or external, in control unit. All motors shall be installed with NEMA-rated starters as specified and shall be connected per the National Electrical Code.

C. The capacity of each motor shall be sufficient to operate associated driven devices under all conditions of operation and load and without overload, and at least of the horsepower indicated or specified. Each motor shall be selected for quiet operation, maximum efficiency and lowest starting KVA per horsepower. Motors producing excessive noise or vibration shall be replaced by the responsible contractor. See Division 26 of Specifications for further requirements related to installation of motors.

34. CUTTING AND PATCHING

A. The Contractor shall provide his own cutting and patching necessary to install his work. Patching shall match adjacent surfaces and shall be to the satisfaction of the Architect and Engineer.

B. No structural members shall be cut without the approval of the Engineer and all such cutting shall be done in a manner directed by him.

C. When installing conduit, pipe, or any other work in insulated concrete form (ICF) walls, the responsible subcontractor for the work shall provide spray foam insulation to patch the rigid insulation to maintain full integrity of the insulating value of the wall after the mechanical and electrical work is complete. Furthermore, all new work shall NOT be installed in concrete center of wall. All mechanical and electrical installations shall be on the interior side of the concrete.

35. CURBS, PLATES, ESCUTCHEONS & AIR TIGHT PENETRATIONS

A. In all areas where ducts are exposed and ducts pass thru floors, the opening shall be surrounded by a 4-inch-high by 3-inch-wide concrete curb.

B. Escutcheon plates shall be provided for all pipes and conduit passing thru walls, floors and ceilings. Plates shall be nickel plated, of the split ring type, of size to match the pipe or conduit. Where plates are provided for pipes passing thru sleeves which extend above the floor surface, provide deep recessed plates to conceal the pipe sleeves.

C. Seal all duct, pipe, conduit, etc., penetrations through walls and floors air tight. If wall or floor assembly is rated then use similarly rated sealing method.

36. WEATHERPROOFING

A. Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Engineer before work is done. The Contractor shall furnish all necessary sleeves, caulking and flashing required to make openings permanently watertight.

37. OPERATING INSTRUCTIONS, MAINTENANCE MANUALS AND PARTS LISTS

A. Upon completion of all work tests, the Contractor shall instruct the Owner or his representative(s) fully in the operations, adjustment and maintenance of all equipment furnished. The time and a list of representatives required to be present will be as directed by the Engineer. Turn over all special wrenches, keys, etc., to the owner at this time.

B. The Contractor shall furnish three (3) complete bound sets for delivery to the Engineer of typewritten and/or blueprinted instructions for operating and maintaining all systems and equipment included in this contract prior to substantial completion. All instructions shall be submitted in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalogs alone will not be acceptable for operating and maintenance instructions.

C. The Contractor, in the instructions, shall include a preventive maintenance schedule for the principal items of equipment furnished under this contract and a detailed, parts list and the name and address of the nearest source of supply.

D. The Contractor shall frame under Lexan in the main mechanical room all temperature control diagrams and all piping diagrams.

38. PAINTING

A. In general, all finish painting shall be accomplished under the Painting Section of the specifications by the Contractor; however, unless otherwise specified under other sections of these specifications, the following items shall be painted:

(1) All exposed piping, valve bodies and fittings (bare and insulated), including hangers, platforms, etc.

(2) All mechanical equipment not factory finished. Aluminum and stainless-steel equipment, motors, identification plates, tags, etc. shall not be painted. All rust and foreign matter shall be thoroughly removed from surfaces prior to painting. All baked enamel factory finish of equipment which may have been scratched or chipped shall be touched up with the proper paint as recommended and supplied by the manufacturer.

(3) All ductwork exposed in finished areas (bare and insulated), all grilles, diffusers, etc. not factory finished. Paint the inside surfaces of all interior duct surfaces visible from any register, grille or diffuser opening on all jobs; surfaces shall receive one (1) prime coat of Rustoleum 1225 red "galvinoleum" or other approved equivalent primer and rust inhibitor and one (1) coat of Rustoleum 1579 jet black "Speedy Dry" enamel or approved equivalent applied in accordance with the manufacturer's recommendations.

(4) All insulated piping, ductwork and equipment shall be properly prepared for painting by the Contractor where mechanical items are to be painted. In the case of externally insulated duct and pipe, the Contractor shall provide 6 oz. canvas jacket with fire retardant lagging. The jacket shall be allowed to dry properly before applying paint to avoid shrinking after painting and exposing unpainted surfaces. The Contractor, at his option, may provide double wall ductwork in lieu of externally insulated ductwork with canvas jacket and lagging.

39. ELECTRICAL CONNECTIONS

A. The Contractor shall furnish and install all (1) temperature control wiring; (2) equipment control wiring and (3) interlock wiring. The Contractor shall furnish and install all power wiring complete from power source to motor or equipment junction box, including power wiring thru starters, and shall furnish and install all required starters not factory mounted on equipment.

B. The Contractor shall, regardless of voltage, furnish and install all temperature control wiring and all associated interlock wiring, all equipment control wiring and conduit for the equipment that the Contractor furnishes. He may, at his option, employ at his own expense, the Electrical Contractor to accomplish this work.

C. After all circuits are energized and completed, the Contractor shall be responsible for all power wiring, and all control wiring shall be the responsibility of the Contractor. Motors and equipment shall be provided for current characteristics as shown on the drawings.

D. The Contractor shall furnish motor starters of the type and size required by the manufacturer for all equipment provided by him, where such starters are necessary. Starters shall have overloads for each phase.

40. FINAL CONNECTIONS TO EQUIPMENT

A. The Contractor shall finally connect to mechanical services, any terminal equipment, appliances, etc., provided under this and other divisions of the work. Such connections shall be made in strict accord with current codes, safety regulations and the equipment manufacturer's recommendations. If in doubt, contact the Engineers prior to installation.

41. REQUIRED CLEARANCE FOR ELECTRICAL EQUIPMENT

A. The NEC has specific required clearances above, in front, and around electrical gear, panels etc. The Contractor shall not install any piping, ductwork, etc., in the required clearance. If any appurtenance is located in the NEC required clearance, it shall be relocated at no additional cost.

42. INDEMNIFICATION

A. The Contractor shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

43. HAZARDOUS MATERIALS

A. The Contractor is hereby advised that it is possible that asbestos and/or other hazardous materials are or were present in this building(s). Any worker, occupant, visitor, inspector, etc., who encounters any material of whose content they are not certain shall promptly report the existence and location of that material to the Contractor and/or Owner. The Contractor shall, as a part of his work, ensure that his workers are aware of this potential and what they are to do in the event of suspicion. He shall also keep uninformed persons from the premises during construction. Furthermore, the Contractor shall ensure that no one comes near to or in contact with any such material or fumes therefrom until its content can be ascertained to be non-hazardous.

B. CMTA, Inc., Consulting Engineers, have no expertise in the determination of the presence of hazardous materials. Therefore, no attempt has been made by them to identify the existence or location of any such material. Furthermore, CMTA nor any affiliate thereof will neither offer nor make any recommendations relative to the removal, handling or disposal of such material.

C. If the work interfaces, connects or relates in any way with or to existing components which contain or bear any hazardous material, asbestos being one, then, it shall be the Contractor's sole responsibility to contact the Owner and so advise him immediately.

D. The Contractor by execution of the contract for any work and/or by the accomplishment of any work thereby agrees to bring no claim relative to hazardous materials for negligence, breach of contract, indemnity, or any other such item against CMTA, its principals, employees, agents or consultants. Also, the Contractor further agrees to defend, indemnify and hold CMTA, its

principals, employees, agents and consultants, harmless from any such related claims which may be brought by any subcontractors, suppliers or any other third parties.

44. ABOVE-CEILING AND FINAL PUNCH LISTS

A. The Contractor shall review each area and prepare a punch list for each of the subcontractors, as applicable, for at least two stages of the project:

(1) For review of above-ceiling work that will be concealed by tile or other materials well before substantial completion.
(2) For review of all other work as the project nears substantial completion.

B. When all work from the Contractor's punch list is complete at each of these stages and prior to completing ceiling installations (or at the final punch list stage), the Contractor shall request that the Engineer develop a punch list. This request is to be made in writing seven days prior to the proposed date. After all corrections have been made from the Engineer's punch list, the Contractor shall review and initial off on each item. This signed-off punch list shall be submitted to the Engineer. The Engineer shall return to the site once to review each punch list and all work prior to the ceilings being installed and at the final punch list review.

C. If additional visits are required by the Engineer to review work not completed by this review, the Engineer shall be reimbursed directly by the Contractor at a rate of $140.00 per hour for extra trips required to complete either of the above-ceiling or final punch lists.

Phone: 859 253-0892 Fax: 859 231-8357

The following is CMTA's guide for Division 20-25 required information relative to the Schedule of Values. Please utilize all items that pertain to this project and add any specialized system as required. A thorough and detailed schedule of values will allow for fair and equitable Pay Application approval and minimize any discrepancies as to the status of the job.

DIVISION 20-25 – MECHANICAL **Field Representative:** _____
Project Engineer: _____

Description of Work	Scheduled Value	Labor	Material
Shop Drawings			
Mobilization/Permits			
Demolition			
Geothermal Horizontal Piping and Vault			
Geothermal Wells, Vertical pipe and grout			
Plumbing Underslab			
Sanitary Above Slab Rough-in			
Plumbing Fixtures			
Plumbing Inspections			
Sprinkler Plan Submittals			
Fire Protection Exterior			
Fire Protection Vault			
Fire Protection Interior			
Storm Piping Exterior			
Storm Piping Interior			

Plumbing Shop Drawings			
Mechanical Shop Drawings			
Domestic Water Piping			
Domestic Water Insulation			
Hydronic Piping			
Gas Piping Exterior			
Gas Piping Interior			
Steam Piping			
HVAC Sheet Metal			
Heat Pumps			
Boiler			
Chiller			
Cooling Tower			
Pumps & Assoc. Equipment			
Grilles & Diffusers			
Insulation			
Controls			
Air Balance			
Water Balance			
Chemical Treatment			
Boiler Inspection			
Factory Start-Up Reports			
Owner Training			
Record Drawings			
O & M Manuals			
Punchlist/Closeout			
Controls Check-out			

END OF SECTION 200100

SECTION 200200- SCOPE OF THE MECHANICAL WORK

1. GENERAL

A. The Mechanical work for this Contract shall include all labor, materials, equipment, fixtures, excavation, backfill and related items required to completely install, test, place in service and deliver to the Owner the complete mechanical systems in accordance with the accompanying plans and all provisions of these specifications. This work shall primarily include, but is not necessarily limited to the following:

(1) Interior domestic hot, cold water system.

(2) Interior soil, waste and vent systems.

(3) All plumbing equipment, fixtures and fittings.

(4) All mechanical exhaust systems.

(5) All insulation associated with mechanical systems.

(6) Condensate drainage systems.

(7) Complete heating, ventilation and air conditioning systems.

(8) Final connection of all mechanical equipment furnished by others (e.g., kitchen equipment).

(9) Complete balancing of air and water systems.

(10) All applicable services and work specified in Section 200100; General Provisions - Mechanical.

(11) All specified or required control work.

(12) Provide all required motor starters, etc. not provided under the electrical sections.

(13) One year guarantee of all mechanical equipment, materials and workmanship.

(14) Thorough instruction of the owner's maintenance personnel in the operation and maintenance of all mechanical equipment.

(15) Thorough coordination of the installation of all piping, equipment and any other material with other trades to ensure that no conflict in installation.

(16) Approved supervision of the mechanical work.

(17) Excavation, backfilling, cutting, patching, sleeving, concrete work, etc., required to construct the mechanical and plumbing systems.

(18) Prior to submitting a bid, the Contractor shall contact all serving utility companies to determine exactly what each utility company will provide and exactly what is required of the Contractor and shall include such requirements in his base bid.

(19) Procurement of all required permits and inspections, including fees for all permits and inspection services and submission of final certificates of inspection to the Engineers (Plumbing, Boiler, HVAC, etc.).

(20) All necessary coordination with gas, water, and sewer utility companies, etc., to ensure that work, connections, etc., that they are to provide is accomplished.

(21) Factory start-up of all major equipment (including terminal HVAC equipment) and submission of associated factory start-up reports to the Engineer.

END OF SECTION 200200

SECTION 200300 - SHOP DRAWINGS, DESCRIPTIVE LITERATURE, MAINTENANCE MANUALS, PARTS LISTS, SPECIAL KEYS & TOOLS

1. GENERAL

A. The Contractor's attention is directed also to the General and Special Conditions and Section 200100 - General Provisions - Mechanical as well as to all other Contract Documents as they may apply to his work.

B. The Contractor shall prepare and submit to the Engineer, through the General Contractor and the Architect (where applicable) within thirty (30) days after the date of the Contract, a minimum of seven (7) copies of all shop drawings, certified equipment drawings, installation, operating and maintenance instructions, samples, wiring diagrams, etc. on all items of equipment specified hereinafter.

C. Submittal data shall include specification data including metal gauges, finishes, accessories, etc. Also, the submittal data shall include certified performance data, wiring diagrams, dimensional data, and a spare parts list. Submittal data shall be reviewed by the Engineer before any equipment or materials is ordered or any work is begun in the area requiring the equipment.

D. All submittal data shall have the stamp of approval of the Contractor submitting the data as well as the General Contractor and the Architect (if applicable) to show that the drawings have been reviewed by the Contractor. Any drawings submitted without these stamps of approval may not be considered and will be returned for proper resubmission.

E. It shall be noted that review of shop drawings by the Engineer applies only to conformance with the design concept of the project and general compliance with the information given in the contract documents. In all cases, the Contractor alone shall be responsible for furnishing the proper quantity of equipment and/or materials required, for seeing that all equipment fits the available space in a satisfactory manner and that piping, electrical and all other connections are suitably located.

F. The Engineers review of shop drawings, schedules or other required submittal data shall not relieve the Contractor from responsibility for: adaptability of the item to the project; compliance with applicable codes, rules, regulations and information that pertains to fabrication and installation; dimensions and quantities; electrical characteristics; and coordination of the work with all other trades involved in this project. Any items that differ from the Drawings or Specifications shall be flagged by the Contractor so the Engineer will be sure to see the item. Do not rely on the Engineer to “catch” items that do not comply with the Drawings or Specifications. The Contractor is responsible for meeting the Drawings and Specification requirements, regardless of whether or not something does not get caught by the Contractor or Engineer during shop drawing reviews.

G. Equipment shall not be ordered and no final rough-in connections, etc., shall be accomplished until reviewed equipment shop drawings are in the hands of the Contractor. It shall be the Contractor's responsibility to obtain reviewed shop drawings and to make all connections, etc. in

the neatest and most workmanlike manner possible. The Contractor shall coordinate with all the other trades having any connections, roughing-in, etc. to the equipment.

H. If the Contractor fails to comply with the requirements set forth above, the Engineer shall have the option of selecting any or all items listed in the Specifications or on the drawings; and the Contractor shall be required to furnish all materials in accordance with this list.

I. Colors for equipment in other than mechanical spaces shall be selected from the Manufacturer's standard and factory optional colors. Color samples shall be furnished with the shop drawing submission for such equipment.

J. Shop Drawing Submittals

(1) All submittals for HVAC equipment shall include all information specified. This shall include air and water pressure drops, RPM, noise data, face velocities, horsepower, voltage motor type, steel or aluminum construction, and all accessories clearly marked.

(2) All items listed in the schedules shall be submitted for review in a tabular form similar to the equipment schedule.

(3) All items submitted shall be designated with the same identifying tag as specified on each sheet.

(4) Any submittals received in an unorganized manner without options listed and with incomplete data will be returned for resubmittal.

2. SHOP DRAWINGS

Shop Drawings, descriptive literature, technical data and required schedules shall be submitted on the following:

Duct Insulation (Internal and External)
Condensing units
Complete VRF System
DOAS Unit
VAV Boxes
Pipe Insulation
Controls
Hydronic Specialties
Plumbing Fixtures
Heat Pumps

SPECIAL NOTES:

1) Upon substantial completion of the project, the Contractor shall deliver or send verified email to the Engineers (in addition to the required Shop Drawings) three

(3) complete copies of operation and maintenance instructions and parts lists for each item marked (1) above. These documents shall include at least:

a. Detailed operating instructions
b. Detailed maintenance instructions including preventive maintenance schedules.
c. Addresses and phone numbers indicating where parts may be purchased.

2) Shop drawings for the Control Systems shall include detailed, scaled plans and schematic diagrams indicating the function and operation of the system.

3) The Contractor shall submit Material Safety Data sheets for all refrigerant.

3. SPECIAL WRENCHES, TOOLS, ETC.

(1) The Contractor shall furnish, along with equipment provided, any special wrenches or tools necessary to dismantle or service equipment or appliances installed under the Contract. Wrenches shall include necessary keys, handles and operators for valves, cocks, hydrants, etc. A reasonable number of each shall be furnished.

4. BALANCE REPORTS

A. Upon substantial completion of the project, the Contractor shall submit to the Engineers four (4) bound copies and an email copy of the Certified Air and Hydronic Balance Report.

END OF SECTION 200300

SECTION 200400 - DEMOLITION AND SALVAGE

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

2. DEMOLITION

A. INTENT

It is the intent of this section to completely remove all components of any existing mechanical system no longer in use that will be open to view in, or will interfere with the operations of the completed building, or which will, in any way, interfere with project construction. Components of the existing mechanical systems which do not meet the above criteria, may be abandoned in place in a safe, workmanlike, code approved manner.

B. PLUMBING

(1) All existing piping not to be reused, shall be removed when located in accessible chases, accessible ceiling spaces, crawl spaces, mechanical rooms, exposed, etc.

(2) Unless otherwise indicated, the Contractor shall be responsible for patching and repairing all holes, etc. in the ceilings, walls, and floors where plumbing piping is removed.

(3) All lines abandoned in place shall be made safe in compliance with the Internatinoal Plumbing Code.

C. HVAC

(1) Remove from the project area all piping not to be reused and hangers, specialties, etc. that are accessible or that become accessible during construction and/or interfere in any way with any part of the construction or would be exposed in the completed building.

(2) Remove all temperature controls and related items that are accessible or become accessible during construction.

(3) Remove all existing heating and ventilating equipment not indicated to be reused from the building.

(4) The Contractor shall be responsible for the removal and/or relocation of any HVAC piping, equipment, fittings, valves, etc. which may, in the course of construction, interfere with the installation of any new and/or relocated Architectural, Structural, Mechanical or Electrical Systems at no increase in the contract price.

(5) Unless otherwise indicated, the Contractor shall be responsible for the patching and repairing of all holes, etc. in the ceiling, wall and floors where HVAC equipment is removed.

(6) Unless otherwise noted, when removing equipment sitting on a concrete pad, also remove the concrete pad and patch and repair floor to match adjacent surfaces.

D. REFRIGERANT RECOVERY

(1) The Contractor shall have a licensed refrigerant recovery technician evacuate all refrigerants from all refrigeration equipment being removed in accordance with EPA guidelines and regulations. The Contractor shall take all necessary precautions to not accidentally vent refrigerants to the atmosphere. The recovered refrigerant shall be offered to the Owner. If the Owner refuses it then it becomes the property of the Contractor.

E. THERMOSTAT, THERMOMETER, AND MERCURY BEARING DEVICE DISPOSAL

(1) The Contractor shall dispose of all mercury bearing materials in accordance with state and federal guidelines. The Contractor shall take all necessary precautions to not accidentally allow mercury to be released from the device during demolition.

3. SALVAGE

A. It is the intent of this section to deliver to the owner all components of any mechanical system which may be economically reused by him. The Contractor shall make every effort to remove reusable components without damage and deliver them to a location designated by the Owner.

B. Components to be delivered to the owner shall be specifically identified by the owner's representative prior to beginning the demolition.

C. Other items become the property of the Contractor and are to be removed from the site.

END OF SECTION 200400

SECTION 200500 - COORDINATION AMONG TRADES, SYSTEMS INTERFACING AND CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

1. COORDINATION

   A. The Contractor is expressly directed to read the General Conditions and all detailed sections of these specifications for all other trades and to study all drawings applicable to his work, including Architectural and Structural drawings, to the end that complete coordination between trades will be affected. Special attention shall be given to the points where ducts or piping must cross other ducts or piping, where lighting fixtures must be recessed in ceilings, and where ducts, piping and conduit must fur into walls, soffits, columns, etc. It shall be the responsibility of the Contractor to leave the necessary room for other trades. No extra compensation will be allowed to cover the cost of removing piping, conduit, ducts, etc., or equipment found encroaching on space required by others.

   B. The Contractor shall be responsible for coordination with the Electrical trade to ensure that he has made provision for connections, operational switches, disconnect switches, fused disconnects, etc. for electrically operated equipment provided under this division of the specifications, or called for on the plans.

   C. If any discrepancies occur between accompanying drawings and these specifications and drawings and specifications covering other Contracts, each trade shall report such discrepancies to the Architect far enough in advance so that a workable solution can be presented. No extra payment will be allowed for relocation of piping, ductwork, conduit, and equipment not installed in accordance with the above instructions, and which interfered with work and equipment of other trades.

   D. In all areas where air diffusers and lighting fixtures are to be installed, the Contractor shall coordinate their respective construction and installations so as to provide combined symmetrical arrangements.

2. INTERFACING

   The Contractor shall ensure that coordination is affected relative to interfacing of systems. Some interface points are (but not necessarily all):

   A. Connection of Domestic Water System to water service mains.

   B. Connection of Sanitary sewer house line to municipal service.

   C. Connection of Domestic Water System to Hydronic System.

   D. Connection of all controls to equipment.

   E. Electrical power connections to electrically operated (or controlled) equipment.

3. CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

A. The Contractor shall make all connections to equipment furnished by others, or relocated from the existing structure, whenever such equipment is shown on any part of the drawings or mentioned in any part of the Specifications, unless otherwise specifically specified hereinafter.

B. Supervision to assure proper functioning and operation shall be provided by the Contractor.

C. Items indicated on the drawings as rough-in only (RIO) will be connected by others. The Contractor shall be responsible for rough-in provisions only.

D. For items furnished by others, relocated, or RIO, the Contractor shall obtain from the supplier or shall field determine as appropriate, the exact rough-in locations and connection sizes for the referenced equipment.

E. The Contractor shall be responsible for coordinating to determine any and all final connections that he is to make to equipment furnished by others.

4. COORDINATION DRAWINGS AND RECORD DRAWINGS

A. RECORD DRAWINGS - Each Contractor shall ensure that any deviations from the Coordination Drawings are recorded as they occur, in red erasable pencil on Coordination Drawings kept at the jobsite. Upon completion of a particular phase, the Mechanical Contractor shall incorporate all field deviations into the Coordination Drawings to be utilized as Record Drawings. The Engineer shall review the Record Documents from time to time to ensure compliance with this specification. Compliance shall be a contingency of final payment. Pay particular attention to the location of under floor sanitary and water lines, shut-off valves, cleanouts and other appurtenances important to the maintenance and operation of Mechanical Systems. Also, pay particular attention to Deviations in the Control Systems and all exterior utilities. Keep information in a set of drawings set aside at the job site especially for this purpose. The Record Drawings shall be distributed electronically (on CD) to the Construction Manager, Owner, Architect and Engineer for their Records.

END OF SECTION 200500

SECTION 201100 - SLEEVING, CUTTING, PATCHING AND REPAIRING

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

B. The Contractor shall be responsible for all openings, sleeves, trenches, etc., that he may require in floors, roofs, ceilings, walls, etc., and shall coordinate all such work with the General Contractor and all other trades. Coordinate with the General Contractor, any openings which he is to provide before submitting a bid proposal in order to avoid conflict and disagreement during construction. Improperly located openings shall be reworked at the expense of the Contractor.

C. The Contractor shall plan his work ahead and shall place sleeves, frames or forms through all walls, floors and ceilings during the initial construction, where it is necessary for piping, ductwork, conduit, etc., to go through; however, when this is not done, the Contractor shall do all cutting and patching required for the installation of his work, or he shall pay other trades for doing this work when so directed by the Engineer. Any damage caused to the buildings by the workmen of the responsible Contractor must be corrected or rectified by him at is own expense.

D. The Contractor shall notify other trades in due time where he will require openings or chases in new concrete or masonry. He shall set all concrete inserts and sleeves for his work. Failing to do this, he shall cut openings for his work and patch same as required at his own expense.

E. The Contractor shall be responsible for properly shoring, bracing, supporting, etc., any existing and/or new construction to guard against cracking, settling, collapsing, displacing or weakening while openings are being made. Any damage occurring to the existing and/or new structures, due to failure to exercise proper precautions or due to action of the elements shall be promptly and properly made good to the satisfaction of the Engineer.

F. All work improperly done or not done at all as required by the Mechanical Trades in this section, will be performed by the Contractor at the direction of the trade whose work is affected.

2. SLEEVES, PLATES AND ESCUTCHEONS

A. The Contractor shall provide and locate all sleeves and inserts required for his work before the floors and surface being penetrated are built, otherwise the Contractor shall core drill for pipes where sleeves and inserts were not installed, or where incorrectly located. Core drilling is the only acceptable alternative to sleeves. Do not chisel openings. Where sleeves are placed in exterior walls or in slabs on grade, the space between the pipe or conduit and the sleeves shall be made completely and permanently water tight.

B. Pipe that penetrates fire and/or smoke rated assemblies shall have sleeves installed as required by the manufacturer of the rating seal used.

C. At all other locations either pipe sleeves or core drilled openings are acceptable.

D. Where thermal expansion does not occur, the wall may be sealed tight to the pipe or insulation.

E. Insulation, that requires a vapor barrier (i.e., cold water or refrigerant piping, etc.), must be continuous through the sleeve/cored hole. For other piping, insulation may stop on either side of the sleeve.

F. Sleeves shall be constructed of 24-gauge galvanized sheet steel with lock seam joints or Schedule 40 pipe. Sleeves in floors shall extend 1" above finished floor level.

G. Fasten sleeves securely in floors, walls, so that they will not become displaced when concrete is poured or when other construction is built around them. Take precautions to prevent concrete, plaster or other materials being forced into the space between pipe and sleeve during construction.

H. In all areas where ducts are exposed and ducts pass thru floors, the opening shall be surrounded by a 4-inch-high by 3-inch-wide concrete curb.

I. Escutcheon plates shall be provided for all pipes and conduit passing thru walls, floors and ceilings. Plates shall be nickel plated, of the split ring type, of size to match the pipe or conduit. Where plates are provided for pipes passing thru sleeves which extend above the floor surface, provide deep recessed plates to conceal the pipe sleeves.

3. CUTTING

A. All rectangular or special shaped openings in plaster, stucco or similar materials, including gypsum board, shall be framed by means of plaster frames, casing beads, wood or metal angle members as required. The intent of this requirement is to provide smooth even termination of wall, floor and ceiling finishes as well as to provide a fastening means for grilles, diffusers, lighting fixtures, etc.

B. Mechanical, plumbing, and fire protection contractors shall coordinate all openings in new and existing masonry walls with the General Contractor; and, unless otherwise indicated on the Architectural drawings, provide lintels for all openings required for the work (Louvers, wall boxes, exhaust fans, etc.). Lintels shall be sized as follows:

(1) New Openings under 48" in width: Provide one 3-1/2"x3-1/2"x3/8" steel angle for each 4" of masonry width. Lintel shall have 8" bearing on either side.

(2) New Openings 48" to 96" in width: Provide one 3-1/2"x6"x3/8" steel angle for each 4" of masonry width. Lintel shall have 8" bearing on either side.

(3) New Openings over 96" in width: Consult the Project Structural Engineer.

C. No cutting is to be done at points or in a manner that will weaken the structure and unnecessary cutting must be avoided. If in doubt, contact the Engineer.

D. Pipe openings in slabs and walls shall be cut with core drill. Hammer devices will not be permitted. Edges of trenches and large openings shall be scribe cut with a masonry saw.

E. Openings in metal building walls shall be made in strict accord with building suppliers recommendations.

4. PATCHING AND REPAIRING

A. Patching and repairing made necessary by work performed under this division shall be included as a part of the work and shall be done by skilled mechanics of the trade or trades for work cut or damaged, in strict accordance with the provisions herein before specified for work of like type to match adjacent surfaces and in a manner acceptable to the Engineer.

B. Where portions of existing lawns, shrubs, paving, etc. are disturbed for installation of work of this Division, such items shall be repaired and/or replaced to the satisfaction of the Engineer.

C. Where the installation of conduit, ducts, piping, etc. requires the penetration of fire or smoke rated walls, ceilings or floors, the space around such conduit, duct, pipe, etc., shall be tightly filled with an approved non-combustible fire insulating material satisfactory to maintain the rating integrity of the wall, floor or ceilings affected.

D. Where ducts penetrate fire rated assemblies, fire dampers shall be provided with an appropriate access door.

E. Piping passing through floors, ceilings and walls in finished areas, unless otherwise specified, shall be fitted with chrome plated brass escutcheons of sufficient outside diameter to amply cover the sleeved openings and an inside diameter to closely fit the pipe around which it is installed.

F. Stainless steel collars shall be provided around all ducts, large pipes, etc., at all wall penetrations; both sides.

G. Where ducts, pipes, and conduits pass through interior or exterior walls, the wall openings shall be sealed air tight. This shall include sealing on both sides of the wall to ensure air does not enter or exit the wall cavity. This is especially critical on exterior walls where the wall cavity may be vented to the exterior.

H. When installing conduit, pipe, or any other work in insulated concrete form (ICF) walls, the responsible subcontractor for the work shall provide spray foam insulation to patch the rigid insulation to maintain full integrity of the insulating value of the wall after the mechanical and

electrical work is complete. Furthermore, all new work shall NOT be installed in concrete center of wall. All mechanical and electrical installations shall be on the interior side of the concrete.

END OF SECTION 201100

SECTION 201200 - EXCAVATION, TRENCHING, BACKFILLING AND GRADING

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

   B. The Contractor shall include all excavating, filling, grading, and related items required to complete his work as shown on the drawings and specified herein or as required to complete, connect and place all mechanical systems in satisfactory operation.

   C. Unless otherwise shown or required, provide separate trenches for sewers, water lines and other underground raceways, with a minimum of 10 feet measured from outside diameter between pipes. In locations, such as close to buildings where separate trenches for sewers and water lines are impractical, lay the water pipe on a solid shelf at least 2'-0" above the top of the sewer and 2-0" to the side. Electric and fuel lines shall always be placed in a separate trench. All exterior lines shall have a minimum earth cover of thirty (30) inches to top of pipe, unless otherwise indicated.

   D. Water lines crossing under sewer lines, or crossing less than 2 feet above sewer lines, must be encased for a distance not less than 5 feet on either side of the point of crossover.

2. SUBSURFACE DATA

   A. Materials to be excavated shall be unclassified, and shall include earth, rock, or any other material encountered in the excavating to the depth and extent indicated on the drawings and specified herein. No adjustment in the Contract sum will be made on account of the presence or absence of rock, shale, or other materials encountered in the excavating. This paragraph is written to include the removal of all rock with no extras, whether rock is indicated or not.

3. BENCH MARKS AND MONUMENTS

   A. Maintain carefully all bench marks, monuments and other reference points. If disturbed or destroyed, replace as directed.

4. EXCAVATION

   A. Excavate trenches of sufficient width for proper installation of the work. When the depth of backfill over sewer pipe exceeds 10 feet, keep the trench at the level of the top of the pipe as narrow as practicable. Trench excavation for piping eight inches and smaller shall not exceed thirty-inch width for exterior lines and twenty-four-inch width for interior lines.

B. Sheet and brace trenches as necessary to protect workmen and adjacent structures. Comply with local regulations or, in the absence thereof, with the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc., and current OSHA Standards. Do not remove sheeting until trench is backfilled sufficiently to protect pipe and prevent injurious caving. Where removal of sheeting and/or bracing is hazardous, leave in place. Cut off such sheeting not to be removed at least 3 feet below finished grade.

C. Rules and regulations governing the respective utilities shall be observed in executing all work under this heading. Active utilities discovered in the course of excavation shall be protected or relocated in accordance with written instructions from the Engineer. Inactive and abandoned utilities encountered in trenching operations shall be removed and abandoned with ends plugged or capped in accord with current codes and safe practice. If in doubt, contact Engineers. Machine excavation shall not be allowed within ten (10) feet of existing electric lines or lines carrying combustible materials. Use only hand tools.

D. The removal of rock shall be accomplished by use of hand or power tools only. Blasting shall not be permitted unless authorized in writing by the Engineer. Any damage to existing structures, exterior services, or rock intended for bearing, shall be corrected at the Contractor's expense.

E. Perform final grading of trench bottoms by hand tools; carry machine excavation only to such depth that soil bearing for pipes and raceways will not be disturbed. Grade the bottom of trenches evenly to ensure uniform bearing for all piping and raceways. Cut bell holes as necessary for joints and jointmaking. Except as hereinafter specified, bottom of trenches for bell and spigot pipe, flanged pipe, etc. shall be shaped to the lower quadrant of pipe with additional excavation for bell or flange. Piping installed where it rests on bell, or flange and/or is supported with blocks or wedges will not be accepted.

F. Keep trenches free from water while construction therein is in progress. Under no circumstances lay pipe or appurtenances in water. Pump or bail water from bell holes to permit proper jointing of pipe. Any water pumping from this Contractor's trenches which is required during construction, shall be included in this Contract.

G. In no case shall excavation work be accomplished that will damage in any way the new structure, existing structures, equipment, utility lines, large trees to remain, etc. The Contractors shall take the necessary steps to prevent flow of eroded earth by water or landslide onto the property of others, or against the structures. The repair of all such damage or any other damage incurred in the course of excavation shall be borne by the responsible Contractor.

H. Use surveyor's level to establish elevations and grades.

I. The Contractor shall accept the site as he finds it and remove all trash, rubbish and material from the site prior to starting excavation of his work.

J. The Contractor shall provide and maintain barricades and temporary bridges around excavations as required for safety. Temporary bridges shall be provided where excavations cross paved

areas and walks. The Contractor shall maintain these bridges in a safe and passable condition for all traffic until removal. Refer to OSHA Standards for such installations and comply with same in all details.

K. Pay particular attention to existing utilities and lines to avoid damage. The locations of existing lines which are indicated on the plans were taken unconfirmed from drawings prepared for previous construction and locations are approximate only. Also, certain water, gas, electric, storm and sanitary sewer lines and other underground appurtenances, active or abandoned, may not appear on the drawings. It shall be each Mechanical Contractor's responsibility to ascertain the location of all lines and excavate with caution in their area.

5. BACKFILL AND SURFACE REPAIR

A. Backfilling for mechanical work shall include all trenches, manhole pits, storage tank pits, and/or any other earth and/or rock openings which are excavated under this Contract. Backfilling shall be carefully performed and the surface restored to its original level to receive new finish. Wherever trenches and earth openings have not been properly filled and/or settlement occurs, they shall be re-excavated, re-filled and properly compacted, smoothed off and finally made to conform to the level of the original ground surface.

B. Unless otherwise indicated or specified, all piping shall be bedded on four (4) inches minimum of compacted naturally or artificially graded mixture of crushed gravel, crushed stone, or crushed sand with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve on undisturbed soil excavated as described hereinbefore. Install tracer wire above pipe. Cover the pipe with twelve (12) inches of compacted backfill to prevent settlement above and around the new pipe. The backfill shall be naturally or artificially graded mixture of crushed gravel, crushed stone, or crushed sand with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve. Prior to placing this second level of backfill, apply all required coatings and coverings to pipe, apply required tests and check the grading of the pipe to ensure that it is correct and that the pipe is free of swags, bows or bends. Also check lines for leaks at this point and repair as required. Once all of the preceding is accomplished, continue backfill with clean, debris and rock free earth tamped at six (6) inch intervals. Finish the backfill as specified following. Note: Water settling of backfill will be permitted only as an aid to <u>mechanical</u> compacting.

(1) When installing any type of pipe below building footing, parallel or perpendicular to the footing, the area underneath the footing and in the zone of influence shall be backfilled with cementitious flowable fill. The zone of influence is the area within a 45-degree angle projecting down from the bottom edge of footers on all sides of the footing. Piping within flowable fill shall be isolated from the fill by a layer of heavy duty felt paper. Piping installed in trenches backfilled with flowable fill shall be anchored to the soil below prior to backfilling.

C. Backfill beneath areas to be seeded or sodded within six (6) inches of finished grade. The remaining six (6) inches shall be backfilled with clean top soil.

D. Backfill beneath paved areas, walks, etc. shall be brought to proper grade to receive the sub-base and paving. No paving shall be placed on uncompacted fill or unstable soil.

* **REVIEW E, F, AND G BELOW FOR APPLICABILITY TO PROJECT.**

E. Backfill for natural gas lines shall be in strict accordance with the utility company or local municipalities requirements. If in doubt, contact the utility company or local municipality and/or the Engineer.

F. Backfill for lines carrying hazardous or combustible materials shall be in accordance with current codes, rules, regulations and safe practices. If in doubt, contact the Engineers.

G. Backfill for underground tanks shall be in accord with the tank manufacturer's recommendations. If in doubt, contact the Engineers.

H. Wherever, in the opinion of the Engineer, the soil at or below the requisite pipe grade is unsuitable for supporting piping, special support shall be provided as directed by the Engineer.

I. Unsuitable material and surplus excavated material not required for backfill shall be removed from the site. The location of dump and length of haul shall be the affected Contractor's responsibility.

J. Provide and place any additional fill material from off the site as may be required for backfill. Fill obtained from off site shall be of kind and quality as specified for backfill and the source approved by the Engineer and shall be brought to the site by the Contractor requiring the fill.

K. In the absence (if not specified or indicated elsewhere in the drawings or specifications to be done by others) of such work by others, the Contractor shall lay new sod over his excavation work. Level, compress and water in accord with sound sodding practice.

L. When running any type of piping below a footer or in the zone of influence the piping shall be backfilled with cementitious flowable fill. The zone of influence is the area under the footer within a 45-degree angle projecting down from the bottom edge of the footer on all sides of the footer. Additionally, grease traps, manholes, vaults, and other underground structures shall be held away from building walls far enough to be outside of the zone of influence.

M. Warning Tape and Tracer Wire

Provide a yellow and black plastic tape in all trenches 6" above the buried utility that identifies the utility about to be encountered. For non-metallic pipe a #12 copper wire shall also be laid in the trench to aid in future location of the piping. A foil faced warning tape may be used in lieu of the plastic tape and wire.

N. All manholes, vaults, and similar underground structures shall have the top elevation set flush with finished grade unless specifically noted otherwise.

6. MINIMUM DEPTHS OF BURY (TO TOP OF PIPE)

In the absence of other indication, the following shall be the minimum depth of bury of exterior utility lines. (Check drawings for variations).

A. Domestic Water Lines.....36 inches.

B. Fire Protection Lines.....42 inches.

C. Geothermal Lines.....42 inches.

D. Storm Lines.....20 inches.

E. Sanitary Lines (Exterior).....36 inches.

F. Natural Gas Lines.....36 inches.

G. Fuel Oil Lines.....36 inches.

H. Other lines carrying combustible and/or hazardous materials .....36 inches.

END OF SECTION 201200

SECTION 201300 - PIPE, PIPE FITTINGS AND PIPE SUPPORT

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

B. When a pipe size is not indicated, the Contractor shall request the pipe size from the Engineers. All piping shall be installed straight and true, parallel or perpendicular to the building construction. Piping shall be installed so as to allow for expansion without damage to the building finishes, structure, pipe, equipment, etc., use offsets, U-bends or expansion joints as required. Where a section of piping is not indicated but is obviously required for completion of the system, the Contractor shall provide same at no additional cost to the project. No mitered joints or field fabricated pipe bends shall be accepted. Pipe shall clear all windows, doors, louvers and other building openings.

C. All pipe shall be supported in a neat and workmanlike manner and wherever possible, parallel runs of horizontal piping shall be grouped together on trapeze type hangers. Vertical risers shall be supported at each floor line with approved steel pipe riser clamps. The use of wire or perforated metal to support pipes will not be permitted. Hanging pipes from other pipes shall not be permitted. Spacing of pipe supports shall not exceed eight feet for pipes up to 1-1/4 inches and ten feet on all other piping. Small vertical pipes (1 inch and less) shall be bracketed to walls, structural members, etc. at four (4) foot intervals so as to prevent vibration or damage by occupants. Insulated piping shall be supported on a rigid insulation block at each hanger so as to prevent crushing of insulation by hangers. Hangers shall pass completely around the insulation jacket and a steel protective saddle shall be applied to prevent compression of the insulation. (Refer to Specifications Section entitled INSULATION-MECHANICAL). In metal buildings, support piping with standard pipe hangers with C-clamp connection to main structural members (not purlins), use angle steel cross pieces between main structural members where required to provide rigid support.

D. Where piping rests directly on a hanger, clip, bracket or other means of support, the support element shall be of the same material as the pipe, (e.g., copper to copper, ferrous to ferrous, etc.) or shall be electrically isolated one from the other so as to prevent pipe damage by electrolysis. Pay particular attention and do not allow copper pipe to rest on ferrous structural members, equipment, etc. without electrolytic isolation.

E. In general, piping shall be installed concealed except in Mechanical Rooms, etc. unless otherwise indicated, and shall be installed underground or beneath concrete slabs only where indicated. All lines at ceilings shall be held as high as possible and shall run so as to avoid conflicts with other trades, and to facilitate the Owner's use and maintenance. Location of pipe in interior partitions shall be carefully coordinated with whoever will construct the partitions after the piping is in place. Where exposed risers occur, they shall be kept as close to walls as possible.

F. Installation of pipe shall be in such a manner as to provide complete drainage of the system toward the source. Drain valves shall be provided at all drainage points on pipes. Drain valves shall be 1/2" size gate type with 3/4" hose thread end and vacuum breaker. Label each drain valve.

G. All hot and cold-water piping shall be kept a sufficient distance apart so as to prevent heat transfer between them. Cold water piping shall also be kept apart from refrigerant hot gas lines.

H. Piping carrying water or other fluids subject to freezing shall not be installed in locations subject to freezing; if in doubt, consult Engineer.

I. Piping for all drainage systems shall be installed to permit flow, trapping, and venting in accord with current codes and sound practice.

J. All cast iron soil pipe and fittings shall be coated inside and out with coal tar varnish.

K. Non-metallic piping shall be installed in strict accordance with the manufacturer's instructions. If no such instructions are available, consult Engineers.

L. Nipples shall be of the same material, composition and weight classification as pipe with which installed.

M. Where piping is not indicated on the plans, but is obviously or apparently required, contact the Engineers prior to submission of a bid proposal.

N. Pay particular attention to conflict of piping with other work. Do not install until conflict is resolved. If necessary, contact Engineers.

O. Piping materials in each system shall, to the extent practicable, be of the same material. Frequent changes of material (for example, from copper to steel) shall be avoided and in no case, shall be accomplished without use of insulating unions and permission of the Engineers.

P. Apply approved pipe dope (for service intended) to all male threaded joints. Pay particular attention to dope for fuel gas lines. The dope shall be listed for such use.

Q. High points of closed loop hot water heating systems shall have manual or automatic air vents as indicated or required unless automatic air vents are specifically indicated. Pipe to suitable drainage point.

R. All piping shall be capped or plugged during erection as required to keep clean and debris and moisture free.

S. The entire domestic hot, cold and recirculating hot water piping system shall be sterilized in strict accord with requirements of the Department of Health Codes, Rules and Regulations for the State which the work is being accomplished in.

T. Provide expansion joints where shown on the plans and where required by good practice. Expansion joints shall be guided and anchored in accordance with the recommendations of the Expansion Joint Manufacturer's Association.

U. Where plastic pipe penetrates a fire rated assembly, it shall be replaced with a metal threaded adapter and a metal pipe per code.

V. Foam Core PVC is not permitted

W. Where piping penetrates interior or exterior walls, the wall shall be sealed air tight. Refer to the sleeving, cutting, patching and repairing section of the specifications for additional requirements.

X. Provide thrust blocks on all storm, sanitary, water, steam, hot, chilled, condenser, etc., and any other piping subject to hammering. Thrust blocks shall be provided at all turns.

Y. All piping to hydronic coils shall be full size all the way to the coil connection on the unit. If control valve is smaller than pipe size indicated, transition immediately before and after control valve. Also, if coil connection at unit is a different size than the branch pipe size indicated, provide transition at coil connection to unit. On 3-way valve applications, the coil bypass pipe shall be full size.

Z. Provide check valves on individual hot and cold-water supplies to each mixing valve (including each sensor style faucet, safety shower, mop sink, etc.) and each showerhead with a diverter valve (including all ADA showers). This requirement shall not be satisfied by mixing valves or fixtures with internal check valves. Independent external check valves are required.

2. UNIONS AND FLANGES AND WELDED TEES

A. Screwed unions, soldered unions or bolted flanges shall be provided as required to permit removal of equipment, valves and piping accessories from the piping system. Keep adequate clearances for coil removal, rodding, tube replacement, motor lubrication, filter replacement, etc. Flanged joints shall be assembled with appropriate flanges, gaskets and bolting. Gaskets for steam piping systems shall be flexitalic spiral wound type. The clearance between flange faces shall be such that the connections can be gasketed and bolted tight without imposing undue strain on the piping system.

B. Dielectric insulating unions or couplings shall be used wherever the adjoining materials being connected are of dissimilar metals such as connections between copper and steel pipe.

C. Tee connections for welded pipe shall be made up with welding fittings. Where the size of the side outlet is such that a different connection technique than on the run is required, a weldolet, sockolet, or threadolet type fitting may be used for the branch in place of reducing tees only where the branch is 2/3 the run size or smaller.

3. SPECIFICATIONS STANDARDS

All piping and material shall be new, made in the United States and shall conform to the following minimum applicable standards:

A. Steel pipe; ASTM A-120, A-53 Grade A, A-53 Grade B.

B. Copper tube; Type K, L, M; ASTM B88-62; Type DWV ASTM B306-62.

C. Cast iron soil pipe; ASA A-40.l and CS 188-59.

D. Cast iron drainage fittings; ASA B16.12.

E. Cast iron screwed fittings; ASA B16.4.

F. Welding fittings; ASA B16.9.

G. Cast brass and wrought copper fittings; ASA B16.18.

H. Cast brass drainage fittings; ASA B16.23.

I. Reinforced concrete pipe; ASTM-C-76-64T.

J. Solder; Handy and Harmon, United Wire and Supply; Air Reduction Co. or equivalent.

K. CPVC Plastic pipe; ASTM D2846.

L. PVC plastic pipe; ASTM D1785.

M. ABS plastic pipe; ASTM D1788-73.

N. Cross-linked polyethylene (PEX) pipe; ASTM F876 and ASTM F877.

O. Cross-linked polyethylene (PEX) fittings; ASTM F1960

4. PITCH OF PIPING

All piping systems shall be installed so as to drain to a low point. Certain minimum pitches shall be required for this drainage. For proper flow and/or for proper operation, the following pitches shall be required:

A. Interior Soil, Waste and Vent Piping:

1/4 inch per foot in direction of flow where possible but in no case less than 1/8" per foot.

B. Exterior Sanitary Lines:

Not less than one (1) percent fall in direction of flow and no greater than indicated.

C. Condensate Drain Lines from Cooling Equipment:

Not less than 1/4 inch per foot in direction of flow.

D. All Other Lines:

Provide ample pitch to a low point to allow 100 percent drainage of the system.

5. APPLICATIONS

A. General Notes

(1) Where plastic piping penetrates a fire rated assembly, it shall be replaced with a threaded metal adapter and metal pipe or whatever means necessary to maintain the separation rating in accordance with local plumbing and fire codes.

(2) Plastic piping or any materials with a flame and smoke spread rating not approved for plenum use shall not be permitted in supply, return, relief or exhaust plenums.

(3) PVC, CPVC, or plastic piping shall not be used under paving, roads or areas where vehicular traffic is expected.

(4) PVC or plastic piping whether specifically listed or not may not be used in high rise buildings or anywhere else prohibited by code.

B. Soil Waste and Vent Piping - General Requirements

(1) Water closet floor flanges and ells shall be cast iron regardless whether PVC piping is allowed or not.

(2) Soil and waste piping serving mechanical rooms, laundries and kitchens shall be cast iron regardless whether PVC piping is allowed or not. Cast iron will also be required at any other location where waste water temperature can exceed 120°F. Cast iron shall extend a minimum of 35' past last waste inlet.

C. Soil, Waste and Vent Piping (Below Slab)

(1) Schedule 40 PVC pipe with drainage pattern fittings and solvent cement joints made in accordance with the Kentucky Plumbing Code. **Foam core piping is not permitted.**

(2) Service weight hubless cast iron with manufacturer's approved bands.

D. Soil, Waste and Vent Piping (Above Slab)

(1) Service weight hubless cast iron pipe. Bands shall be heavy duty band with extra width for lateral support. Each coupling shall include a minimum of four bands.

E. Roof Leaders/Interior Storm Sewer Piping

(1) Service weight hubless cast iron pipe with manufacturers approved bands. Horizontal pipe and fittings 6" and larger, shall be suitably braced to prevent horizontal movement. Provide bracing in accordance to CIPI 301-00. Provide "Holdrite" bracing system or approved equal.

NOTES:

(1) All gas piping shall be installed per NFPA 54.

(2) Unions or valves shall not be installed in an air plenum.

(3) Piping below slab must be sleeved and vented.

(4) Piping installed in concealed locations shall not have mechanical joints.

F. Domestic Cold, Hot and Recirculating Hot Water Piping (Above Slab)

(1) Type "L" hard copper tubing with wrought copper fittings with lead free solder equivalent in performance to 95/5. (Maximum lead content of solder and flux is 2%).

G. Trap Prime Piping

(1) Above slab: It shall match domestic water piping requirements.

(2) Underslab: It shall match domestic water piping requirements with a protective wrap or cross-linked polyethylene (PEX) piping.

H. Domestic Cold, Hot and Recirculating Hot Water Piping (Below Slab)

Type "K" hard or soft copper tubing with wrought copper fittings and brazed joints. There shall be no joints beneath slabs.

I. Air Vent Discharge Lines

Type "L" soft copper; wrought copper fittings, 95/5 solder.

J. Condensate Drain Lines

(1) Type "DWV" copper, wrought copper, lead free solder.

(2) Schedule 40 PVC with solvent welded fittings.

END OF SECTION 201300

SECTION 201310 - WELDING

1. GENERAL

A. All welding accomplished by the Contractor shall comply with provision of the latest revision of applicable codes, whether ASME Boiler and Pressure Vessel Code for pressure piping or such State and Local requirements as may supersede these codes.

B. Welds shall be of sound metal thoroughly fused to the base metal at all points, free from cracks and reasonably free from oxidation blow holes and non-metallic inclusions. No fins or weld metal shall project within the pipe and should they occur they shall be removed. All pipe beveling shall be done by machine. The surface of all parts to be welded shall be thoroughly cleaned free from paints, oil, rust or scale at the time of welding, except that a light coat of oil may be used to preserve the beveled surfaces from rust.

C. Pipe and fittings shall be carefully aligned with adjacent parts and this alignment must be preserved in a rigid manner during the process of welding.

D. Each Contractor shall be responsible for quality of welding done by his organization and shall repair or replace any work not done in accordance with specifications. If required by the Architect/Engineer, the Contractor shall cut out at least three (3) welds during the job for X-raying and testing. These welds shall be selected at random by the Resident Inspector and shall be tested as a part of the Contractor's Contract. Certifications of these tests and X-rays shall be submitted, in triplicate to the Engineer. In case a faulty weld is discovered, the Contractor shall be required to furnish additional tests.

2. WELDING QUALIFICATIONS

A. It is required that all welding of piping covered by this specification, regardless of conditions of service, be installed as follows:

(1) Pipe welding shall comply with the provisions of the latest revision of the applicable codes, whether ASME Boiler and Pressure Vessel Code, ASA Code for Pressure Piping, or such state or local requirements as may supersede codes mentioned above.

(2) Before any pipe welding is performed, submit to the Owner or his authorized representative, a copy of the welding procedure specifications, together with proof of its qualification as outlined and required by the most recent issue of the code having jurisdiction.

(3) Before any welder shall perform any pipe welding, submit to the Owner or his authorized agent the operator's qualification record in conformance with the provisions of the code having jurisdiction, showing that the operator was tested under the proven procedure specifications submitted.

(4) Standard Procedure Specifications and Welders qualified by the National Certified Pipe Welding Bureau shall be considered as conforming to the requirements of these specifications.

(5) “R” Stamp: Any welder performing modifications, repairs, etc. to boilers, pressure vessels, or other pressure retaining items shall have a current R stamp issued by the National Board of Boiler and Pressure Vessel Inspectors.

(6) “PP” Stamp: Any welder working with steam systems exceeding 15 PSIG shall have a current PP stamp issued by ASME. This shall apply up to the first stop valve for single boiler installations and up to the second stop valve for multiple boiler installations.

B. MATERIALS

(1) Welding fittings shall conform to ASA B16.9; of the same materials, thickness, etc., as the pipe being jointed; see ASA B36.10.

END OF SECTION 201310

SECTION 202100 - VALVES AND COCKS

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

B. The Contractor shall provide all valves required to control, maintain and direct flow of all fluid systems indicated or specified. This shall include, but may not be limited to all valves of all types including balancing cocks, air cocks, lubricated plug cocks, packed plug cocks, special valves for special systems, etc., for all Mechanical Systems.

C. All valves shall be designed and rated for the service to which they are applied.

D. The following type valves shall not be acceptable: Zinc, plastic, fiber or non-metallic.

E. Ball valves with temperature and pressure ports are not an acceptable alternative to the balancing valves specified herein. Valves that do not comply with these specifications shall be removed and replaced by the Contractor with no increase in contract price.

F. Each type of valve shall be of one manufacturer, i.e., gate valves, one manufacturer, globe valves, one manufacturer, silent check valves, one manufacturer, etc. The following valve manufacturers shall be acceptable: Lunkenheimer, Tour & Anderssen, Powell, Nibco, Crane, Jenkins, T & S Brass, Walworth, Milwaukee, DeZurik, Consolidated Valve Industries, Inc., Victaulic, Bell & Gossett, Flow Design, Watts, Victaulic.

G. All valves shall comply with current Federal, State and Local Codes.

H. All valves shall be new and of first quality.

I. All valves shall be full line size. Valves and hydronic specialties shall not be reduced to coil or equipment connection size. Size reductions shall be made at the connection to the equipment.

J. Angle stops for plumbing fixtures shall be quarter turn ball type.

K. All valves for use in potable water systems shall comply with federal lead-free requirements that the lead content of wetted surfaces cannot exceed 0.25% by weight.

2. LOCATION OF MAINTENANCE VALVES

Maintenance valves and unions, installed so as to isolate equipment from the system shall be installed at the following locations:

A. At each plumbing fixture.

B. At each air handling unit, and make–up air unit.

C. At each unit heater.

D. At each heating or cooling coil.

E. At all other locations indicated on the drawings.

3. WORKMANSHIP AND DESIGN

A. Handwheels for valves shall be of a suitable diameter to allow tight closure by hand with the application of reasonable force without additional leverage and without damage to stem, seat and disc. Seating surfaces shall be machined and finished to ensure tightness against leakage for service specified and shall seat freely. All screwed valves shall be so designed that when the screwed connection is properly made, no interference with, nor damage to the working parts of the valve shall occur. The same shall be true for sweat valves when solder or brazing is applied.

4. TYPES AND APPLICATION

A. GATE VALVES

Gate Valves shall be of the wedge disc type, permit straight line flow, complete shut-off and designed so that when the valve is wide open, it can be packed under pressure. Valves 1-1/2 inches and smaller shall be bronze, with ends to suit piping and non-rising stem. The valve shall have a deep stuffing box for long contact with the stem, packing gland and filled with high quality packing. Valves 2 inches thru 4 inches shall be iron body bronze mounted with flanged ends and non-rising stem. Boiler stop valves and valves larger than 4 inches shall be iron body bronze mounted flanged ends with outside screw and yoke with rising stem. Working pressure for bronze valves shall be 150 pounds and iron valves 125 pounds when installed in piping with system pressures up to 100 pounds per square inch and 250 pounds for 100 pounds per square inch and over. 2" and under NIBCO T133, greater than 2" NIBCO F619. All gate valves 2” and smaller for use in potable water systems shall meet federal requirement to be lead free containing less than 0.25% lead by weight of wetted area. NIBCO F768B.

B. GLOBE VALVES

Globe Valves shall permit control of flow rate from full flow to complete shut-off and designed that when the valve is wide open it can be repacked under pressure, and have a deep stuffing box with gland and filled with high quality packing. Valves 1-1/2 inches and smaller shall be bronze with ends to suit piping union bonnet, and with stainless steel plug type disc and seat of not less than 500 Brinnell hardness. Valves 2 inches and larger shall be iron body bronze mounted with flanged ends, yoke bonnet, and disc guide. Working pressure for bronze valves shall be 150 pounds and iron valves 125 pounds when installed in piping with system pressures up to 100 pounds per square inch and 250 pounds for 100 pounds per square inch and over. 1-1/2" and under NIBCO T256AP, greater than 1-1/2" NIBCO F768B.

C. CHECK VALVES

Check Valves shall be horizontal swing type with two-piece hinges, disc construction seats to be bronze and bronze discs or with composition face depending on service and provide silent operation. Valves 1-1/2 inches and smaller shall be bronze with ends to suit piping, have full area "Y" pattern body and integral seats. Valves 2 inches and larger shall be iron body brass mounted and with flanged ends. Working pressure for bronze valves shall be 150 psi and iron valves 125 psi when installed in piping with system pressures up to 100 psi and 250 psi for 100 psi and over. 3" and under NIBCO T433Y, greater than 3" NIBCO F918B (for less than 100 psi systems) greater than 3" NIBCO F968B (for 100 psi or greater systems). Victaulic 716/779 check valves allowed with grooved piping system.

D. BALL VALVES (NON-POTABLE)

Ball Valves shall have removable lever handle with vinyl grip, adjustable stem gland screw, reinforced Teflon stuffing box ring, blow out proof stem, bronze body, reinforced Teflon seats, chrome plated steel ball as manufactured by Consolidated Valve Industries, Inc., Lunkenheimer, Apollo, Jenkins, Nibco or equivalent. Provide a stem extension so that the base of the handle is 1/4" above the insulation similar to Nibseal. NIBCO T5800-70.

E. BALL VALVES (POTABLE WATER)

All valves for use in potable water systems 2" and smaller contain less than 0.25% lead by weight and comply with federal lead free potable water requirements. Ball valves shall have a removable lever handle with vinyl grip, adjustable stem gland screw, reinforced Teflon stuffing box ring, blowout proof stem, stainless steel or bronze body, reinforced Teflon seats, stainless steel or chrome plate steel ball as manufactured by Apollo, Aslo, Nibco, Milwaukee, or equivalent. Provide a stem extension so that they bas of the handle is ¼" above the insulation similar to Nibseal. NIBCO S-585-66-LF.

F. BUTTERFLY VALVES

Butterfly valves shall be line sized cast iron body, lug style, 200 PSI rating (bubble tight) EPT or Viton seat, cartridge type; high strength stem. Disc to have ground and polished seating surface. Operator shall be locking lever style. Quality equivalent to Crane Monarch series. 3" and under NIBCO LD3222-3, greater than 3" NIBCO LD322-5. Valves 6" and over shall have gear driven operators. 3" and under Victaulic 608N, greater than 3" Vic-300 butterfly valves allowed with grooved piping system

G. BALANCING VALVES

Bell & Gossett, Model CB circuit setter balancing valve or approved equivalent. Calibrated balancing valve shall have flanged connections suitable for 125# working pressure at 250°F. 4" and up shall be rated at 175# at 250°F working pressure. Provide with brass readout valves fitted with an integral EPT insert and check valve. Each balance valve shall have a calibrated nameplate

to assure specific valve settings and be constructed with internal seals to prevent leakage. **Note: Refer to Specification Section 230200-HVAC Equipment for automatic flow control balancing valves on terminal equipment.**

H. AIR COCKS

Straight nose; Lunkenheimer Fig. 476; bronze; tee handle; bent nose; Lunkenheimer Fig. 478, 125#; bronze; tee handle.

I. GAUGE COCKS

Straight, Lunkenheimer, Fig. 1178; 125#; bronze; tee handle. FIP.

J. LUBRICATED PLUG COCKS

2" and under; Homestead Fig. 601; 150#; semi-steel; screwed; 2-1/2" and over; Homestead Fig. 602; ±50#; semi-steel; flanged.

K. PACKED PLUG COCKS

2" and under; DeZurik Fig. 425-S; 175#; semi-steel; screwed. 2-1/2" and over; DeZurik Fig. 425-F; 175#; semi-steel; flanged.

END OF SECTION 202100

SECTION 202110 - ACCESS TO VALVES, EQUIPMENT, FILTERS, ETC.

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Requirements-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

B. All mechanical equipment shall be installed in a manner which allows ready access to all components requiring service, adjustments, shutoff, etc.

C. Filters shall be accessible, removable and replaceable without disconnecting mounting brackets, piping, wiring, etc.

D. All oil cups, grease cups, grease fittings, etc. shall be accessible without disassembly of equipment, piping, ductwork, etc. (Extended oilers or grease fittings may be required).

E. Provide access doors or panels for all equipment, valves, dampers, filters, fire dampers, etc. in concealed spaces not otherwise provided with suitable access. (Lay-in ceilings shall be considered acceptable access; splined or drywall ceilings shall not).

F. All valves, unions, strainers, cleanouts, volume dampers, and test points shall be accessible.

G. Access panels in lay-in ceilings shall be labeled with a lamacoid plate to indicate location of equipment, filters, valves, etc.

H. Access panels in fire rated walls shall bear the same rating as the wall.

I. Each fire damper shall be provided access through the duct to allow reset of the damper. This may be either a gasketed sheet metal panel over a suitable opening or a factory built access panel. The panel shall be at least one and one-half (12) inch larger than the opening all around and shall be held in place with sheet metal screws sufficiently to ensure that it is air tight. Manually check the size and location of each of these openings to ensure that the fire damper may be manually reset by use of hand only.

J. Contractor shall coordinate the finish of all access doors and panels installed in finished areas with Architect.

2. ACCESS DOORS

Refer to Sheet Metal and Flexible Duct section of the specifications.

END OF SECTION 202110

SECTION 202200 - INSULATION - MECHANICAL

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

B. Work under this section shall include all labor, equipment, accessories, materials and services required to furnish and install all insulation, fittings and finishes for all mechanical systems specified herein and/or as indicated.

C. Application of insulation materials shall be done in accordance with manufacturer's written recommendations. Where thickness of insulation is not specified, use applicable thickness recommended by manufacturer for specific use. Insulation shall be applied by a company regularly engaged in the application of insulation and any work deemed unacceptable by the Engineers shall be removed and properly installed at the expense of the Contractor.

2. MANUFACTURERS

A. Insulation shall be as manufactured by Manville, Knauf, CertainTeed, Owens-Corning, Armacell or approved equivalent. Insulation sundries, adhesives, and jackets/covers shall be as made by Benjamin Foster, Zeston, Speedline, Proto, Childers, Vimasco or approved equivalent.

3. FIRE RATINGS AND STANDARDS

A. Insulations, jackets and facings shall have composite fire and smoke hazard ratings as tested by ASTM E-84, NFPA 255 and UL 723 procedures not exceeding Flame Spread 25, Smoke Developed 50.

B. Adhesives, mastics, tapes and fitting materials shall have component ratings as listed above.

C. All products and their packaging shall bear a label indicating above requirements are not exceeded.

D. Duct linings shall meet the Erosion Test Method in compliance with UL Publication No. 181.

4. GENERAL APPLICATION REQUIREMENTS

A. Insulation shall be applied on clean, dry surfaces in a neat and workmanlike manner reflecting the best current practices in the trade. Insulation shall not be applied to piping, ductwork or equipment until tested, inspected and released for insulation.

B. All insulation shall be continuous through walls, ceiling openings and sleeves. However, insulation shall be broken through fire walls. All covered pipe and ductwork are to be located a sufficient distance from walls, other pipe, ductwork and other obstacles to permit the application of the full

thickness of insulation specified. If necessary, extra fittings and pipe are to be used. No noticeable deformation of insulation or discontinuity of vapor seal, where required, will be accepted.

C. "Concealed", where used herein, shall mean hidden from sight as in trenches, chases, furred spaces, pipe shafts, or above hung finished ceilings. "Exposed" shall mean that piping or equipment is not "concealed" as defined above. Piping and equipment in service tunnels, mechanical equipment rooms, mechanical platform, mezzanine, penthouses, storage areas, unfinished rooms, etc. is to be considered as "exposed".

D. Existing and/or new insulation removed and/or damaged during course of construction shall be repaired or replaced as directed by the Engineer.

E. Vapor barrier jackets shall be applied with a continuous unbroken vapor seal. Do not use staples thru the jacket. NO EXCEPTIONS!

F. All insulation shall be installed with joints butted firmly together.

G. The Contractor shall ensure that all insulation (piping, ductwork, equipment, etc.) is completely continuous along all conduits, equipment, connection routes, etc. carrying cold fluids (air, water, other) and that condensation can, in no way, collect in or on the insulation, equipment, conduits, etc. Any such occurrence of condensation collection and/or damage therefrom shall be repaired solely at the expense of the Contractor.

5. PIPING SYSTEMS

A. GENERAL

(1) Bevel insulation and jacket at all points where insulation terminates at unions, flanges, valves and equipment. Note: Applies to hot water lines only; cold water lines require continuous insulation.

(2) Pipe insulation shall extend around valve bodies to above drain pans in hydronic equipment over pumps, etc. to ensure no condensation drip or collection.

(3) Factory molded fittings may be installed in lieu of built-up fittings. Jackets to be the same as adjoining insulation. Insulated fittings must have same or better K factors than adjoining straight run insulation.

(4) Valves, flanges and unions shall only be insulated when installed on piping whose surface temperature will be at or below the dew point temperature of the ambient air.

(5) Insulation shall not extend through fire and smoke walls. A UL-listed penetration system shall be used for each fire or smoke wall penetration in accordance with KBC. Materials used such as caulk, sleeves, etc. shall be manufactured by 3M, Hilti, or equal.

B. INSULATION SHIELDS

(1) Metal insulation shields are required at all pipe hangers where the piping is insulated. Metal shields shall be constructed of galvanized steel, formed to a 180-degree arc. Insulation shields shall be the following size:

PIPE SIZE	SHIELD GAUGE	SHIELD LENGTH
2" AND LESS	20	12"
2 1/2" TO 4"	18	12"
5" TO 10"	16	18"
12" AND GREATER	14	24"

C. INSULATION MATERIAL (FOR THE FOLLOWING SYSTEMS)

Insulation shall be Owens-Corning Model 25ASJ/SSL, or approved equivalent fiberglass pipe insulation with an all service jacket. The insulation shall be a heavy density, pipe insulation with a K factor .23 at 75°F mean temperature. The insulation shall be wrapped with a vapor barrier jacket. Approved manufacturers are listed in Section 2 – Manufacturers. The jacket shall have an inside foil surface with self sealing lap and a water vapor permeability of .02 perm/inch. All circumferential joints shall be vapor sealed with butt strips. All insulation shall be installed in strict accordance with the manufacturers' recommendations. The following pipes shall be insulated with the thickness of insulation as noted.

(1) Domestic Cold Water, Lab High Purity Water, Lab Deionized Water

a. Piping 3'' or less – use 1/2" thick insulation. Provide an additional ½" layer of insulation 3" above and 3" below vertical pipe supports.

b. Piping 4'' or greater – use 1'' thick insulation.

(2) Hydronic System Fill Lines from Domestic Cold Water - 1/2" thick.

(3) Domestic 110°F Hot Water and 110°F Recirculating Hot Water. (If heat traced, see below)

a. Piping 1 ½'' or less – use 1 ½'' thick insulation.

b. Piping 2'' or greater – use 2'' thick insulation.

(4) Domestic 140°F Hot Water and 140°F Recirculating Hot Water. (If heat traced, see below)

a. Piping 1 ½'' or less – use 1 ½'' thick insulation.

b. Piping 2'' or greater – use 2'' thick insulation.

(5) Domestic Hot Water with Heat Tape for Heat Maintenance - Insulation thicknesses as required by the manufacturer to maintain water temperature.

(6) Horizontal Roof Leaders.

a. Piping 3'' or less – use 1/2" thick insulation

b. Piping 4'' or greater – use 1'' thick insulation

(7) Sanitary Sewer and plumbing fixture P-traps to waste stack – see schedule below. Insulate horizontal runs which receive air conditioning condensate and which are not located below slab or grade.

a. Piping 3'' or less – use 1/2" thick insulation

b. Piping 4'' or greater – use 1'' thick insulation

(8) Condensate Drain Lines.

a. Piping 1 ½'' or less – use 1/2" thick insulation

b. Piping 2'' or greater – use 1'' thick insulation

(9) Refrigerant Liquid and Suction Lines - Interior & Exterior

IMCOA, Nomaco, or Armacell closed cell polyethylene, 1.5 Lbs/Ft^3 density, 0.24 BTU-Hr.-Ft^3-°F/in at 75°F thermal conductivity, zero vapor permeance, 25/50 flame and smoke spread per NFPA 90 requirements. Elastomeric closed cell insulations that meet the above requirements are also allowed. Install insulation per the manufacturer's requirements. Provide UV protective coating for all exterior refrigerant lines.

a. All pipe sizes: 1 ½'' thick

D. JACKETS

(1) Exposed (Mechanical Rooms, Interior Finished Rooms and Storage Rooms)

All insulated piping installed in the above areas shall have a canvas or PVC jacket:

a. For all systems except steam, plenum rated PVC jacket equal to LoSmoke PVC jacket with flame/smoke rating of 25/50, ASTM-E84 test method. Minimum thickness 0.04 inches. Steam systems shall utilize plenum rated CPVC jacket with minimum thickness of 0.04 inches. Jackets shall be applied over top of specified pipe insulation. Approved equal manufacturers are Zeston and Speedline. Approved equal manufacturers are Zeston and Speedline.

(2) Exposed (Exterior)

In addition to the insulation specified for the exterior pipe, provide .016" aluminum jacket or PVC jacket 0.05" thick. The jackets shall be installed as recommended by the manufacturer

to maintain water tight seal. All longitudinal and transverse seams to be sealed water tight. PVC jacket shall be Ceel-Co, Proto, or Zeston.

6. DUCTWORK SYSTEMS

A. GENERAL

(1) Duct sizes indicated are the net free area inside clear dimensions; where ducts are internally lined, overall dimensions shall be increased accordingly.

(2) Duct insulation shall extend completely to all registers, grilles, diffusers, and louver outlets, etc., to ensure no condensation drip or collection. The backs of all supply diffusers, plenums, grilles, etc. shall be insulated only if indicated by details on the drawings.

(3) All flexible duct connections on insulated ductwork shall be externally insulated.

(4) All duct outside of building envelope, including rooftop duct, duct in unconditioned attic spaces above the insulation, etc. shall have two layers of specified insulation. This shall apply to supply air, exhaust air where air is run through energy recovery unit, outside air, return air, and combustion air intake ducts.

(EDIT B & C BELOW TO SUIT PROJECT)

B. EXTERNAL INSULATION

(1) Supply Air
(2) Return Air
(3) Outside Air
(4) Exhaust Air
(5) Flexible Duct Connections on Internally Lined Ducts

Owens/Corning “Faced Duct Wrap - Type 100", or approved equal, 2" thick fiberglass duct wrap, 1.0 pcf density factory laminated to a reinforced foil kraft vapor barrier facing (FRK) with a 2" stapling flange at one edge. Flame spread 24, smoke developed 50, vapor barrier performance 0.02 perms per inch. K factor shall not exceed .26 at 75°F. mean temperature. Minimum R-value of the 2” thick insulation shall be 7.4 out of package and 6.0 installed.

Special Notes:

a. Do not provide externally insulated duct per the above specification for any duct that is to be painted. Insulated duct that is to be painted shall be dual wall ductwork per specification Section 231200, Sheet Metal and Flexible Duct.
b. Where supply, return, and outside air ductwork is routed through an unconditioned attic or any other space outside of the building thermal envelope, the ductwork shall be provided with a minimum of 2 layers of duct wrap for a minimum R value of 11.0. Additionally, this shall apply to exhaust ductwork on entering side of energy recovery type air handling units.

C. INTERNAL INSULATION DUCTWORK

(COORDINATE WITH 15-S – SHEET METAL. DELETE IF HIGH VELOCITY RECTANGULAR IS TO BE DOUBLE WALL).

(1) High velocity rectangular supply air.

a. Duct liner shall be 1 ½'' thick Owens/Corning, fiberglass duct liner with factory-applied edge coating or approved equivalent. The liner shall meet NFPA 90A and 90B, FHC 25/50 and Limited Combustibility and the airstream surface coating should contain an immobilized, EPA-registered, anti-microbial agent so it will not support microbial growth as tested in accordance with ASTM G21 and G22. The duct liner shall conform to the requirements of ASTM C 1071, with an NRC not less than .70 as tested per ASTM C 423 using a Type "A" mounting, and a thermal conductivity no higher than .25 mean temperature. Minimum R value 6.0. All exposed fiberglass edges shall be sealed with super seal duct butter or edge treatment products in accordance with the manufacturer's recommendations.

The insulation shall be pinned to the duct per the manufacturer's recommendations for system air velocity. The black coated surface of the insulation shall face the air stream. The insulation liner shall receive an 100% coverage of adhesive to aid in attaching liner to the sheet metal. Provide metal nosing of the liner on the leading edge when system velocity exceeds 4000 FPM.

D. EXPOSED EXTERNALLY INSULATED DUCT

(1) Round. 1 ½'' semi-rigid fiberglass tank and pipe wrap with kraft aluminum foil all service jacket vapor barrier or PSK facing. K=.27 @ 75°F. Minimum R-value shall be OK. Provide 6 oz. canvas jacket with fire retardant lagging.

(2) Rectangular. 1" rigid fiberglass industrial board with foil scrim kraft vapor barrier facing or PSK facing, 6.0 PCF density, K=.22 @ 75°F. Owens/Corning type 705. Provide 6 oz. canvas jacket with fire retardant lagging.

7. MECHANICAL EQUIPMENT

A. ROOF DRAIN SUMPS

(1) Owens-Corning Model 475-FR or approved equivalent rigid board insulation with exterior vapor barrier jacket formed to bottom of sump basin. Insulation shall have a K factor of .22 at 75°F. mean temperature. Insulation shall be 1" thick. Insulation shall be formed to roof drain sump. Vapor barrier shall remain continuous.

B. FLOOR DRAIN SUMPS (Applies to all Floor Drains which Receive Air Conditioning Condensate and which are Installed in Locations Other Than Slab on Grade)

(1) Owens-Corning Model 475-FR or approved equivalent rigid board insulation with exterior vapor barrier jacket formed to bottom of sump basin. Insulation shall have a K factor of .22

at 75°F. mean temperature. Insulation shall be 1" thick. Insulation shall be formed to roof drain sump. Vapor barrier shall remain continuous.

END OF SECTION 202200

SECTION 202300 - THERMOMETERS & OTHERS, MONITORING INSTRUMENTS

1. GENERAL

   A. The Contractor shall include all thermometers, pressure gauges and/or compound gauges at the locations indicated.

2. THERMOMETERS AND PRESSURE GAUGES

   A. All thermometers and gauges shall be readable from a standing position on the floor.

   B. Thermometers shall be linear, alcohol filled, graduated in 1°F. Or less and shall have adequate range for service intended.

   C. Pressure gauges shall be Bourdon Type, circular, 3" face, black letters on white face graduated in 2 PSI or less and shall have adequate range and shall be manufactured for service intended. Provide with pig tail connectors and gauge cocks.

   D. Pressure gauges and thermometers subject to vibration shall be mounted remotely away from vibrating pipe surface, etc., with flexible tubing.

   E. Mount thermometers in approved wells and install with thermal grease. Do not make direct contact of base with fluid in pipe.

   F. Gauges and thermometers shall be Marsh, Marshalltown, Weksler or equivalent.

3. Provide, when indicated on the plans, on the inlet and outlet of each terminal unit, a “Pete’s Plug” or equivalent pressure/temperature test station. Furnish two (2) matching thermometers and pressure gauges to the owner upon project completion.

END OF SECTION 202300

SECTION 202400 – IDENTIFICATIONS, TAGS, CHARTS, ETC.

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

2. VALVE TAGS AND CHARTS

   A. Provide and install on each valve in the Mechanical Systems a 1-1/2" diameter circular brass tag fitted to each valve so that it cannot be removed. Each tag shall be embossed consecutively with letter and number identifiers as to system and purpose respectively. Letter identifiers shall be as follows:

CD	Condensate
RF	Refrigerant
DCW	Domestic Cold Water
DHW	Domestic Hot Water

   Number identifiers shall be determined by the Contractor sequentially. For example, valve No. HC-1 may be maintenance stops for fan coil units. HC-2 maintenance stops for air heaters, etc.

   B. Provide three (3) copies of typewritten valve charts indicating each valve identifier, the valves purpose and its location. For example: "HC-1 Fan Coil Maintenance Stop-one valve at supply and return of each fan coil unit." One (1) copy of this chart shall be mounted in suitable wood frame(s) with clear plastic or glass covers in a conspicuous location in the Mechanical Room. Two other copies shall be turned over to the Engineers.

   C. Where more than one major Mechanical room is indicated for the project, install mounted valve schedule in each major Mechanical Room, and repeat only main valves which are to be operated in conjunction with operations of more than single Mechanical Room.

3. PIPING IDENTIFICATION

   A. GENERAL

      (1) Provide stenciled markers and arrows indicating direction of flow on all piping installed under this Contract. Markers and arrows shall be painted on the piping using machine cut stencils. All letters shall be sprayed using fast drying lacquer paint. All markers and arrows shall be properly oriented so that descriptive name may be easily read from the floor. At the Contractor's option, Setmark or equivalent manufactured marking system may be substituted for field marking. The following table describes the size of the color field and size of the identification letter which shall be used for pipes of different outside pipe diameters.

OUTSIDE DIAMETER OF PIPE OR COVERING	LENGTH OF COLOR FIELD	SIZE OF LETTERS
INCHES	INCHES	INCHES
3/4 TO 1-1/4	8	1/2
1-1/2 TO 2	8	3/4
2-1/2 TO 6	12	1-1/4
8 TO 10	24	2-1/2
OVER 10	32	3-1/2

(2) "Concealed", where used herein, shall mean hidden from sight as in trenches, chases, furred spaces, pipe shafts, or above hung finished ceilings. "Exposed" shall mean that piping or equipment is not "concealed" as defined above. Piping and equipment in service tunnels, mechanical equipment rooms, storage areas, or unfinished rooms is to be considered as "exposed".

(3) All piping shall be marked not less than every 15 linear feet above a ceiling system, every 10 feet in a mechanical room, and at all points where lines pass through walls or floors.

(4) Provide pipe marker colors as indicated in the following table where manufactured marking systems are used:

PIPE+	MARKER COLOR+	ABBREVIATION
Chilled Water Supply*	Green with Black Letters	C.W.S.
Chilled Water Return	Green with Black Letters	C.W.R.
Hot Water Supply*	Yellow with Black Letters	H.W.S.
Hot Water Return	Yellow with Black Letters	H.W.R.
Chilled/Hot Water Supply*	Green with Black Letters	C.H.W.S.
Chilled/Hot Water Return	Green with Black Letters	C.H.W.R.
Steam (Low, Medium & High Pressure)	Yellow with Black Letters	LPS, MPS, HPS
Condensate (Low, Medium & High Pressure)	Yellow with Black Letters	LPC, MPC, HPC
Domestic Cold Water	Green with Black Letters	D.C.W.
Domestic Hot Water	Yellow with Black Letters	D.H.W.
Recirculated Hot Water	Green with Black Letters	R.H.W.
Compressed Air	Blue with White Letters	C.A.
Natural Gas	Yellow with Black Letters	NAT. GAS
Propane Gas	Yellow with Black Letters	PROP. GAS
Fuel Oil (Supply, Return, Fill & Vent)	Yellow with Black Letters	FOS, FOR, FOF, FOV
Sanitary Sewer Piping	Green with Black Letters	SAN.
Sanitary Vent Piping	Green with Black Letters	VENT

Storm Sewer Piping	Green with Black Letters	STORM
Fire Protection Water	Red with White Letters	F.P.

A. Piping, whether exposed or concealed, shall be marked not less than every 15 linear feet and at the points where the piping passes through wall or floors.

B. In mechanical rooms, piping shall be labeled every 10 feet.

4. PIPE PAINTING (REFER ALSO TO ARCHITECTURAL SECTION ON PAINTING)

A. GENERAL

(1) All exposed piping installed shall be painted according to the color-coding chart hereinafter specified.

(2) "Concealed", where used herein, shall mean hidden from sight as in trenches, chases, furred spaces, pipe shafts, or above hung finished ceilings. "Exposed" shall mean that piping or equipment is not "concealed" as defined above. Piping and equipment in service tunnels, mechanical equipment rooms, storage areas, or unfinished rooms is to be considered as "exposed".

(3) Paint all equipment and metal surfaces which are not factory finished (and all damaged or rusted surfaces) in high grade rust proofing machinery enamel. Pay particular attention to flanges, valves, unions, etc., where condensation may collect.

(4) Paint exposed pipe (whether insulated or bare) and exposed surfaces (tanks, etc.).

(5) All piping shall be painted in accordance with the following color-coding chart.

PIPE+	PIPE COLOR CODE+	ABBREVIATION
Chilled Water Supply*	Green with Black Letters	C.W.S.
Chilled Water Return	Green with Black Letters	C.W.R.
Hot Water Supply*	Yellow with Black Letters	H.W.S.
Hot Water Return	Yellow with Black Letters	H.W.R.
Chilled/Hot Water Supply*	Green with Black Letters	C.H.W.S.
Chilled/Hot Water Return	Green with Black Letters	C.H.W.R.
Steam (Low, Medium & High Pressure)	Yellow with Black Letters	LPS, MPS, HPS
Condensate (Low, Medium & High Pressure)	Yellow with Black Letters	LPC, MPC, HPC
Domestic Cold Water	Green with Black Letters	D.C.W.
Domestic Hot Water	Yellow with Black Letters	D.H.W.

Recirculated Hot Water	Green with Black Letters	R.H.W.
Compressed Air	Blue with White Letters	C.A.
Natural Gas	Yellow with Black Letters	NAT. GAS
Propane Gas	Yellow with Black Letters	PROP. GAS
Fuel Oil (Supply, Return, Fill & Vent)	Yellow with Black Letters	FOS, FOR, FOF, FOV
Sanitary Sewer Piping	Green with Black Letters	SAN.
Sanitary Vent Piping	Green with Black Letters	VENT
Storm Sewer Piping	Green with Black Letters	STORM
Fire Protection Water	Red with White Letters	F.P.

* Includes pumps, air separator, valves, compression tanks, etc.

+ Where a pipe is not specifically identified in this table, painting and marking shall be in accordance with the most recent ANSI Standards.

B. Water heaters, storage tanks, heat exchangers, etc., shall be painted light gray.

C. All piping shall be marked. Piping shall be marked not less than every 15 linear feet above a ceiling system, every 10 feet in a mechanical room, and at all points where the piping passes through wall or floors.

5. EQUIPMENT IDENTIFICATION

A. All equipment, except in finished rooms, shall be identified by stenciling the title of the equipment as taken from the plans in a position that is clearly visible from the floor. The letters shall be made with black paint and shall be not less than two inches high. The titles shall be short and concise and abbreviations may be used as long as the meaning is clear. Lamacoid plates are also acceptable. In finished rooms or outdoors, equipment shall be identified by engraved nameplates.

6. DUCTWORK IDENTIFICATION

A. All ductwork shall be identified as to the service of the duct and direction of flow. The letters shall be at least two inches high and the flow arrow shall be at least six inches long. The letters and flow arrow shall be made by precut stencils and black oil base paint with aerosol can. Concealed ducts need not be identified.

7. ACCESS THROUGH LAY-IN CEILINGS

A. Mark the ceiling T-bar nearest the ceiling panel access to equipment, valves, damper, filter, duct heaters, etc., with a small red lamacoid plate with name of item above ceiling.

END OF SECTION 202400

SECTION 202500 - HANGERS, CLAMPS, ATTACHMENTS, ETC.

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Provisions - Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

   B. Each Contractor's attention is also directed to Section 201300, Pipe, Pipe Fittings and Pipe Support.

   C. This section includes, but is not limited to, furnishing and installing dampers, supports, anchors, and accessories for piping, ductwork, equipment, etc. Furnishing and installing shall be by each trade for the completion of their work.

   D. Power driven anchors and expansion anchors shall be permitted only when permission is granted in writing by the Architect and Engineer.

2. MATERIALS AND EQUIPMENT

   A. Hangers, Clamps, Attachments, Etc.:

	SIZE	**SPECIFICATION**
1. Pipe Rings	2" pipe and smaller	Adjustable swivel split ring or split pipe ring, Grinnell Figures 104 and 108, Elcen, Fee & Mason, or approved equivalent.
2. Pipe Clevis	2-1/2" pipe and larger	Adjustable wrought Clevis type, Grinnell Figure 260, Elcen, Fee & Mason, or approved equivalent.
3. Pipe Clevis	All	Steel Clevis for insulated pipe, Elcen Figure 12A, Grinnell, Fee & Mason or approved equivalent.
4. Rise Clamps	All	Extension pipe or riser clamp, Grinnell Figure 261, Elcen, Fee & Mason or approved equivalent.
5. Beam Clamps and Attachments	All	Grinnell Figure numbers listed or, Elcen, Fee & Mason, or approved equivalent. Malleable beam clamp with extension piece figure 229; I-beam clamp figure 131; C-clamp figures 83, 84, 85, 86, 87, and 88.

6. Brackets	All	Welded steel brackets medium weight, Grinnell Figure 195, Elcen, Fee & Mason or approved equivalent.
7. Concrete Inserts	All	Grinnell Figure numbers listed or, Elcen, Fee & Mason or approved equivalent. Wrought steel insert Figure 280 and wedge type insert Figure 281.
8. Concrete Fasteners	All	Self-drilling concrete inserts, Phillips, Grinnell, Elcen or approved equivalent.
9. Ceiling	All	Grinnell Figure numbers listed or Elcen, Fee & Mason, or approved equivalent. Pipe hanger flange Figure 153, adjustable swinging hanger flange Figure 155, ceiling flanges Figures 128 and 128R, and adjustable ceiling flange Figure 116.
10. Rod Attachments	All	Grinnell Figure numbers listed or Elcen, Fee & Mason, or approved equivalent. Extension piece Figure 157, rod coupling Figure 136, and forged steel turnbuckle Figure 230.
11. U-Bolts	All	Standard, U-bolt, Grinnell Figure 137, Elcen, Fee & Mason, or approved equivalent.
12. Welded Pipe Saddles	All	Pipe covering protection saddle sized for thickness of insulation, Grinnell Figure 186, Elcen, Fee & Mason or approved equivalent.
13. Pipe Roll	All	Adjustable swivel pipe roll, Grinnell Figure 174, Elcen, Fee & Mason, or approved equivalent.
14. Protection Saddle	All	18-gauge sheet metal pipe protection saddle, Elcen Figure 219, Fee & Mason, Power Strut, or approved equivalent.
15. Hanger Rods	All	Steel, diameter of the hanger threading, ASTM A-107.
16. Miscellaneous Steel	All	Steel angles, rods, bars, channels, etc., used in framing for supports and

		fabricated brackets, anchors, etc., shall conform to ASTM-A-7.
17. Concrete Channel Inserts	All	Continuous slot inserts, Unistrut, or approved equivalent. Heavy duty Series P-3200 or Light Duty Series P-3300 as required.
18. Adjustable Spot Insert	All	Adjustable spot insert Unistrut, or approved equivalent, P-3245. Design load 1000 lbs.

3. INSTALLATION

A. Unless otherwise specifically indicated or hereinafter specified in the specifications, all supporting, hanging and anchoring of piping, ductwork, equipment, etc., shall be done by each trade as is necessary for completion of the work and shall be as directed in the following paragraphs:

(1) Supporting and hanging shall be done so that excessive load will not be placed on any one hangers so as to allow for proper pitch and expansion of piping. Hangers and supports shall be placed as near as possible to joints, turns and branches.

(2) For concrete construction, utilize adjustable concrete inserts for fasteners. Expansion anchors and power-driven devices may be used when approved in writing by the Architect/Engineer. Utilize beam clamps for fastening to steel joists and beams and expansion anchors in masonry construction. When piping is run in joists, piping shall be top mounted on trapeze type hangers with each pipe individually clamped to trapeze hanger.

(3) Trapeze hangers shall be supported by steel rods of sufficient diameter to support piping from joists or concrete construction. Where desired or required, piping may be double mounted on trapeze hangers. Where conditions permit, trapeze hangers may be surface mounted on exposed joists by means of approved beam clamps, or to concrete construction by means of approved adjustable inserts or expansion anchors.

(4) Install all miscellaneous steel other than designed building structural members as required to provide means of securing hangers, supports, etc., where piping does not pass directly below or cross steel joists.

(5) Piping shall not be supported by the equipment to which it is connected. Support all piping so as to remove any load or stress from the equipment.

(6) Where piping, etc., is run vertically, approved riser clamps, brackets or other means shall be utilized at approximately 10'-0" center to center minimum and an approved adjustable base stand or fitting on concrete support base shall be utilized at the base of the vertical run.

(7) Where piping is run along walls, knee braced angle frames or pipe brackets with saddles, clamps, and rollers (where required) mounted on structural brackets fastened to walls or columns shall be used.

(8) Support all ceiling hung equipment, with approved vibration isolators.

(9) Where copper tubing is specified, hangers shall be of copper clad type when piping is uninsulated.

(10) Uninsulated piping hung from above shall be supported with ring and clevis type pipe hangers. Uninsulated piping mounted on trapeze and wall bracket type support shall be held in place with U-bolts. U-bolts shall allow for axial movement in the piping.

(11) All insulated piping shall be supported with clevis type and/or pipe roll hangers. Hangers shall be sized to allow the pipe insulation to pass through the hangers. Install insulation protection saddles at all hanger locations. Welded pipe saddles shall be installed at all hangers on piping 5" and larger. The pipe saddles shall be sized for the thickness of insulation used. Hangers shall fit snugly around outside of insulation saddles.

(12) Under no conditions will perforated band iron or steel wire driven hangers be permitted.

(13) In general, support piping at the following spacing:

a. Steel and copper piping - 5 feet intervals for piping 3/4" and smaller. 6 feet intervals for 1 ¼" and 1" pipe. 8-foot intervals for piping 1 ½" to 3". 10-foot intervals piping 3 ½" and larger.

b. PVC piping – 4-foot intervals for piping 1 1/2" and smaller. 5-foot intervals for 2 and 2 ½" piping. 6-foot intervals for 3" pipe and larger.

c. Where the manufacturer of the pipe has more strict guidelines, the manufacturer's recommendations shall be followed.

END OF SECTION 202500

SECTION 202600 – MECHANICAL/ELECTRICAL VIBRATION CONTROLS AND SEISMIC RESTRAINTS

1. GENERAL

A. RELATED DOCUMENTS

(1) Drawings and general provisions of the Contract, including General and Supplementary Conditions, General Mechanical Provisions and Division 1 Specifications Sections, apply to this section.

B. MANUFACTURERS

(1) Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include:

Mason Industries
Vibration Eliminator Co., Inc.
Vibration Isolation Co., Inc.
Kinetics Noise Control
Vibration Management Corporation - Vimco

All Seismic restraint devices; isolators, calculations and seismic design shall be provided by a single vibration isolator manufacturer as listed above.

C. SUMMARY

(1) This Section includes vibration isolators, vibration isolation bases, and seismic restraints and snubbers for mechanical and electrical equipment, duct and piping systems.

Drawings and calculation
Certification of seismic restraint designs
Installation supervision

D. PROJECT CONDITIONS

(1) Building Classification Category is III (2015 IBC – Table 1604.5).

(2) Seismic Design Category: D

(3) Seismic calculations, design and installation for Mechanical Systems shall be per ASCE Standard 7, Minimum Design Loads for Buildings and Other Structures, 2005 edition, chapter 13.

(4) Component Importance Factors shall be as follows:

1. 1.5 for all Fire Protection Systems, Natural Gas Piping, & Gas-Fired Equipment.
2. 1.0 for all other Mechanical & Electrical systems & equipment.

a. The interrelationship of components and their effect on each other shall be considered so that the failure of any essential or non-essential architectural, mechanical or electrical component shall not cause the failure of another essential architectural, mechanical or electrical component.

(5) Duct restraints are not required if conditions of ASCE 7-05; Chapter 13 paragraph 13.6.7 are met.

(6) Piping restraints are not required if conditions of ASCE 7-05; Chapter 13; paragraph 13.6.8 are met.

(7) Fire Protection Sprinkler Systems: Refer to ASCE 7-05; Chapter 13, paragraph 13.6.8.2 and 13.6.8.3.

E. APPLICABLE CODES AND STANDARDS

(1) The International Building Code; 2015; Chapter 16, 17

(2) ASCE 7-05, Chapter 13.

F. SUBMITTALS

(1) Product Data: Indicate types, styles, materials, and finishes for each type of isolator and seismic restraint specified. Include load deflection curves.

(2) Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to the structure and to the supported equipment. Include auxiliary motor slides and rails, and base weights.

G. SEISMIC RESTRAINT SUBMITTALS

(1) Shop Drawings: Show designs and calculations, prepared and stamped by a licensed professional engineer, for the following:

a. Design Calculations: Calculations for design and selection of seismic restraints for equipment (including fire pump and related equipment), duct and piping systems (including risers), stamped by a licensed professional engineer.

b. Analysis must include calculated dead loads, static seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/ or welded length. All seismic restraint devices shall be designed to accept, without failure, the forces detailed in listed building codes acting through the equipment center of gravity. Overturning moments may exceed forces at ground level.

c. Seismic Restraint Details: Detail fabrication and attachment of restraints and Snubbers.

d. Concrete Pad Details: Show required concrete pad size and location for equipment. Show locations of required pad anchors and stud wedge anchors.

e. Where wall, floors, slabs, or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for ducts, conduit and pipe must be included and approved before the condition is accepted for installation. Restraint manufacturers' submittals must include spacing, static loads and seismic loads at all attachment and support points.

H. SEISMIC RESTRAINT QUALITY ASSURANCE

(1) Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the Project is located and who has a minimum of 5 years experience in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of vibration isolation bases and seismic restraints that are similar to those indicated for this Project in material, design, and extent.

2. PRODUCTS

A. VIBRATION ISOLATORS

(1) Rubber Isolator Mounts: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements, with encapsulated top-and baseplates. Factory drilled and tapped top plate for bolted equipment mounting. Factory-drilled baseplate for bolted connection to structure. Color-code to indicate capacity range.

(2) Restraint Spring Isolators: Vertically restrained, freestanding, laterally stable, steel open-spring-type isolators.

(3) Housing: Welded steel or ductile iron. Factory-drilled baseplate for bolting to structure and bonded to a 1/4 –inch-(6mm) thick, rubber isolator pad attached to the baseplate underside. Provide adjustable equipment mounting and leveling bolt.

(4) Outside Spring Diameter: Not less than 80 percent of the compressed height of spring at rated load.

(5) Minimum Additional Travel: 50 percent of the required deflection at rated load.

(6) Lateral Stiffness: More than 0.8 times the rated vertical stiffness.

(7) Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

(8) Finishes: Baked enamel for metal components on isolators for interior use. Hot-dip galvanized for metal components on isolators for exterior use.

(9) Vertical Limit Stops: Where required or shown, provide resilient vertical limit stops to prevent spring extension due to wind loads or when weight is removed.

(10) Rubber Hangers: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to formed-steel housings with threaded connections for hanger rods. Color-code to indicate capacity range.

(11) Spring Hangers: Combination spring and elastomeric hanger with coil spring and elastomeric insert in compression.

(12) Frame: Formed steel, fabricated for connection to threaded rods and to allow for 30 degrees of angular hanger rod misalignment without binding or reducing isolation efficiency.

(13) Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

(14) Minimum Additional Travel: 50 percent of the required deflection at rated load.

(15) Elastomeric Element: Molded, oil-resistant rubber or neoprene.

(16) All-directional acoustical pipe anchor shall consist of two sizes of steel tubing separated by a minimum ½" thick 60 durometer neoprene. Vertical restraint shall be provided by similar material arranged to prevent vertical travel in either direction. Allowable loads on the isolation material should not exceed 500 psi and the design shall be balanced for equal resistance in any direction.

(17) Seismic solid braces shall consist of steel angles or channels to resist seismic loads with minimum safety factor of 2 and arranged to provide all directional restraint. Seismic solid brace end connection shall be steel assemblies that swivel to the final installation angle and utilize two through bolts to provide proper attachment. Seismic solid brace assembly shall have anchorage pre-approval "R" number OSHPD in the state of California verifying the maximum certified load ratings.

(18) Housekeeping pad anchors shall consist of a ductile iron casting that is tapered and hexagonal, smaller at its base than at its top. The upper portion shall have holes for rebar to pass through. The anchor should be continuously threaded from top to bottom for the attachment of soleplates. Housekeeping anchors shall be attached to the structural slab using stud wedge anchors.

(19) Stud wedge anchors shall be manufactured from full diameter wire, not from undersized wire that was "rolled up" to create the thread. The stud anchor shall also have a safety shoulder, which fully support the wedge ring under load. The stud anchors shall have an evaluation report number from the I.C.B.O. Evaluation Service, Inc. verifying its allowable loads.

(20) Female wedge anchors are preferred in floor locations so isolators or equipment can be slid into place after the anchors are installed. Anchors shall be manufactured from full diameter wire, and shall have a safety shoulder to fully support the wedge ring under load. Female wedge anchors shall have evaluation report number from the I.C.B.O. Evaluation Service, Inc. verifying to its allowable loads.

B. VIBRATION ISOLATION BASES

(1) Fabricated Steel Bases: Structural-steel bases and rails designed and fabricated by the isolation equipment manufacturer. Include equipment static loadings, power transmission, component misalignment, and cantilever loadings.

(2) Fabricate bases to shapes required, with welded structural-steel shapes, plates and conforming to ASTM A 36 (ASTM A 36M). Include support brackets to anchor base to isolators units. Include pre-located equipment anchor bolts and auxiliary motor slide bases or rails.

(3) Design and fabricate bases to result in the lowest possible mounting height with not less than an inch (25-mm) clearance above the floor.

(4) Concrete-Filled Inertia Bases: Weld reinforcing bars to the structural frame. Pour concrete into base with relocated equipment anchor bolts.

(5) Weld steel angles on frame for outrigger isolation mountings, and provide for anchor bolts and equipment support.

(6) Configure inertia bases to accommodate equipment supported.

(7) Pump Bases: Size to support pump and piping elbows.

(8) Factory Finish: Manufacturer's standard corrosive-resistant finish.

C. SEISMIC CONTROLS

(1) Thrust Restraints: Combination spring and elastomeric restraints with coil spring and elastomeric insert in compression. Factory set for thrust.

(2) Frame: Formed steel, fabricated for connection to threaded rods and to allow for 30 degrees of angular hanger rod misalignment without binding or reducing isolation efficiency.

(3) Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

(4) Minimum Additional Travel: 50 percent of the required deflections at rated load.

(5) Elastomeric Element: Molded, oil-resistant rubber or neoprene.

(6) Finishes: Baked enamel for metal components. Color-code to indicate capacity range.

(7) Seismic cable restraints shall consist of galvanized steel aircraft cables sized to resist seismic loads with a minimum safety factor of two and arranged to provide all-directional restraint. Cable end connections shall be steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement. Cables must not be allowed to bend across sharp edges.

(8) Manufactured Seismic Snubbers: All-directional, double-acting snubbers

(9) Construction: Interlocking steel members restrained by ¾-inch-(19-mm-) thick, replaceable, shock-absorbing neoprene insert. Maintain 1/8inch (3mm) clearance in all directions between rigid and resilient surfaces.

(10) Fabricated Seismic Snubbers: Welded structural-steel designed and fabricated to restrain equipment or vibration isolation bases from excessive movement during a seismic event. Design to resist gravity forces identified by authorities having jurisdiction.

(11) Construction: Welded steel shapes conforming to ASTM A 36 (ASTM A 36M)

(12) Resilient Components: ¾ inch-(19-mm-) thick, replaceable, shock-absorbing neoprene insert.

(13) Flexible Stainless-Steel Hose: Hoses shall be installed on equipment side of shut-off valves horizontally and parallel to the equipment shafts wherever possible.

a. Construction: Stainless steel braid and carbon steel fittings.

b. Connection: Less than 3": Male nipples.

3. EXECUTION

A. INSTALLATION

(1) Install and anchor vibration-, sound-, and seismic-control products according to manufacturer's written instructions and authorities having jurisdiction.

(2) Anchor interior mounts, isolators, hangers, and snubbers to vibration isolation bases. Bolt isolator baseplates to structural floors as required by authorities having jurisdiction.

(3) Filled concrete inertia bases, after installing base frame, with 3000-psig (20.7-Mpa) concrete, and trowel to a smooth, hard finish. Cast-in-place concrete is specified in Division 3.

(4) Isolate duct as follows:

a. Provide spring and neoprene hanger or floor spring mount on all duct discharge runs for a distance of 50' from the connected equipment. Spring deflection shall be a minimum of 0.75".

b. Provide pre-compressed spring and neoprene hanger or floor spring mount on all duct runs having air velocity of 1000 fpm or more. Spring deflection shall be a minimum of 0.75".

(5) Isolated piping as follows:

a. Horizontal pipe isolation: The first three pipe hangers in the main lines near the mechanical equipment shall be pre-compressed spring and neoprene type. Floor

supported piping shall rest on spring type isolators. If piping is connected to equipment located in basements and hangs from ceilings under occupied spaces the first three hangers shall have 0.75" deflection for pipe sizes up to and including 3", 1 ½" deflection for pipe sizes up to and including 6", and 2 ½" deflection thereafter.

b. Riser isolation: Risers shall be suspended from spring and neoprene hangers or supported by floor spring isolators, all-directional acoustic pipe anchor, and pipe guide. steel springs shall be a minimum of 0.75" except in those expansion locations where additional deflection is required to limit load changes to +25% of the initial load. Submittals must include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on the building structure, spring deflection changes and seismic loads. Submittal data shall include certification that the riser system has been examined for excessive stresses and that none will exist in the proposed design.

B. SEISMIC CONTROL

(1) All mechanical systems are to be seismically restrained. Equipment buried underground is excluded but entry of services through the foundation wall is included. Equipment referred to below is typical (equipment not listed is still included in this specification).

(2) Ductwork, where seismically restrained, must be reinforced. Reinforcement shall consist of all additional angel on top of the ductwork that is attached to the support hanger rods. Ductwork is to be attached to the support hanger rods. Ductwork is to be attached to both upper angle and lower trapeze.

(3) Vibration Isolation Bases: Mount equipment on structural-steel bases or concrete inertia bases.

(4) Snubbers: Install the required number of seismic snubbers on each spring-mounted piece of equipment. Locate snubber as close as possible to the vibration isolators and bolt to supporting structure.

(5) Manufacturer shall provide installation instructions, drawings and trained field supervision to ensure proper installation and performance. Visit the project site before installation is begun and instruct installers in correct installation procedures for vibration isolation, seismic restraints and concrete pads. Observe installation of other work related to vibration isolation and seismic work, including concrete pad installations; and, after completion of other related work (but before equipment startup), shall furnish written report to Contractor listing observed inadequacies for proper operation and performance of vibration isolation work. Report shall cover the following:

a. Equipment installations (performed as work of other sections) on vibration isolators and Seismic restraints.

b. Piping connections including flexible connections.

c. Ductwork connections including provisions for flexible connections.

d. Passage of piping and ductwork which is to be isolated through walls and floors.

e. Installation of isolators and seismic restraints on duct and piping systems.

(6) Do not start-up equipment until inadequacies have been corrected in manner acceptable to Vibration Isolator and Seismic Controls Manufacturer.

(7) Spacing for restraints shall be as follows, except where lesser spacing is required to limit anchorage loads:

a. Ductwork and electrical services (conduit, bus ducts, cable trays, and ladder trays) transverse restraints shall occur at 30' intervals (or at both ends of the duct run if less than specified interval) and longitudinal restraints shall occur at 60' intervals (with at least one restraint per duct run). Transverse restraints shall be installed at each duct/electrical service turn and at each end of a duct/electrical run.

b. Walls including gypsum board non-bearing partitions, which have ducts running through them may replace a typical transverse brace. Provide channel framing around ducts and solid blocking between the duct and frame.

END OF SECTION 202600

SECTION 203100 - TESTING, BALANCING, LUBRICATION AND ADJUSTMENTS

1. GENERAL

A. The General Conditions, Instructions to Bidders, Section 200100, and other Contract Documents are a part of this specification and shall be binding on all Mechanical Contractors. It shall be each Contractor's responsibility to apprize himself of all information pertinent to his work prior to submitting his proposal. No adjustments will be made in this Contract which is a result of failure to comply with this requirement.

B. The Engineer, or his authorized representative, shall be notified by the Contractor twenty-four (24) hours in advance of any tests called for in these specifications or required by others. Any leaks or imperfections found shall be corrected and a new test run to the satisfaction of the Engineer or his authorized representative. Upon completion of a test, a written approval of that part of the work will be given to the Contractor. Only after written approval, signed by the Engineer, shall the Contractor apply insulation or paint or allow his work to be furred-in. This written approval, however, does not relieve the Contractor of the responsibilities for any failure during the guarantee period. The expense of all tests shall be borne by the Contractor, along with all temporary equipment, materials, gauges, etc. required for tests.

2. PLUMBING

A. Piping shall be tested before being insulated or concealed in any manner. Where leaks or defects develop, required corrections shall be made and tests repeated until systems are proven satisfactory.

B. Water piping systems shall be subjected to a hydrostatic test of one hundred fifty pounds. The system shall be proven tight after a twenty-four (24) hour test.

C. The house drain line, interior storm sewers, interior rain water conductors, and all soil, waste and vent piping shall be subjected to a hydrostatic test of not less than a 10-foot head or an air test of not less than 5 lbs. per sq. inch using a mercury column gauge and shall hold for 15 minutes.

D. Exterior sewer lines to the termination point outside the building shall be subject to a ten-foot hydrostatic test or an approved smoke test. These lines shall be subjected to a second test after 2 feet of backfill has been properly installed.

E. After fixtures have been installed, the entire plumbing system, exclusive of the house sewer, shall be subjected to an air pressure test equivalent to one-inch water column and proven tight. The Contractor responsible shall furnish and install all of the test tees required, including those for isolating any portion of the system for tests.

F. Thermometers and gauges shall be checked for accuracy. If instruments prove defective, they shall be replaced.

G. The Contractor shall perform all additional tests that may be required by the Department of Health or other governing agency.

H. Set temperature control on water heaters and adjust tempering valves as required.

I. Balance the water flow rate of each domestic hot water recirculating pump. Set the flow rate for each balancing valve in the recirculating hot water system. If flow rates are not indicated, contact the engineer for each balance valve GPM.

J. Any leaks or imperfections found shall be corrected and a new test run until satisfactory results are obtained. The cost of repair or restoration of surfaces damaged by leaks in any system shall be borne by the Contractor.

3. HEATING, VENTILATING AND AIR CONDITIONING

A. The test and balance of this system shall be by a contractor who employs only the services of a certified AABC or independent NEBB firm whose sole business is to perform test and balance services. The test and balance contractor shall report all deficiencies to the engineer.

B. The Mechanical Contractor shall test all piping before being insulated or concealed in any manner. Where leaks or defects develop, required corrections shall be made and tests repeated until systems are proven satisfactory. Water piping systems shall be subjected to a hydrostatic test of not less than one hundred pounds and shall be proven tight after a twenty-four (24) hour test.

C. All motors, bearings, etc. shall be checked and lubricated as required during start-up procedures. All automatic, pressure regulating and control valves shall be adjusted. Excessive noise or vibration shall be eliminated. Provide all start-up documents to Designer prior to any test and balance services.

D. System balancing, where required, shall be performed only by persons skilled in this work. The system shall be balanced as often as necessary to obtain desired system operation and results.

E. All fan belts shall be adjusted for proper operation of fans.

F. All deficiencies observed by the Test and Balance Contractor shall be reported immediately to the Engineer and Mechanical Contractor.

G. For the purpose of placing the heating, ventilating and air conditioning system in operation according to design conditions and certifying same, final testing and balancing shall be performed in complete accordance with AABC Standards for Total System Balance, Volume Six (2002), for air and hydronic systems as published by the Associated Air Balance Council. The following systems shall be test and balance:

(1) The supply, return and outside air duct systems associated with (DOAS-1). Provide static pressure profiles thru each system. Static pressure profiles shall include all sections from the return duct inlet and supply duct outlet of the air handling unit. Show accurate representation of return, relief, outdoor and economizer damper locations. On units equipped with return air fans; show location and profile of the return fan.

(2) Verify that the temperature control systems supply and return air flow stations on DOAS-1 are calibrated corrected. Test at 25%, 50%, 75% and 100% flow rated.

(3) Verify calibrations of the duct static pressure sensors for DOAS-1.

(4) Set the minimum and maximum air flow rates for each VAV box.

(5) Balance all supply, return and exhaust air grille to within 10% of design air flow rate.

(6) Balance all supply, return and exhaust air grilles to within 5% for critical rooms such as operating rooms, ICU, L&D, Isolation, Nursery and Trauma.

(7) Balance all exhaust air fans and record inlet static pressure.

(8) Balance the kitchen range hood supply/exhaust air system.

(9) Balance domestic hot water return system including all balance valves and record settings and flows.

(12) Adjust all adjustable diffusers to minimize air drafts and eliminate suspended light fixture sway. Furthermore, adjustable diffusers in spaces with ceilings taller than 9 feet shall be adjusted to eliminate air stratification during heating season.

H. Provide a preliminary test report to the mechanical engineer immediately after the system is air balanced, or any initial phases are balanced. This report may be hand written. Anticipate visiting the site again after the engineer has reviewed the report. The engineer may request up to 15 additional static pressure measurements for any air handling system to help resolve any balancing deficiencies. Include five additional static pressure measurements for each exhaust air system.

I. The Test and Balance agency shall provide lifts, scaffolding, etc. as required to balance devices in areas with high ceilings such as gymnasiums, auditoriums, atriums, cupolas, etc. The Test and Balance agency may coordinate with the General Contractor or Mechanical Contractor to arrange for these items to be provided to access high devices, however, it is emphasized the Contractor is finally responsible for providing the means required to balance all devices.

J. Instruments used for testing and balancing of air and hydronic systems shall have been calibrated within a period of six months prior to balancing. All final test analysis reports shall include a letter of certification listing instrumentation used and last date of calibration.

K. Test and Balance agency is to provide sizing of fan or motor sheaves required for proper balance. The Mechanical Contractor will purchase and install all sheaves and belts as required. This includes new and existing equipment.

L. Four (4) copies of the complete test reports shall be submitted to the Consulting Engineer prior to final acceptance of the project. Preliminary test reports shall be submitted when requested.

M. The Contractor shall provide and coordinate their work in the following manner:

(1) Provide sufficient time before final completion date so that tests and balancing can be accomplished.

(2) Provide immediate labor and tools to make corrections when required without undue delay.

N. The Contractor shall put all heating, ventilating and air conditioning systems and equipment and range hood system into full operation and shall continue the operation of same during each working day of testing and balancing.

O. Balance all water and air systems.

END OF SECTION 203100

SECTION 203200 - MECHANICAL MAINTENANCE

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

2. MECHANICAL MAINTENANCE CONTRACT

   A. In addition to all other work indicated and specified, the Contractor shall provide the necessary skills and labor to assure the proper operation and to provide all required current preventative maintenance for all equipment and controls provided under Division 20 for a period of one year after substantial completion of the contract as defined in these specifications.

   B. The Contractor shall receive calls for any and all problems experienced in the operation of the equipment provided and shall take steps to immediately correct any deficiencies that may exist.

   C. The Contractor shall provide monthly inspection of all equipment and record the findings on a check list hereinafter specified.

   D. The Contractor shall provide a check list and shall post a copy of it in the main mechanical room. The check list shall be a list of each piece of equipment found in Division 20 of these specifications. The check list shall have a space for each of the next 12 months to provide a space for check-off. The Contractor shall certify on this check list that he has examined each piece of equipment and that, in his opinion, it is operating as intended by the manufacturer, it has been properly lubricated, and that all necessary current and preventative maintenance has been performed as recommended by the manufacturer and by good and accepted practice. This check list shall be approved in writing by the Engineers.

   E. All equipment that requires repairing shall be immediately serviced and repaired. Since the period of maintenance runs for one year concurrently with the warranty and guarantee, all parts and labor shall be furnished at no extra cost to the Owner.

   F. Control System - Once each month, the Control Sub-Contractor shall check all controls in the building to ascertain that they are functioning as designed and installed. This shall apply to all thermostats, aquastats, humidistats, freezestats, and firestats. This portion of the work shall be performed only by the Sub-Contractor that installed the controls.

   G. Filter maintenance shall be a special part of this contract and this Contractor shall inspect all filters once every month and shall clean or replace filter as necessary.

   H. When emergency service is required beyond regular working hours to maintain the system in operation, the Contractor shall furnish such service.

I. Failure on the part of the Contractor to comply with all or part of this section of his work, will be required to relinquish a portion of his original contract sum. In general, that cost will be determined by the cost incurred by the owners to have work accomplished which should have, by contract, been accomplished by the Contractor.

END OF SECTION 203200

SECTION 220100 - PLUMBING SPECIALTIES

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work specified in this section.

B. The Contractor shall provide all equipment and specialties complete with trim required and connect in a manner conforming to the International Plumbing Code.

C. The Contractor shall obtain exact centerline rough-in dimensions between partitions, walls, etc. as required for lay-out of his rough-in work. All work shall be roughed-in so that all exposed piping will be straight and true without bends or offsets.

D. Prior to final inspection, test by operation at least twice, all equipment.

E. Prior to final inspection, remove all stick-on labels, dirt, grease, other removable stampings, lettering, etc. from equipment and specialties and thoroughly clean same.

F. All equipment and specialties shall be installed as recommended by the manufacturer in a neat and workmanlike manner. Unacceptable workmanship shall be removed and replaced at the installing Contractor's cost.

G. All pipes, valves, fittings, fixtures, etc. for use in potable water systems 2” and below shall comply with federal lead-free requirements that the lead content of wetted surfaces cannot exceed 0.25% by weight.

2. DRAINAGE SPECIALTIES

A. GENERAL

(1) Provide all drainage specialties indicated, specified and/or required to provide complete and acceptable removal of all storm, sanitary, waste, laboratory waste, etc. from the building and into approved receptors.

(2) Drainage specialties shall be on non-electrolytic conduction to the material to which they are connected.

(3) Drainage specialties shall be installed in a manner so as to ensure no leakage of toxic or odorous gases or liquids and shall have traps and/or backflow preventers where required. Nor shall they allow backflow into other or existing systems.

B. CLEANOUTS - INTERIOR (CO)

(1) In addition to cleanouts indicated, provide cleanouts in soil and waste piping and storm drainage at the following minimum locations:

a. At base of each stack.
b. At fifty (50) foot maximum intervals in horizontal lines.
c. At each change of direction of a horizontal line.
d. As required by current IPC.
e. As required to permit rodding of entire system. (If in doubt, contact Engineers.)

(2) Water closets, slop sinks and other fixtures with fixed traps shall not be accepted as cleanouts.

(3) Cleanouts and/or test tees concealed in inaccessible pipe spaces, walls and other locations shall have an eight (8) inch by eight (8) inch (minimum) access panel or cover plates shall be set flush with finished floors and walls and shall be key or screw driver operable.

(4) Access panels for cleanouts shall be of the Zurn, 1460 series or equivalent by Josam or Watts. They may, at the Contractor's option, be Perma-Coated steel, prepared to receive finish. The Contractor shall coordinate the finish of all access panels installed in finished areas with Architect.

(5) Cleanouts and access panels shall be sized so as to permit the entry of a full sized rodding head capable of one hundred percent circumferential coverage of the line served.

(6) Provide a non-hardening mixture of graphite and grease on threads of all screwed cleanouts during installation.

(7) Do not install cleanouts against walls, partitions, etc. where rodding will be difficult or impossible. Extend past the obstruction.

(8) In finished walls, floors, etc., ensure that cleanouts are installed flush with finished surfaces and, where required, grout or otherwise finish in a neat and workmanlike manner.

(9) Cleanouts shall be as manufactured by Zurn, Josam, Jay R. Smith, Watts, MIFAB, Ancon or equivalent, similar to the following:

a. Zurn, Z-1440 cleanouts or Z-1445 cleanout tee at base of exposed stack and at change in direction of exposed lines.

b. Zurn, Z-1440 cleanout or Z-1445-1 cleanout tee where stacks are concealed in finished walls

c. Zurn, ZN-1400-T cleanout with square scoriated top in finished concrete and masonry tile floors.

d. Zurn, ZN-1400-Tx cleanout with square recessed top for tile in vinyl and linoleum finished floors.

e. Zurn, ZN-1400-Z cleanout with round recessed top for terrazzo floors.

f. Zurn, Z-1400-HD cleanout with tractor cover for exterior locations. Provide concrete supporting pad crowned to shed water. Refer to drawings for pad size.

g. Mueller, No. D-731 or D-714, Nibco, Flage or equivalent for cleanouts in copper waste with cover plates and/or access panels listed for other cleanouts.

h. Threaded hex head type cleanouts of same materials as pipe for piping 2" and smaller.

i. Zurn, cleanout with round top with adjustable retainer for carpet area. Install flush with carpet.

C. FLOOR DRAINS

(1) Provide floor drains at locations indicated. Install in a neat and workmanlike manner. Coordinate locations with appropriate persons or party to ensure floor pitch to drain where required.

(2) Install floor drains in strict accordance with manufacturer's recommendations and the IPC unless otherwise indicated.

(3) Each floor drain located on floors above the lowest floor shall be provided complete with a three (3) foot by three (3) foot, four (4) pound sheet lead flashing and clamping collar or chlorinated polyethylene shower pan liner of 30 mil. Lead pans shall be given a heavy coat of asphaltum on bottom and sides before installation and a heavy coat on exposed surfaces (if any). After installation, provide one ply of fifteen (15) pound roofing felt beneath each pan.

(4) Ensure by coordination with the appropriate persons or party that spaces served by a floor drain(s) has a water seal extending at least three (3) inches from the floor of the space served on all floors above the lowest level.

(5) The floor drains shall be Zurn, Josam, Watts, Jay R. Smith, MIFAB, Sioux Chief or equivalent, similar to the following:

a. FD-1:
Refer to plans.

D. TRAP PRIMERS

Provide trap primers for all floor drains and open receptacle. Acceptable Trap Primer Manufacturers included Zurn, Precision Plumbing Products and Sioux Chief. Trap Primer selection shall be as follows:

(1) Trap Primer Type-1 (TP-1)

Refer to plans.

E. CLEANOUTS (EXTERIOR) (ECO)

Provide exterior cleanouts at each location indicated and in the manner indicated.

F. ROOF DRAINS

(1) Each drain shall be provided complete with a three (3) foot by three (3) foot, four (4) pound sheet lead flashing and clamping collar. Roof drains shall be installed in strict accordance with the drain manufacturers and roofing manufacturer's instructions. Provide all accessories required for a complete installation.

(2) RD-1

Refer to plans

G. VARMINT GUARDS

Provide at each live discharge and/or culvert discharge (where culvert exceeds 30 linear feet in length) and where the line has a surface opening greater than one-half (2) square feet, a three (3) inch mesh steel varmint guard made up with frame and 3/8-inch minimum steel rods welded together and affixed tightly into the end of the open pipe.

3. WATER SUPPLY SPECIALTIES

A. GENERAL

(1) Provide all water supply specialties indicated, specified and/or required for the complete installation. Install in a neat and workmanlike manner in accordance with the manufacturer's recommendations and the IPC.

(2) Where required by the AHJ, install code approved vacuum breakers in each water supply specialty.

B. FREEZEPROOF WALL HYDRANTS (FPWH)

(1) Provide code approved wall hydrants at each location indicated in a neat and workmanlike manner. Affix tight to walls and ensure that the feed piping is on the heated side of the building insulation blanket.

(2) Where hydrants are of handwheel type, remove handwheels and turn over to owners in an envelope labeled "Wall Hydrants" exterior upon completion of the project.

(3) Where hydrants have key operators, turn over at least two (2) keys in an envelope labeled "Wall Hydrants" to owners upon completion of the project.

(4) Where hydrants have lockable boxes, turn over at least two (2) keys in an envelope labeled "Wall Hydrants, Exterior" to owners upon completion of project.

(5) Mount all wall hydrants at least twenty (20) inches above finished exterior grade. Where this is not possible or practical, contact Engineers.

(6) Wall hydrants shall be as follows or equivalent:

a. Refer to plans.

C. WATER HAMMER ARRESTORS (WHA): Provide water hammer arrestors at each location indicated and/or as required to eliminate hydrostatic on the domestic water system. Provide at least one water hammer arrestor at all quick acting valve locations including:

Automatic Clothes Washers – Type "A"
Commercial Dishwashers – Type "B"
Sterilizers – Type "B"
Mop Basins (downstream of check valve) – Type "A"
Flush valve fixtures - Type "B" (Each toilet room with 1-3 flush valve fixtures shall have its own Type "B" water hammer arrestor.)

(1) Multiple Fixtures – Branch Line Less Than 20' Long: The preferred location for a Zurn Shoktrol is at the end of the branch line between the last two fixtures when the branch lines do not exceed 20' in length, from the start of the horizontal branch line to the last fixture supply on this line.

(2) Multiple Fixtures – Branch Line More Than 20' Long: On branch lines over 20' in length, use two Shoktrols whose capacities total the requirement of the branch. Locate one unit between the last and next to last fixture and the other unit approximately midway between the fixtures.

(3) Water hammer arrestors shall be Zurn, Z-1700, Shoktrol, Smith, Josam, Wade, or equivalent. Water hammer arrestors shall be stainless steel, bellows type. Field fabricated capped cylinders shall not be acceptable.

(4) Note: Provide insulation unions where arrestors are of dissimilar material from the piping served (unless piping is non-conducting, such as ABS or PVC).

MARK	MANUFACTURER & MODEL	SIZE	P.D.I. SIZE
TYPE "A"	ZURN, Z-1700 # 100	1-11	A

TYPE "B"	ZURN, Z-1700 # 200	12-32	B
TYPE "C"	ZURN, Z-1700 # 300	33-60	C
TYPE "D"	ZURN, Z-1700 # 400	61-113	D

D. REDUCED PRESSURE BACKFLOW PREVENTERS (RPZ-1)

Watts #LF909S or equivalent reduced pressure backflow preventer. Provide with gate valves for isolation, FDA food grade strainer and air gap fitting. RPBP shall be UL listed.

4. GENERAL SPECIALTIES

A. VACUUM BREAKERS AND BACK FLOW PREVENTERS

Where required by the IPC, whether indicated or not, provide approved vacuum breakers or backflow preventers at the following locations.

(1) Where domestic water system connects to fire protection system.

(2) Where domestic water system connects to hydronic system.

(3) At any hose (threaded) tap on the domestic water system.

B. ROOF FLASHINGS

All plumbing vents or other plumbing passing thru the roof shall be flashed as approved by the IPC and as recommended by the roofing manufacturer and/or Contractor.

C. GAS PRESSURE REGULATORS

Provide gas pressure regulators for all gas fired equipment that requires a lower pressure than what is delivered to the appliance. Regulators shall be installed in accordance with the requirements of NFPA 54 and/or International Fuel Gas Code, whichever is more stringent.

END OF SECTION 220100

SECTION 220200 - PLUMBING FIXTURES, FITTINGS AND TRIM

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

B. The Contractor shall provide all fixtures complete with trim required and connect in a manner conforming to the State Plumbing Code.

C. The Contractor shall obtain exact centerline rough-in dimensions between partitions, walls, etc. as required for lay-out of his rough-in work. All work shall be roughed-in so that all exposed piping will be straight and true without bends or offsets.

D. All exposed piping or in casework below sinks, stops, traps, tailpieces, etc., shall be code approved chrome plated brass unless otherwise indicated or specified. Water supplies shall connect through walls with stops and chrome plated escutcheons with set screws.

E. All fittings, fixtures and trim shall be new unless otherwise indicated or specified. They shall also be of equivalent quality, dimensions, material, etc. as those specified. All faucets, shower heads, drains, levers, trim, etc. shall be constructed of metal and not plastic.

F. Handicapped fixtures shall be mounted as recommended by the ADA.

G. All fixtures shall be mounted as recommended by the manufacturer. Fixtures shall be rigidly mounted to walls and floors. Pay particular attention to flush valves and bracket concealed portion to building structure during rough-in. Loose, shaky flush valves, lavatories, etc. shall not be acceptable.

H. Prior to final inspection open all faucets and allow to run for fifteen (15) minutes, then remove all faucet aerators and thoroughly clean until smooth flow is obtained.

I. Prior to final inspection, test by operation at least twice:

(1) (Where applicable) adequate flow of hot and/or cold water at;

a. Shower Heads
b. All Faucets
c. Flush Valves and Tanks
d. Tub Drains
e. Hose Bibbs
f. Sill Cocks
g. All Other Valved Hot and/or Cold-Water Openings in the Plumbing System

(2) All toilet seats

(3) All flush tank overflows

J. Prior to final inspection, remove all stick-on labels, dirt, grease, other removable stampings, lettering, etc. from plumbing fixtures and thoroughly clean same.

K. All sink and lavatory traps shall have screw in plugs in the bottom for ease of cleaning and have mechanical fittings for ease of removal.

L. All fixtures shall be set level and true and shall be grouted into finished walls, floors, etc. in a neat and workmanlike manner with an approved waterproof non-yellowing grout for such service.

M. Special Note for Handicap Grab Rails: Coordinate top of shower valves, flush valves, flush tank, etc., with location of grab rails as shown on the architectural plans. The Contractor shall install all items to allow for installation, removal and service without removal of the grab bar.

N. All exposed drain pipes and domestic water piping under handicap accessible sinks and lavatories shall be insulated in accordance with ADA requirements and shall have a vinyl plastic covering over all insulation.

O. The Contractor shall obtain a copy of the casework shop drawings and confirm sinks, faucets, gas turrets, etc., will fit in the space provided. Additionally, in ADA applications with handicap sink base cabinets, the Contractor shall limit the total distance from the bottom of the sink to the bottom of the P-trap and coordinate waste pipe rough-in height to ensure the proper installation of the handicap sink base cabinet front closure panel. The Contractor shall not order sinks until he confirms no conflicts occur and shall adjust sink sizes if required. If the Contractor orders sinks, faucets, etc., that do not fit in the casework supplied, he shall replace them at no additional cost.

P. All lavatories, sinks, etc. shall be supplied with center rear drain outlets where necessary to avoid conflict with casework, handicapped kneeboards, etc. If the Contractor orders sinks that do not fit in the casework supplied, he shall replace them at no additional cost.

Q. All single supply faucets shall be provided with mechanical mixing valves unless otherwise noted. Mechanical mixing valves shall have hot and cold-water inlet connections, common outlet, in-line check valves, and adjustable temperature setting. Mixing valves shall be Moen model 104424 or equal. Provide one mixing valve per single supply faucet unless otherwise noted. Contractor shall provide all required connections and set mixing valve to required temperature.

R. All gooseneck faucets shall have rigid spouts, unless swing spouts are specified. If swing spouts are specified, the spout shall have a maximum swing of 140 degrees from side to side.

S. All plumbing fixtures shall comply with federal lead-free requirements that the lead content of wetted surfaces cannot exceed 0.25% by weight.

T. All water closet handles on ADA water closets shall be located on the approach side of the fixture.

2. FIXTURES AND TRIM

Available Manufacturers: Subject to compliance with requirements of manufacturers offering plumbing fixtures and trim. Plumbing fixtures and trim, which may be incorporated in the work include, but are not limited to, the following:

A. Plumbing Fixtures - Water Closet, Lavatory, Urinal, Bathtubs, Clinical Sink and Scrub Sink

American Standard, U.S. Plumbing Products
Eljer Plumbingware Div., Wallace-Murray Corp.
Kohler Co.
Crane Plumbing
Universal-Rundle
Toto
Zurn Co.
Sloan Fixtures

B. Plumbing Trim

American Standard, U.S. Plumbing Products
Chicago Faucet Co.
Kohler Co.
Delta Co.
T&S Brass & Bronze Work Co. (Commercial)
Zurn Co.
Just Co.
Speakman Co.
Moen Commercial

C. Flush Valves

Delany Co.
Sloan Valve Co.
Zurn Co.
American Standard

D. Fixture Seats

Bemis Mfg. Co.
Church Seat Co.
Olsonite Corp., Olsonite Seats

E. Water Coolers

Elkay Mfg. Co.

Halsey Taylor Div., King-Sealey Thermos Co.
Haws Drinking Faucet Co.
Western Drinking Fountains, Div. of Sunroc Corp.
Oasis Co.
Acorn AQUA

F. Service Sinks and Mop Basins

American Standard, U.S. Plumbing Products
Eljer Plumbingware Div., Wallace-Murray Corp.
Fiat Products
Kohler Co.
Stern-Williams Co., Inc.
Florestone

G. Stainless Steel Sink

Elkay Mfg. Co.
Just Mfg. Co.
Moen, Div. of Stanadyne/Western
Sterling Co.

H. Fixture Carriers

Josam Mfg. Co.
Jay R. Smith
Tyler Pipe
Zurn Industries
Watts

I. Shower

Bradley Co.
Zurn Co.
Symmons Industries, Inc.
Chicago Faucets
Speakman Company
Powers
Acorn Co.
Moen Commercial

J. Shower Stalls

Clarion
Universal-Rundle
Aqua Bath

Aquarius
Aqua Glass
Acryline
Lasco Bathware

K. Canwash

Zurn Industries
Murdock
Woodford
Watts

L. Washer/Dryer Connection Box

Guy Gray Co.
Wolverine Brass, Inc.

M. Wash Fountain

Bradley Co.
Acorn Co.
Intersan
Willoughby

N. Shampoo Sink

Belvedere

O. Care Ware - Swingette, Swivette

Bradley Co.
Acorn Co.
White Hall Co.

P. Penal Ware

Bradley Co.
Acorn Co.
Willoughby

Q. Emergency Fixtures - Eyewash, Showers

Bradley Co.
Speakman Co.
Guardian Co.

R. P-Trap Insulation Kit (Trap Wrap)

Truebro
Brocar
Plumberex

Note: Kitchen, Lab, Science Room Fixtures, Special Equipment, Etc.

Contractor to provide final plumbing connections to all of the equipment furnished by Owner including, but not limited to: chrome supplies, stops, continuous drains, drain tailpiece, "P" traps and escutcheons.

3. FIXTURE SELECTION

A. Refer to drawings for fixture schedule.

END OF SECTION 220200

SECTION 23 02 00 - HVAC EQUIPMENT AND HYDRONIC SPECIALTIES

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

B. The Contractor shall provide in complete working order the following heating, ventilation and air conditioning equipment located as indicated and installed, connected and placed in operation in strict accordance with the manufacturer's recommendations. All equipment shall be factory painted and, where applicable, factory insulated and shall, where such standards exist, bear the label of the Underwriters Laboratory.

C. Each subcontractor shall be responsible for their own completion of System Verification Checklists/Manufacturer's Checklist.

D. Factory startup is required for all HVAC equipment. In general, as part of the verification process, equipment suppliers shall perform start-up by their factory authorized technicians and shall complete and submit start-up reports/checklists. This shall include air handling units, VFDs, VRF systems, etc.

E. All HVAC equipment shall comply with the latest provisions of ASHRAE Standard 90.1-2010.

F. Installation of all heating, ventilating and air conditioning systems shall be performed by a master HVAC contractor licensed in the state the work will be performed.

G. Note to Suppliers and Manufacturers Representative furnishing proposals for equipment for the project:

(1) Review the Controls Section of these Specifications (if applicable) to determine controls to be furnished by the equipment manufacturer, if any. The Contractor shall provide all controls with equipment unless specifically listed otherwise.

(2) Review the section of these specifications entitle: SHOP DRAWINGS, DESCRIPTIVE LITERATURE, MAINTENANCE MANUALS, PARTS LISTS, SPECIAL KEYS, TOOLS, ETC., and provide all documents called for therein.

(3) Insure that the equipment which you propose to furnish may be installed, connected, placed in operation and easily maintained at the location and in the space allocated for it.

(4) Determine from the Bid Documents the date of completion of this project and insure that equipment delivery schedules can be met so as to allow this completion date to be met.

(5) Where manufacturers' temperature controls are specified, they shall be in full compliance with International Mechanical Code Section 606 including automatic smoke shut down provisions.

(6) Provide factory start-up on site by a factory representative (not a third party contractor) for all HVAC equipment, including pumps, VFDS, boilers, chillers, cooling towers, heat pumps, rooftop units, etc. Submit factory start-up reports to the Engineer.

(7) Provide training to the Owner by a factory representative for each type of equipment. Training shall be a minimum of eight (8) hours on site and the Engineer shall be notified one (1) week in advance of the training. Training shall only occur when the systems are complete and 100% functional. All training shall be video taped.

(8) Review the Section on Motor Starters and Electrical Requirements for Mechanical Equipment.

(9) Requirements for motors controlled by variable frequency drives:

a. All motors shall be inverter duty rated.

b. Motors less than 100 HP in size shall be furnished with shaft grounding kit, Aegis SGR Bearing Protection Ring or equal. One shaft grounding ring and related hardware shall be provided on drive end or non-drive end of motor per manufacturer's instructions. These shall be factory mounted and installed on the exterior of the motor to allow for visual inspection. Ground motor frame per manufacturer's instructions. Install kit in strict accordance with manufacturer's instructions.

c. Motors greater than 100 HP to 1000 HP in size shall be furnished with shaft grounding kit, Aegis SGR Bearing Protection Ring or equal. Provide shaft grounding ring on drive end and non-drive end of motor per manufacturer's instructions. Additionally, provide insulated bearing journals to further reduce risk of current dissipation through bearings. Ground motor frame per manufacturer's instructions. Install kit in strict accordance with manufacturer's instructions.

(10) All condensate producing equipment shall be provided with a condensate trap as recommended by the equipment manufacturer and a condensate overflow switch.

(11) Provide low ambient and all required controls and accessories on all HVAC equipment to ensure they can provide cooling during the winter season.

(12) Provide a complete air tight enclosure with opening door that seals air tight for all filters on air moving equipment.

(13) All equipment shall be furnished for a single point electrical connection unless specifically excluded as a requirement.

(14) Where mechanical equipment is not provided with a disconnect, the disconnect shall be furnished by the mechanical contractor and installed by the electrical contractor. The disconnect type shall meet all NEC requirements.

2. EQUIPMENT

A. VENTILATING FANS

(1) Ventilating fans shall be of the type, capacity, size, etc. here-in-after scheduled. Catalog numbers are listed as design criteria only. Alternate selections will be accepted provided quality, function, etc. are equivalent. All fans shall be UL listed, complete with all required disconnects and starters and shall be AMCA rated and certified. Model numbers listed are Captive-Aire, acceptable alternates are Greenheck, Twin City, Jenn-Fan, and Loren-Cook. The Architect shall select the color for all exposed fans.

(2) Selection

Refer to the schedule on the plans.

B. 100% OA UNIT

PART 1: GENERAL

1.01 SECTION INCLUDES

A. Packaged Rooftop air conditioners

1.02 REFERENCES

A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. AMCA 99—Standards Handbook

C. AMCA 500—Test Methods for Louver, Dampers, and Shutters.

D. AHRI 340/360 - Unitary Large Equipment

E. NEMA MG1—Motors and Generators

F. National Electrical Code.

G. NFPA 70—National Fire Protection Agency.

H. SMACNA—HVAC Duct Construction Standards—Metal and Flexible.

I. UL 900—Test Performance of Air Filter Units.

1.03 SUBMITTALS

A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics and connection requirements.

B. Product Data:

1. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, and electrical characteristics and connection requirements.

2. Provide computer generated fan curves with specified operating point clearly plotted.

3. Manufacturer's Installation Instructions.

1.04 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Provide instructions for installation, maintenance and service

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience, who issues complete catalog data on total product.

B. Startup must be done by trained personnel experienced with rooftop equipment.

C. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters and remote controls are in place, bearings lubricated, and manufacturers' installation instructions have been followed.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site.

B. Accept products on site and inspect for damage.

C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

PART 2: PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Daikin Applied

1. No equal exists. [Deducts for alternative equipment will be considered.]

2.02 GENERAL DESCRIPTION

A. Furnish as shown on plans, Daikin Applied Rebel Single zone Heating and Cooling Unit(s) model DPS. Unit performance and electrical characteristics shall be per the job schedule.

B. Configuration: Fabricate as detailed on prints and drawings:

1. Return plenum / economizer section

2. Filter section

3. Cooling coil section

4. Supply fan section

5. Condensing unit section

C. The complete unit shall be cETLus listed.

D. The unit shall be ASHRAE 90.1-2016 compliant and labeled.

E. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with R-410 Refrigerant and oil.

F. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection.

G. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

H. Performance: All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.

I. Warranty: The manufacturer shall provide 12-month parts only warranty. Defective parts shall be repaired or replaced during the warranty period at no charge. The warranty period shall commence at startup or six months after shipment, whichever occurs first.

2.03 CABINET, CASING, AND FRAME

A. Panel construction shall be double-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 1" thick with an R-value of 7.0, and shall be 2 part injected foam. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.

B. Exterior surfaces shall be constructed of painted galvanized steel, for aesthetics and long-term durability. Paint finish will include a base primer with a high-quality polyester resin topcoat. Finished, unabraded panel surfaces shall be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16” at 1,000 hours minimum exposure to an ASTM B117 salt spray environment. Measurements of results shall be quantified using ASTM D1654 in conjunction with ASTM D610 and ASTM D714 to evaluate blister and rust ratings.

C. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.

D. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

2.04 OUTDOOR/RETURN AIR SECTION

A. Unit shall be provided with a 100% outdoor air hood. The 100% outdoor air hood shall allow outdoor air to enter from the back of the unit, at the draw-through filter section. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include a bird screen to prevent infiltration of foreign materials and a rain lip to drain water away from the entering air stream.

B. Daikin Applied UltraSeal low leak dampers shall be provided. Damper blades shall be fully gasketed and side sealed and arranged vertically in the hood. Damper leakage shall be less than 1.5 CFM/Sq. Ft. of damper area at 1.0 inch static pressure differential. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers. Control of the dampers shall be from a factory installed actuator.

C. Control of the outdoor dampers shall be by a factory installed actuator. Damper actuator shall be of the modulating type. Damper to open when when supply fan starts, and close when supply fan stops.

2.05 FILTERS

A. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2" prefilter and a 4" final filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2" MERV 8 construction filters. The contractor shall furnish and install, at building occupancy, the final set of filters per the contract documents.

2.06 COOLING COIL

A. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.

B. The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.

C. The cooling coil shall have an electronic controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid subcooling and the superheat of the refrigerant system.

D. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.

E. The drain pan shall be stainless steel and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit base.

2.07 HOT GAS REHEAT

A. Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser

B. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.

C. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature setpoints shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F.

D. Each coil shall be factory leak tested with high-pressure air under water.

2.08 SUPPLY FAN

A. Supply fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additonal maintenance.

B. All fan assemblies shall employ solid steel fan shafts. Heavy-duty pillow block type, self-aligning, grease lubricated ball bearings shall be used. Bearings shall be sized to provide a L-50 life at 250,000 hours. The entire fan assembly shall be isolated from the fan bulkhead with a flexible collar and mounted on 1" spring isolators.

C. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment.

D. Supply fan and motor assembly combinations larger than 8 hp or 22" diameter shall be internally isolated on 1" deflection, spring isolators and include removable shipping tie downs.

E. The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

F. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

2.09 HEATING SECTION

A. The rooftop unit shall include an electrical resistance heating coil section. Staged electric heating coil modules shall be factory installed downstream of the supply air fan in the heating section of the rooftop unit. Heating coils shall be constructed of a low watt density, nickel - chromium alloy resistance wire with intermediate supports that include ceramic bushings. The electrical contactors shall be of the full line-breaking type with all the electrical power legs being disconnected when the contactors are not energized. All electrical circuit wiring shall be designed with copper conductors, aluminum wires are not acceptable. Heating element branch circuits shall be individually fused to a maximum of 48 Amps per NEC requirements. The power supply for the electric heater shall be factory wired into the units main power block or disconnect switch.

B. The heating modules shall have an automatic reset, high temperature limit safety protection. A secondary high limit protection shall also be provided that requires a manual reset. An airflow switch shall be provided with the heating module to prevent the electric heater from operating in the event of no airflow.

C. The electric heat elements shall be controlled by the factory installed DDC unit control system. The heater shall have proportional SCR control. The unit controller shall modulate the electric heater to maintain the discharge air temperature setpoint.

D. Field installed heating modules shall require a field ETL certification. Duct heaters mounted within the rooftop unit in the field shall not be acceptable. The manufacturer's rooftop unit ETL certification shall cover the complete unit including the electric heating modules

2.010 ELECTRICAL

A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.

2.011 CONTROLS

A. Provide a complete integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.

B. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.

C. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.

D. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.

E. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to insure that it is not lost during a power

failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.

F. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:

1. Return air temperature.
2. Discharge air temperature.
3. Outdoor air temperature.
4. Space air temperature.
5. Outdoor enthalpy, high/low.
6. Compressor suction temperature and pressure
7. Compressor head pressure and temperature
8. Expansion valve position
9. Condenser fan speed
10. Inverter compressor speed
11. Dirty filter indication.
12. Airflow verification.
13. Cooling status.
14. Control temperature (Changeover).
15. VAV box output status.
16. Cooling status/capacity.
17. Unit status.
18. All time schedules.
19. Active alarms with time and date.
20. Previous alarms with time and date.
21. Optimal start
22. Supply fan and exhaust fan speed.
23. System operating hours.
    a. Fan
    b. Exhaust fan
    c. Cooling
    d. Inndividual compressor
    e. Heating
    f. Economizer
    g. Tenant override

G. The user interaction with the keypad shall provide the following:

1. Controls mode
    a. Off manual
    b. Auto
    c. Heat/Cool
    d. Cool only
    e. Heat only
    f. Fan only
2. Occupancy mode
    a. Auto

b. Occupied
c. Unoccupied
d. Tenant override

3. Unit operation changeover control
   a. Return air temperature
   b. Space temperature
   c. Network signal
4. Cooling and heating change-over temperature with deadband
5. Cooling discharge air temperature (DAT)
6. Supply reset options
   a. Return air temperature
   b. Outdoor air temperature
   c. Space temperature
   d. Airflow (VAV)
   e. Network signal
   f. External (0-10 vdc)
   g. External (0-20 mA)
7. Temperature alarm limits
   a. High supply air temperature
   b. Low supply air temperature
   c. High return air temperature
8. Lockout control for compressors.
9. Compressor interstage timers
10. Night setback and setup space temperature.
11. Building static pressure.
12. Economizer changeover
    a. Enthalpy
    b. Drybulb temperature
13. Currently time and date
14. Tenant override time
15. Occupied/unoccupied time schedule
16. One event schedule
17. Holiday dates and duration
18. Adjustable set points
19. Service mode
    a. Timers normal (all time delays normal)
    b. Timers fast (all time delays 20 sec)

H. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:

1. Zone sensor with tenant override switch
2. Zone sensor with tenant override switch plus heating and cooling set point adjustment. (Space Comfort Control systems only)

I. To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:

1. Airflow
2. Outside air temperature

3. Space temperature
4. Return air temperature
5. External signal of 1-5 vdc
6. External signal of 0-20 mA
7. Network signal

B. VARIABLE REFRIGERANT VOLUME SYSTEM (HP, AC)

1) VARIABLE REFRIGERANT VOLUME (VRV IV) AIR CONDITIONING - Three Pipe Heat Recovery

(a) SYSTEM DESCRIPTION

i. The variable capacity, heat recovery air conditioning system shall be a Daikin Variable Refrigerant Volume Series (heat and cool model) split system as specified. LG and Samsung are acceptable. The system shall consist of multiple evaporators, branch selector boxes, REFNET™ joints and headers, a three pipe refrigeration distribution system using PID control and Daikin VRV® condenser unit. The condenser shall be a direct expansion (DX), air-cooled heat recovery, multi-zone air-conditioning system with variable speed inverter driven compressors using R-410A refrigerant. The condensing unit may connect an indoor evaporator capacity up to 200% of the condensing unit capacity. All zones are each capable of operating separately with individual temperature control. A dedicated hot gas pipe shall be required to ensure optimum heating operation performance. Two-pipe, heat recovery systems utilizing a lower temperature mixed liquid/gas refrigerant to perform heat recovery are not acceptable due to reduced heating capabilities.

ii. The Daikin condensing unit shall be interconnected to indoor unit models FXFQ, FXHQ, FXMQ, FXLQ, FXNQ, FXTQ, FXDQ, FXZQ, FXAQ, FXMQ_MF and FXUQ and shall range in capacity from 7,500 Btu/h to 36,000 Btu/h in accordance with Daikin's engineering data book detailing each available indoor unit. The indoor units shall be connected to the condensing unit utilizing Daikin's REFNET™ specified piping joints and headers to ensure correct refrigerant flow and balancing. T style joints are not acceptable for a variable refrigerant system.

iii. Operation of the system shall permit either individual cooling or heating of each indoor unit simultaneously or all of the indoor units associated with each branch of the cool/heat selector box (BSQ_T / BS_Q54T). Each indoor unit or group of indoor units shall be able to provide set temperature independently via a local remote controller, an Intelligent Controller, an Intelligent Manager or a BMS interface.

iv. Branch selector boxes shall be located as shown on the drawing. The branch selector boxes shall have the capacity to control up to 290 MBH (cooling) downstream of the branch selector box. Each branch of the branch selector box shall consist of three electronic expansion valves, refrigerant control piping and electronics to facilitate communications between the box and main processor and between the box and indoor units. The branch selector box shall control the operational mode of the subordinate indoor units. The use of three EEV's ensures continuous heating during defrost (multiple condenser systems), no heating impact during changeover and reduced sound levels. The use of solenoid valves for changeover and pressure equalization shall not be acceptable due to refrigerant noise.

(b) VRV IV FEATURES AND BENEFITS

i. Voltage Platform –Heat recovery condensing units shall be available with a 208-230V/3/60 power supply.

ii. Advanced Zoning – A single system shall provide for up to 64 zones.

iii. Independent Control – Each indoor unit shall use a dedicated electronic expansion valve with 2000 positions for independent control.

iv. VFD Inverter Control and Variable Refrigerant Temperature – Each condensing unit shall use high efficiency, variable speed all "inverter" compressor(s) coupled with inverter fan motors to optimize part load performance. The system capacity and refrigerant temperatures shall be modulated automatically to set suction and condensing pressures while varying the refrigerant volume for the needs of the cooling or heating loads. The control will be automatic and customizable depending on load and weather conditions. Indoor units shall use PID to control superheat to deliver a comfortable room temperature condition and optimize efficiency.

v. Configurator software – Each system shall be available with configurator software package to allow for remote configuration of operational settings and also for assessment of operational data and error codes. If this software is not provided by an alternate manufacturer, for each individual outdoor unit the contractor shall do the settings manually and keep detailed records for future maintenance purposes.

vi. Autocharging – Each system shall have a refrigerant auto-charging function.

vii. Defrost Heating – Multiple condenser VRV systems shall maintain continuous heating during defrost operation. Reverse cycle (cooling mode) defrost operation shall not be permitted due to the potential reduction in space temperature.

viii. Oil Return Heating – Multiple condenser VRV systems shall maintain continuous heating during oil return operation. Reverse cycle (cooling mode) oil return during heating operation shall not be permitted due to the potential reduction in space temperature.

ix. Low Ambient Cooling – Each system shall be capable of low ambient cooling operation to -4°F DB.

x. Independent Control – Each indoor unit shall use a dedicated electronic expansion valve for independent control.

xi. Flexible Design

a) Systems shall be capable of up to 540ft (623ft equivalent) of linear piping between the condensing unit and furthest located indoor unit.
b) Systems shall be capable of up to 3,280ft total "one-way" piping in the piping network.
c) Systems shall have a vertical (height) separation of up to 295ft between the condensing unit and the indoor units.
d) Systems shall be capable of up to 295ft from the first REFNET™ / branch point.
e) The condensing unit shall have the ability to connect an indoor unit evaporator capacity of up to 200% of the condensing unit capacity.
f) Systems shall be capable of 98ft vertical separation between indoor units.
g) Condensing units shall be supported with a fan motor ESP up to 0.32". WG as standard to allow connection of discharge ductwork and to prevent discharge air short circuiting.
h) Oil Return – Each system shall be furnished with a centrifugal oil separator and active oil recovery cycle
i) Simple Wiring – Systems shall use 16/18 AWG, 2 wire, multi-stranded, non-shielded and non-polarized daisy chain control wiring.
j) Outside Air – Systems shall provide outside air capability.
k) Space Saving – Each system shall have a condensing unit module footprint as small as 36-5/8'' x 30-1/8''.
l) Advanced Diagnostics – Systems shall include a self diagnostic, auto-check function to detect a malfunction and display the type and location.
m) Each condensing unit shall incorporate contacts for electrical demand shedding with optional 3 stage demand control with 12 customizable demand settings.
n) Advanced Controls – Each system shall have at least one remote controller capable of controlling up to 16 indoor units.

o) Each system shall be capable of integrating with open protocol BACnet and LonWorks building management systems.
p) Low Sound Levels – Each system shall use indoor and condensing units with quiet operation as low as 27 dB(A).

(c) QUALITY ASSURANCE
i. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995 – Heating and Cooling Equipment and bear the Listed Mark.
ii. All wiring shall be in accordance with the National Electric Code (NEC).
iii. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
iv. Mechanical equipment for wind-born debris regions shall be designed in accordance with ASCE 7-2010 and installed to resist the wind pressures on the equipment and the supports.
v. The condensing unit will be factory charged with R-410A.

(d) DELIVERY, STORAGE AND HANDLING
i. Unit shall be stored and handled according to the manufacturer's recommendations.

PART 2 – WARRANTY

2.01 STANDARD LIMITED WARRANTY

Daikin North America LLC warrants original owner in which the Daikin products are installed that under normal use and maintenance for comfort cooling and conditioning applications such products (the "Products") will be free from defects in material and workmanship. This warranty applies to compressor and all parts and is limited in duration to ten (10) years starting from the ''installation date'' which is one of the two dates below:

a. The installation date is the date that the unit is originally commissioned, but no later than 18 months after the manufacture date noted on the unit's rating plate.
b. If the date the unit is originally commissioned cannot be verified, the installation date is three months after the manufacture date.

2.02 Contractor Warranty

The Contractor shall provide a complete one year warranty starting at the date of substantial completion.

PART 3 – PERFORMANCE

3.01 The systems shall provide at a minimum the lsited cooling and heating capacities on the equipment schedule at the list outdoor temperatures. Equipment that does not meet the listed capacities will not be accepted.

3.02 OPERATING RANGE

The operating range in cooling or cooling dominant simultaneous cooling/heating will be (-4°F) 23°F DB ~ 122°F DB. Each system as standard shall be capable of onsite reprogramming to allow low ambient cooling operation down to -4°F DB

The operating range in heating or heating dominant simultaneous cooling/heating will be -13°F WB – 60°F WB.

If an alternate equipment manufacturer is selected, the mechanical contractor shall provide, at their own risk and cost, all additional material and labor to meet low ambient operating condition and performance.

Cooling mode indoor room temperature range will be 57°F-77°F WB.

Heating mode indoor room temperature range will be 59°F-80°F DB.

3.03 REFRIGERANT PIPING

The system shall be capable of refrigerant piping up to 540 actual feet or 623 equivalent feet from the condensing unit to the furthest indoor unit, a total combined liquid line length of 3,280 feet of piping between the condensing and indoor units with 295 feet maximum vertical difference, without any oil traps.

REFNET™ piping joints and headers shall be used to ensure proper refrigerant balance and flow for optimum system capacity and performance. T style joints shall not be acceptable as this will negatively impact proper refrigerant balance and flow for optimum system capacity and performance.

PART 4 – PRODUCTS

4.01 CONDENSING UNIT

A. General: The condensing unit is designed specifically for use with VRV IV series components.
   1. The condensing unit shall be factory assembled in the USA and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of Daikin inverter scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports, liquid receiver and suction accumulator.
      High/low pressure gas line, liquid and suction lines must be individually insulated between the condensing and indoor units.
   2. The condensing unit can be wired and piped with access from the left, right, rear or bottom.
   3. The connection ratio of indoor units to condensing unit shall be permitted up to 200%.
   4. Each condensing system shall be able to support the connection of up to 64 indoor units dependent on the model of the condensing unit.
   5. The sound pressure level standard shall be that value as listed in the Daikin engineering manual for the specified models at 3 feet from the front of the unit. The condensing unit shall be capable of operating automatically at further reduced noise during night time or via an external input.
   6. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for reprogramming.
   7. The unit shall incorporate an auto-charging feature. Manual changing should be support with a minimum of 2 hours of system operation data to ensure correct operation.
   8. The condensing unit shall be modular in design and should allow for side-by-side installation with minimum spacing.
   9. The following safety devices shall be included on the condensing unit; high pressure sensor and switch, low pressure sensor, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
   10. To ensure the liquid refrigerant does not flash when supplying to the various indoor units, the circuit shall be provided with a sub-cooling feature.
   11. Oil recovery cycle shall be automatic occurring 2 hours after start of operation and then every 8 hours of operation. Each system shall maintain continuous heating during oil return operation.
   12. The condensing unit shall be capable of heating operation at -13°F wet bulb ambient temperature without additional low ambient controls or an auxiliary heat source.
   13. The multiple condenser VRV systems shall continue to provide heat to the indoor units in heating operation while in the defrost mode.

B. Unit Cabinet:
   1. The condensing unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.

C. Fan:
   1. The condensing unit shall consist of one or more propeller type, direct-drive 350 or 750 W fan motors that have multiple speed operation via a DC (digitally commutating) inverter.
   2. The condensing unit fan motor shall have multiple speed operation of the DC (digitally commutating) inverter type, and be of high external static pressure and shall be factory set as standard at 0.12 in. WG. A field setting switch to a maximum 0.32 in. WG pressure is available to accommodate field applied duct for indoor mounting of condensing units.
   3. The fan shall be a vertical discharge configuration with a nominal airflow maximum range of 5,544 CFM to 24,684 CFM dependent on model specified.
   4. The fan motor shall have inherent protection and permanently lubricated bearings and be mounted.
   5. The fan motor shall be provided with a fan guard to prevent contact with moving parts.
   6. Night setback control of the fan motor for low noise operation by way of automatically limiting the maximum speed shall be a standard feature.

D. Condenser Coil:

1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance.
3. The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.
4. The fins are to be covered with an anti-corrosion Ulta Gold coating as standard with a salt spray test rating of 1000hr (ASTM B117 & Blister Rating:10), Acetic acid salt spray test: 500hr (ASTM G85 & Blister Rating:10)
5. The pipe plates shall be treated with powdered polyester resin for corrosion prevention. The thickness of the coating must be between 2.0 to 3.0 microns.
6. The outdoor coil shall have three-circuit heat exchanger design eliminating the need for bottom plate heater. The lower part of the coil shall be used for inverter cooling and be on or off during heating operation enhancing the defrost operation.

E. Compressor:
1. The Daikin inverter scroll compressors shall be variable speed (PVM inverter) controlled which is capable of changing the speed to follow the variations in total cooling and heating load as determined by the suction gas pressure as measured in the condensing unit. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and calculated. With each reading, the compressor capacity (INV frequency) shall be controlled to eliminate deviation from target value. Non inverter-driven compressors, which may cause starting motor current to exceed the nominal motor current (RLA) and require larger wire sizing, shall not be allowed.
2. The inverter driven compressor in each condensing unit shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed scroll “G-type” or “J-type”.
3. Neodymium magnets shall be adopted in the rotor construction to yield a higher torque and efficiency in the compressor instead of the normal ferrite magnet type. At complete stop of the compressor, the neodymium magnets will position the rotor into the optimum position for a low torque start.
4. The capacity control range shall be as low as 3% to 100%.
5. The compressors’ motors shall have a cooling system using discharge gas, to avoid sudden changes in temperature resulting in significant stresses on winding and bearings.
6. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.
7. Oil separators shall be standard with the equipment together with an intelligent oil management system.
8. The compressor shall be spring mounted to avoid the transmission of vibration eliminating the standard need for spring insolation.
9. In the event of compressor failure the remaining compressors shall continue to operate and provide heating or cooling as required at a proportionally reduced capacity. The microprocessor and associated controls shall be designed to specifically address this condition.
10. In the case of multiple condenser modules, conjoined operation hours of the compressors shall be balanced by means of the Duty Cycling Function, ensuring sequential starting of each module at each start/stop cycle, completion of oil return, completion of defrost or every 8 hours and extending the operating life of the system. When connected to a central control system, sequential start is activated for all system on each DIII network.

F. Electrical:
1. The power supply to the condensing unit shall be as scheduled on plans
2. The control voltage between the indoor and condensing unit shall be 16VDC non-shielded, stranded 2 conductor cable.
3. The control wiring shall be a two-wire multiplex transmission system, making it possible to connect multiple indoor units to one condensing unit with one 2-cable wire, thus simplifying the wiring installation.
4. The control wiring lengths shall be as shown below.

	Condenser to Indoor Unit	Condenser to Central Controller	Indoor Unit to Remote Control

Control Wiring Length	6,665 ft	3,330 ft	1,665 ft
Wire Type	16/18 AWG, 2 wire, non-polarity, non-shielded, stranded		

4.02 BS(4/6/8/10/12)Q_T BRANCH SELECTOR BOX FOR VRV IV HEAT RECOVERY SYSTEM

A. General: The BSQ36TVJ, BSQ60TVJ, BSQ96TVJ, BS4Q54TVJ, BS6Q54TVJ, BS8Q54TVJ, BS10Q54TVJ and BS12Q54TVJ branch selector boxes are designed specifically for use with VRV IV series heat recovery system components.
   1. These selector boxes shall be factory assembled, wired, and piped.
   2. These BSQ_T / BS(4/6/8/10/12)Q54T branch controllers must be run tested at the factory.
   3. These selector boxes must be mounted indoors.
   4. When simultaneously heating and cooling, the units in heating mode shall energize their subcooling electronic expansion valve.

B. Unit Cabinet:
   1. These units shall have a galvanized steel plate casing.
   2. Each cabinet shall house 3 electronic expansion valves for refrigerant control per branch.
   3. The cabinet shall contain one subcooling heat exchanger per branch.
   4. The unit shall have sound absorption thermal insulation material made of flame and heat resistant foamed polyethylene.
   5. Nominal sound pressure levels must be measured and published on the submittals by the manufacturer. These sound levels must not exceed the values below.

Model Number	Sound Level dB(A) Operating	Sound Level dB(A) Max
BSQ36TVJ	42	32
BSQ60TVJ	43	32
BSQ96TVJ	44	34
BS4Q54TVJ	38	45
BS6Q54TVJ	39	47
BS8Q54TVJ	39	47
BS10Q54TVJ	40	48
BS12Q54TVJ	40	48

If an alternate manufacturer is selected, the mechanical contractor shall provide, at their own cost and expense, any additional material and labor to meet the published sound levels above.

C. Dimensions:
   1. Each BSQ_T unit shall be no larger than 8-1/8” x 15-1/4” x 12-13/16”.
   2. Each BS4Q_T shall be no larger than 11-3/4” x 14-9/16” x 18-15/16”.
   3. Each BS(6/8)Q_T shall be no larger than 11-3/4” x 22-13/16” x 18-15/16”.
   4. Each BS(10/12)Q_T shall be no larger than 11-3/4” x 32-5/16” x 18-15/16”.

D. Refrigerant Valves:
   1. The unit shall be furnished with 3 electronic expansion valves per branch to control the direction of refrigerant flow. The use of solenoid valves for changeover and pressure equalization shall not be acceptable due to refrigerant noise.
   2. The refrigerant connections must be of the braze type.
   3. In multi-port units, each port shall have its own electronic expansion valves. If common expansion/solenoid valves are used, redundancy must be provided.
   4. Each circuit shall have at least one (36,000 Btu/h indoor unit or smaller for the BSQ36TVJ, 54,000 Btu/h indoor unit or smaller for the BS(4/6/8/10/12)Q54TVJ, 60,000 Btu/h indoor unit or smaller for the BSQ60TVJ and 96,000 Btu/h indoor unit or smaller for the BSQ96TVJ) branch selector box.
   5. Multiple indoor units may be connected to a branch selector box with the use of a REFNET™ joint provided they are within the capacity range of the branch selector.

E. Condensate Removal:
   1. The unit shall not require provisions for condensate removal. A safety device or secondary drain pan shall be installed by the mechanical contractor to comply with the applicable mechanical code, if an alternate manufacturer is selected.

F. Electrical:

1. The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz.
2. The unit shall be capable of operation within the limits of 187 volts to 255 volts.
3. The minimum circuit amps (MCA) shall be 0.1 and the maximum overcurrent protection amps (MOP) shall be 15.
4. The control voltage between the indoor and condensing unit shall be 16VDC non-shielded 2 conductor cable.

4.03 VRV INDOOR UNITS

FXMQ_PA - CONCEALED CEILING DUCTED UNIT (Med. Static)

A. General: Daikin indoor unit FXMQ_PA shall be a built-in ceiling concealed fan coil unit, operable with refrigerant R-410A, equipped with an electronic expansion valve, direct-drive DC (ECM) type fan with auto CFM adjustment at commissioning, for installation into the ceiling cavity. It is constructed of a galvanized steel casing. It shall be available in capacities from 7,500 Btu/h to 18,000 Btu/h. Model numbers are FXMQ07PAVJU, FXMQ12PAVJU, and FXMQ18PAVJU, to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. It shall be a horizontal discharge air with horizontal return air configuration. All models feature a low height cabinet making them applicable to ceiling pockets that tend to be shallow. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E72 and BRC2A71. Included as standard equipment, a condensate drain pan and drain pump kit that pumps to 18-3/8" from the drain pipe opening. The indoor units sound pressure shall range from 29 dB(A) to 43 dB(A) at low speed measured 5 feet below the ducted unit.

B. Performance: Each unit's performance is based on nominal operating conditions:

C. Indoor Unit:
1. The Daikin indoor unit FXMQ_PA shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall be equipment with automatically adjusting external static pressure logic that is selectable during commissioning. This adjusts the airflow based on the installed external static pressure.
2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
3. Both refrigerant lines shall be insulated from the outdoor unit.
4. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 18-3/8" of lift from the center of the drain outlet and has a built in safety shutoff and alarm.
5. The indoor units shall be equipped with a return air thermistor.
6. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
7. The voltage range will be 253 volts maximum and 187 volts minimum.

D. Unit Cabinet:
1. The cabinet shall be located into the ceiling and ducted to the supply and return openings.
2. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.

E. Fan:
1. The fan shall be direct-drive DC (ECM) type fan, statically and dynamically balanced impeller with three fan speeds available.
2. The unit shall be equipment with automatically adjusting external static pressure logic selectable during commissioning.
3. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range of 0.12 to 0.47 HP respectively.
4. The airflow rate shall be available in three settings.
5. The fan motor shall be thermally protected.
6. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings.
7. Fan motor external static pressure range for nominal airflow:

Model Number	Fan ESP (in. WG)
FXMQ07PAVJU	0.40 – 0.12
FXMQ09PAVJU	0.40 – 0.12
FXMQ12PAVJU	0.40 – 0.12
FXMQ15PAVJU	0.80 – 0.20
FXMQ18PAVJU	0.80 – 0.20
FXMQ24PAVJU	0.80 – 0.20
FXMQ30PAVJU	0.80 – 0.20
FXMQ36PAVJU	0.80 – 0.20
FXMQ48PAVJU	0.80 – 0.20
FXMQ54PAVJU	0.56 – 0.20

F. Coil:
   1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
   2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
   3. The coil shall be a 3 row cross fin copper evaporator coil with 13 fpi design completely factory tested.
   4. The refrigerant connections shall be flare connections and the condensate will be 1-1/4" outside diameter PVC.
   5. A condensate pan shall be located under the coil.
   6. A condensate pump with an 18-3/8" lift shall be located below the coil in the condensate pan with a built in safety alarm.
   7. A thermistor will be located on the liquid and gas line.

G. Electrical:
   1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
   2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
   3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.

H. Control:
   1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
   2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
   3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.

PART 5 - CONTROLS

5.01 General Controls

A. All indoor units shall maintain the settings for: temperature setpoint, start/stop status, operating mode, fan speed, air flow direction in non-volatile memory each time they are changed. These setting shall not be lost upon a power loss event.

B. All indoor unit settings shall be adjusted through the BMS system using the BACnet interface. The BMS Contractor will provide the wall mounted zone controller – there shall be no VRV brand controllers on the wall. As changes are made to the BMS zone controller, the BMS will change the setpoint of the indoor unit via the BACnet gateway. See Control specification for more information.

C. The entire system shall automatically re start upon a power loss event.

D. All indoor units shall be auto addressing. Manual addressing of the indoor unit shall not be acceptable.

E. Control Wiring Requirements
   1. All control wiring shall be done per the control wiring drawings provided on the drawings.
   2. All control wiring shall be 18 AWG, 2 conductor, stranded non-shielded cable.

F. Remote wall mounted temperature sensor

1. In all zones a wall mounted space temperature sensor shall be mounted 48” above the finished floor and next to the BMS unit controller
2. This remote sensor shall wire to the indoor unit that serves this space and shall be wire in place of the factory installed return air sensor.
3. This remote sensor shall not be a controller and shall not have any adjustments on it.

5.02 BRC1E72: Navigation (NAV) Unit Controller

The NAV Remote Controller can provide control for all VRV indoor units. The remote controller wiring consist of a non-polar two-wire connection to the indoor unit at terminals P1/P2. The NAV Remote Controller is wall mounted and can be adjusted to maintain the optimal operation of the connected indoor unit(s). The NAV Remote Controller does not require addressing.

The NAV Remote Controller can be used in conjunction with the BRC2A71 (Simplified Remote Controller) or another NAV Remote Controller to control the same indoor unit group. No more than 2 remote controllers can be placed in the same group.

a. Mounting:

The NAV Remote Controller shall be mounted into a standard 2” x 4” junction box.

b. Display Features:

- The NAV Remote Controller shall be approximately 4.75” x 4.75” in size with a backlit 2.75” x 1.75” LCD display.
- Feature Backlit LCD Display with contrast adjustment and auto off after 30 seconds.
- Display information shall be selectable from English, French, or Spanish.
- Configurable display mode – Detailed, Standard, and Simple
    - Large 11/16” room temperature displayed in Simple display
- The controller shall display Operation Mode, Setpoint, and Fan Speed.
    - Displayed items configurable
    - Configure “Off” to be displayed when unit is turned off (field setting required)
        - Prevents mode adjustment
    - Setpoint can be removed from display when unit is turned Off (field setting required)
        - Prevents setpoint adjustment
    - Fan speed display removable (field setting required)
        - Prevents fan speed adjustment
- System Status icons.
- The controller shall display temperature setpoint in one degree increments with a range of 60-90^{o}F (16-32^{o}C)
- Detailed and Simple display will reflect room temperature (0-176^{o}F/-18-80^{o}C range in one degree increment).
    - Display of temperature information shall be configurable for Fahrenheit or Celsius
- On/Off status shall be displayed with an LED.
- Error codes will be displayed in the event of system abnormality/error with a two digit code.
    - A blinking LED will also signal system abnormality/error
- The following system temperatures can be displayed to assist service personnel in troubleshooting:
    - Return Air Temperature
    - Liquid Line Temperature
    - Gas Line Temperature
    - Discharge Air Temperature (depending on unit),
    - Remote Controller Sensor Temperature
    - Temperature used for Indoor Unit Control

c. Basic Operation:

- Capable of controlling a group of up to 16 indoor units.
- Controller shall control the following group operations:
    - On/Off, Operation Mode (Cool, Heat, Fan, Dry and Auto* (*with VRV Heat Recovery & Heat Pump Systems))

        - Configure only the essential modes to be selectable – remove unnecessary mode selection(s) from display
    - Independent Cooling and Heating setpoints in the occupied mode
        - Dual setpoints (individual Cool and Heat setpoints with minimum setpoint differential 0 – 8°F (0 – 4°C) default 2°F (1°C)) or Single setpoint
    - Independent Cooling Setup and Heating Setback setpoints in the unoccupied mode
    - Fan Speed
    - Airflow direction (dependent on indoor unit type).
    - The controller shall be able to limit the user adjustable setpoint ranges individually for cooling and heating in the occupied period
    - Function button lockout (On/Off, Mode, Fan Speed, Up/Down, Left, Right Arrows)
    - Indoor Unit group assignment
    - Clock (12/24 hour) and Day display
    - Automatic adjustment for Day Light Savings Time (DST)
        - Set changeover period (second Sunday in March / first Sunday in November)

d. Programmability:
- Controller shall support schedule settings with selectable weekly pattern options.
    - 7-day
    - Weekday + Weekend
    - Weekday + Saturday + Sunday
    - Everyday
    - The schedule shall support unit On/Off
    - Independently settable Cooling and/or Heating setpoints when unit is on (occupied)
    - Setup (Cooling) and Setback (Heating) setpoints when unit is off (unoccupied)
    - A maximum of 5 operations can be schedulable per day
    - Time setting in 1-minute increments
- The Controller shall support auto-changeover mode for both Heat Pump and Heat Recovery systems allowing the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat according to the room temperature and temperature setpoint.
    - Changeover to cooling mode shall occur at cooling setpoint + 1°F (0.5°C) as the primary changeover deadband and takes the guard timer into consideration
        - Configurable from 1 – 4°F (0.5 – 2°C)
    - Changeover to cooling mode shall occur at the primary changeover deadband to cooling + 1°F (0.5°C) as the secondary changeover deadband.
        - Configurable from 1 – 4°F (0.5 – 2°C)
    - Changeover to heating mode shall occur at heating setpoint - 1°F (0.5°C) as the primary changeover deadband and takes the guard timer into consideration
        - Configurable from 1 – 4°F (0.5 – 2°C)
    - Changeover to heating mode shall occur at the primary changeover deadband to heating - 1°F (0.5°C) as the secondary changeover deadband.
        - Configurable from 1 – 4°F (0.5 – 2°C)
    - 1 hour guard timer
        - Upon changeover, guard timer will prevent another changeover during this period.
        - Guard timer is ignored by a change of setpoint manually from either the Multi-zone Controller, Remote Controller, or by schedule.
        - The Guard timer is also ignored if the space temperature reaches the secondary changeover deadband (configurable from 1 - 4°F (0.5 – 2°C)) from the primary changeover deadband, and the guard timer has been activated
        - 60 minutes as default, configurable to 15, 30, or 90 minutes
- The Controller shall support an Auto Off Timer for temporarily enabling indoor unit operation during the unoccupied period.
    - When the Off Timer is enabled and when the unit is manually turned on at the remote controller
    - The controller shall shut off the unit after a set time period
    - The time period shall be configurable in the controller menu with a range of 30-180 minutes in 10 minute increments

- The room temperature shall be capable of being sensed at either the NAV Remote Controller, the Indoor Unit return air temperature sensor (default), or Remote Temperature Sensor (KRCS01-1B) configured through the field settings.

VARIABLE REFRIGERANT VOLUME (VRV) HVAC SYSTEM
Advanced Multi-zone Controller

Part 1 - General

1.01. Physical characteristics

A. General:
The advanced multi-zone controller shall be made from plastic materials with a neutral color. Each control shall have a LCD (Liquid Crystal Display) that shows On/Off, setpoint, room temperature, mode of operation (Cool/Heat/Dry/Fan/Auto), louver position, and fan speed.

1.02. Electrical characteristics

A. General:
The advanced multi-zone controller will require 24 VAC to power the controller. The advanced multi-zone controller shall supply 16 VDC to the communication bus on the F1F2 (out-out) terminal of the outdoor unit. The voltage may rise or fall in relation to the transmission packets that are sent and received.

B. Wiring:
The advanced multi-zone controller communication wiring shall be terminated in a daisy chain design at the outdoor unit, which is then daisy chained to branch selector (Heat Recovery system), then daisy chained to each indoor unit in the system and terminating at the farthest indoor unit. The termination of the wiring shall be non-polar. The remote control wiring shall run from the indoor unit control terminal block to the remote controller connected with that indoor unit.

C. Wiring size:
Wiring shall be non-shielded, 2-conductor sheathed vinyl cord or cable, and 18 AWG stranded copper wire.

1.03. VRV Controls Network
The VRV Controls Network is made up of local remote controllers, multi-zone controllers, advanced multi-zone controllers, and open protocol network devices that transmit information via the communication bus. The VRV Controls Network shall also have the ability to be accessed via a networked PC. The VRV Controls Network supports operation monitoring, scheduling, error e-mail distribution, general user software, tenant billing, maintenance support, and integration with Building Management Systems (BMS) using open protocol via BACnet® interface , Lonworks® interface or Modbus® adapter; all of which blend to provide the optimal control strategy for the best HVAC comfort solution.

Part 2 - Products

2.01. Advanced Multi-zone Controllers
The Daikin AC VRV advanced multi-zone controllers are compatible with all VRV, SkyAir, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter. The advanced multi-zone controller wiring consist of a non-polar two-wire connection to the outdoor unit. The advanced multi-zone controllers may be wall-mounted and can be adjusted to maintain the optimal operation of up to 64 connected indoor unit groups and 128 indoor units. Set temperatures can be adjusted in increments of 1°F. In the cases where a system or unit error may occur, the VRV controllers will display a two-digit error code and the unit address.

A. DCM601A71: intelligent Touch Manager (iTM) V2.XX.XX
The intelligent Touch Manager (version 2.04) shall provide control for all VRV, SkyAir, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter. It shall be capable of controlling a maximum or 64 indoor unit groups and 128 indoor units connected to a maximum of 10 outdoor units. The intelligent Touch Manager shall support operations superseding that of the local remote controller, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring.

The controller wiring shall consist of a non-polar two-wire connection to the indoor unit at terminals F1F2 (out-out) of the outdoor unit. The intelligent Touch Manager is wall mounted and can be adjusted to maintain the optimal operation of the connected indoor unit(s).

The intelligent Touch Manager can be used in conjunction with the BRC1E73 (Navigation Remote Controller), the BRC2A71 (Simplified Remote Controller), or the BRC4C82/7E83/7C812/7E818 (Wireless Remote Controller), BACnet interface, Lonworks interface, and Modbus adapter to control the same indoor unit groups. The remote controller shall require daisy chain wiring for grouping multiple indoor units (up to 16) together. Manual addressing is required of each remote controller group associated with the intelligent Touch Manager. DIII-NET address can be set for one (1) indoor unit or each indoor unit in the remote controller group. No more than 2 remote controllers can be placed in the same group.

The intelligent Touch Manager shall be equipped with two RJ-45 Ethernet ports for 100 Mbps network communication to support interconnection with a network PC via the Internet, Local Area Network (LAN), or connection with a non-networked PC after completed installation.

Web access functions shall be available so that facility staff can securely log into each Intelligent Touch Manager via the PC's web browser to support monitoring, scheduling, error recognition, and general user functions. Error emails are also sent to designated email addresses. An additional optional software function Power Proportional Distribution (PPD) tenant billing shall also be available. The optional software shall require advanced purchase and can only be activated upon receipt of a license activation key from Daikin AC.

1. Mounting:
   The intelligent Touch Manager shall be mounted on the wall or into the mounting fixtures included with the intelligent Touch Manager.

2. Display Features:
   a. The intelligent Touch Manager shall be approximately 11.42" x 9.57" x 1.97' in size with a backlit 10.4" LCD display.
   b. Display information shall be selectable from English, French, Italian, Korean, Dutch, Portuguese, Chinese, Japanese, German, or Spanish.
   c. Featured backlit LCD with auto off after 30 minutes (default) is adjustable between 1 to 60 minutes, or the choice of 3 different screen savers.
   d. Area and Group configuration
      1) Area contains one (1) or more Area(s) or Group(s)
      2) A Group may be an indoor unit, Di, Dio point that has a DIII-Net address
      3) A Group may be an external management point such as a Di, Do, Bi, Bo, Bv, Ai, Ao, Av, Mi, Mo, Mv that does not have a DIII-Net address
   e. An Area is a tiered group where management points (indoor unit, digital input/output, and analog input/output groups) can be monitored and controlled by global settings. Up to 650 Areas can be created. Area hierarchy can have up to 10 tiered levels (ex. top level: 1st floor West, 2nd level: offices, hallways, 3rd level: Office 101, 102, and 103, etc.). Area configuration shall classify levels of monitoring and control for each management point
      1) Areas and Groups may be assigned names (ex. Office 101, Lobby, North Hallway, etc.)
   f. The Controller shall display On/Off, Operation Mode, Setpoint, Space Temperature, Louver Position, Fan Speed for each Area or Group.
   g. The Controller shall display Date (mm/dd/yyyy, yyyy/mm/dd, or dd/mm/yyyy format selectable) and day of the week along with the time of day (12hr or 24hr display selectable).
   h. The Controller shall adjust for daylight savings time (DST) automatically.
   i. Display information shall be updated every 3 seconds to show the latest status of the indoor unit groups.
   j. System status icons shall display On/Off (color coded), Malfunction/Error (color coded), Forced Stop, Setback, Filter, Maintenance, and Screen Lock.
   k. The controller shall display the temperature setpoint in one degree increments with a range of 60°F – 90°F, 1°F basis (16°C – 32°C, 0.1°C basis).
      1) Display of temperature setpoint information shall be configurable for Fahrenheit or Celsius

l. Display shall reflect room temperature in one tenth degree increments with a range of-58°F – 248°F, 0.1°F basis (-50°C – 120°C, 0.1°C basis) with 0.1°C accuracy.
   1) Display of room temperature information shall be configurable for Fahrenheit or Celsius

m. The Menu List shall be used to configure options and display information for each Area or Group.

n. Error status shall be displayed in the event of system abnormality/error with one of three color coded icons placed over the indoor unit icon or lower task bar.
   1) System errors are generated when the intelligent Touch Manager system with other VRV controls systems are combined incorrectly or power proportional distribution calculation errors occur. The intelligent Touch Manager shall display the error with a red triangle placed on the lower task bar.
   2) Unit errors occurring within the VRV system shall be displayed with a yellow triangle placed over the indoor unit icon
   3) Limit errors are based upon preconfigured analog input upper and lower limit settings and are generated when the limits have been met. When limit error is generated a yellow triangle will be placed over the unit icon.
   4) Communication errors between the intelligent Touch Manager and the indoor units shall be displayed with a blue triangle placed over the indoor unit icon
   5) Error history shall be available for viewing for up to 500,000 errors/abnormality events with operation events.

o. Layout View
   1) Capable of displaying site floor plan or graphical user interface (GUI) as the background for visual navigation. Indoor unit, DIII-Net Di and Dio, and External Di, Do, Ai, Ao, Av, Mi, Mo, Mv icons with operational status can be placed on the floor layout or GUI
      i) Up to 4 status points can be assigned to the indoor unit icon (room name, room temperature, setpoint, and mode)
      ii) Digital input and output icons will display On/Off status
      iii) Analog icons will display Ai, Ao and Av.
      iv) Multistate icons will display Mi, Mo and Mv.
   2) Up to 60 floor layout sections can be created

3. Basic Operation:
   a. Capable of controlling by Area(s) or Group(s)
   b. Controller shall control the following group operations:
      1) On/Off
      2) Operation Mode (Cool, Heat, Fan, Dry, and Auto)
      3) Independent Cool and Heat dual Setpoints or single Setpoint for current mode in the occupied period
      4) Controller shall be able to limit the user adjustable setpoint ranges individually for cooling and heating based upon the Area or Group configurations
      5) Independent Setup (Cooling) and Setback (Heating) setpoints in the unoccupied mode adjustable to 50 - 95^{0}F
         i) Setup and Setback setpoints can only be set outside of the occupied setpoint range
         ii) The Setup and Setback setpoints will automatically maintain a 2°F fixed differential from the highest possible occupied setpoints
         iii) The recovery differential shall be 4^{0}F (default) and adjustable between 2 – 10^{0}F
         iv) Settings shall be applied based upon the Area or Group configurations
      6) Fan Speed
         i) Up to 3 speeds (dependent upon indoor unit type)
      7) Airflow direction (dependent upon indoor unit type)
         i) 5 fixed positions or oscillating
      8) Remote controller permit/prohibit of On/Off, Mode, and Setpoint
      9) Lock out setting for Intelligent Touch Manager display
      10) Indoor unit Group/Area assignment
   c. Capable of providing battery backup power for the clock at least 1 year when no AC power is applied.

1) The battery can last at least 13 years when AC power is applied
2) Settings stored in non-volatile memory

4. Programmability:
   a. Controller shall support weekly schedule settings.
      1) 7 day weekly pattern (7)
      2) Weekday + Weekend (5 + 2)
      3) Weekday + Saturday + Sunday (5 + 1 + 1)
      4) Everyday (1)
      5) The schedule shall have the capabilities of being enabled or disabled
      6) 100 independent schedules configurable with up to 20 events settable for each days schedule
         i) Each scheduled event shall specify time and target Area or Group
         ii) Each scheduled event shall include On/Off, Optimum Start, Operation Mode, Occupied Setpoints, Setback Setpoints, Remote Controller On/Off Prohibit, Remote Controller Mode Prohibit, Remote Controller Setpoint Prohibit, Timer Extension Setting, Fan Speed, and Setpoint Range Limit
            - Setpoint when unit is On (occupied)
            - Configurable Setup (Cooling) and Setback (Heating) setpoints when unit is Off (unoccupied)
         iii) Time setting in 1-minute increments
         iv) Timer Extension shall be used for a timed override (settable from 30 – 180 minutes) to allow indoor unit operation during the unoccupied period
      7) A maximum of 40 exception days can be schedule on the yearly schedule (repeats yearly)
         i) Exception days shall be used to override specified days on the weekly schedule based upon irregular occupied/unoccupied conditions
         ii) Exception days can be configured on a set date (Jan 1) or floating date (1st Monday in September)
   b. Controller shall support auto-changeover.
      1) Auto-change shall provide Fixed (default), Individual, Averaging, and Vote changeover methods for both Heat Pump and Heat Recovery systems based upon the changeover group configuration. This will allow for the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat in accordance with the room temperature and setpoint. The following changeover scheme shall be applicable to the Fixed, Individual, and Averaging methods.
         i) Changeover to cooling mode shall occur at cooling setpoint + 1°F (0.5°C) as the primary changeover deadband and takes the guard timer into consideration
            - Configurable from 1 – 4°F (0.5 – 2°C)
         ii) Changeover to cooling mode shall occur at the primary changeover deadband to cooling + 1°F (0.5°C) as the secondary changeover deadband.
            - Configurable from 1 – 4°F (0.5 – 2°C)
         iii) Changeover to heating mode shall occur at heating setpoint - 1°F (0.5°C) as the primary changeover deadband and takes the guard timer into consideration
            - Configurable from 1 – 4°F (0.5 – 2°C)
         iv) Changeover to heating mode shall occur at the primary changeover deadband to heating - 1°F (0.5°C) as the secondary changeover deadband.
            - Configurable from 1 – 4°F (0.5 – 2°C)
         v) A weighted demand shall be configurable for the Averaging and Vote methods.
      2) Fixed Method
         i) Changeover evaluated by room temperature and setpoint of the representative indoor unit (first registered indoor unit in changeover group) in the changeover group even when it is not operating (must be in Cool, Heat, or Auto mode)
         ii) Changeover affects all indoor unit groups in the changeover group.
      3) Individual method (recommended for Heat Recovery Systems)
         i) Changeover evaluated by room temperature and setpoints of the individual indoor unit group in the changeover group
         ii) Changeover affects individual indoor unit group in the changeover group
      4) Average method
         i) Changeover evaluated by the average of all indoor unit group's room temperatures and setpoints operating in Cool, Heat, or Auto mode in the changeover group list

ii) If none of the indoor units in the group meet the above requirements the Fixed method of changeover will be applied
iii) A weighted demand (0 – 3) can be configured for each indoor unit in the changeover group.
iv) Changeover affects all indoor unit groups in the changeover group.

5) Vote Method
i) In each indoor unit, the cooling demand is calculated based upon the difference between the room temperature and cooling setpoint. If the room temperature falls below the primary cool changeover point (cool setpoint plus the primary changeover deadband) the cooling demand is considered as 0 (zero). Then the total cooling demand is calculated as the sum of each indoor unit's cooling demand
ii) The opposite is true for the total heating demand
iii) A weight (0-3) can be added to each indoor unit's demand in the changeover group. The default setting is 1
iv) The weight 0 (zero) means the indoor unit's demand is not added in the total demand, so the indoor unit's demand is considered to be 0 (zero)
v) The weight 2 or 3 means the indoor unit's demand is added 2 or 3 times in the total demand, respectively
vi) Changeover to cooling mode shall occur when the total cooling demand is greater than the total heating demand.
vii) The opposite is true for changeover to heating
viii) Vote supports a Heating Override option, which prioritizes switching to the heating mode if at least one room temperature falls below the secondary heat changeover point (heat setpoint minus the secondary changeover deadband) even if the total cooling demand is greater than the total heating demand.
ix) Changeover affects all indoor unit groups in the changeover group.

6) Changeover shall change the operation mode of the indoor unit that is set as the Changeover Master. The Changeover Master indoor unit shall then change the operation mode of all indoor unit groups daisy chained to the same outdoor unit in the Heat Pump system or branch selector box in the Heat Recovery system.

7) Guard timer
i) Upon changeover, guard timer will prevent another changeover during the guard timer activation period (15, 30, 60 (default) min).
ii) Guard timer is ignored by a change of setpoint manually from either intelligent Touch Manger or Remote Controller, by schedule, or the room temperature meets or exceeds the secondary changeover deadband of the mode opposite of the current mode setting

c. Controller shall support Interlock

1) Interlock feature for use with 3rd party equipment (DOAS, dampers, occupancy sensing, etc…) to automatically control Groups or Areas corresponding to the change of the operation states or the On/Off states of any Group.

2) WAGO I/O unit – Di, Do, Ai, Ao
i) On/Off based monitoring and control of equipment
ii) Manual or scheduled operation of equipment
iii) Operation based upon interlock with management points (group(s))
iv) Monitor equipment error/alarm status

3) Digital Input/Output (DEC102A51-US2) unit or Digital Input (DEC101A51-US2) unit
i) On/Off based monitoring and control of equipment
ii) Manual or scheduled operation of equipment
iii) Operation based upon interlock with management points (group(s))
iv) Monitor equipment error/alarm status

d. Controller shall support force shutdown of associated indoor unit groups.

5. Web/Email Function
a. Each intelligent Touch Manager shall be capable of monitoring, operating, and scheduling a maximum of 64 indoor unit groups (up to 512 indoor unit groups with the addition of the iTM Plus Adapter) from a networked PC's web browser. It shall also be capable of creating general user access and sending detailed error emails to a customized distribution list (up to 10 email addresses).
b. All PCs shall be field supplied

a. DCM014A51: BACnet Server Gateway Option
   1) The iTM BACnet Server Gateway Option shall be capable of making the intelligent Touch Manager work as a BACnet gateway using the BACnet/IP protocol. The iTM BACnet Server Gateway Option shall be capable of exposing indoor unit management points as BACnet objects to the (BMS). The iTM BACnet Server/Gateway Option shall be capable of allowing the BMS to monitor and control indoor units BACnet objects.
   2) The iTM BACnet Server Gateway Option shall be compatible with VRV, SkyAir, Outdoor Air Processing Unit, Mini-Split system with use of KRP928, and FFQ indoor unit for Multi-split system.
   3) Functions:
      i. The iTM BACnet Server Gateway Option shall be capable of supporting Change of Value (COV) notification.
      ii. The iTM BACnet Server Gateway Option shall communicate to BMS using port number 47808 (configurable).
      iii. The iTM BACnet Server Gateway Option shall function as BACnet router to provide unique virtual BACnet device identification number (ID) for every indoor unit group address.
      iv. The iTM BACnet Server Gateway Option shall provide configurable BACnet Network number.
      v. The iTM BACnet Server Gateway Option shall be capable of being configured as a foreign device. It shall be capable of communicating across BACnet Broadcast Management Devices (BBMD) in different subnet networks.
      vi. The iTM BACnet Server Gateway Option shall be run in environments with BACnet communication traffic up to 100 packets/second.
      vii. The iTM BACnet Server Gateway Option functions shall be configurable through CSV file which shall be downloaded from iTM and configured by trained personnel.
   4) System Capacity
      i. Max of 128 indoor units groups (Up to 256 indoor units) can be controlled from (BMS)
      ii. Max of 8 DIII-Net ports shall be connected to iTM.
   5) The Building Management System shall monitor and control the following BACnet objects for indoor units
      i. Indoor unit ON/OFF status.
      ii. Alarm status with error description
      iii. Room temperature.
      iv. Indoor Unit ON details
         - Off
         - Normal [ON]
         - Override
         - Setback
      v. Filter sign status.
      vi. Fan status.
      vii. Communication status.
      viii. Thermo-on status.
      ix. Compressor status
         - On
         - Off
         - Defrost
      x. Aux heater status.
      xi. Occupancy Mode
         - Unoccupied,
         - Occupied
         - Standby
      xii. Operation Mode (Cool, Heat, Fan, and Dry)
      xiii. Cooling and Heating setpoints during occupied mode.
      xiv. Cooling and Heating setpoints during unoccupied mode.
      xv. Maximum and minimum cooling setpoint.
      xvi. Maximum and Minimum heating setpoint
      xvii. Minimum cooling and heating setpoint differential.
      xviii. Fan Speed
         - Up to 3 speeds (dependent upon indoor unit type)

xix. Vane direction (dependent upon indoor unit type)
- 5 fixed positions or swing position

xx. Remote controller permit/prohibit
- On/Off
- Mode,
- Setpoint

xxi. Filter sign reset for indoor units

xxii. Forced indoor units off.

6) The Building Management System may choose to monitor and control the following BACnet objects linked to iTM control logic:
   i. Enable/Disable iTM Schedule operation.
   ii. Enable/Disable iTM Auto Changeover Operation.
   iii. Set Timed Override Minutes.
   - Monitor and configure timer extension on iTM (30, 60, 90, 120, 150, 180 minutes)

   iv. System forced off
   - Enable/Disable all emergency stop programs that are registered on the iTM.

7) Schedule
   The BMS shall utilize iTM schedule function or support weekly schedule settings through its programming.
   i. BMS schedule shall support the indoor unit:
   - Each scheduled event shall specify time and target group address.
   - Each scheduled event shall include Occupancy Mode, Operation Mode, Occupied Cooling Setpoint, Occupied Heating Setpoint, and Unoccupied cooling setpoint, Unoccupied heating setpoint, Remote Controller On/Off Permit/Prohibit, Remote Controller Mode Permit/Prohibit, Remote Controller Setpoint Permit/Prohibit, and Timed Override Enable.
   - An override shall be provided for use enabling indoor unit operation during the unoccupied period by the BMS programming.

8) Auto Changeover
   The BMS shall utilize iTM Auto changeover function or support auto-changeover through its programming.
   i. Auto-change shall provide changeover for both Heat Pump and Heat Recovery systems based upon the group configurations. This will allow the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat in accordance with the room temperature and setpoint temperature.
   ii. Changeover shall change the operation mode of the indoor unit that is set as the Changeover Master. The Changeover Master indoor unit shall then change the operation mode of all indoor unit groups daisy chained on the same DIII-Net communication bus to the same outdoor unit in the Heat Pump system or the same branch selector box in the Heat Recovery system.
   iii. Changeover to cooling mode shall occur when the room temperature is great than or equal to the cooling setpoint
   - Differential to be determined by BACnet building management system programming

   iv. Changeover to heating mode shall occur when room temperature is less than or equal to the heating setpoint.
   - Differential to be determined by BACnet building management system programming

   v. Guard timer
   - Upon changeover, guard timer will prevent another changeover during this period.
   - Guard timer should be ignored by a change of setpoint manually from the BMS, Intelligent Touch Controller, Remote Controller, or by schedule.
   - Guard timer to be configured by BMS programming (30 minute minimum recommended)

9) Setpoint limitation
   The BMS shall utilize maximum and minimum cooling and heating setpoint to configure upper and lower setpoints range.

10) System shutdown:
BMS should utilize System forced off point to execute emergency stop program registered on the iTM.
11) Restricted functions:
The following iTM functions shall be prohibited when the BACnet Server Gateway option enabled:
i. Interlocking Control.
ii. Emergency Stop (Emergency stop manual release).
iii. Power Proportional Distribution (PPD) option.
iv. BACnet Client option.
v. D-Net Service.

1. Mounting:
The iTM Plus Adapter can be mounted on the wall or in a standard enclosure (field supplied).

2. Features:
a. The iTM Plus Adapter shall be approximately 6.30” x 5.87” x 2.41” in size.

3. Basic Operation:
a. Control of all associated indoor unit groups shall be done via the connected intelligent Touch Manager.

4. Programmability:
a. Programming of all associated indoor unit groups shall be done via the connected intelligent Touch Manager.

D. HVAC SYSTEM START-UP PROCEDURE

a. GENERAL

i. The goal of this procedure is for a few units to run as much as possible with the coils as cold as possible to "wring out" the water and allow it to drain away in the condensate drain pans. Allowing all units to cycle on and off, running for short periods of time, does not dehumidify the air in the building. Starting the system without following the steps outlined will raise the relative humidity in the building and most likely cause condensation on some of the building surfaces and HVAC system that the Contractor will be responsible to correct.

ii. The high humidity and condensation occurs in buildings at start up primarily because the building is only partly occupied (or not occupied) when the HVAC system is started. Most people believe that the answer to this problem is to turn the thermostats down very low. The assumption is that cold air will not hold moisture. That is not true. What happens is that the thermostats are quickly satisfied thermally because there is very little cooling load on the building and the cooling equipment. The terminal units then only have to run for a very short period of time to keep the thermostats satisfied and the relative humidity of the air is in fact raising. The goal is to cause the moist air to pass over coils which are cooling it and drying it without allowing more moist air to be introduced into the building.

iii. To reduce the always present high humidity start-up problem, we have devised this start-up procedure that will minimize the adverse effects of the start-up. As the building sits at start-up, all of the walls, floor, and ceilings are saturated with moisture from the air and also moisture is being released from the drying paint and curing concrete and mortar.

iv. The following procedure will slowly bring down the temperature and humidity in the lightly loaded building. It will also allow the HVAC equipment to more closely match the actual building load without students and equipment in use.

To reach these goals we require the following:

(1) Set 1/3 of the units (approximately every third unit) on 74°F (no lower). Set the other thermostats for a cooling setpoint of 90°F so the units will not cool. Override the controls so that the fans in all units will circulate air.
(2) Leave all of the interior doors open to allow the air to mix throughout the building.
(3) Close all exterior windows and doors.
(4) Turn off all exhaust fans and outside air units. Outside air unit exhaust and outside air dampers shall be closed.
(5) Leave all of the lights on in the building to provide a cooling load.
(6) Provide portable electric heaters or dehumidifiers in any room that shows signs of condensation.

Here is a list of things you should not do:

(1) Do not prop the exterior doors open during construction or while moving in furnishings.

(2) Do not start all of the units until students are starting school. When students start school the normal setpoints, schedules, and fan cycling shall begin.

END OF SECTION

SECTION 230300 - CONDENSATE DRAINAGE SYSTEM (FOR COOLING EQUIPMENT)

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this section of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

   B. The Contractor shall provide a complete condensate drainage system to carry all condensate discharge from all cooling equipment from the building. Condensate system shall be installed in accordance with IMC. Provide condensate overflow switch for all condensate producing equipment.

   C. Pipe installation and fabrication shall be in accordance with the section of these specifications entitled PIPE, PIPE FITTINGS AND PIPE SUPPORT and as hereinafter specified.

   D. All piping shall be installed concealed, unless specifically noted otherwise and shall be installed under slabs or underground only when specifically indicated.

   E. Lines installed in ceiling spaces shall be held at the maximum possible elevation and shall be coordinated with all other trades to avoid conflicts.

   F. Condensate drain lines shall be pitched 1/4 inch per foot and installed with cleanout plugs at each change in direction and/or at thirty (30) foot intervals. Where this minimum pitch cannot be attained, contact Engineers.

   G. Horizontal runs of condensate drain lines shall be supported at six (6) foot intervals maximum, or more frequently where required to prevent sags and low spots.

   H. Lengths of horizontal lines shall be held at a minimum due to potential lint collection.

   I. Provide condensate traps in accordance with the manufacturer’s recommendations.

2. MATERIAL

   A. Refer to Section of these Specifications entitled: PIPE, PIPE FITTINGS AND SUPPORT.

3. INSULATION

   A. Refer to Section of these Specifications entitled: INSULATION - MECHANICAL.

END OF SECTION 230300

SECTION 231100 - REGISTERS, GRILLES, DIFFUSERS & LOUVERS

1. REGISTERS, GRILLES AND DIFFUSERS

   A. GENERAL

      Alternate register, grille, & diffuser selections, other than manufacturers and models listed below, will be accepted, provided quality, function and characteristics are equivalent. Acceptable alternates are Price, Titus, Metalaire, Nailor, Carnes, Anemostat, Kruegar, and Tuttle & Bailey. Shop drawings shall identify and list all characteristics of each device exactly as scheduled herein. Finishes shall be selected by the Architect. If Architect elects not to select color, all colors shall be off-white. Factory color samples shall be submitted with shop drawings.

   B. SELECTION

      Refer to the Selections Scheduled on the Drawings.

END OF SECTION 231100

SECTION 231200 - SHEET METAL AND FLEXIBLE DUCT

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Requirements-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

B. This branch of the work includes all materials, labor and accessories for the fabrication and installation of all sheet metal work as shown on the drawings and/or as specified herein. Where construction methods for various items are not indicated on the drawings or specified herein, all such work shall be fabricated and installed in accordance with the recommended methods outlined in the latest edition of SMACNA's HVAC Duct Construction Standards, Metal and Flexible, and its subsequent addenda. HVAC duct systems shall be fabricated and installed in accordance with the SMACNA duct construction standards (SMACNA-HVAC and SMACNA-Seismic) including Appendix B of the Seismic Restraint Manual Guidelines for Mechanical Systems. These references and plate numbers shall be used by the Engineer for required sheet metal thicknesses and final acceptance of methods of fabrication, hanging, accessories, etc. All equipment furnished by manufacturers shall be installed in strict accord with their recommended methods.

C. Ductwork shall be constructed and installed per the latest edition of the International Mechanical Code.

D. Ductwork shall be kept clean at all times. Ductwork stored on the job site shall be placed a minimum of 4” above the floor and shall be completely covered in plastic. Installed ductwork shall be protected with plastic to prohibit dust and dirt from entering the installed ductwork, air handling unit, terminal devices, etc. Provide temporary filters on all return grilles and duct openings if the units are running prior to the building being satisfactorily cleaned. Do not install the ductwork if the building is not “dried-in”. If this is required, the open ends of duct shall be covered in plastic to protect. The Owner/Engineer shall periodically inspect that these procedures are followed. If deemed unacceptable, the Contractor shall be required to clean the duct system utilizing a NADCA certified Contractor.

   Prior to purchase and fabrication of ductwork (shop fabricated or manufactured), the Contractor shall coordinate installations with new and existing conditions. Notify the Engineer if there are any discrepancies for resolution.

E. Provide a SMACNA duct cleanliness level “C” per the latest SMACNA standards. [Refer to LEED / Healthcare Requirements]

F. If separate filter grilles are specified for an HVAC unit the Contractors shall remove any unit mounted filters and blank off the unused filter access opening with sheet metal and seal air tight.

G. Wall Penetrations: Where ducts penetrate interior or exterior walls, the walls shall be sealed air tight. Refer to the sleeving, cutting, patching, and repairing section of the specifications for additional requirements.

H. Duct dimensions indicated are required inside clear dimensions. Plan duct layouts for adequate insulation and fitting clearance.

I. Prior to purchase/shipment of the ductwork, manufacturer shall provide as part of the submittal process scaled, field coordinated AutoCAD drawings of the complete system to be furnished. Drawings will indicate all system components including fittings, ductwork and manifolds. Drawings shall be available in an electronic format.

2. LOW PRESSURE DUCTWORK

A. General (Low Pressure)

(1) Double turning vanes shall be installed in all square turns and in any other locations indicated.

(2) Provide a “high efficiency” type take-off with round damper (Flexmaster STOD-B03 or approved equal) for all round duct branches from a rectangular main to a GRD. Refer to the detail on the drawings for all installation requirements.

(3) Cross-break all ducts where any duct section dimension or length is 18" or larger.

(4) Air volume dampers shall be installed in each duct branch takeoffs and/or where indicated, whichever is more stringent. All such dampers shall be accessible without damage to finishes or insulation and shall be provided where required for proper system balance.

(5) Splitter dampers shall be provided in all rectangular supply air duct tees. Damper blade operator shall extend a minimum two inches thru the insulation.

(6) Unless otherwise dimensioned on the drawings, all diffusers, registers and grilles shall be located aesthetically and symmetrically with respect to lighting, ceiling patterns, doors, masonry bond, etc. Locate all supply, return and exhaust diffusers and grilles in the locations shown on the architectural reflected ceiling plan.

(7) Ducts shall be hung by angles, rods, 18 ga. minimum straps, trapezes, etc., in accordance with SMACNA's recommended practices. Duct supports shall not exceed 12 ft intervals. There shall be no less than one set of hangers for each section of ductwork. Where ductwork contains filter sections, coils, fans or other equipment or items, such equipment or items shall be hung independently of ductwork with rods or angles. Do not suspend ducts from purlins or other weak structural members where no additional weight may be applied. If in doubt, consult the structural engineer.

(8) Provide approved flexible connectors at inlet and outlet of each item of heating and cooling equipment whether indicated or not. Install so as to facilitate removal of equipment as well as for vibration and noise control.

(9) All ductwork connections, fittings, joints, etc., including longitudinal and transverse joints, seams and connections shall be sealed. Seal with medium pressure, smooth-textured, water based duct sealant. Sealant shall be UL 181B-M listed, UL 723 classified, NFPA 90A & 90B compliant, permanently flexible, nonflammable, and rated to 15" wg. Apply per manufacturer's recommendations. Contractors shall ensure no exposed sharp edges or burrs on ductwork.

(10) All angular turns shall be made with the radius of the center line of the duct equivalent to 1.5 times the width of the duct.

(11) Miscellaneous accessories such as test openings with covers, latches, hardware, locking devices, etc., shall be installed as recommended by SMACNA and/or as indicated. Test openings shall be placed at the inlet and discharge of all centrifugal fans, coils, VAV boxes, fan sections of air handling units, at the end and middle of all main trunk ducts and where indicated. All such openings shall be readily accessible without damage to finishes.

(12) Whether indicated or not, provide code approved, full sized fire dampers at all locations where ductwork penetrates fire rated walls. Fire stop rating shall meet or exceed the rating of the wall. Provide an approved access panel at each fire damper located and sized so as to allow hand reset of each fire dampers. All such fire dampers and access panels shall be readily accessible without damage to finishes. Refer to Architectural Plans for locations of fire rated walls. All access doors shall be 16"x16" or as high as ductwork permits and 16" in length.

(13) The Contractor who installs the sheet metal shall furnish to the Air Balancing Contractor, a qualified person to assist in testing and balancing the system.

(14) All fans and other vibrating equipment shall be suspended by independent vibration isolators.

(15) The interior surface of the ductwork connecting to return/exhaust air grilles shall be painted flat black. The ductwork shall be painted a minimum of 24" starting from the grille.

B. Materials (Low Pressure Single Wall)

(1) Ductwork, plenums and other appurtenances shall be constructed of the following:

a. Steel sheets, zinc coated, Federal Specification 00-S-775, Type I, Class E & ASTM A93-59T with G-90 zinc coating or aluminum alloy sheets 3003, Federal Specification AA-A-359, Temper H-14. Utilize Aluminum in MRI Scan Rooms or NMR Room applications.

b. Exposed ductwork in finished spaces requiring insulation such as gymnasiums, etc., shall be dual wall ductwork.

(2) Ductwork, plenums and other appurtenances shall be constructed of the materials of the minimum weights or gauges as required by the latest SMACNA 2" W.G. Standard or the below table, whichever is more stringent. When gauge thickness differs, the heavier gauge shall be selected. The below table shall serve as a minimum:

ROUND DUCT		RECTANGULAR DUCT	
DIA., INCHES	GAUGE	WIDTH, INCHES	GAUGE
3 TO 12	26	UP TO 12	26
12 TO 18	24	13 TO 30	24
19 TO 28	22	31 TO 54	22
29 TO 36	20	55 TO 84	20
37 TO 52	18	85 AND ABOVE	18

C. Materials (Low Pressure Double Wall Ductwork)

(1) Install Double Wall Ductwork in the following areas:

a. At all locations indicated on drawings.

(2) Furnish and install where indicated double wall duct. The double wall duct shall be Eastern Sheet Metal, United McGill, Semco or approved equivalent. The duct shall have an inner shell, a 1-inch layer of fiberglass insulation and an outer pressure shell.

(3) Ductwork outer shell shall be spiral, lock-seam construction fabricated from galvanized steel meeting ASTM-527 standard. Any ductwork exposed to view shall be constructed of G90 galvanized steel, 20 gauge, and shall be supported as required with aircraft cables and self-tightening locks. Ductwork shall be constructed as specified in LOW PRESSURE DUCTWORK.

(4) Inner shell for spiral pipe shall be a perforated inner liner. The inner liner shall have 3/32" perforation with an overall open area of 23%.

(5) Inner shell for fittings shall be galvanized steel. All fittings shall be manufactured by the same manufacturer as the spiral pipe. Fittings shall be constructed a minimum of 22 Ga.

(6) The fiberglass liner shall have a maximum thermal conductivity (k) factor of 0.27 btu per hour per square foot per degree Fahrenheit per inch thickness at 75-degree F ambient temperature.

(7) All double wall ductwork will be furnished with factory installed flanges equal to Eastern Sheet Metal Flange which shall consist of a 1.5 outer flange and an inner secondary flange which

shall keep the inner flange concentric and eliminate inner wall connections. Flanges requiring inner couplings will not be allowed, no insulation shall be exposed to the airstream at the connections.

(8) All grille and register taps shall be factory manifolded. Field installed taps will not be allowed. Manifolded taps may be tack welded and caulked for appearance. Only taps for grilles and registers may be provided this way. All other fittings shall be full body welded.

D. Miscellaneous (Low Pressure)

(1) Un-insulated Flexible ductwork (Use Only Where Indicated)

a. Un-insulated flexible ductwork shall be corrugated aluminum. No sections shall be greater than five feet in length. Ductwork shall be UL rated and in accordance with IMC.

b. Flexible ductwork installed in a return or exhaust or other negative static pressure application shall be rated for installation in negative pressure systems.

(2) Insulated Flexible Duct (Use Only Where Indicated)

a. Owens/Corning or equivalent, 1 ½'' inch thick fiberglass insulation; flexible liner; with aluminum pigment vinyl vapor barrier facing. Insulated flexible duct shall meet Fire Hazards Standards of NFPA 90A and IMC, flame spread not to exceed 25, smoke develop and fuel contributed not to exceed 50 when tested in accordance with ASTM-E84. Minimum R-value of 6.0, tested in accordance with ASTM C177.71. Flexible duct may be used only for runouts and no sections shall be more than five feet in length.

b. When flexible duct is located in areas where it will be visible because the ceiling allows views to the ductwork above, the flexible duct shall be black. The black color shall be factory coloring and not field applied.

c. Flexible duct shall not be used in areas where there is no ceiling.

d. Flexible ductwork installed in a return or exhaust or other negative static pressure application shall be rated for installation in negative pressure systems

(3) Flexible Connectors: Duro-Dyne, Ventfabrics, Inc., U.S. Rubber or equivalent; conforming to NFPA Pamphlet No. 90-A; neoprene coated glass fabric; 20 oz. for low pressure ducts secured with snap lock.

(4) Turning Vanes: Duro-Dyne or equivalent fabricated as recommended by SMACNA: noiseless when in place without mounting projections in ducts. All turning vanes shall be double blade type.

(5) Splitter Damper: Splitter damper shall be constructed of 16-gauge galvanized steel. Provide with operating hardware by Ventfabrics, Inc. to include damper blade bracket, ball joint

bracket and operator shaft. Operator shall extend two inches from duct to allow for external insulation, where required. Regulator shall seal operator shaft air tight. Install hardware as recommended by manufacturer.

(6) Access Doors; In Ductwork: Flexmaster TBSM, Air Balance, Vent Products or equal. Access doors for rectangular ducts shall be 16"x16" where possible. Otherwise install as large an access door as height permits by 16" in length. Door shall be 1" thick double-wall insulated with continuous hinge and cam lock. Provide in ducts where indicated or where required for servicing equipment whether indicated or not. Provide a hinged access door in duct adjacent to all fire, smoke and control dampers for the purpose of determining position. Access doors shall also be provided on each side of duct coils (water, electric, steam, etc.) and downstream side of VAV boxes and CAV boxes.

(7) Architectural Access Doors in Ceilings or Walls: Provide where required to access equipment, dampers, valves, filters, etc. Provide Kees D Panel, Cesco, Milcor or equal. Panels shall be 24"x24" in size and constructed with 16 gauge galvannealed steel for door and frame. In finished areas, provide with primed steel with 1" border to accept architectural specified finish. In Mechanical, Electrical, or service spaces, provide brushed satin finish with 1" border. Door shall include three (3) screwdriver operated cam latches and concealed continuous pivoting rod hinge. Door shall open 175 degrees. For masonry construction, furnish frames with adjustable metal masonry anchors. For fire rated units, provide manufacturer's standard insulated flush panel/doors with continuous piano hinge and self-closing mechanism. The Contractor shall include all required access doors in the bid and shall coordinate with the General Contractor prior to the bid to ensure a complete project.

(8) Security Architectural Access Doors in Walls: Provide where required to access equipment, dampers, valves, filters, etc.Provide Kees SSAP Panel, Cesco, Milcor or equal. Panels shall be 24"x24" in size and constructed with 12-gauge steel for door and frame. In finished areas, provide with primed steel with 1" border to accept architectural specified finish. In Mechanical, Electrical, or service spaces, provide brushed satin finish with 1" border. Door shall include key-operated cylinder dead bolt lock (coordinate cylinders and keys with Owner to match facility standards) and concealed continuous pivoting rod hinge. Door shall open 175 degrees. For masonry construction, furnish frames with adjustable metal masonry anchors and straps. For fire rated units, provide manufacturer's standard insulated flush panel/doors with continuous piano hinge and self-closing mechanism. The Contractor shall include all required access doors in the bid and shall coordinate with the General Contractor prior to the bid to ensure a complete project.

(9) Volume Dampers (Rectangular): Ruskin, Model MD35 or Empco, Air Balance; Louvers and Dampers, Titus, Carnes, Cesco/Advanced Air, Creative Metals, United Air, Pottorf rectangular volume dampers. Frames shall be 4" x 1 "x 16-gauge galvanized steel. Blades shall be opposed blade 16-gauge galvanized steel with triple crimped blades on 6" centers. Linkage shall be concealed in jamb. Bearings shall be ½" nylon. Maximum single section size shall be 48" wide and 72" high. Provide with Ventfabrics 2" high elevated dial regulator to avoid damper handle from conflicting with duct insulation. Provide permanent mark on dial regulator to mark air balance point.

(10) Volume Dampers (Round): Ruskin, Model MDRS25 or, Empco, Air Balance; Louvers and Dampers, Titus, Carnes, Cesco/Advanced Air, Creative Metals, United Air, Pottorff round volume dampers. Dampers shall be butterfly type consisting of circular blade mounted to axle. Frames shall be 20-gauge steel, 6" long. Damper blades shall be 20-gauge galvanized steel. Axle shall be 3/8"x6" square plated steel. Bearing shall be 3/8" nylon. Provide with Ventfabrics 2" high elevated dial regulator to avoid damper handle from conflicting with duct insulation. Provide permanent mark on dial regulator to mark air balance point.

(11) Fire Dampers: Fire dampers shall comply with IMC and shall be constructed and tested in accordance with UL Safety Standard 555. Each fire damper shall have a 1-1/2 or 3-hour fire protection rating as required by fire wall. Damper shall have a 165°F fusible link, and shall include a UL label in accordance with established UL labeling procedures. Fire damper shall be equipped for vertical or horizontal installation as required by the location shown. Fire dampers shall be installed in wall and floor openings utilizing 16-gauge minimum steel sleeves, angles, other materials, practices required to provide an installation equipment to that utilized by the manufacturer when dampers were tested at UL. Installation shall be in accordance with the damper manufacturer's instructions. **All fire dampers shall be dynamic. Static fire dampers are not allowed**. Provide velocity level and pressure level as required for application (if in doubt, contact Engineer). Fire dampers shall be Ruskin Type DIBD for 1-1/2-hour rating or Ruskin Type DIBD 23 for a 3-hour rating. Other acceptable manufacturers are Air Balance, Prefco, Greenheck, Nailor, or Safe Air. Provide an access door for fire damper reset at all fire damper locations.

(12) Motor Driven Smoke Dampers – Air Foil Blade: Provide Ruskin SD60 smoke damper where required by the locations of smoke partitions or as shown on the plans, whichever is more stringent. Other acceptable manufacturers are Air Balance or Pottorff. All smoke dampers shall be three inches larger than HVAC duct in each direction. Frame shall be a minimum of 18-gauge galvanized steel formed into a structural hat channel shaper with tabbed corners for reinforcement. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, on 6" maximum centers. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame. Jamb seal shall be stainless steel flexible metal compression type. Each smoke damper shall be classified by Underwriters Laboratories as a Leakage Rated Damper for use in smoke control systems under the latest version of UL555S, and bear a UL label attesting to same. As part of the UL qualification, dampers shall have demonstrated a capacity to operate (to open and close under HVAC system operating conditions) with pressures of at least the maximum possible of the HVAC system in the closed position, and the system maximum duct air velocity in the open position. In addition to the leakage ratings already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 350 degrees F. Appropriate electric actuators shall be installed by the damper manufacturer. Refer to building fire alarm and controls for exact type. Actuator to be mounted outside of air stream. The pressure drop shall not be greater than .16" wg @ 2500 FPM when tested by an independent laboratory. Provide factory supplied caulked sleeve, gauge as required to meet manufacturer UL installation requirements.

(13) Motor Driven Fire/Smoke Dampers – Air Foil Blade: Fire damper shall be constructed and tested in accordance with UL Safety Standard 555. The damper shall be Ruskin FSD60. Other acceptable manufacturers are Air Balance or Pottorff. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, on 6" maximum centers. Frame is to be a minimum of 16-gauge galvanized steel, rollformed into a structural hat shape channel. Frame seals shall consist of flexible, compression type stainless steel. The damper and actuator electric shall be rated to an elevated temperature or 250 degrees F or 350 degrees F. In addition, the damper must be factory supplied with actuator and sleeve to comply with the requirements of UL 555S. These dampers shall have been constructed and tested in compliance with U.L. Standard 555 and U.L. Standard 555S, current editions. The pressure drop shall not be greater than .25 in.wg. At 2500 fpm when tested by an independent laboratory. Each damper shall bear an approved U.L. label identifying its classification as a Dynamic Rated Fire Damper (Static Rated dampers are not acceptable), and shall further be classified by U.L. as a Leakage Rated Damper for use in Smoke Control Systems. Each damper shall have a 1-1/2-hour fire protection rating, 212EF U.L. Listed fusible link and a leakage class I. In addition to the leakage ratings already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 350 degrees F. Appropriate electric actuators shall be installed by the damper manufacturer. Refer to building fire alarm and controls for exact type. Provide factory supplied caulked sleeve, 20 gauge on dampers through 84” wide and 18 gauge above 84" wide. Actuator to be mounted outside of air stream. Provide factory supplied caulked sleeve, gauge as required to meet manufacturer UL installation requirements.

(14) Motor Driven Control Dampers – Provide Ruskin Model CD50 air foil damper as shown on the plans. Frame shall be a minimum of 16-gauge galvanized steel formed into a structural hat channel shaper with tabbed corners for reinforcement. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, 6 inches wide. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame. Jamb seal shall be stainless steel flexible metal compression type. Blade seals shall be equal to Ruskinprene. Leakage Rating shall be Pressure/Class 1.

3. MEDIUM PRESSURE DUCTWORK

A. General (Medium Pressure)

(1) All ductwork connections, fittings, joints, etc., shall be sealed. Seal with high velocity, smooth-textured, water based duct sealant. Sealant shall be UL 181B-M listed, UL 723 classified, NFPA 90A & 90B compliant, permanently flexible, non-flammable, and rated to 15” wg. Apply per manufacturer's recommendations.

(2) Ductwork shall be installed per SMACNA Medium or High-Pressure Manual, whichever is applicable. (Latest Edition shall apply.)

(3) All hanger straps shall be 18 ga. minimum with reinforcement angles installed in strict accordance with SMACNA. Flat oval ducts shall be installed with 2"x2"x1/4" angles on top and bottom ducts 18" wide and larger. Use 1"x1"x3/16" angles on ducts under 18" wide.

(4) Miscellaneous accessories such as test openings with covers, latches, hardware, locking devices, etc., shall be installed as recommended by SMACNA or the duct manufacturer, and/or as indicated. Test openings shall be placed at the discharge of all air handling units and at the end and middle of all main trunk ducts and where indicated. All such openings shall be readily accessible without damage to finishes.

(5) Whether indicated or not, provide code approved, full sized fire dampers at all locations where ductwork penetrates fire rated walls. Fire stop rating shall meet or exceed the rating of the wall. Provide an approved access panels at each fire damper located and sized so as to allow hand reset of each fire damper. All such fire dampers and access panels shall be readily accessible without damage to finishes. Refer to Architectural Plans for locations of fire rated walls. Where access doors are installed in insulated ductwork, the access door shall be the insulated type.

B. Materials (Medium Pressure Single Wall)

(1) All round, rectangular, and oval medium pressure ductwork for systems above 1.5" W.G. shall be Eastern Sheet Metal, United McGill or Semco or equal with construction as required by the latest SMACNA Standard (Refer to required pressure rating of the duct system as outlined in the Duct Schedule of this spec section).

(2) Any ductwork exposed to view shall be double wall and constructed of galvanized steel. Galvanized metal shall be prepped and clean prior to painting. Coordinate with General Contractor.

Ductwork shall be spiral, lock-seam construction fabricated from galvanized steel meeting ASTM-527 standard. Ductwork shall be constructed of materials of the minimum weights or gauges as required by the latest SMACNA Standard (Refer to required pressure rating of the duct system as outlined in the Duct Schedule of this spec section) or the below table. When gauge thickness differs, the heavier gauge shall be selected. The below table shall serve as a minimum:

ROUND DUCT (or Equivalent Diameter for Flat Oval)		RECTANGULAR DUCT	
DIA., INCHES	GAUGE	WIDTH, INCHES	GAUGE
3 TO 14	26	UP TO 12	26
15 TO 26	24	13 TO 30	24
27 TO 36	22	31 TO 54	22
37 TO 50	20	55 TO 84	20
52 TO 60	18	85 AND ABOVE	18

(3) All medium pressure duct fittings shall be fabricated by the same manufacturer as the spiral pipe. Contractor or field fabricated fittings shall not be accepted. Duct fittings shall be constructed per the latest SMACNA standard (Refer to required pressure rating of the duct system as outlined in the Duct Schedule of this spec section) with continuous welds. Take-off fittings shall be combination type tees (Eastern Sheet Metal Model "CB" or equal). Straight or angle tees are not acceptable. Fittings shall be constructed of the following minimum gauges:

ROUND DUCT (or Equivalent Diameter for Flat Oval)		RECTANGULAR DUCT	
DIA., INCHES	GAUGE	WIDTH, INCHES	GAUGE
3 TO 50	20	UP TO 36	20
51 TO 60	18	37 TO 60	18
61 TO 84	16	61 AND ABOVE	16

(4) All single wall ductwork will be furnished with factory installed flanges equal to Eastern Sheet Metal Flange on all ductwork greater than 24 inches in size.

C. Materials (Medium pressure Double Wall)

(1) Furnish and install where indicated by drawings or specifications medium pressure double wall duct. The double wall duct shall be United McGill Acoustic K27, SEMCO, Dixie or approved equivalent. The duct shall have a **[perforated inner liner. The inner liner shall have 3/32" perforation with an overall open area of 23%.] [solid galvanized steel inner liner]**, an intermediate layer of fiberglass insulation minimum 1'' thick and an outer pressure shell. Duct shall be of spiral lock seam construction fabricated from galvanized steel meeting ASTM-A527 standard. The duct insulation shall have minimum R-value of 6.0. Medium pressure double wall fittings shall have the same construction features as the double wall duct. Duct shall be constructed of G90 Galvanized steel. Outer shell of ductwork shall be constructed of the minimum gauges specified above for single wall medium pressure ductwork.

(2) All double wall ductwork will be furnished with factory installed flanges equal to Eastern Sheet Metal Flange which shall consist of a 1.5 outer flange and an inner secondary flange which shall keep the inner flange concentric and eliminate inner wall connections. Flanges requiring inner couplings will not be allowed, no insulation shall be exposed to the airstream at the connections.

D. Miscellaneous (Medium pressure)

(1) Flexible Connectors: Duro-Dyne, Ventfabrics, U.S. Rubber or equivalent; conforming to NFPA Pamphlet No. 90-A or IMC, whichever is more stringent; neoprene coated glass fabric; 30 oz.

for medium pressure ducts secured with bolted angles. Provide flexible connectors at inlet and outlet of air handling equipment to accommodate a minimum of three times the operating pressure of the system.

(2) Architectural Access Doors In Ceilings or Walls: Provide where required to access equipment, dampers, valves, filters, etc. Provide Kees D Panel, Cesco, Milcor or equal. Panels shall be 24”x24” in size and constructed with 16 gauge galvannealed steel for door and frame. In finished areas, provide with primed steel with 1” border to accept architectural specified finish. In Mechanical, Electrical, or service spaces, provide brushed satin finish with 1” border. Door shall include three (3) screwdriver operated cam latches and concealed continuous pivoting rod hinge. Door shall open 175 degrees. For masonry construction, furnish frames with adjustable metal masonry anchors. For fire rated units, provide manufacturer’s standard insulated flush panel/doors with continuous piano hinge and self-closing mechanism. The Contractor shall include all required access doors in the bid and shall coordinate with the General Contractor prior to the bid to ensure a complete project.

(3) Security Architectural Access Doors in Walls: Provide where required to access equipment, dampers, valves, filters, etc. Provide Kees SSAP Panel, Cesco, Milcor or equal. Panels shall be 24”x24” in size and constructed with 12-gauge steel for door and frame. In finished areas, provide with primed steel with 1” border to accept architectural specified finish. In Mechanical, Electrical, or service spaces, provide brushed satin finish with 1” border. Door shall include key-operated cylinder dead bolt lock (coordinate cylinders and keys with Owner to match facility standards) and concealed continuous pivoting rod hinge. Door shall open 175 degrees. For masonry construction, furnish frames with adjustable metal masonry anchors and straps. For fire rated units, provide manufacturer’s standard insulated flush panel/doors with continuous piano hinge and self-closing mechanism. The Contractor shall include all required access doors in the bid and shall coordinate with the General Contractor prior to the bid to ensure a complete project.

(4) Fire Dampers: Fire dampers shall comply with IMC and shall be constructed and tested in accordance with UL Safety Standard 555. Each fire damper shall have a 1-1/2 or 3-hour fire protection rating as required by fire wall. Damper shall have a 165°F fusible link, and shall include a UL label in accordance with established UL labeling procedures. Fire damper shall be equipped for vertical or horizontal installation as required by the location shown. Fire dampers shall be installed in wall and floor openings utilizing 16-gauge minimum steel sleeves, angles, other materials, practices required to provide an installation equipment to that utilized by the manufacturer when dampers were tested at UL. Installation shall be in accordance with the damper manufacturer's instructions. **All fire dampers shall be dynamic. Static fire dampers are not allowed**. Provide velocity level and pressure level as required for application (if in doubt, contact Engineer). Fire dampers shall be Ruskin Type DIBD for 1-1/2-hour rating or Ruskin Type DIBD 23 for a 3-hour rating. Other acceptable manufacturers are Air Balance, Prefco, Greenheck, Nailor, or Safe Air. Provide an access door for fire damper reset at all fire damper locations.

(5) Motor Driven Smoke Dampers – Air Foil Blade: Provide Ruskin SD60 smoke damper where required by the locations of smoke partitions or as shown on the plans, whichever is more

stringent. Other acceptable manufacturers are Air Balance or Pottorff. Frame shall be a minimum of 18-gauge galvanized steel formed into a structural hat channel shaper with tabbed corners for reinforcement. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, on 6" maximum centers. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame. Jamb seal shall be stainless steel flexible metal compression type. Each smoke damper shall be classified by Underwriters Laboratories as a Leakage Rated Damper for use in smoke control systems under the latest version of UL555S, and bear a UL label attesting to same. As part of the UL qualification, dampers shall have demonstrated a capacity to operate (to open and close under HVAC system operating conditions) with pressures of at least the maximum possible of the HVAC system in the closed position, and the system maximum duct air velocity in the open position. In addition to the leakage ratings already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 350 degrees F. Appropriate electric actuators shall be installed by the damper manufacturer. Refer to building fire alarm and controls for exact type. Actuator to be mounted outside of air stream. The pressure drop shall not be greater than .16" wg @ 2500 FPM when tested by an independent laboratory. Provide factory supplied caulked sleeve, gauge as required to meet manufacturer UL installation requirements.

(6) Motor Driven Fire/Smoke Dampers – Air Foil Blade: Fire damper shall be constructed and tested in accordance with UL Safety Standard 555. The damper shall be Ruskin FSD60. Other acceptable manufacturers are Air Balance or Pottorff. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, on 6" maximum centers. Frame is to be a minimum of 16-gauge galvanized steel, rollformed into a structural hat shape channel. Frame seals shall consist of flexible, compression type stainless steel. The damper and actuator electric shall be rated to an elevated temperature or 250 degrees F or 350 degrees F. In addition, the damper must be factory supplied with actuator and sleeve to comply with the requirements of UL 555S. These dampers shall have been constructed and tested in compliance with U.L. Standard 555 and U.L. Standard 555S, current editions. The pressure drop shall not be greater than .25 in.wg. At 2500 fpm when tested by an independent laboratory. Each damper shall bear an approved U.L. label identifying its classification as a Dynamic Rated Fire Damper (Static Rated dampers are not acceptable), and shall further be classified by U.L. as a Leakage Rated Damper for use in Smoke Control Systems. Each damper shall have a 1-1/2-hour fire protection rating, 212EF U.L. Listed fusible link and a leakage class I. In addition to the leakage ratings already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 350 degrees F. Appropriate electric actuators shall be installed by the damper manufacturer. Refer to building fire alarm and controls for exact type. Provide factory supplied caulked sleeve, 20 gauge on dampers through 84” wide and 18 gauge above 84" wide. Actuator to be mounted outside of air stream. Provide factory supplied caulked sleeve, gauge as required to meet manufacturer UL installation requirements

(7) Motor Driven Control Dampers – Provide Ruskin Model CD60 air foil damper as shown on the plans. Frame shall be a minimum of 16-gauge galvanized steel formed into a structural hat channel shaper with tabbed corners for reinforcement. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, 6 inches

wide. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame. Jamb seal shall be stainless steel flexible metal compression type. Blade seals shall be equal to Ruskinprene. Leakage Rating shall be Pressure/Class 1.

(8) Access Doors; In Rectangular Medium Pressure Ductwork: Flexmaster TBSM, Air Balance, Vent Products or equal. Access doors for rectangular ducts shall be 16"x16" where possible. Otherwise install as large an access door as height permits by 16" in length. Door shall be 1" thick double-wall insulated with continuous hinge and cam lock. Provide in ducts where indicated or where required for servicing equipment whether indicated or not. Provide a hinged access door in duct adjacent to all fire, smoke and control dampers for the purpose of determining position.

(9) Access Doors; In Round or Oval Medium Pressure Ductwork: All access doors in round or oval medium pressure ductwork shall be screw and gasketed type. Screws shall be maximum 4 inches on centers. Access door sizes shall be as follows:

DUCT DIAMETER	OPENING SIZE
3-4 inches	4" x 10"
5-6 inches	6" x 10"
7-24 inches	10" x 16"
26-36 inches	16" x 16"
Over 36 inches	16" x 22"

4. DRYER VENT

A. All dryer ducting shall be a minimum of 4" in diameter. Refer to the drawings for exact duct sizing.

B. Dryer vent ductwork shall be rigid metal 20-gauge aluminum duct. Duct joints shall be installed so that the male end of the duct points in the direction of the airflow. Joints shall be secured with metal tape (not duct tape). Do not use rivets or screws in the joints or anywhere else in the duct as these will incur lint collection

C. Length of concealed rigid metal ducting shall not exceed the allowable length of 35 feet. Deduct 5 feet from the allowable length for every 4" 90-degree elbow and 4" 2.5 feet for every 45-degree fitting. lengths may vary per local codes and dryer manufacturer's recommendations. Install per 2012 IMC Section 504 Clothes Dryer Exhaust. Provide a complete, working in-line booster fan system, including power, if the maximum allowable duct length is exceeded.

D. Flexible transition hose connection at the dryer shall be the aluminum flexible duct type. Do not use the plastic or vinyl.

E. Termination of dryer venting shall be to the exterior with a proper hood or roof jack equipped with a backdraft damper. Hood/jack shall be painted with suitable exterior grade paint and color per the Owner's direction. Small orifice metal screening shall not be part of the hood or roof jack as this will trap lint and block the opening. The hood opening shall point down and maintain a

minimum of 12 inches of clearance between the bottom of the hood and the ground or other obstruction.

5. DUCT SCHEDULE

A. Supply Ducts:

(1) Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, downstream of Terminal Units:

a. Pressure Class: Positive **2**-inch wg Refer to Low Pressure requirements as outlined in section 2 of this spec.
b. Minimum SMACNA Seal Class: **A**.
c. SMACNA Leakage Class for Rectangular: **24**.
d. SMACNA Leakage Class for Round and Flat Oval: **12**.

(2) Ducts Connected to Variable-Air Volume Air-Handling Units RTU-1:

a. Pressure Class: Positive **4**-inch wg Refer to medium pressure standards as outlined in section 3 of this spec.
b. Minimum SMACNA Seal Class: **A**.
c. SMACNA Leakage Class for Rectangular: **6**.
d. SMACNA Leakage Class for Round and Flat Oval: **3**.

B. Return Ducts:

(1) Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, downstream of Terminal Units:

a. Pressure Class: Negative 2-inch wg Refer to Low Pressure requirements as outlined in section 2 of this spec.
b. Minimum SMACNA Seal Class: **A**.
c. SMACNA Leakage Class for Rectangular: **24**.
d. SMACNA Leakage Class for Round and Flat Oval: **12**.

(2) Ducts Connected to Air-Handling Units RTU-1:

a. Pressure Class: Negative **2**-inch wg Refer to **Low Pressure requirements as outlined in section 2 of this spec**.
b. Minimum SMACNA Seal Class: **A**.
c. SMACNA Leakage Class for Rectangular: **24**.
d. SMACNA Leakage Class for Round and Flat Oval: **12.**

C. Exhaust/Relief Ducts:

(1) Ducts Connected to Exhaust Fans EF-1, EF-2, EF-3, EF-4:

a. Pressure Class: Negative **2**-inch wg Refer to **Low Pressure requirements as outlined in section 2 of this spec**.

b. Minimum SMACNA Seal Class: **A.**
c. SMACNA Leakage Class for Rectangular: **24**.
d. SMACNA Leakage Class for Round and Flat Oval: **12.**

12. Air Leakage Testing of the Ductwork Systems

A. It is the intent of this section to ensure the ductwork installed has minimal air leakage.

B. Air leakage testing shall be accomplished by an AABC or NEBB certified company. Refer to the Test & Balance specifications.

C. It is the intent to test all ductwork. The duct systems which will require testing are as follows: **(Note to Designer to edit.)**

(1) All supply air duct systems

(2) All exhaust air duct systems.

D. Do not insulate the supply air systems prior to testing.

E. The maximum allowable air leakage rate for each system tested must conform to SMACNA required leakage class rating as specified in section 11, DUCT SCHEDULE, of this spec.

F. The entire supply air ductwork system shall be tested with some exceptions. On VAV systems, the medium pressure ductwork upstream of the VAV boxes shall only be tested. Cap the duct at the inlet to the VAV box.

G. All return and exhaust air sheet metal ductwork associated with the system shall be tested. Flexible ductwork shall not be tested. Cap the main duct prior to the central equipment fan connection. Also cap the branch ducts which serve the diffusers, after the round branch air volume with sheet metal caps. Seal caps well to damper to avoid air loss at this location. This air loss, from the caps, is included in the noted leakage rate.

H. The noted allowable leakage rate is the total allowable. It shall include leakage associated with the following:

(1) All ductwork as described in above paragraphs.

(2) Access doors

(3) Volume dampers

(4) Relief air doors

(5) Smoke dampers

(6) Fire dampers

(7) Fire smoke dampers

(8) End caps used to seal ducts

I. If any duct system fails a test, the contractor shall reseal the system. It shall then be retested until the duct system meets the leakage allowable at no additional cost to the owner.

J. Carefully select the ductwork construction requirements and the type of duct sealant to be used as required to meet the leakage allowances. The sheet metal duct pressure classification is a minimum only. The contractor shall select the appropriate sheet metal pressure classification, duct sealant class and duct sealant materials to meet the project air leakage allowances.

K. Whenever the systems are being leak tested by the Test & Balance Contractor, a representative from the Mechanical Contractor shall be present to assist.

END OF SECTION 231200

SECTION 250100 - MOTOR STARTERS AND OTHER ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

1. MOTOR STARTERS-GENERAL

   A. Where motor starters are required for mechanical equipment, they are to be the responsibility of the Contractor furnishing the equipment as outlined herein.

   B. Motor starters shall be furnished by the Equipment Supplier with his equipment. Coordinate all requirements for starters with equipment suppliers and other trades.

   C. Motor starters shall be NEMA style. I.E.C.-style starters are not to be provided. Their sizing and installation shall be coordinated with the equipment manufacturer's requirements and in accordance with the National Electrical Code.

   D. Unless otherwise noted, provide combination starter/disconnects for all equipment requiring a starter.

2. ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

   A. All mechanical equipment shall be provided for single point electrical connection unless specifically noted to the contrary. Refer to schedules and other sections of these specifications for further requirements. It is the responsibility of the Contractor to coordinate the electrical characteristics of all equipment with the electrical provisions indicated on the Contract Documents. The Contractor shall notify the Engineer in writing ten calendar days prior to bid of any discrepancy so a written clarification by Addendum may be made. If such notice is not given, the Contractor shall be responsible for any and all costs or delays associated with any changes required. Specification of equipment characteristics made during review of shop drawings shall not relieve the Contractor of this responsibility.

   B. The equipment manufacturer shall provide internally mounted fuses with his equipment, as required, to comply with the U.L. listing on the equipment name plate. (i.e., hermetically sealed compressors or equipment with name plate data that recommends or requires fuse protection.) See also, National Electrical Code, Article 440, and other applicable sections of the N.E.C.

   C. It is the Contractor's responsibility to furnish and install fusible or non-fusible disconnect switches or circuit breakers for disconnecting means as required by the Code for <u>all</u> electrically powered equipment. All power wiring from source, thru disconnecting means and motor starters to motor terminals or equipment junction box is to be furnished and installed by the Contractor. Each separate contractor engaged for the project shall coordinate with all other trades to ensure all necessary equipment and labor is included for fully functioning mechanical systems, installed per code requirements. Unless otherwise notes, provide combination starter/disconnects for all equipment requiring a starter.

   D. Final electrical connection of equipment shall be verified for proper voltage requirements in conjunction with the motor nameplate patch and actual wiring configuration. Any costs

associated with damage to appliances motors, equipment, etc., connected to incorrect supply voltage shall be borne by the Contractor.

E. Refrigeration condensing units with internal compressors shall be furnished with integral starter. The Contractor is to furnish and install a fusible disconnecting means with fuses sized to motor nameplate requirements. Coordinate wiring, mounting and style of disconnect switch at unit in field.

F. All interlock or other control wiring, unless specifically noted otherwise, is the responsibility of the Contractor.

G. All equipment shall be suitably enclosed. All enclosures for equipment shall be rated and approved for the environment in which it operates. (i.e., NEMA 1, NEMA 3R, NEMA 7, NEMA 12, etc.) Verify the requirement with the installation condition if not indicated on the plans.

H. Observe the following standards for manufacturers of equipment and selection of components.

(1) Starters, control devices and assemblies: NEMA, U.L. - (I.E.C. style not acceptable)

(2) Enclosures for electrical equipment: NEMA, U.L.

(3) Enclosed switches: NEMA, U.L.

(4) All electrical work, generally: National Electrical Code

(5) All electrical work in industrial occupancies: J.I.C. standards

(6) All electrical components and materials: U.L. listing required.

I. Where required, the Contractor is to provide mounting rails or channels to install starters with code-required clearances. Framing shall be solidly anchored by welding expansion shields in masonry or other approved anchorage. Frames are to be constructed of steel angles or pre-manufactured channel systems such as Unistrut, Kindorf or B-Line Company. Framing material shall be pre-finished with corrosion-resistant material or painted with two coats corrosion-resistant oil-based enamel.

3. REQUIREMENTS FOR MECHANICAL EQUIPMENT, 1/2 H.P OR LESS

A. This section describes requirements for small mechanical equipment such as (but not limited to) package terminal heating/cooling units, (water source heat pumps, etc.) VAV boxes, unit heaters, vertical and horizontal unit ventilators, exhaust fans, in-line fans, fan coil units, cabinet heaters and the like.

B. Small equipment with motor(s) of 1/2 H.P., single phase or less are generally not required to be furnished with NEMA-style starter(s), unless otherwise noted.

C. For such equipment, provide integral contactor or horsepower-rated relay where controlled by thermostat or other type of switch. Contactors or relays shall be as recommended by the manufacturer of the equipment, suitable for the service duty.

D. Provide transformer within unit as required to derive low voltage A.C. for thermostat control or derive from temperature controls panel, if available.

E. Provide internal fusing for unit motor and other loads in fuse block or in-line fuseholder. See also Article 2-B, this Section.

F. Where externally-mounted disconnecting means is required and would be impractical, unsightly or inappropriate in the judgment of the Engineer, disconnects shall be located within the unit. These disconnects may be fusible H.P.-rated snap switches or manual starters with overload elements, as required. Locate this and other electrical equipment within enclosure where easily accessible behind access panel or door on unit, and as acceptable to the electrical inspector or local authority having jurisdiction. Refer to mechanical equipment schedules for further information.

G. Where fractional horsepower duplex pumps such as water circulators, sump pumps, etc. are provided, they shall be provided with alternators, cordsets, etc., as required for a complete installation.

4. REQUIREMENTS FOR MECHANICAL EQUIPMENT, 3/4 H.P. OR LARGER

A. This section describes requirements for mechanical equipment such as (but not limited to) exhaust fans, larger air handling units, cooling tower fans, water source heat pumps, chilled or hot water pumps, D.X. roof-top units, air compressors and the like.

B. Provide premium efficiency motors.

C. Equipment provided with motor(s) of 3/4 H.P. and larger, single or three-phase are required to be furnished with starters suitable for the load(s) specified. It is recommended that starters be furnished integrally with or mounted on equipment for field wiring by the Contractor. Where starters are furnished separate from equipment, furnish templates or rough-in diagrams to the appropriate contractor for his use in installation.

D. All starters shall be size 0 minimum. They shall be constructed and tested in accord with latest edition of NEMA standards. All starters shall be across-the-line magnetic type, unless indicated otherwise. On motors of 20 H.P. or greater rating, the supplier shall provide starters capable of limiting inrush currents. These shall be of the wye-delta, reduced voltage open-transition type, or electronic controlled, as required. Do not utilize closed transition starters unless specifically indicated.

E. Magnetic starters shall be furnished with the following characteristics and accessories as a minimum. See other sections of these specifications and mechanical schedules for further requirements.

(1) Contacts shall be silver-alloy, double-break type. Contacts shall be replaceable without removal of wiring or removal of starter from enclosure. Number of contacts shall be as required for service indicated. Contacts shall be gravity dropout type, positive operation.

(2) Coil voltage shall be 120 volts, A.C., 60 HZ or less, as required to suit control systems available voltages. Coils shall be of molded construction, rated for continuous duty. Provide coil clearing contact as required.

(3) Provide control transformer of adequate K.V.A. as required on all starters with line-to-line voltages higher than 120 volts A.C. Provide fuse block and slow-blow fuse to protect control transformer per NEMA, N.E.C. and U.L.

(4) Provide hand-off-auto selector switch in face of starter, wired into hand and off switch positions. Auto position (if needed) to be field wired as indicated on plans or schedules for automatic control. Provide a green run pilot light.

(5) Provide NEMA Class 20 resettable overload relays, accurately sized to the motor nameplate rating of the motor served and the temperature differential between motor and controller. Overloads shall be easily replaceable, and resettable without opening enclosure, via a push button or similar means. Class 10 or Class 30 overloads may be used, depending on the type of anticipated service.

(6) Provide at least one N.O. and one N.C. auxiliary contact (field-convertible to opposite operation) with each starter. Refer to mechanical details or schedules for additional requirements, if any. All starters shall have space for two additional single-pole contacts.

(7) All starters shall be thru-wiring type.

(8) Provide phase failure sensing relay to open starter coil circuit (on loss of one or more phases) on all three-phase starters controlling motors of 15 H.P. or larger.

(9) Provide power factor correction capacitors on motors of 15 H.P. or larger where predicted power factor based on manufacturer's data will fall below 0.90%. Capacitors shall be of the unit-cell type, in single enclosure with discharge resistors and tank overpressure circuit interrupter for safety.

5. REQUIREMENTS FOR WIRING

A. All wiring, including controls, interlock, miscellaneous power, sensors, thermostats, etc., shall be installed in metallic raceway systems that are in compliance with all Division 26 requirements of these Specifications, unless specifically noted otherwise. Open cabling systems will only be permitted where specifically permitted within the Division 26 Specifications and if less than 50 volts A.C. peak-to-peak or 50 volts maximum D.C.

B. Where open cabling is permitted, it shall be installed with proper support as specified in the Division 26 Specifications.

C. Where open cabling is permitted, and installed in environmental air plenum (return, relief, supply, etc.), the materials installed shall be in compliance with N.E.C. Articles 700, 725, 770 (for fiber optic), 780 and 800.

D. Where open cabling is permitted, it shall only be installed open in accessible spaces. Where concealed in walls, it shall be routed through raceways to outlet box(es) for the terminal device.

6. INVERTER DUTY MOTORS

A. Motors which are controlled by variable frequency drive shall be:

(1) NEMA MG-1 Part 31 rated for Inverter Duty.

(2) Furnished with shaft grounding kit for all motors:

a. Motors less than 100 HP in size shall be furnished with shaft grounding kit, Aegis SGR Bearing Protection Ring or equal. One shaft grounding ring and related hardware shall be provided on drive end or non-drive end of motor per manufacturer's instructions. These shall be factory mounted and installed on the exterior of the motor to allow for visual inspection. Ground motor frame per manufacturer's instructions. Install kit in strict accordance with manufacturer's instructions.

b. Motors Pumps greater than 100 HP to 1000 HP in size shall be furnished with shaft grounding kit, Aegis SGR Bearing Protection Ring or equal. Provide shaft grounding ring on drive end and non-drive end of motor per manufacturer's instructions. Additionally, provide insulated bearing journals to further reduce risk of current dissipation through bearings. Ground motor frame per manufacturer's instructions. Install kit in strict accordance with manufacturer's instructions.

END OF SECTION 250100

SECTION 250200 - CONTROLS – DIRECT DIGITAL

1. GENERAL

A. The Contractor shall furnish all labor, materials, equipment and services required to provide a complete temperature control system as specified and as shown on the plans.

B. Prior to the installation of or payment for any work, the Contractor shall prepare submittals which shall be reviewed by the Architect and Engineer. These submittals shall include a complete control diagram and sequence of operation of the entire system, plus engineering data on all devices used.

C. The Contractor shall be a licensed installer of HVAC temperature controls by a national temperature controls manufacturer. Acceptable manufacturer shall be Trane. The installer shall have 5 years experience and installed a minimum of 8 systems of similar size. Their offices shall be within 150 miles of the project site.

D. The system herein specified shall be free from defects in workmanship and material under normal use and service if, within twelve (12) months from the date of acceptance by the Engineer, any of the equipment herein described is proved to be defective in workmanship or material, it will be adjusted, repaired, or replaced free of charge by the Contractor.

E. All equipment, unless specified to the contrary, shall be fully proportioning and adjustable. The Control System shall consist of all room thermostats, air stream thermostats, valves, damper operators, relays, freeze protection equipment, dampers, panels, and other accessory equipment not provided with the equipment to fill the intent of the specifications and drawings.

F. Complete freeze protection equipment shall be provided at all required locations. Freeze protection thermostats shall have twenty-foot elements and be capable of de-energizing the circuit when any point along the element reaches the set point of the thermostat. Freezestat elements shall be placed on the leaving side of each heating coil, so that every square foot on the heating coil is protected. On heating coils larger than eighteen (18) square feet, provide multiple freezestats wired in series. The Contractor shall ensure that all freeze protection devices and equipment has been fully tested prior to the heating season and shall so certify in writing to the Engineers. The cost of replacement of equipment damaged by freeze-up caused by improper freeze protection or faulty control equipment shall be borne by the Contractor.

G. All units, controls, equipment, heat pumps, etc., and controls shall reset automatically when power is restored after an outage.

H. All control wiring concealed in walls and exposed in mechanical rooms, closets, etc., shall be in conduit. Provide plenum rated wiring where cable is concealed above ceilings. Do not paint wiring. The Contractor is responsible for protecting wiring from paint. Any painted cabling shall be replaced.

I. All dampers shall be capable of operating properly with the system pressures encountered. This shall include modulating and shut-off functions.

J. The Contractor shall also refer to the mechanical maintenance, HVAC equipment, and all other sections of the specifications for additional control requirements.

K. Provide smoke detectors and shut down control for all air handling units and combined air systems as required by the KBC and IMC Section 606.

L. All DDC controllers or control modules shall have covers to protect the circuit boards. All wiring shall be anchored securely within 6" of the controller.

M. Provide all control dampers, etc. not supplied with the equipment or required to accomplish the sequences specified.

N. The Contractor shall provide all refrigeration control and interlock wiring as recommended by the equipment manufacturer.

O. Wiring and required conduit in connection with the control system(s), including power wiring of any voltage, shall be installed by the Contractor. The Contractor may, at his option, engage the Electrical Contractor to accomplish this work. It is emphasized however, that the Contractor is finally responsible for all such work.

P. Electric power for the control panels, modules, unit controller, damper motors, etc., shall be derived from the building electric system. Power shall not be derived from the HVAC equipment power source or equipment low voltage transformers (internal or integral).

Q. The electrical work required for the installation of the control system(s), shall be provided by the Contractor in accordance with all National and Local Electrical Codes. All wiring shall be concealed except in Mechanical Rooms. All electrical work specified under this division of the specifications shall also comply with Division 26 of these specifications.

R. All exterior electrical work, equipment, etc. shall be waterproofed.

S. Controls system and all related components shall comply with ASHRAE Standard 135 (BACnet protocol).

2. OWNER'S TRAINING

A. The Contractor shall provide full instructions to designated personnel in the operation, maintenance, and programming of the system. The training shall be specifically oriented to the system and interfacing equipment installed. Four hours of Owner Training shall be provided at substantial completion, again after 6 months and again 1 year after substantial completion. The Owner Training shall include an overview of the entire HVAC system operation, temperature sensor setpoint manipulation, critical alarm training and graphics display overview. Subcontractors shall be present during Owner training sessions.

B. The Contractor shall provide a Sign-in Sheet and Meeting Minutes of the training. The Contractor shall also video record the initial training sessions. Complete Operations and Maintenance Manuals shall be reviewed by the Contractor during training.

3. CONTROL SYSTEM CHECKOUT AND TESTING – BY CONTROLS CONTRACTOR PRIOR TO DEMONSTRATION AND ACCEPTANCE

A. Startup Testing. Complete startup testing to verify operational control system before notifying Owner of system demonstration. Provide Owner with schedule for startup testing. Owner may have representative present during any of all startup testing.

(1) Calibrate and prepare for service each instrument, control, and accessory equipment furnished under Section 250200.
(2) Verify that control wiring is properly connected and free of shorts and ground faults.
(3) Enable control systems and verify each input device's calibration. Calibrate each device according to manufacturer's recommendations.
(4) Verify that binary output devices such as relays, solenoid valves, two-position actuators and control valves, and magnetic starters, operate properly and that normal positions are correct.
(5) Verify that analog output devices such as I/Ps and actuators are functional, that start and span are correct, and that direction and normal positions are correct. Check control valves and automatic dampers to ensure proper action and closure. Make necessary adjustments to valve stem and damper blade travel.
(6) Prepare a log documenting startup testing of each input and output device, with technician's initials certifying each device has been tested and calibrated. Submit log to Engineer for review.
(7) Verify that system operates according to sequences of operation. Simulate and observe each operational mode by overriding and varying inputs and schedules. Tune PID loops and each control routine that requires tuning.
(8) Alarms and Interlocks.
    a. Check each alarm with an appropriate signal at a value that will trip the alarm.
    b. Trip interlocks using field contacts to check logic and to ensure that actuators fail in the proper direction.
    c. Test interlock actions by simulating alarm conditions to check initiating value of variable and interlock action.

4. EQUIPMENT

A. CONTROL PANEL(S)

(1) Each system shall be provided with a local panel for mounting of all relays, switches, controllers, and thermometers associated with that system. Where one cabinet will not accommodate all the equipment necessary for one system, a second cabinet shall be mounted and bolted adjacent to it. Cabinets shall be provided with a 2/3's door. All devices shall be provided with lamacoid plastic nameplates for identification.

B. THERMOSTATS

(1) General

a. All thermostats shall have a "warmer-cooler" knob. This control shall allow the space occupants to reset the temperature up or down a predetermined amount. This amount, or no amount at all, shall be settable thru the BAS.

b. The thermostat shall have an unoccupied override button and an integral communications port.

c. The thermostat shall have no integral thermometer.

d. All thermostats provided for the project shall be similar in size and appearance.

e. Provide tamper-proof guards for all wall mounted thermostats selected by Owner.

f. All thermostats shall be mounted on a plastic base or other insulating material to prevent wall coupling effect.

g. Thermostats shall be mounted with the top at a maximum of 48" A.F.F. and shall be mounted to comply with A.D.A.

h. Thermostats shall provide temperature dead band of 5˚ F as required by IECC 2012.

i. Thermostat, or any other DDC sensor back box in rated walls shall be a minimum distance apart as allowed by code to maintain the rating. If closer, provide rated box or fireproofing in code approved manner.

C. DAMPERS

(1) Several louvers of practical widths shall be provided for larger dampers. Modulating dampers shall have opposed blades. Dampers shall have edge and end seals. Dampers shall be Ruskin CD-60 or better. Maximum leakage rate shall be 2 CFM per square foot at 1" W.G. pressure differential for dampers greater than 12" wide. Leak rate for dampers 12" and less shall be 3 CFM per square foot. NOTE: Do not mount outside air dampers so close to water coils, piping, etc., that freeze-up may occur due to a leaky damper.

D. RELAYS AND SWITCHES

(1) Relays and switches shall be of the positive and gradual acting type and shall be furnished and installed as required for the successful operation of the system. All switches shall have suitable indicating plates.

E. VALVES

(1) All valves shall be of the fully modulating and silent type unless otherwise specified. They shall provide accurate control of the heating or cooling medium under all load conditions. All valves 2-inches or smaller shall have brass or bronze bodies with screwed ends. Valves 2-1/2 inches and larger shall have iron bodies, brass or bronze trimming with flange ends. Valves shall be normally open or normally closed as required. Valves shall be installed with the stem in the upright position or as recommended by the valve manufacturer.

5. DEMONSTRATION

A. A complete demonstration and readout of the capabilities of the monitoring and control system shall be performed. The contractor shall demonstrate on -site with the Owner and Engineer that all points and sequences operate as designed.

The warranty does not start until all controls, graphics, points, etc. are functioning.

All controls functioning on _____ Date

Witnessed by _____

END OF SECTION 250200

ELECTRICAL INDEX

SECTION

SECTION 260501 - GENERAL PROVISIONS - ELECTRICAL

1. GENERAL

A. The Instructions to Bidders, General and Special Conditions, and all other contract documents shall apply to the Contractor's work as well as to each of his Sub Contractor's work. Each Contractor is directed to familiarize himself in detail with all documents pertinent to this Contract. In case of conflict between these General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Engineer for clarification and final determination.

B. The Contractor shall be governed by any alternates, unit prices and Addenda or other contract documents insofar as they may affect his part of the work.

C. The work included in this division consists of the furnishing of all labor, equipment, transportation, supplies, material and appurtenances and performing all operations necessary for the satisfactory installation of complete and operating electrical systems indicated on the drawings and/or specified herein.

D. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the electrical systems in a substantial manner, in compliance with the requirements stated, implied, or intended in the drawings and specifications, shall be included as part of this Contract. The Contractor shall give written notice of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted a minimum of ten days prior to bid. In the absence of such written notice and by the act of submitting his bid, it shall be understood that the Contractor has included the cost of all required items in his bid, and that he will be responsible for the approved satisfactory functioning of the entire system without extra compensations.

E. It is not the intent of this section of the specifications (or the remainder of the contract documents) to make any specific Contractor, other than the Contractor holding the prime contract, responsible to the Owner, Architect and Engineer. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be done through the Contractor to the Architect (if applicable), then to the Engineer.

F. This section of the Specifications or the arrangement of the contract documents shall not be construed as an attempt to arbitrarily assign responsibility for work, material, equipment or services to a particular trade Contractor or Sub-Contractor. Unless stated otherwise, the subdivision and assignment of work under the various sections shall be the responsibility of the Contractor holding the prime contract.

G. It is the intent of this Contract to deliver to the Owner a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall be responsibility of the Contractors involved to remove and/or relocate or re-attach any existing or new systems which interfere with new equipment or materials to be installed by other trades without additional cost to the Owner.

H. The Contractor shall provide interim life safety and fire detection measures as required by the Authority Having Jurisdiction, Division 1 specifications, NFPA, and applicable Codes. This includes temporary relocations of heat/smoke detection, exit signage, and egress lighting in existing buildings as applicable.

I. In general, and to the extent possible, all work shall be accomplished without interruption of the existing facilities' operations. Each Contractor shall advise the Architect, Owner and Engineer (as applicable) in writing at least one week prior to the deliberate interruption of any services. The Owner shall be advised of the exact time that interruption will occur and the length of time the interruption will occur. Failure to comply with this requirement may result in complete work stoppage by the Contractors involved until a complete schedule of interruptions can be developed.

J. Whenever utilities are interrupted, either deliberately or accidentally, the Contractor shall work continuously to restore said service. The Contractor shall provide tools, materials, skilled journeymen of his own and other trades as necessary, premium time as needed and coordination with all applicable utilities, including payment of utility company charges (if any), all without request for extra compensation to the Owner, except where otherwise provided for in the contract document.

K. Definitions:

(1) Prime Contractor - The Contractor who has been engaged by the Owner in a contractual relationship to accomplish the work.

(2) Electrical Contractor - Any Contractor whether bidding or working independently or under the supervision of a General Contractor, that is: the one holding the Prime Contract and who installs any type of Electrical work, such as: power, lighting, television, telecommunications, data, fiber optic, intercom, fire detection and alarm, security, video, underground or overhead electrical, etc.

Note: Any reference within these specifications to a specific entity, i.e., "Electrical Contractor" is not to be construed as an attempt to limit or define the scope of work for that entity or assign work to a specific trade or contracting entity. Such assignments of responsibility are the responsibility of the Contractor or Construction Manager holding the prime contract, unless otherwise provided herein.

(3) Electrical Sub-Contractor - Each or any Contractor contracted to, or employed by, the Electrical Contractor for any work required by the Electrical Contractor.

(4) Engineer - The Consulting Mechanical-Electrical Engineers, either consulting to the Owner, Architect, other Engineers, etc.

(5) Architect - The Architect of Record for the project, if any.

(6) Furnish - Deliver to the site in good condition.

(7) Provide - Furnish and install in complete working order.

(8) Install - Install equipment furnished by others in complete working order.

(9) Contract Documents - All documents pertinent to the quality and quantity of all work to be performed on the project. Includes, but not limited to: Plans, Specifications, Addenda, Instructions to Bidders, (both General and Sub-Contractors), Unit Prices, Shop Drawings, Field Orders, Change Orders, Cost Breakdowns, Construction Manager's Assignments, Architect's Supplemental Instructions, Periodical Payment Requests, etc.

2. INTENT

A. It is the intent of these specifications and all associated drawings that the Contractor provide finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "furnish and install complete and ready for use."

B. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

3. ELECTRICAL DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed insofar as possible. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Engineer for review before proceeding with the work. The Contract Drawings are not intended to show every vertical or horizontal offset which may be necessary to complete the systems. Contractors shall, however, anticipate that additional offsets may be required and submit their bid accordingly.

B. The drawings and specifications are intended to supplement each other. No Contractor or supplier shall take advantage of conflict between them, or between parts of either, but should this condition exist, the Contractor or supplier shall request a clarification of the condition at least ten days prior to the submission of bids so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be the determining factor. In all instances, unless modified in writing and agreed upon by all parties thereto, the Contract to accomplish the work shall be binding on the affected Contractor.

C. The drawings and specifications shall be considered to be cooperative and complimentary and anything appearing in the specifications which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.

D. The Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.

E. The Engineer shall reserve the right to make minor adjustments in location of conduit, fixtures, outlets, switches, etc., where he considers such adjustments desirable in the interest of concealing work or presenting a better appearance.

F. The Contractor shall evaluate ceiling heights called for on Architectural Plans. Where the location of Electrical equipment may interfere with ceiling heights, the Contractor shall call this to the attention of the Engineer in writing prior to making the installation. Any such changes shall be anticipated and requested sufficiently in advance so as to not cause extra work on the part of the Contractor or unduly delay the work.

G. Special Note: Always check ceiling heights indicated on Drawings and Schedules and insure that these heights may be maintained after all mechanical and electrical equipment is installed. If a conflict is apparent, notify the Engineer in writing for instructions.

H. Should overlap of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume that he is to be relieved of the work which is specified under his branch until instructions in writing are received from the Engineer.

I. The drawings are intended to show the approximate location of equipment, materials, etc. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions whether given in figures or scaled shall be verified in the field. In case of conflict between small and large scale drawings, the larger scale drawings shall take precedence.

J. The Contractor and his Sub Contractors shall review all drawings in detail as they may relate to his work (structural, architectural, site survey, mechanical, etc.). Review all drawings for general coordination of work, responsibilities, ceiling clearances, wall penetration points, chase access, fixture elevations, etc. Make any pertinent coordination or apparent conflict comments to the Engineers at least ten days prior to bids, for issuance of clarification by written addendum.

K. Where on any of the drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornament or other detail is indicated by starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.

4. EXAMINATION OF SITE AND CONDITIONS

A. The Contractor shall inform himself of all of the conditions under which the work is to be performed, the site of the work, the structure of the ground, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work. All Contractors or suppliers shall carefully examine all Drawings and

Specifications and contract documents to determine the kind and type of materials to be used throughout the project and which may, in any way, affect the execution of his work.

B. The Contractor shall fully acquaint himself with all existing conditions as to ingress and egress, distance of haul from supply points, routes for transportation of materials, facilities and services, availability of temporary or permanent utilities, etc. The Contractor shall include in his work all expenses or disbursements in connection with such matters and conditions. The Contractor shall verify all work shown on the drawings and conditions at the site, and shall report in writing to the Engineer ten days prior to bid, any apparent omissions or discrepancies in order that clarifications may be issued by written addendum. No allowance is to be made for lack of knowledge concerning such conditions after bids are accepted.

5. EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

A. When any Contractor requests review of substitute materials and/or equipment, and when under an approved formal alternate proposal, it shall be understood and agreed that such substitution, if approved, will be made without additional cost regardless of changes in connections, spacing, service, mounting, etc. In all cases where substitutions affect other trades, the Contractor offering such substitutions shall advise all such Contractors of the change and shall reimburse them for all necessary changes in their work. Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Special Note: Review of Shop Drawings by the Engineer does not absolve the Contractor of this responsibility

B. References in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Each Contractor, in such cases, may, at his option, use any article, device, product, material, fixture, form, or type of construction which in the judgment of the Engineer is equivalent to that specified, provided the provisions of paragraph (A) immediately preceding are met. Substitutions shall be submitted to the Engineer a minimum of ten days prior to bid date for approval to bid in written form thru addenda or other method selected by the Engineer. If prevailing laws of cities, towns, states or countries are more stringent than these specifications regarding such substitutions, then those laws shall prevail over these requirements.

C. Wherever any equipment and material is specified <u>exclusively</u> only such items shall be used unless substitution is accepted in writing by the engineers.

D. The Contractor shall furnish along with his proposal a list of specified equipment and materials which he proposes to provide. Where several makes are mentioned in the Specifications and the Contractor fails to state which he proposes to furnish, the Engineer shall have the right to choose any of the makes mentioned without change in price.

E. The Contractor shall review the contract documents and if a material substitution form is required for each proposed substitution, it shall be submitted per requirements.

6. SUPERVISION OF WORK

A. Each Contractor and Sub-Contractors shall personally supervise the work or have a competent superintendent on the project site at all times during progress of the work, with full authority to act for him in matters related to the project.

7. CODES, RULES, PERMITS, FEES, REGULATIONS, ETC.

A. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, and other costs including utility connections or extensions, in connection with his work. As necessary, he shall file all required plans, utility easement requests and drawings, survey information on line locations, load calculations, etc., prepare all documents and obtain all necessary approvals of all utility and governmental departments having jurisdiction; obtain all required certificates of inspection for his work and deliver same to the Engineer before request for acceptance and final payment for the work.

B. Ignorance of Codes, Rules, regulations, utility company requirements, laws, etc., shall not diminish or absolve Contractor's responsibilities to provide and complete all work in compliance with such.

C. The Contractor shall include in the work, without extra cost, any labor, materials, services, apparatus or drawings required in order to comply with all applicable laws, ordinances rules and regulations, whether or not shown on drawings and/or specified.

D. All materials furnished and all work installed shall comply with the current edition of the National Electrical Codes, National Fire Codes of the National Fire Protection Association, the requirements of local utility companies, and with the requirements of all governmental agencies or departments having jurisdiction.

E. All material and equipment for the electrical systems shall bear the approval label, or shall be listed by the Underwriters' Laboratories, Incorporated. Listings by other testing agencies may be acceptable with written approval by the Engineer.

F. All electrical work is to be constructed and installed in accordance with plans and specifications which have been approved in their entirety and/or reflect any changes requested by the State Fire Marshal, as applicable or required. Electrical work shall not commence until such plans are in the hands of the Electrical Contractor.

G. The Contractor shall insure that his work is accomplished in accord with OSHA Standards and any other applicable government requirements.

H. Where conflict arises between any code and the plans and/or specifications, the code shall apply except in the instance where the plans and specifications exceed the requirements of the code. Any changes required as a result of these conflicts shall be brought to the attention of the Engineer at least ten working days prior to bid date, otherwise the Contractor shall make the required changes at his own expense. The provisions of the codes constitute minimum standards for wiring methods, materials, equipment and construction and compliance therewith will be required for

all electrical work, except where the drawings and specifications require better materials, equipment, and construction than these minimum standards, in which case the drawings and specifications shall be the minimum standards.

8. COST BREAKDOWNS/SCHEDULE OF VALUES

A. Within thirty days after acceptance of the Contract, the Contractor is required to furnish to the Engineer one copy of a detailed cost breakdown on each respective area of work. These cost breakdowns shall be made on forms provided or approved by the Engineer or Architect. Payments will not be made until satisfactory cost breakdowns are submitted. Refer to the end of this section for a sample of expected level and breakout being required.

9. CORRECTION PERIOD

A. All equipment, apparatus, materials, etc., shall be the best of its respective kind. The Contractor shall replace all materials at his own expense, which fail or are deemed defective as described in the General Conditions. The effective date of completion of the work shall be the date each or any portion of the work is accepted by the Architect or Engineer as being substantially complete.

B. Items of equipment which have longer guarantees, as called for in these specifications or as otherwise offered by the manufacturer, such as generators, engines, batteries, transformers, etc., shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of final acceptance of the work. The Owner reserves the right to use equipment installed by the Contractor prior to date of final acceptance. Such use of equipment shall in no way invalidate the guarantee except that Owner shall be liable for any damage to equipment during this period due to negligence of his operator or other employee.

10. INSPECTION, APPROVALS AND TESTS

A. Before requesting a final review of the installation from the Architect and/or Engineer, the Contractor shall thoroughly inspect his installation to assure that the work is complete in every detail and that all requirements of the Contract Documents have been fulfilled. Failure to accomplish this may result in charges from the Architect and/or Engineers for unnecessary and undue work on their part.

B. The Contractor shall provide as part of this contract electrical inspection by a competent Electrical Inspection Agency (local or state as specific to project), licensed to provide such services in the State of West Virginia. The name of this agency shall be included in the list of materials of the Form of Proposal by the Contractor. All costs incidental to the provision of electrical inspections shall be borne by the Electrical Contractor.

C. The Contractor shall advise each Inspection Agency in writing (with an information copy of the correspondence to the Architect and/or Engineer) when he anticipates commencing work. Failure of the Inspection Agency to inspect the work in the stage following and submit the related reports

may result in the Contractor's having to expose concealed work not so inspected. Such exposure will be at the expense of the responsible Contractor.

D. Inspections shall be scheduled for rough as well as finished work. The rough inspections shall be divided into as many inspections as may be necessary to cover all roughing-in without fail. Report of each such inspection visit shall be submitted to the Architect, Engineer and the Contractor within three days of the inspection.

E. Approval by an Inspector does not relieve the Contractor from the responsibilities of furnishing equipment having a quality of performance equivalent to the requirements set forth in these plans and specifications. All work under this contract is subject to the review of the Architect and/or Engineer, whose decision is binding.

F. Before final acceptance, the Contractor shall furnish three copies of the certificates of final approval by the Electrical Inspector (as well as all other inspection certificates) to the Engineer with one copy of each to the appropriate government agencies, as applicable. Final payment for the work shall be contingent upon completion of this requirement.

G. The Contractor shall test all wiring and connections for cross connects, continuity and grounds before equipment and fixtures are connected, and when indicated or required, demonstrate by continuity/load/voltage test and Megger Test the installation of any circuit or group of circuits. Where such tests indicate the possibility of faulty insulation, locate the point of such fault, replacing same with new and demonstrate by further test the elimination of such defect. The secondary service entrance conductors from the utility (source) transformer to the main service disconnecting means shall be megger tested. The results of this test shall be turned over to the engineer for review and approval. Any conductor failing the test shall be replaced and any costs associated shall be borne by the contractor.

11. COMPUTER-BASED SYSTEM SOFTWARE

A. For all equipment, controls, hardware, computer-based systems, programmable logic controllers, and other materials provided as a part of the work, software that is installed shall be certified in writing to the Engineer and Owner by the manufacturer and/or writer to be free of programming errors that might affect the functionality of the intended use.

12. CHANGES IN ELECTRICAL WORK

REFER TO GENERAL AND SPECIAL CONDITIONS.

13. CLAIMS FOR EXTRA COST

REFER TO GENERAL AND SPECIAL CONDITIONS.

14. SURVEYS, MEASUREMENTS AND GRADES

A. The Contractor shall lay out his work and be responsible for all necessary lines, levels, elevations and measurements. He must verify the figures shown on the drawings before laying out the work and will be held responsible for any error resulting from his failure to do so.

B. The Contractor shall base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at site and check the correctness of same as related to the work.

C. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the Engineer thru normal channels of job communication and shall not proceed with his work until he has received instructions from the Engineer.

15. TEMPORARY USE OF EQUIPMENT

A. The permanent electrical equipment, when installed, may be used for temporary services, subject to an agreement among the Contractors involved, the Owner, and with the consent of the Engineer. Should the permanent systems be used for this purpose, each Contractor shall pay for all temporary connections required and any replacements required due to damage without cost, leaving the equipment and installation in "as new" condition. The Contractor may be required to bear utility costs, user fees, etc.

B. Permission to use the permanent equipment does not relieve the Contractors who utilize this equipment from the responsibility for any damages to the building construction and/or equipment which might result because of its use.

16. TEMPORARY SERVICES

A. The Contractor shall arrange for temporary electrical and other services which he may require to accomplish his work. In the absence of other provisions in the contract, the Contractor shall provide for his own temporary services of all types, including the cost of connections, utility company fees, construction, removal, etc., in his bid. The contractor may use existing service but will be responsible for all bills/fees with utility company.

17. RECORD DRAWINGS

A. The Contractor shall insure that any deviations from the design are being recorded daily or as necessary on record drawings being maintained by the Contractor. Dimensions from fixed, visible permanent lines or landmarks shown in vertical and horizontal ways shall be utilized. Compliance shall be a requirement for final payment. Pay particular attention to the location of underfloor or underground exterior in-contract or utility-owned or leased service lines, main switches and other appurtenances important to the maintenance and safety of the Electrical System. Keep information in a set of drawings set aside at the job site especially for this purpose. Deliver these record drawings electronically to the Engineer in AutoCad 2000 format (or more recent version) along with the hand marked field set. Electronic bid drawings will be furnished to the Contractor for his use at the completion of the work.

18. MATERIALS AND WORKMANSHIP

A. All electrical equipment, materials and articles incorporated in the work shall be new and of comparable quality to that specified. All workmanship shall be first-class and shall be performed by electricians skilled and regularly employed in their respective trades. The Contractor shall determine that the equipment he proposes to furnish can be brought into the building(s) and installed within the space available. All equipment shall be installed so that all parts are readily accessible for inspection, maintenance, replacement, etc. Extra compensation will not be allowed for relocation of equipment for accessibility or for dismantling equipment to obtain entrance into the building(s).

B. All conduit and/or conductors shall be concealed in or below walls, floors or above ceilings unless otherwise noted. All fixtures, devices and wiring required shall be installed to make up complete systems as indicated on the drawings and specified herein.

C. All materials, where applicable, shall bear Underwriters' Laboratories label or that of another Engineer-approved testing agency, where such a standard has been established.

D. Each length of conduit, wireway, duct, conductor, cable, fitting, fixture and device used in the electrical systems shall be stamped or indelibly marked with the makers mark or name.

E. All electrical equipment shall bear the manufacturer's name and address and shall indicate its electrical capacity and characteristics.

F. All electrical materials, equipment and appliances shall conform to the latest standards of the National Electric Manufacturers Association (NEMA) and the National Board of Fire Underwriters (NBFU) and shall be approved by the Owner's insuring agency if so required.

19. QUALIFICATIONS OF WORKMEN

A. All electrical work shall be accomplished by qualified workmen competent in the area of work for which they are responsible. Untrained and incompetent workmen as evidenced by their workmanship shall be relieved of their responsibilities in those areas. The Engineer shall reserve the right to determine the quality of workmanship of any workman and unqualified or incompetent workmen shall refrain from work in areas not satisfactory to him. Requests for relief of a workman shall be made through the normal channels of responsibility established by the Architect or the contract document provisions.

B. All electrical work shall be accomplished by Journeymen electricians under the direct supervision of a licensed Electrician. All applicable codes, utility company regulations, laws and permitting authority of the locality shall be fully complied with by the Contractor.

C. Special electrical systems, such as Fire Detection and Alarm Systems, Intercom or Sound Reinforcement Systems, Telecommunications or Data Systems, Lightning Protection Systems, Video Systems, Special Electronic Systems, Control Systems, etc., shall be installed by workmen

normally engaged or employed in these respective trades. As an exception to this, where small amounts of such work are required and are, in the opinion of the Engineer, within the competency of workmen directly employed by the Contractor involved, they may be provided by this Contractor.

20. CONDUCT OF WORKMEN

A. The Contractor shall be responsible for the conduct of all workmen under his supervision. Misconduct on the part of any workmen to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt relief of that workman. The consumption or influence of alcoholic beverages, narcotics or illegally used controlled substances on the jobsite is strictly forbidden.

21. COOPERATION AND COORDINATION BETWEEN TRADES

A. The Contractor is expressly directed to read the General Conditions and all detailed sections of these specifications for all other trades and to study all drawings applicable to his work, including Architectural, Mechanical, Structural and other pertinent Drawings, to the end that complete coordination between trades will be effected.

B. Refer to Coordination Among Trades, Systems Interfacing and Connection of Equipment Furnished by Others section of these Specifications for further coordination requirements.

22. PROTECTION OF EQUIPMENT

A. The Contractor shall be entirely responsible for all material and equipment furnished by him in connection with his work and special care shall be taken to properly protect all parts thereof from damage during the construction period. Such protection shall be by a means acceptable to the Engineer. All rough-in conduit shall be properly plugged or capped during construction in a manner approved by the Engineer. Equipment damaged while stored on site either before or after installation shall be repaired or replaced (as determined by the Engineer) by the responsible Contractor.

23. CONCRETE WORK

A. The Contractor shall be responsible for the provision of all concrete work required for the installation of any of his systems or equipment. If this work is provided by another trade, it will not relieve the Electrical Contractor of his responsibilities relative to dimensions, quality of workmanship, locations, etc. In the absence of other concrete specifications, all concrete related to Electrical work shall be 3000 PSI minimum compression strength at 28 days curing and shall conform to the standards of the American Concrete Institute Publication ACI-318. Heavy equipment shall not be set on pads for at least seven days after pour.

B. All concrete pads shall be complete with all pipe sleeves, embeds, anchor bolts, reinforcing steel, concrete, etc., as required. Pads larger than l8" in width shall be reinforced with minimum #4 round bars on 6" centers both ways. All reinforcing steel shall be per ASTM requirements,

tied properly, lapped 18 bar diameters and supported appropriately up off form, slab or underlayment. Bars shall be approximately 3" above the bottom of the pad with a minimum 2" cover. All parts of pads and foundations shall be properly rodded or vibrated. If exposed parts of the pads and foundations are rough or show honeycomb after removing forms properly adhered repairs shall be made. If structural integrity is violated, the concrete shall be replaced. All surfaces shall be rubbed to a smooth finish.

Special Note: All pads and concrete lighting standard bases shall be crowned slightly so as to avoid water ponding beneath equipment.

C. In general, concrete pads for small equipment shall extend 6" beyond the equipment's base dimensions. For large equipment with service access panels, extend pads l8" beyond base or overall dimensions to allow walking and servicing space at locations requiring service access.

D. Exterior concrete pads shall be 4" minimum above grade and 4" below grade on a tamped 4" dense grade rock base unless otherwise noted or required by utility company. Surfaces of all foundations and bases shall have a smooth finish with three-quarter inch radius or chamfer on exposed edges, trowelled or rubbed smooth. All exterior pads shall be crowned approximately 1/8" per foot, sloping from center for drainage.

24. RESTORATION OF NEW OR EXISTING SHRUBS, PAVING, ETC.

A. The Contractor shall restore to their original condition all paving, curbing surfaces, drainage ditches, structures, fences, shrubs, existing or new building surfaces and appurtenances, and any other items damaged or removed by his operations. Replacement and repairs shall be in accordance with good construction practice and shall match materials employed in the original construction of the item to be replaced. All repairs shall be to the satisfaction of the Engineer, and in accord with the Architect's standards for such work, as applicable.

25. MAINTENANCE OF EXISTING UTILITIES AND LINES

A. The locations of all piping, conduits, cables, utilities and manholes existing, or otherwise, that come within the contract construction site, shall be subject to continuous uninterrupted maintenance with no exception unless the Owner of the utilities grants permission to interrupt same temporarily, if need be. Provide one week's written notice to Engineer, Architect and Owner prior to interrupting any utility service or line. Also see Article 1. - General, this section.

B. Known utilities and lines as available to the Engineer are shown on the drawings. However, it is additionally required that, prior to any excavation being performed, each Contractor ascertain that no utilities or lines, known or unknown, are endangered by the excavation.

C. If the above mentioned utilities or lines occur in the earth within the construction site, the Contractor shall first probe and make every effort to locate the lines prior to excavating in the respective area. Electromagnetic utility locators and acoustic pipe locators shall be utilized to determine where metallic and non-metallic piping is buried prior to any excavation.

D. Cutting into existing utilities and services shall be done in coordination with and as designated by the Owner of the utility. The Contractor shall work continuously to restore service(s) upon deliberate or accidental interruption, providing premium time and materials as needed without extra claim to the Owner.

E. The Contractor shall repair to the satisfaction of the Engineer any surface or subsurface improvements damaged during the course of the work, unless such improvement is shown to be abandoned or removed.

F. Machine excavation shall not be permitted within ten feet of existing gas or fuel lines. Hand excavate only in these areas, in accord with utility company, agency or other applicable laws, standards or regulations.

G. Protect all new or existing lines from damage by traffic, etc. during construction.

H. Protect existing trees, indicated to remain with fencing or other approved method. Hold all new subsurface lines outside the drip line of trees, offsetting as necessary to protect root structures. Refer to planting or landscaping plans, or in their absence, consult with the Architect.

26. SMOKE AND FIRE PROOFING

A. The Contractor shall not penetrate rated fire walls, ceilings or floors with conduit, cable, bus duct, wireway or other raceway system unless all penetrations are protected in a code compliant manner which maintains the rating of the assembly. Smoke and fire stop all openings made in walls, chases, ceiling and floors. Patch all openings around conduit, wireway, bus duct, etc., with appropriate type material to smoke stop walls and provide needed fire rating at fire walls, ceilings and floors. Smoke and fire proofing materials and method of application shall be approved by the local authority having jurisdiction.

27. QUIET OPERATION, SUPPORTS, VIBRATION AND OSCILLATION

A. All work shall operate under all conditions of load without any objectionable sound or vibration, the performance of which shall be determined by the Engineer. Noise from moving machinery or vibration noticeable outside of room in which it is installed, or annoyingly noticeable noise or vibration inside such room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer shall be corrected in an approved manner by the Contractor (or Contractors responsible) at his expense.

B. All equipment subject to vibration and/or oscillation shall be mounted on vibration supports suitable for the purpose of minimizing noise and vibration transmission, and shall be isolated from external connections such as piping, ducts, etc., by means of flexible connectors, vibration absorbers or other approved means. Surface mounted equipment such as panels, switches, etc., shall be affixed tightly to their mounting surface.

C. The Contractor shall provide supports for all equipment furnished by him using an approved vibration isolating type as needed. Supports shall be liberally sized and adequate to carry the load of the equipment and the loads of attached equipment, piping, etc. All equipment shall be securely fastened to the structure either directly or indirectly through supporting members by means of bolts or equally effective means. No work shall depend on the supports or work of unrelated trades unless specifically authorized in writing by the Architect or Engineer.

28. FINAL CONNECTIONS TO EQUIPMENT

A. The roughing-in and final connections to all electrically operated equipment furnished under this and all other sections of the contract documents or by others, shall be included in the Contract and shall consist of furnishing all labor and materials for connection. The Contractor shall carefully coordinate with equipment suppliers, manufacturers representatives, the vendor or other trades to provide complete electrical and dimensional interface to all such equipment (kitchen, hoods, mechanical equipment, panels, refrigeration equipment, etc.).

29. WELDING

A. The Contractor shall be responsible for quality of welding done by his organization and shall repair or replace any work not done in accordance with the Architect's or structural Engineer's specifications for such work. If required by the Engineer, the responsible Contractor shall cut at least three welds during the job for X-raying and testing. These welds are to be selected at random and shall be tested as a part of the responsible Contractor's work. Certification of these tests and X-rays shall be submitted, in triplicate, to the Engineer. In case a faulty weld is discovered, the Contractor shall be required to furnish additional tests and corrective measures until satisfactory results are obtained.

30. ACCESSIBILITY

A. The Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in partitions and above suspended ceilings for the proper installation of his work. He shall cooperate with the General Contractor (or Construction Manager) and all other Contractors whose work is in the same space, and shall advise each Contractor of his requirements. Such spaces and clearances shall be kept to the minimum size required to ensure adequate clearance and access.

B. The Contractor shall locate all equipment which must be serviced, operated, or maintained in fully accessible positions. Equipment shall include but not be limited to junction boxes, pull boxes, contactors, panels, disconnects, controllers, switchgear, etc. Minor deviations from drawings may be made to allow for better accessibility, and any change shall be approved where the equipment is concealed.

C. Each Contractor shall provide (or arrange for the provision by other trades) the access panels for each concealed junction box, pull box, fixtures or electrical device requiring access or service as shown on Engineer's plans or as required. Locations of these panels shall be identified in

sufficient time to be installed in the normal course of work. All access panels shall be installed in accord with the Architect's standards for such work.

D. Access Doors; in Ceilings or Walls:

(1) In mechanical, electrical, or service spaces:

14 gauge aluminum brushed satin finish, 1" border.

(2) In finished areas:

14 gauge primed steel with 1" border to accept the architectural finishes specified for the space. Confirm these provisions with the Architect prior to obtaining materials or installing any such work.

(3) In fire or smoke rated partitions, access doors shall be provided that equal or exceed the required rating of the construction they are mounted in.

31. ELECTRICAL CONNECTIONS

A. The Contractor shall furnish and install all power wiring complete from power source to motor or equipment junction box, including power wiring through starters. The Contractor shall install all starters not factory mounted on equipment. Unless otherwise noted, the supplier of equipment shall furnish starters with the equipment. Also refer to Divisions 11, 14, 20, 21, 22, 23 and 25 of the Specifications, shop drawings and equipment schedules for additional information.

B. All control, interlock, sensor, thermocouple and other wiring required for equipment operation shall be provided by the Contractor. All such installations shall be fully compliant with all requirements of Division 26 regardless of which trade actually installs such wiring. Motors and equipment shall be provided for current and voltage characteristics as indicated or required. All wiring shall be enclosed in raceways unless otherwise noted.

C. Each Contractor or sub-contractor, prior to bidding the work, shall coordinate power, control, sensor, interlock and all other wiring requirements for equipment or motors with all other contractors or sub-contractors, to ensure all needed wiring is provided in the Contract. Failure to make such coordination shall not be justification for claims of extra cost or a time extension to the Contract.

32. MOTORS

A. Each motor shall be provided by the equipment supplier, installer or manufacturer with conduit terminal box and N.E.C. required disconnecting means as indicated or required. Three-phase motors shall be provided with external thermal overload protection in their starter units. Single-phase motors shall be provided with thermal overload protection, integral to their

windings or external, in control unit. All motors shall be installed with NEMA-rated starters as specified and shall be connected per the National Electrical Code.

B. The capacity of each motor shall be sufficient to operate associated driven devices under all conditions of operation and load and without overload, and at least of the horsepower indicated or specified. Each motor shall be selected for quiet operation, maximum efficiency and lowest starting KVA per horsepower as applicable. Motors producing excessive noise or vibration shall be replaced by the responsible contractor. See Division 20, 22 and 23 of the Specifications for further requirements and scheduled sizes.

C. All three-phase motors shall be tested for proper rotation. Correct wiring if needed and retest. Document testing and corrective action in operations and maintenance manual.

33. CUTTING AND PATCHING

A. Unless otherwise indicated or specified, the Contractor shall provide cutting and patching necessary to install the work specified in this Division. Patching shall match adjacent surfaces to the satisfaction of the Engineer and shall be in accord with the Architect's standards for such work, as applicable.

B. No structural members shall be cut without the approval of the Structural Engineer and all such cutting shall be done in a manner directed by him.

C. When installing conduit, pipe, or any other work in insulated concrete form (ICF) walls, the responsible subcontractor for the work shall provide spray foam insulation to patch the rigid insulation to maintain full integrity of the insulating value of the wall after the mechanical and electrical work is complete. Furthermore, all new work shall NOT be installed in concrete center of wall. All mechanical and electrical installations shall be on the interior side of the concrete.

34. ANCHORS

A. Each Contractor shall provide and locate all inserts required for his work before the floors and walls are built, or shall be responsible for the cost of cutting and patching required where inserts were not installed, or where incorrectly located. Each Contractor shall do all drilling required for the installation of his hangers. Drilling of anchor holes may be prohibited in post-tensioned concrete construction, in which case the Contractor shall request approved methods from the Architect and shall carefully coordinate setting of inserts, etc., with the Structural Engineer and/or Architect.

35. WEATHERPROOFING

A. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be as approved by the Architect and/or Engineer before work is done. The Contractor shall furnish all necessary sleeves, caulking and flashing required to make openings absolutely watertight.

B. Wherever work penetrates roofing, it shall be done in a manner that will not diminish or void the roofing guarantee or warranty in any way. Coordinate all such work with the roofing installer.

36. OPERATING INSTRUCTIONS

A. Upon completion of all work and all tests, each Contractor shall furnish the necessary skilled labor and helpers for operating his systems and equipment for a period of three days of eight hours each, or as otherwise specified. During this period, instruct the Owner or his representative fully in the operations, adjustment, and maintenance of all equipment furnished. Give at least one week's written notice to the Owner, Architect and Engineer in advance of this period. The Engineer may attend any such training sessions or operational demonstrations. The Contractor shall certify in writing to the Engineer that such demonstrations have taken place, noting the date, time and names of the Owner's representative that were present.

B. Each Contractor shall furnish three complete bound sets for approval to the Engineer of typewritten and/or blueprinted instructions for operating and maintaining all systems and equipment included in this contract. All instructions shall be submitted in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions.

C. Each Contractor, in the above mentioned instructions, shall include the maintenance schedule for the principal items of equipment furnished under this contract and a detailed, easy to read parts list and the name and address of the nearest source of supply.

D. Formatting & content shall follow the guidelines outlined in the latest version of ASHRAE Applications Handbook, Guideline 4. As a minimum, the following shall be included:

- The operation and maintenance document directory should provide easy access and be well organized and clearly identified.
- Emergency information should be immediately available during emergencies and should include emergency and staff and/or agency notification procedures.
- The operating manual should contain the following information:

I. General Information
   a. Building function
   b. Building description
   c. Operating standards and logs

II. Technical Information
   a. System description
   b. Operating routines and procedures
   c. Seasonal start-up and shutdown
   d. Special procedures
   e. Basic troubleshooting

- The maintenance manual should contain the following information:
    I. Equipment data sheets
        a. Operating and nameplate data
        b. Warranty

    II. Maintenance program information
        a. Manufacturer's installation, operation, and maintenance instructions
        b. Spare parts information
        c. Preventive maintenance actions
        d. Schedule of actions
        e. Action description
        f. History
- Test reports document observed performance during start-up and commissioning.

37. SCAFFOLDING, RIGGING AND HOISTING

A. The Contractor shall furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

38. CLEANING

A. The Contractor shall, at all times, keep the area of his work presentable to the public and clean of rubbish caused by his operations; and at the completion of the work, shall remove all rubbish, all of his tools, equipment, temporary work and surplus materials, from and about the premises, and shall leave the work clean and ready for use. If the Contractor does not attend to such cleaning immediately upon request, the Engineer may cause cleaning to be done by others and charge the cost of same to the responsible Contractor. Each Contractor shall be responsible for all damage from fire which originates in, or is propagated by, accumulations of his rubbish or debris.

B. After completion of all work and before final acceptance of the work, each Contractor shall thoroughly clean all equipment and materials and shall remove all foreign matter such as grease, dirt, plaster, labels, stickers, etc., from the exterior of materials, equipment and all associated fabrication. Pay particular attention to finished area surfaces such as lighting fixture lenses, lamps, reflectors, panels, etc.

39. PAINTING

A. Each fixture device, panel, junction box, etc., that is located in a finished area shall be provided with finish of color and type as selected or approved by the Architect or Engineer. If custom color is required, it shall be provided at no additional cost to the Owner. All other equipment, fixtures or devices located in finished or unfinished areas, that are not required to have or are

provided with finish color or coating shall be provided in a prime painted condition, ready to receive finish paint or coating. All galvanized metal in finished areas shall be properly prepared with special processes to receive finish paint as directed and approved by the Architect.

40. INDEMNIFICATION

A. The Contractor shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

41. HAZARDOUS MATERIALS

A. The Contractor is hereby advised that it is possible that asbestos and/or other hazardous materials are or were present in this building(s). Any worker, occupant, visitor, inspector, etc., who encounters any material of whose content they are not certain shall promptly report the existence and location of that material to the Contractor and/or Owner. The Contractor shall, as a part of his work, ensure that his workers are aware of this potential and what they are to do in the event of suspicion. He shall also keep uninformed persons from the premises during construction. Furthermore, the Contractor shall insure that no one comes near to or in contact with any such material or fumes therefrom until its content can be ascertained to be non-hazardous.

B. CMTA, Inc., Consulting Engineers, have no expertise in the determination of the presence of hazardous materials. Therefore, no attempt has been made by them to identify the existence or location of any such material. Furthermore, CMTA nor any affiliate thereof will neither offer nor make any recommendations relative to the removal, handling or disposal of such material.

C. If the work interfaces, connects or relates in any way with or to existing components which contain or bear any hazardous material, asbestos being one, then, it shall be the Contractor's sole responsibility to contact the Owner and so advise him immediately.

D. The Contractor by execution of the contract for any work and/or by the accomplishment of any work thereby agrees to bring no claim relative to hazardous materials for negligence, breach of contract, indemnity, or any other such item against CMTA, its principals, employees, agents or consultants. Also, the Contractor further agrees to defend, indemnify and hold CMTA, its principals, employees, agents and consultants, harmless from any such related claims which may be brought by any subcontractors, suppliers or any other third parties.

42. ABOVE-CEILING AND FINAL PUNCH LISTS

A. The Contractor shall review each area and prepare a punch list for each of the subcontractors, as applicable, for at least two stages of the project:

(1) For review of above-ceiling work that will be concealed by tile or other materials well before substantial completion.

(2) For review of all other work as the project nears substantial completion.

B. When all work from the Contractor's punch list is complete at each of these stages and prior to completing ceiling installations (or at the final punch list stage), the Contractor shall request that the Engineer develop a punch list. This request is to be made in writing seven days prior to the proposed date. After all corrections have been made from the Engineer's punch list, the Contractor shall review and initial off on each item. This signed-off punch list shall be submitted to the Engineer. The Engineer shall return to the site once to review each punch list and all work prior to the ceilings being installed and at the final punch list review.

C. If additional visits are required by the Engineer to review work not completed by this review, the Engineer shall be reimbursed directly by the Contractor by check or money order (due net 10 days from date of each additional visit) at a rate of $140.00 per hour for extra trips required to complete either of the above-ceiling or final punch lists.

Phone: (502) 262-0316

The following is CMTA's guide for required electrical information relative to the Schedule of Values. Please utilize all items that pertain to this project and add any specialized system as required. A thorough and detailed schedule of values will allow for fair and equitable Pay Application approval and minimize any discrepancies as to the status of the job.

Electrical

Description of Work	Scheduled Value	Labor	Material
Shop Drawings			
Mobilization/Permits			
Temporary Utilities			
Demolition			
Site Utilities			
Branch Panels			
Feeder Conduit			
Branch Conduit			
Feeder Wire			
Branch Wiring			
Fire Alarm Conduit & Wiring			
Fire Alarm Devices			
Cabletray & Accessories			
Light Fixture Interior			
Light Fixture Exterior			
Lighting Control System			
Wiring Devices			

Surge Suppression			
CCTV System Conduit			
Intrusion Detection Conduit			
Voice/Data System Conduit			
Audio/Video System Conduit			
Electrical Inspection			
Owner Training			
Record Drawings			
O & M Manuals			
Punch List / Closeout			

END OF SECTION 260501

SECTION 260502 - SCOPE OF THE ELECTRICAL WORK

1. GENERAL

Each Electrical Contractor's attention is directed to Section 260501 - General Provisions, Electrical, and all other Contract Documents as they apply to his work.

2. SCOPE OF THE ELECTRICAL WORK

The Electrical work for this project includes all labor, materials, equipment, fixtures, excavation, backfill and related items required to completely install, test, verify place in service and deliver to the Owner complete electrical systems in accordance with the accompanying plans and all provisions of these specifications. This work shall primarily include, but is not limited to the following:

A. All conduits, conductors, outlet boxes, fittings, etc.

B. All switchgear, panels, disconnect switches, fuses, contactors, starters, etc.

C. Fault Current, Arc Flash and Coordination Studies.

D. All wiring devices and device plates.

E. All light fixtures.

F. Electrical connection to all electrically operated equipment furnished and/or installed by others, including powered casework, kitchen equipment, etc.

G. Voice/Data wiring system expansion

H. All necessary coordination with electric utility company, telephone company, cable television company, etc. to ensure that work, connections, etc., that they are to provide is accomplished and that service to this facility is delivered complete prior to occupancy.

I. Paying all necessary fees and cost for permits, inspections, work by utility companies (power, telephone, CATV, etc). The Contractor shall contact the utility companies prior to submitting a bid to determine exactly these charges will be.

J. Prior to submitting a bid, the Contractor shall contact all serving utility companies to determine exactly what each utility company will provide and exactly what is required of the Contractor and the Contractor shall include all such requirements in his base bid.

K. Obtaining, coordinating and paying all necessary fees and costs for permits and inspections required by local, state and federal law. The Contractor shall contact the appropriate agencies prior to submitting a bid to determine exactly these charges will be.

END OF SECTION 260502

SECTION 260503 - SHOP DRAWINGS, LITERATURE, MANUALS, PARTS LISTS, AND SPECIAL TOOLS

1. SHOP DRAWINGS

A. Each Contractor shall submit to the Architect and/or Engineer, within thirty days after the date of the Contract, seven sets of shop drawings and/or manufacturer's descriptive literature on all equipment required for the fulfillment of his contract. Each shop drawing and/or manufacturer's descriptive literature shall have proper notation indicated on it and shall be clearly referenced so the specifications, schedules, light fixture numbers, panel names and numbers, etc., so that the Architect and/or Engineer may readily determine the particular item the Contractor proposes to furnish. All data and information scheduled, noted or specified by hand shall be noted in color red on the submittals. The Contractor shall make any corrections or changes required and shall resubmit for final review as requested. Review of such drawings, descriptive literature and/or schedules shall not relieve the Contractor from responsibility for deviation from drawings or specifications unless they have, in writing, directed the reviewer's attention to such deviations at the time of submission of drawings, literature and manuals; nor shall it relieve them from responsibility for errors or omissions of any nature in shop drawings, literature and manuals. The term "as specified" will not be accepted.

B. If the Contractor fails to comply with the requirements set forth above, the Architect and/or Engineer shall have the option of selecting any or all items listed in the specifications or on the drawings, and the Contractor will be required to provide all materials in accordance with this list.

C. Review of shop drawings by the Engineer applies only to conformance with the design concept of the project and general compliance with the information given in the contract documents. In all cases, the installing Contractor alone shall be responsible for furnishing the proper quantity of equipment and/or materials required, for seeing that all equipment fits the available space in a satisfactory manner and that piping, electrical and all other connections are suitably located.

D. The Engineer's review of shop drawings, schedules or other required submittal data shall not relieve the Contractor from responsibility for the adaptability of the equipment or materials to the project, compliance with applicable codes, rules, regulations, information that pertains to fabrication and installation, dimensions and quantities, electrical characteristics, and coordination of the work with all other trades involved in this project.

E. No cutting, fitting, rough-in, connections, etc., shall be accomplished until reviewed equipment shop drawings are in the hands of the Contractors concerned. It shall be each Contractor's responsibility to obtain reviewed shop drawings and to make all connections, etc. in the neatest and most workmanlike manner possible. Each Contractor shall coordinate with all the other Contractors having any connections, roughing-in, etc., to the equipment, to make certain proper fit, space coordination, voltage and phase relationships are accomplished.

F. In accord with the provisions specified hereinbefore, shop drawings, descriptive literature and schedules shall be submitted on each of the following indicated items as well as any equipment or systems deemed necessary by the Engineer:

Power Equipment

- Fault current coordination study (submit along with switchgear & panelboards).
- Panelboards.
- Circuit breakers, per each type.
- Power and lighting contactors.
- Disconnect switches.
- Transient voltage surge suppression system.

Raceways

- Cable tray and each type of cable tray fitting.
- Wireways and each type of wireway fitting.
- J-hook or Bridle ring assemblies.

Devices

- Each type of wiring device and their coverplates.
- Data/voice/video wallplates, each by type.
- Any special items not listed above.

Lighting

- Light fixtures, each by type, marked to indicate all required accessories and lamp selection. Also provide original color selection chart to allow Architect and/or Engineer to indicate color selection.
- Lighting standards or poles.
- Photocells, time clocks or other lighting accessories.
- Lighting control system schematic, functional & programming data, along with building specific floor plan drawings indicating each device, master controller, input device locations and specific interconnect/wiring requirements for each device.

Systems

<u>Note</u>: Each system submittal is to be complete with legible cutsheets for all devices, equipment, special wiring, etc. Include system specific wiring schematics showing each device and its specific interconnect/wiring requirements. For rack mounted equipment, provide a scalable elevation drawing with proposed component locations & specific interconnect wiring requirements for each component/panel. Also provide scale building specific layout drawings that indicate device placement, wiring, etc. Refer to the specific system's specification for additional submittal requirements where required.

Miscellaneous

- Control panel assemblies.
- Non-standard junction/pullboxes.

2. SPECIAL WRENCHES, TOOLS AND KEYS

A. Each Contractor shall provide, along with the equipment provided, any special wrenches or tools necessary to dismantle or service equipment or appliances installed by him. Wrenches shall include necessary keys, handles and operators for valves, switches, breakers, etc. and keys to electrical panels, emergency generators, alarm pull boxes and panels, etc. At least two of any such special wrench, keys, etc. shall be turned over to the Architect prior to completion of the project. Obtain a receipt that this has been accomplished and forward a copy to the Engineer.

3. MAINTENANCE AND OPERATION MANUALS

A. Prior to substantial completion of the project, the Contractor shall deliver to the Engineers (in addition to the required Shop Drawings) three complete copies of operation and maintenance instructions and parts lists for all equipment provided. Formatting and content shall follow the guidelines outlined in the latest version of ASHRAE Application Handbook, Guideline 4. As a minimum, the following shall be included:

- The **operation and maintenance document directory** should provide easy access and be well organized and clearly identified.
- **Emergency information** should be immediately available during emergencies and should include emergency and staff and/or agency notification procedures.
- **The operating manual** should contain the following information:
  I. General Information
     a. Building function
     b. Building description
     c. Operating standards and logs

  II. Technical Information
     a. System description
     b. Operating routines and procedures
     c. Seasonal start-up and shutdown
     d. Special procedures
     e. Basic troubleshooting

- **The maintenance manual** should contain the following information:
  I. Equipment data sheets
     a. Operating and nameplate data

b. Warranty

II. Maintenance program information
   a. Manufacturer's installation, operation, and maintenance instructions
   b. Spare parts information
   c. Preventive maintenance actions
   d. Schedule of actions
   e. Action description
   f. History

- **Test reports** document observed performance during start-up and commissioning.

END OF SECTION 260503

SECTION 260504 - SLEEVING, CUTTING, PATCHING AND REPAIRING

1. GENERAL

A. The Contractor shall be responsible for all openings, sleeves, trenches, etc. that he may require in floors, roofs, ceilings, walls, etc. and shall coordinate all such work with the General Contractor and all other trades. He shall determine and coordinate any openings which he is to provide before submitting a bid proposal in order to avoid conflict and disagreement during construction. Improperly located openings shall be reworked at the expense of the responsible Contractor.

B. The Contractor shall plan his work ahead and shall place sleeves, frames or forms through all walls, floors and ceilings during the initial construction, where it is necessary for conduit, buss duct, conductors, wireways, etc. to go through; however, when this is not done, this Contractor shall do all cutting and patching required for the installation of his work, or he shall pay other trades for doing this work when so directed by the Architect. Any damage caused to the building by the workmen of the responsible Contractor must be corrected or rectified by him at his own expense.

C. The Contractor shall cut holes in casework, equipment panels, etc. (if any), as required to pass pipes in and out.

D. The Contractor shall notify other trades in due time where he will require openings of chases in new concrete or masonry. He shall set all concrete inserts and sleeves for his work. Failing to do this, he shall cut openings for his work and patch same as required at his own expense.

E. Openings in slabs and walls shall be cut with core drill. Hammer devices will not be permitted. Edges of trenches and large openings shall be scribe cut with a masonry saw.

F. Cast iron sleeves shall be installed through all walls where pipe enters the building below grade. Sleeves shall be flush with each face of the wall and shall be sufficiently larger than the entering pipe to permit thorough caulking with lead and oakum between pipe and sleeve for waterproofing.

G. In all cases, sleeves shall be at least two inches larger than nominal pipe diameter.

H. Sleeves passing through roof or exterior wall or where there is a possibility of water leakage and damage shall be caulked water tight for horizontal sleeves and flashed and counter-flashed with lead (4 lb.) or copper and soldered to the piping, lapped over sleeve and properly weather sealed. Any roof penetration shall not void or lessen the warranty in any way.

I. All rectangular or special shaped openings in plaster, stucco or similar materials including gypsum board shall be framed by means of plaster frames, casing beads, wood or metal angle members as required. The intent of this requirements is to provide smooth even termination of wall, floor and ceiling finishes as well as to provide a fastening means for lighting fixtures, panels, etc. Lintels shall be provided where indicated over all openings in bearing walls, etc.

J. No cutting is to be done at points or in a manner that will weaken the structure and unnecessary cutting must be avoided. If in doubt, contact the Architect.

K. The Contractor shall be responsible for properly shoring, bracing, supporting, etc. any existing and/or new construction to guard against cracking, settling, collapsing, displacing or weakening while openings are being made. Any damage occurring to the existing and/or new structures, due to failure to exercise proper precautions or due to action of the elements, shall be promptly and properly made good to the satisfaction of the Architect.

L. All work improperly done or not done at all as required by the Contractor will be performed by others. The cost of this work shall be paid for by the Contractor who is in non-compliance with the Contract.

2. SLEEVES, PLATES AND ESCUTCHEONS

A. The Contractor shall provide and locate all sleeves required for his work before the floors and surface being penetrated are built, otherwise the Contractor shall core drill for conduits where sleeves were not installed, or where incorrectly located. Core drilling is the only acceptable alternative to sleeves. Do not chisel openings. Where sleeves are placed in exterior walls or in slabs on grade, the space between the conduit and the sleeves shall be made completely and permanently water tight.

B. Conduits that penetrates fire and/or smoke rated assemblies shall have sleeves installed as required by the manufacturer of the rating seal used.

C. At all other locations either pipe sleeves or core drilled openings are acceptable.

D. Where thermal expansion does not occur, the wall may be sealed tight to the conduit.

E. Sleeves shall be constructed of rigid steel conduit. Sleeves in floors shall extend 6" above finished floor level.

F. Fasten sleeves securely in floors, walls, so that they will not become displaced when concrete is poured or when other construction is built around them. Take precautions to prevent concrete, plaster or other materials being forced into the space between pipe and sleeve during construction.

G. In all areas where ducts are exposed and ducts pass thru floors, the opening shall be surrounded by a 4 inch high by 3 inch wide concrete curb.

H. Escutcheon plates shall be provided for all conduit passing thru walls, floors and ceilings. Plates shall be nickel plated, of the split ring type, of size to match the pipe or conduit. Where plates are provided for pipes passing thru sleeves which extend above the floor surface, provide deep recessed plates to conceal the sleeves.

END OF SECTION 260504

SECTION 260505 - DEMOLITION, RESTORATION AND SALVAGE

1. GENERAL

   A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and all other divisions of these specifications apply to work specified in this section.

2. DESCRIPTION OF WORK

   A. This section covers all demolition, restoration and salvage required to perform the electrical work indicated on the drawings, specified and/or as required to complete the project. It is the intent of this section of work to remove all existing electrical equipment, materials, etc. which are not required for the completed building and to restore any and all finished surfaces to their original type and conditions. To accomplish these requirements, the Contractor(s) shall, at his own expense, engage the services of others already performing finish work on this project. All work shall be completed to the satisfaction of the Architect/Engineers whose decisions shall be final. This requirement shall apply to all restoration work whether indicated or specified.

   B. The Contractor shall lawfully dispose of any removed P.C.B.-bearing ballasts (containing polychlorinated biphenyl), and all mercury-vapor bearing lamps, in accordance with all state, local, federal and other applicable laws and regulations.

3. ELECTRICAL

   A. Where electrical fixtures, equipment or other materials are removed and/or relocated, all abandoned conduit and conductors shall be removed in exposed areas. In concealed areas, materials shall be abandoned in place or removed as indicated and patch all openings.

   B. The Contractor shall be responsible for the removal and/or relocation of any electrical equipment, fixtures, devices, appurtenances, etc., which may, in the course of construction, interfere with the installation of any new and/or relocated Architectural, Mechanical, Electrical, Structural or Fire Protection Systems whether indicated or not.

4. REPAIR

   A. Unless otherwise indicated, the Contractor shall be responsible for the patching and repairing of all holes, etc. in the ceiling, wall and floors where electrical equipment is removed.

5. SALVAGE

   A. It is the intent of this section to deliver to the Owner all components of any electrical system which may be economically reused by him. The Contractor shall make every effort to remove reusable components without damage and deliver them to a location designated by the Owner. Prior to demolition, walk site with Owner to determine any equipment they may want to salvage.

END OF SECTION 260505

SECTION 260508 - COORDINATION AMONG TRADES, SYSTEMS INTERFACING AND CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

1. COORDINATION

A. The Contractor is expressly directed to read the General Conditions and all sections of these specifications for all other trades and to study all drawings applicable to his work, including Architectural, Plumbing, Fire Protection, Mechanical and Structural drawings, to the end that complete coordination between trades will be affected. Each Contractor shall make known to all other contractors the intended positioning of materials, raceways, supports, equipment and the intended order of his work. Coordinate all work with other trades and proceed with the installation in a manner that will not create delays for other trades or affect the Owner's operations.

B. Special attention to coordination shall be given to points where raceways, fixtures, etc., must cross other ducts or conduit, where lighting fixtures must be recessed in ceilings, and where fixtures, conduit and devices must recess into walls, soffits, columns, etc. It shall be the responsibility of each Contractor to leave the necessary room for other trades. No extra compensation or time will be allowed to cover the cost of removing fixtures, devices, conduit, ducts, etc. or equipment found encroaching on space required by others.

C. The Contractor shall be responsible for coordination with all trades to ensure that they have made provision for connections, operational switches, disconnect switches, fused disconnects, etc., for electrically operated equipment provided under this or any other division of the specifications, or as called for on the drawings. Any connection, circuiting, disconnects, fuses, etc., that are required for equipment operation shall be provided as a part of this contract.

D. If any discrepancies occur between accompanying drawings and these specifications and drawings and specifications covering other trade's work, each trade shall report such discrepancies to the Architect far enough in advance so that a workable solution can be presented. No extra payment will be allowed for relocation of fixtures, devices, conduit, and equipment not installed or connected in accordance with the above instructions.

E. In all areas where air diffusers, devices, lighting fixtures and other ceiling-mounted devices are to be installed, the Mechanical Trade(s) and the Electrical Trade and the General Trades shall coordinate their respective construction and installations so as to provide a combined symmetrical arrangement that is acceptable to the Architect and Engineer. Where applicable, refer to reflected ceiling plans. Request layouts from the Architect or Engineer where in doubt about the potential acceptability of an installation.

2. INTERFACING

Each Electrical Trade, Specialty Controls Trade, Mechanical Trade and the General Trades, etc., shall insure that coordination is affected relative to interfacing of all systems. Some typical interface points are (but not necessarily all):

A. Connection of all controls to equipment.

B. Electrical power connections to electrically operated (or controlled) equipment.

C. Electrical provisions for all equipment provided by other trades or suppliers within this contract.

3. CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

A. Each Contractor shall make all connections to equipment furnished by others, whenever such equipment is shown on any part of the drawings or mentioned in any part of the Specifications, unless otherwise specifically specified hereinafter.

B. All drawings are complementary, one trade of the other. It is the Contractor's responsibility to examine all drawings and specifications to determine the full scope of his work. The project Engineers have arranged the specifications and drawings in their given order solely as a convenience in organizing the project, and in no way shall they imply the assignment of work to specific trades, contractors, subcontractors or suppliers.

C. Supervision to assure proper installation, functioning and operation shall be provided by the Contractor furnishing the equipment or apparatus to be connected.

D. Items indicated on the drawings as rough-in only (RIO) will be connected by the equipment supplier or Owner, as indicated. The Contractor shall be responsible for rough-in provisions only as indicated. These rough-ins shall be in accord with the manufacturer's or supplier's requirements.

E. For items furnished by others, relocated, or RIO, the Contractor shall obtain from the supplier or shall field determine as appropriate, the exact rough-in locations and connection sizes for the referenced equipment.

F. The Contractor shall be responsible for coordinating with the General and all other trades, as necessary, to determine any and all final connections that he is to make to equipment furnished by others.

END OF SECTION 260508

SECTION 260519 - CONDUCTORS, IDENTIFICATION, SPLICING DEVICES & CONNECTORS

1. GENERAL

A. This section of the Specifications covers all of the electrical power, lighting, and control power (line voltage) conductors, but does not include communications, data or signal system conductors, which are specified separately in these specifications.

B. All conduits installed without conductors shall have a 200 lb. test nylon string installed for future use, tied off securely at each end.

C. **No more than 40% conduit fill is permitted for <u>any</u> conduit system, including video, intercom, data, power or other signal circuits unless specifically indicated otherwise on the plans.**

D. Lighting circuits: No more than five conductors shall be installed in conduit except for switch legs and travelers in multi-point switching arrangements.

E. Receptacle circuits: If multiple circuits are pulled in a single homerun, a dedicated neutral shall be provided for each phase conductor. In these cases, a maximum of seven conductors are permitted in a single conduit. Conductors shall be derated per N.E.C.

F. Intentional or unintentional painting of exposed low voltage or line voltage cabling is prohibited. The contractor shall ensure that exposed cabling is adequately protected from direct painting or overspray whether painting is required within the electrical specifications or required by other disciplines/trades. The contractor shall review the painting requirements for all disciplines and shall provide cabling protection as required. Where exposed cabling is being installed in exposed ceiling or wall spaces that are required to be painted, the contractor shall provide alternate options for cable colors and shall provide submittals for such cabling to engineer for approval.

2. MATERIALS

A. CONDUCTORS

(1) All conductors shall be 98% conductive annealed copper unless otherwise noted, UL listed and labeled.

(2) Lighting and receptacle branch circuits shall be not less than No. 12 copper wire or of the sizes shown on the drawings with Type THW, THHN or THWN insulation. All feeder circuits shall be Type THW or THWN of the size as shown on the Contract Drawings. THHN wiring shall only be installed in overhead, dry or damp locations. THWN or THW wiring shall be used for all circuits pulled in underground or other wet locations.

(3) Conductors No. 10 and smaller sizes of wire shall be solid. Conductors No. 8 and larger sizes shall be stranded.

(4) Conductors for fire alarm wiring shall be stranded and in full compliance with N.E.C. 760. All fire alarm conductors shall be installed within conduit and enclosed junction boxes.

(5) All wire on the project shall be new, in good condition, and shall be delivered in standard coils or reels.

(6) The color of the wire shall be selected to conform with Section 210-5 of the latest edition of the National Electrical Code. Refer also to 260519-4, Color Coding.

(7) All equipment grounding conductors shall have green color insulation or if larger than #8, shall be taped for two inches, green color at every termination and pullbox access point.

(8) Conductors used for motor connections and connections to vibrating or oscillating equipment shall be extra flexible.

(9) Conductors for main ground from neutral bus, equipment grounding bus, building steel, grounding grid and main cold water pipe connection shall be bare copper.

(10) All conductors shall be identified by color code and by means of labels placed on conductors in all junction boxes and at each terminal point with Brady, Ideal, T & B or approved equivalent labels indicating source, circuit No. or terminal No.

(11) Branch wiring and feeder conductors that are greater than 100' in length shall be increased at least one size to compensate for voltage drop. All circuits shall be installed and sized for a maximum 2% voltage drop. As calculated using 80% of the supply breaker rating as the load. Adjust conductors and conduit size accordingly for actual field installed conditions.

(12) No aluminum conductors shall be used.

B. SPLICING DEVICES & CONNECTORS

(1) Splicing devices for use on No. 14 to No. 10 AWG conductors shall be pressure type such as T & B "STA-KON", Burndy, Reliable or approved equivalent.

(2) Wire nuts shall be spring pressure type, insulation 600V, 105°C insulation, up to #8 size. Greater than #6 Cu shall be a compression type connection, 600V insulation, cold shrink tubing, taped to restore full insulation value of the wire being spliced.

(3) Pressure crimp-applied ring type (or fork with upturned ends) terminations shall be employed on motor and equipment terminals where such terminals are provided on motor and equipment leads or on all stranded wire terminations using No. 10 AWG or smaller conductors.

(4) Splices, where necessary, shall be made with hydraulically-set "Hy-press" or equivalent crimped connectors. All splices shall be insulated to the full value of the wiring insulation using a cold-shrink kit or the equivalent in built-up materials.

(5) Large connectors (lugs) at terminals shall be mechanical type, hex-head socket or crimp-on style, installed per the manufacturer's recommendations.

(6) Exterior underground connections made between bare ground wires or to ground rods shall be exothermically welded, "Cadweld" or equivalent.

(7) The use of split-bolt clamps will be permitted in wireways at service entrance only. Torque to 55 foot-pounds or as recommended by manufacturer.

3. INSTALLATION

A. The pulling of all wires and cable on this project shall be performed in strict compliance with applicable sections of the National Electrical Code. No conductor entering or leaving a cabinet or box shall be deflected in such a manner as to cause excess pressure on the conductor insulation. Conductors shall only be installed after insulating bushings are in place.

B. The radius of bending of conductors shall be not less than eighteen times the outside diameter of the conductor insulation or more, if recommended by the manufacturer.

C. Conductors installed within environmental air plenums shall be per N.E.C. Article 800 and other applicable codes, with FEP-type insulation or an approved equivalent. Also provide plenum-rated tie-wraps where plastic straps or other supports, etc., are installed in plenum areas.

D. Where indicated, communications conductors that are installed exposed shall not be routed across ceilings or ductwork. They shall be held up against building structure or against permanent support members. They shall be installed in such a manner that they do not interfere with the access to or operation of equipment or removal of ceiling tiles. Tie-wraps shall be installed in such a manner so as to bundle conductors neatly, allowing runouts of single conductors or groups to drop down to equipment served. Install grommeting where dropping out of trays or into panels or service columns. Install sleeves with bushings where penetrating partitions. Firestop sleeves with approved material. Do not penetrate firewalls if so indicated on plans. Refer to the drawings for support requirements and details on routing exposed communications conductors.

E. Conductors for isolated power systems shall be installed in as short a run of conduit as practicable. No pulling soap shall be used on conductors in isolated power systems.

F. Maximum permissible pulling tensions, as recommended by the manufacturer for any given type of cable or wire installed shall not be exceeded. Utilize special remote readout equipment as required to ensure compliance. Use particular caution when installing twisted pair data cable or fiber optic cables -- forces permitted for pulling in are typically very low for these cable types.

G. All cables and wiring, regardless of voltage, installed in manholes or cable vaults shall be routed in such a manner to provide a minimum of 6 feet of slack cable for future splicing. Install cables along walls by utilizing the longer route from entry to exit. If both routes are symmetrical, provide a loop of cable secured to wall. All cables shall be tied to insulated cable supports on wall-mounted racks, spaced a maximum of three feet apart.

4. COLOR CODING DISTRIBUTION VOLTAGE CONDUCTORS, 600 VOLT OR LESS

A. Conductors to be color coded as follows:

(1) 120/208 Volt Conductors
Phase A - Black
Phase B - Red
Phase C - Blue
Neutral - Solid White or White with tracer stripe to match phase conductor

Note: Further identify isolated power conductors with 2" wide purple tape at all terminations and junctions.

(2) Control Wiring - Red, or as indicated.

(3) Conductors within enclosures that may be energized when enclosure disconnect is off - yellow, or taped with 1/2" yellow tape every 6" of length, inside enclosure. Provide lamacoid plate warning sign on front of enclosure where this condition occurs.

(4) D.C. Wiring - Positive - Light Blue
Negative - Dark Blue

END OF SECTION 260519

SECTION 260526 - GROUNDING

1. GENERAL

A. All metallic conduit, raceways, cable trays, wireways, supports, cabinets and equipment shall be grounded in accordance with the latest issue of the National Electrical Code, as shown on the Contract Drawings and in accord with the requirements of the local authority having jurisdiction, as applicable.

B. The size of the equipment grounding conductors, grounding electrode conductors and service grounding conductors shall be not less than that given in Article No. 250 of the National Electrical Code, and/or as shown on the Contract Drawings. Where ungrounded conductor sizes are increased to minimize voltage drop, grounded conductor sizes shall be increased in the proper proportion.

C. Grounding bus and non-current carrying metallic parts of all equipment and raceway systems shall be securely grounded by connection to common ground.

D. The service entrance main ground bus shall also be connected to the main cold metallic water pipe within three feet of where it enters the building, on both the house and street sides of the main shut-off valve with a properly sized bonding jumper. A properly sized bonding jumper shall also be provided to the frame of any steel structure utilized in the construction. The steel frame of the building (if any) shall be made electrically continuous.

2. MATERIALS

A. Ground wires and cables shall be of the AWG sizes shown on the Contract Drawings or shall be sized in accord with the prevailing codes. All ground wires and cables shall be copper.

B. All grounding fittings shall be heavy cast bronze or copper of the mechanical type except for underground installations or interconnection of grounding grid to cable, columns and ground electrodes, which shall be thermically welded type as manufactured by Cadweld, Burndy Co., Therm-O-Weld, or approved equivalent. Other bonding clamps or fittings in above ground locations shall be as manufactured by O.A. Co., T & B, Burndy, or approved equivalent.

C. Ground electrode pipe systems shall be solid copper construction. Ground rods shall be 5/8" minimum diameter, eight feet long, copperweld steel. All ground electrode systems shall be installed in accord with manufacturer's recommendations, U.L. listings, National Electrical and National Electrical Safety Codes.

3. INSTALLATION

A. All grounding conductors shall be protected from mechanical injury and shall be rigidly supported. Where ground conductors are run through flexible conduit and through panelboard switchboard or motor control center feeders, they shall be securely bonded to such conduit thru the use of grounding bushings at the entrance and exit. All connection of equipment shall be made with an

approved type of solderless connection and same shall be bolted or clamped to equipment or conduit.

B. All equipment grounding conductors to lighting fixtures, devices, receptacles, electric heaters, furnace and other equipment not exceeding No. 8 AWG in size shall be green colored Type "THWN".

C. Equipment ground connections to GFI circuit breakers shall be carried and bonded to each outlet on the circuit. Provide a separate equipment grounding conductor with green color insulation.

D. Resistance to the grounding at the service entrance equipment shall be in accordance with the N.E.C. for style of construction and shall not exceed ten ohms as measured by the described testing method.

E. All circuits shall have a separate grounding conductor, except as otherwise noted.

F. When grounding systems are completely installed and all grading in the area of the service grounding electrode has been completed up to finish elevations, perform a fall-of potential or other approved test to determine actual system resistance to earth. Report results to the Engineer in writing. Refer to testing provisions in this section of specifications.

G. Where separately-derived systems are utilized as part of the power distribution network, the neutral leg of the secondary side of generators, transformers, etc., shall be connected to a grounding electrode in accordance with the manufacturer's recommendations.

H. The Contractor shall ensure that the ground return path thru building structural steel or other means is electrically continuous back to the service grounding electrode and is of adequate capacity and impedance to carry the maximum expected fault or other current. Where no electrically continuous steel building frame is available, the Contractor shall provide a properly sized ground bar and ground conductor routed back to the main facility ground bus.

I. Where a building's steel frame is made electrically discontinuous by masonry breaks (as at firewalls, etc.), the Contractor shall provide an accessible thermically welded bonding jumper of #500MCM copper to bond the building steel frame sections together, making the entire steel frame electrically continuous. The installation of these bonding jumpers shall be reviewed by the Engineer prior to their being covered by construction.

J. Grounding connections shall **never** be made to fire protection, natural gas, flammable gas or liquid fuel piping, except where specifically indicated on the plans.

K. Where dielectric fittings are utilized in piping systems, the piping system shall **not** be utilized as a ground path. Bonding jumpers shall not be utilized to bridge over such fittings. Piping systems shall not be utilized as ground paths except where specifically required by codes in the case of water piping.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

B. Related Sections include the following:

1. Division 26 Section "Vibration and Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of **five** times the applied force.

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.
2. Nonmetallic slotted support systems.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.
2. Steel slotted channel systems. Include Product Data for components.
3. Nonmetallic slotted channel systems. Include Product Data for components.
4. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

1.8 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit.
    b. Cooper B-Line, Inc.; a division of Cooper Industries.
    c. ERICO International Corporation.
    d. GS Metals Corp.
    e. Thomas & Betts Corporation.
    f. Unistrut; Tyco International, Ltd.
    g. Wesanco, Inc.

3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
6. Channel Dimensions: Selected for applicable load criteria.

B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- (14-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c., in at least 1 surface.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit.
    b. Cooper B-Line, Inc.; a division of Cooper Industries.
    c. Fabco Plastics Wholesale Limited.
    d. Seasafe, Inc.

3. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
4. Fitting and Accessory Materials: Same as channels and angles.
5. Rated Strength: Selected to suit applicable load criteria.

C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

    a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Hilti Inc.
        2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
        3) MKT Fastening, LLC.
        4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

    a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Cooper B-Line, Inc.; a division of Cooper Industries.
        2) Empire Tool and Manufacturing Co., Inc.
        3) Hilti Inc.
        4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
        5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.

2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete.

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Comply with requirements in Division 09 Painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260531 - CABINETS, OUTLET BOXES AND PULL BOXES

1. GENERAL

   A. This section of the specifications covers all electrical cabinets, outlet boxes and pull boxes.

   B. Continuous runs of conduit shall have properly sized pull boxes at least each eighty-five feet of run, or as near as possible to that limit.

2. MATERIALS & INSTALLATION

   A. Cabinets, Outlet and Pull Boxes:

      (1) Cabinets for lighting and power, telephone, pull boxes, outlet boxes, or any other purposes specified or shown on the Contract Drawings, shall be constructed of code gauge, galvanized steel with sides formed and corner seams riveted or welded before galvanizing. Boxes assembled with sheet metal screws will not be accepted. Pull boxes shall include all boxes used to reduce the run of conduit to the required number of feet or bends, supports, taps, troughs, and similar applications and shall also be constructed as specified above.

      (2) All cabinets and boxes for NEMA 1 and 1A application shall be provided with knockouts, as necessary, or shall be cut in the field by approved cutting tools which will provide a clean, symmetrically cut opening. All boxes, except panelboards, shall be provided with code gauge fronts with hex head or pan head screw fasteners. Outdoor cabinets shall be hinged cover with pad locking provisions. Fronts for panelboards shall be as specified for panelboards.

      (3) Ceiling outlet boxes shall be galvanized steel, 4" octagonal, not less than 2 1/8" deep, with lugs or ears to secure covers. Those for use with ceiling lighting fixtures shall be fitted with 3/8" fixture studs fastened to the back of the boxes, where applicable. Provide adequate support with at least a 2 x safety factor for the anticipated fixture weight.

      (4) Special size concealed outlet boxes for clocks, speakers, alarms, panels, etc., shall be provided by the manufacturer of the equipment.

      (5) Floor outlet boxes shall be as specified in Section 262726, fully adjustable unless noted or specified otherwise.

      (6) Unless otherwise noted on the drawings or in the specifications, outlet boxes shall be installed at the following heights to centerline of box:

         Wall Switches, Control Stations.....3'-10"
         Convenience Outlets .....1'-6"
         Convenience Outlets - Above Counters.....Bottom at 4" above top of backsplash
         T.V. Outlets.....1'-6"
         T.V. Outlets - At Wall Brackets.....Refer to Plans
         Desk Telephones.....1'-6"

Weatherproof Outlets .....2'-2"
Disconnects, Branch Panelboards .....5'-0" max. to centerline
Fire Alarm Manual Stations .....3'-10"
Fire Alarm Audio and/or Visual Units80" AFF to bottom of device or 6" below ceiling, whichever is lower.

(7) The location of outlets, as shown on the drawings, shall be considered as approximate only. It shall be incumbent upon this Contractor to study the general building drawings, with relation to spaces surrounding each outlet, in order to make his work fit the work of others and in order that when the devices or fixtures are installed, they will be symmetrically located and will not interfere with any other work or equipment. Any change in fixture or layout shall be coordinated with and approved by the Engineer before this change is made. Regardless of the orientation shown on the drawings, all devices shall be easily accessible when installed.

(8) Boxes installed in fire rated assemblies shall not compromise the rating of the assembly. The Contractor is responsible for identifying assembly ratings and construction requirements prior to rough-in.

a. Listed single and double gang metallic outlet and switch boxes with metallic or nonmetallic cover plates may be used in bearing and nonbearing wood stud and steel stud walls with rating not exceeding 2 h. The boxes shall be fastened to the studs with the openings in the wallboard facing cut so that the clearance between the boxes and the wallboard do not exceed 1/8 in. The boxes shall be installed so that the surface area of individual boxes do not exceed 16 sq in, and the aggregate surface area of the boxes do not exceed 100 sq in per 100 sq ft of wall surface unless approved alternate protection materials are used.

b. Boxes located on opposite sides of walls or partitions shall be separated by a minimum horizontal distance of 24 in. This minimum separation distance between the boxes may be reduced when listed Wall Opening Protective Materials are installed according to the requirements of their Classification.

c. Boxes installed on opposite sides of walls or partitions of staggered stud construction shall have listed Wall Opening Protective Materials installed with the boxes in accordance with Classification requirements for the protective materials.

d. All installation shall be done in accordance with AHJ requirements.

(9) All outlets, pull boxes, junction boxes, cabinets, etc., shall be sized per the current edition of the National Electrical Code.

B. Cabinets, outlet boxes and junction or pull boxes shall be threaded for rigid-threaded conduit, dust-tight, vapor-tight or weatherproof as required for areas other than for NEMA 1 or 1A application. These shall be as manufactured by Crouse-Hinds, Appleton, Killark, or approved equivalent.

(1) NEMA 1 or 1A cabinets, outlet boxes or pull or junction boxes shall be as manufactured by Appleton, Steel City, T & B, or approved equivalent.

(2) Outlet boxes for switches, receptacles, telephone, etc., concealed in walls shall be galvanized steel, 2" X 4" X 2" with plaster cover for the number of devices as required. Where outlet boxes are installed in walls of glazed tile, brick, concrete block, or other masonry which will not be covered with plaster or in walls covered by wood wainscot or paneling, deep sectional masonry boxes shall be used and they shall be completely covered with the plates or lighting fixtures. This Contractor shall cooperate with the brick layers, block layers and carpenters to insure that the outlet boxes are installed straight and snugly in the walls. Receptacles shall be set vertically in walls, unless noted otherwise.

(3) Outlet boxes mounted in glazed tile, brick, concrete block or other types of masonry walls shall be mounted above or below the mortar joint. Do Not Split The Mortar Joint.

(4) Boxes for more than two devices shall be for the number of devices required and shall be one piece. No ganging of single switch boxes will be allowed.

(5) Outlets provided shall have only the holes necessary to accommodate the conduit at the point of installation and shall be rigidly secure in position. Boxes with knockouts removed and openings not used shall be replaced or be provided with a listed knockout closure.

(6) Openings for conduit entrance in cabinets and boxes shall be prefabricated, punched, drilled and/or reamed. The use of a cutting torch for this purpose is prohibited.

END OF SECTION 260531

SECTION 260533 - RACEWAYS & FITTINGS

1. GENERAL

A. This section is intended to specify the raceways, conduit, conduit fittings, hangers, junction boxes, splice boxes, specialties and related items necessary to complete the work as shown on the drawings and specified herein.

B. This section specifies basic materials and methods and is a part of each Division 26, 27 and 28 that implies or refers to electrical raceways specified therein.

C. The types of raceways specified in this section include the following:

(1) Steel electrical metallic tubing. (E.M.T.)
(2) Rigid galvanized steel conduit. (G.R.S.)
(3) Intermediate metal conduit (I.M.C.).
(4) Rigid aluminum conduit.
(5) Flexible metal conduit (aluminum or steel)
(6) Liquid - tight flexible metal conduit.
(7) Rigid nonmetallic conduit.
(8) Cable tray or cable trough.
(9) Duct banks, and their construction.

D. All raceways, as listed in 1C. above and otherwise specified herein shall be provided in compliance with latest editions of all applicable U.L., NEMA, N.E.C. and A.N.S.I. standards. All conduit, raceways and fittings shall be Underwriters Laboratories listed and labeled, or bear the listing of an agency acceptable to the local authority having jurisdiction.

E. Conduit and raceways, as well as supporting inserts in contact with or enclosed in concrete shall comply with the latest edition of all A.C.I. standards and the equipment manufacturer's recommendations for such work.

F. P.V.C. or other non-metallic conduit shall be rated for the maximum operating temperature that could be developed by the conductors it encloses, while in normal operation.

G. The decision of the Engineer shall be final and binding in any case where a question or inquiry arises regarding the suitability of a particular installation or application of raceways, supports or materials, if other than outlined herein.

H. Minimum size of conduit shall be 3/4" trade size. All conduit and raceways shall be sized for the number of conductors contained, in accord with the latest edition of the National Electrical Code or any other applicable standards.

I. The installer of raceway systems shall avoid the use of dissimilar metals within raceway installations that would result in galvanic-action corrosion.

2. MATERIALS

A. STEEL ELECTRICAL METALLIC TUBING

(1) Electrical metallic tubing, (E.M.T.) of corrosion-resistant steel construction shall be permitted for concealed installation in dry interior locations. Electrical metallic tubing shall not be installed in concrete slabs or where exposed to physical damage. Electrical metallic tubing shall be permitted for exposed work in mechanical and electrical rooms and other exposed structure areas where not subjected to physical damage, as determined by the Engineer.

B. RIGID GALVANIZED STEEL CONDUIT

(1) Rigid galvanized steel conduit shall be used where subject to physical damage for exposed work in mechanical spaces, within factory or other industrial work areas, for exposed fit-up work on machinery, for exposed exterior damp or wet location work, in hazardous atmospheres, in exterior underground locations where installed beneath roadways, where ells occur in underground P.V.C. conduits, or where turning out of concrete encased duct banks, and at other locations as specifically called out on the drawings.

(2) Rigid galvanized steel conduit shall be used for all building interior power wiring or cables of over 600 Volts.

C. INTERMEDIATE METAL CONDUIT

(1) Unless otherwise indicated on the drawings, intermediate metal conduit (I.M.C.) may be used in any location in place of rigid galvanized steel conduit, as permitted by codes, and as approved by the Engineer.

D. RIGID ALUMINUM CONDUIT

(1) Rigid aluminum conduit, shall be permitted for installation indoors in dry locations only. Under no conditions shall it be cast into concrete slabs or pass thru construction where prolonged contact will degrade the aluminum. All ells used in rigid aluminum conduit systems shall be rigid galvanized steel. Rigid aluminum conduit shall always be used for power wiring greater than 5 KVA and higher than 60 Hz frequency.

E. FLEXIBLE METAL CONDUIT

(1) Flexible conduit shall be used where permitted by NEC. It may be constructed of aluminum or steel. It shall be installed with connectors designed for the purpose. All flexible metal conduit shall be installed as a single piece. No joints shall be installed. Flexible conduit shall not be used in wet or dusty locations or where exposed to oil, water or other damaging environments. An equipment grounding conductor or bonding jumper shall be used at all flexible conduit installations. Maximum permitted length of flexible metal conduit shall be 72”, as for light fixture whips unless approved in writing by Engineer.

F. LIQUIDTIGHT FLEXIBLE METAL CONDUIT

(1) Weatherproof flexible metal conduit shall be wound from a single strip of steel, neoprene covered, equivalent to "Liquatite" or "Sealtite" Type "UA". It shall be installed in such a manner that it will not tend to pull away from the connectors. Provide strain relief fittings equivalent to "Kellems" as required where subject to vibration. Flexible connections to motors in dusty areas shall be dust-tight, in areas exposed to the weather - weatherproof.

G. RIGID NON-METALLIC CONDUIT

(1) Rigid non-metallic conduit shall be constructed of P.V.C, nominally schedule 40 weight, except where encased in concrete, where it may be "EB" type. If installation will enclose utility company provided conductors, verify exact type required and install in accord with their standards, if more stringent than this specification.

(2) Rigid non-metallic conduit may be used in exterior wet or damp locations where installed underslab or underground. It shall not be run in interior locations, except with special permission from the Engineer for use in corrosive environments, and then only if protected from physical damage. No rigid nonmetallic conduit may be installed in environmental air plenums or cast into above-grade concrete slabs. No rigid nonmetallic conduit may be installed in locations where the ambient temperature might exceed the rating of the raceway.

(3) Where rigid non-metallic conduit is placed underground, as for feeder circuits, secondaries or branch circuit runs and where ell is made upward thru a slab on grade, transition the turning ell and the riser to rigid steel conduit to a height of 6" above the concrete slab. Transition may then be made to E.M.T or other approved conduit for remainder of run.

(4) Flexible nonmetallic conduit shall not be used, except by special permission, obtained in writing from the Engineer.

(5) Provide equipment grounding conductors of copper, sized as required by codes, in all circuits installed in rigid nonmetallic raceways.

H. OPEN WIRE MESH CABLETRAY

(1) Section includes continuous, rigid, welded steel wire mesh cable management system.

(2) References

a. ASTM A 123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

b. ASTM A 510 - General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.

c. ASTM B 633 - Electrodeposited Coatings of Zinc on Iron and Steel.

(3) Design Requirements

a. Maximum Deflection Between Supports: L/240.

(4) Submittals

a. Product Data: Submit manufacturer's product data, including UL classification.

b. Shop Drawings: Submit shop drawings indicating materials, finish, dimensions, and accessories. Show layout, support, and installation details.

c. Manufacturer Qualifications: Submit manufacturer's certification indicating ISO 9002 quality certified.

(5) Delivery, Storage and Handling

a. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

b. Storage: Store materials in a dry area indoors, protected from damage, and in accordance with manufacturer's instructions.

c. Handling: Protect materials and finishes during handling and installation to prevent damage.

(6) Manufacturer

a. Cablofil, Inc., 8319 State Route 4, Mascoutah, IL, 62258. Phone (618) 566-3230. Toll Free (800) 658-4641. Fax (618) 566-3250. www.cablofil.com, or approved equivalent. Part numbers included in this section are not meant to restrict truly equivalent manufacturers.

(7) Open Wire Mesh Cabletray System

a. Description: Continuous, rigid, welded steel wire mesh cable management system.

1) Mesh System: Permitting continuous ventilation of cables and maximum dissipation of heat.

2) Safety Edge: Continuous safety edge T-welded wire lip.

3) Wire Mesh: Welded at all intersections.

b. UL Classification: Straight sections -Refer to drawings for sizes.

c. Material: Carbon steel wire, ASTM A 510, Grade 1008. Wire welded, bent, and surface treated after manufacture.

d. Finish for Carbon Steel Wire: Finish applied after welding and bending of mesh.

1) Hot-Dip Galvanizing: ASTM A 123. (Only in exterior, wet or corrosive locations)

2) Flat Black: Powder painted surface treatment using ASA 61 black polyester coating. (In indoor dry locations)

e. Nominal Dimensions:

1) Nominal Mesh: 2 x 4 inches.

2) Nominal Straight Section Lengths: 80 inches and 118 inches.

3) Width: Refer to the drawings.

4) Depth: Four inches in depth for all but 6” wide, which shall be 2” depth.

5) Wire Diameter: Nominal .177 inch, minimum.

f. Fittings: Field fabricated in accordance with manufacturer's instructions from straight sections.

g. Support System: Standard.

1) Wall Installation: CS Bracket. Maximum tray width of 12 inches (300 mm).

2) Trapeze Mounting to Ceilings: CS Profile. Maximum tray width of 18 inches (450 mm).

3) Ceiling Installation: CSC Bracket. Maximum tray width of 12 inches (300 mm).
4) Fasteners: As required by tray widths. To be furnished by manufacturer.

h. Hardware: Hardware, including splice connectors, grounding fittings and support components to be furnished by the manufacturer.

i. Grounding: GTA-2-2 grounding lugs for attachment on tray of continuous ground conductor fixing system.

(8) Examination

a. Examine areas to receive cable management system. Notify the Engineer of conditions that would adversely affect the installation or subsequent utilization of the system. Do not proceed with installation until unsatisfactory conditions are corrected.

(9) Installation

a. Install open wire mesh cabletray system at locations indicated on the drawings and in accordance with manufacturer's instructions.

b. Load Span Criteria: Install open wire mesh cabletray system in accordance with span load criteria of L/240.

c. Cutting:

1) Cut wires in accordance with manufacturer's instructions.

2) Cut wires with side action bolt cutters to ensure integrity of galvanic protective layer.

3) Cut each wire with 1 clean cut to eliminate grinding or touch-up.

d. Install open wire mesh cabletray system using hardware, splice connectors, support components, and accessories furnished by manufacturer.

e. Coordinate with other trades to provide as straight and accessible runs as possible. Not all offsets are shown on drawings, but Contractor shall make accessible offsets as required around ductwork, structure, piping or other interferences as required.

I. RACEWAY FITTINGS

(1) Raceway fittings (or condulets) shall be of gray iron, malleable iron or heavy copper-free cast aluminum. They shall be furnished in proper configurations, avoiding excessive plugged openings. Any openings that are left shall be properly plugged. All coverplates shall be gasketed with neoprene or similar approved materials, rated for the environment.

(2) Where conduit transitions in a run from a cold to a warm environment, (such as at a freezer, refrigerator or exterior wall) sealoff fittings shall be placed on the warm side immediately at the boundary to prevent migration of condensation within raceway systems.

(3) Expansion fittings shall be provided at all locations where conduits or other raceways cross over expansion joints. Provide copper ground bonding jumpers across expansion fittings.

(4) Conduit bodies, junction boxes and fittings shall be dust tight and threaded for dusty areas, weatherproof for exterior locations and vapor tight for damp areas. Conduit fittings shall be as manufactured by Crouse Hinds, Appleton, Killark or approved equivalent. All surface mounted conduit fittings as with "FS", "FD", "GUB" Types etc., shall be provided with mounting hubs.

(5) Where lighting fixtures, appliances or wiring devices are to be suspended from ceiling outlet boxes, they shall be provided with 3/4" rigid conduit pendants. Outlet boxes shall be malleable iron, provided with self-aligning covers with swivel ball joint and No. 14 gauge steel locking ring. Provide safety chain between building structure and ballast housing of light

fixtures for all fixtures, appliances or devices greater than 10 lbs weight. Fixtures shall be installed plumb and level.

(6) Fittings for threaded raceways shall be tapered thread with all burrs removed, reamed ends and cutting oil wiped clean.

(7) Fittings for E.M.T. conduit shall be of the compression type. Conduit stops shall be formed in center of couplings. All EMT connectors and couplings shall be of formed steel construction.

(8) Indentation or die-cast fittings shall not be permitted in any raceway system.

(9) All conduit fittings shall be securely tightened. All threaded fittings shall be engaged seven full threads. Fasteners shall be properly torqued to manufacturer's recommendations.

3. INSTALLATION

A. This Contractor shall lay out and install all conduit systems so as to avoid any other service or systems, the proximity of which may prove injurious to the conduit, or conductors which it confines. All conduit systems, except those otherwise specifically shown to the contrary, shall be concealed in the building construction or run above ceilings. Size of all conduit shall as a minimum conform to the National Electrical Code, unless larger size is indicated on the Contract Drawings.

B. No conduit larger shall be installed in poured concrete slabs except with permission of the structural engineer. All other shall be held below slab. Conduit shall be held at least 6" from flues or hot water pipes.

C. All exposed conduit shall be installed with runs parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of cast metal fittings or symmetrical bends unless otherwise shown. All conduit shall have supports spaced not more than eight feet apart.

D. Conduit shall be installed in such a manner so as to insure against collection of trapped condensation. All runs of conduit shall be arranged so as to be devoid of traps. Trapped conduit runs shall be provided with explosion proof drains at low points. Runs of conduit between junctions shall not have more than the equivalent of three 90º bends.

E. Junction boxes shall be installed so that conduit runs will not exceed 85', as shown on the Contract Drawings.

F. Underground electric, cable TV, telephone service or other rigid steel conduit and underfloor rigid steel conduit below the concrete floor slab shall be painted with two coats of bitumastic paint, such as "Asphaltum".

G. All underground or underfloor conduits shall be swabbed free of all moisture and debris before conductors are pulled.

H. At least two 1 inch and four 3/4 inch conduits shall be stubbed from flush-mounted panelboards into the nearest accessible area for future use. Provide suitable closures for these stubs. Identify each stub with a suitable hang tag.

I. Install electrical raceways in accordance with manufacturer's written instructions, applicable requirements of latest edition of the N.E.C., and NECA "Standard of Installation", complying with recognized industry practices.

J. Coordinate with other trades, including metal and concrete deck trades, as necessary to interface installation of electrical raceways and components.

K. Level and square raceway runs, and install at proper elevations and required heights. Hold tight to structure or route through joists webbing wherever possible, to maximize available space and not restrict other trades.

L. Complete installation of electrical raceways before starting installation of cables or wires within raceways.

M. All underground conduits shall be buried to minimum depth of 24" from the top of the concrete encasement or raceway to finished grade, unless otherwise noted on plans. Observe minimum burial requirements of local utility company where their standards or regulations apply. Conduits containing primary power conductors, (higher than 600 volts to ground) shall be 42" to top below finished grade, unless otherwise noted on plans.

N. All raceways shall be installed to maintain a minimum of 4” clearance below roof decking.

4. SPECIALTIES

A. All EMT terminations at junction boxes, panels, etc. shall be made with case hardened locknuts and appropriate fittings, with insulated throat liners. Insulating terminations shall be manufactured as a single unit. The use of split sleeve insulators is not permitted.

B. All rigid conduit, except main and branch feeders, shall have heavy fiber insulating bushings reinforced with double locknuts. All branch and main feeders shall have insulated bushings with grounding lugs and shall be bonded to enclosures with appropriately sized copper jumpers, except at pad mounted transformers. Bonding jumpers shall be installed as required by the N.E.C. and other applicable codes.

C. All conduit stubbed through floor during construction shall have openings protected with plastic caps approved for this purpose. Connections on both ends of all flexible conduit shall be equivalent to Thomas and Betts, Ideal, Appleton, Efcor, or approved equivalent, rated for the environment.

D. All pulling lines left in open conduit systems shall be non-metallic, left securely tied off at each end.

E. Where spare raceways terminate in switchboards or motor control centers a fishtape barrier shall be provided.

END OF SECTION 260533

SECTION 260544 - EXCAVATION, TRENCHING, BACKFILLING AND GRADING

1. GENERAL

   A. Each Contractor's attention is directed to Section 260501, General Provisions, Electrical and all other contract documents as they may apply to his work.

   B. Each Contractor shall include all excavating, filling, grading and related items required to complete his work as shown on the drawings and specified herein.

   C. Electrical distribution lines and underground telephone or TV cables shall, in no case, be placed in the same trench with sanitary, storm, domestic or fire protection water lines. Phone cable may, at the Contractor's option, and if acceptable to both utility companies, be placed in a common trench with power lines as long as 8" of earth separation is maintained. T.V. cable shall, in all cases, be placed in a separate trench with two feet separation from electrical power lines.

   D. Depths of bury shall be as indicated on the drawings.

2. SUBSURFACE DATA

   A. Subsurface investigations have been made and the results shown on the drawings. The information was obtained primarily for use in preparing foundation design. Each Contractor may draw his own conclusions therefrom. No responsibility is assumed by the Owner for subsoil quality or conditions other than at the locations and at the time investigations were made. No claim for extra compensation, or for extension of time, will be allowed on account of subsurface conditions inconsistent with the data shown.

   B. Materials to be excavated shall be unclassified, and shall include earth, rock, or any other material encountered in the excavation to the depth and extent indicated on the drawings and specified herein. No adjustment in the Contract sum will be made on account of the presence or absence of rock, shale, or other materials encountered in the excavating.

3. BENCH MARKS AND MONUMENTS

   A. Maintain carefully all bench marks, monuments and other referenced points. If disturbed or destroyed, replace as directed.

4. EXCAVATION

   A. Each Contractor shall accept the site as he finds it and remove all trash, rubbish and material from the site prior to starting excavation for his work.

   B. Excavate trenches to sufficient width and depth for proper installation of the work and where required, smooth the bottom on the trench with hand tools.

C. The removal of rock shall be accomplished by use of hand or power tools only. Blasting shall not be permitted unless authorized in writing by the Architect. Any damage to existing structures, exterior services or rock intended for bearing, shall be corrected at the responsible Contractor's expense.

D. Keep trenches free from water while construction therein is in progress. Under no circumstances lay conduit or cable in water. Pumping or bailing water from this Contractor's trenches, which is required during construction shall be accomplished at his expense.

E. In no case shall excavation work be accomplished that will damage in any way the new structure, existing structures, equipment, etc. Each Contractor shall take the necessary steps to prevent flow of eroded earth by water or landslide onto the property of others, or against the structures. The repair of all such damage, or any other damage incurred in the course of excavation, shall be borne by the responsible Contractor.

5. BACKFILL

A. Backfill shall be accomplished with clean debris free earth and the new earth tamped at 12" intervals so as to avoid earth sinks along the trench. The responsible Contractor will be required to return to the project and fill any sunken areas along the route of his work.

B. Backfill trenches only after conduit and cable have been inspected, tested, and locations of pipe lines have been recorded on "as-built" drawings.

C. The backfill below paved areas shall be brought to proper grade to receive the sub-base and paving. No paving shall be placed on uncompacted fill.

D. The backfill below sodded or seeded areas shall be brought to within six inches of finished grade. The remaining six inches shall be backfilled with clean soil.

END OF SECTION 260544

SECTION 260553 - IDENTIFICATIONS

1. GENERAL

A. Equipment, disconnect switches, motor starters, pushbutton stations, special device plates, and similar materials shall be clearly marked as to their function and use. Markings shall be applied neatly and conspicuously to the front of each item of equipment with 1/2" white lamacoid plate (or equivalent) with black letters 1/4" high.

B. The Contractor shall provide clearly legible typewritten directories in each electrical panel indicating the area, item of equipment, etc., controlled by each switch, breaker, fuse, etc. These directories are to be inserted into plastic card holders in each panel. The Contractor shall be required to demonstrate the accuracy of the panel directory for a random sampling of circuits in each panelboard as directed in the field by the Engineer with corrections made immediately so it is imperative that care be taken during installation to insure 100% accurate directories.

C. All circuit breakers and disconnects serving fire alarm equipment shall be painted red and clearly labeled as Fire Alarm Circuits.

D. Branch circuit panelboards and switch gear shall be provided with a white lamacoid plastic plate with 1/2" black letters for panel designation and 1/4" black letters showing voltage and feeder information. Branch circuit switches shall be designated as to function. Panelboard and switchgear labels shall indicate the source they are fed from, and the circuit number at that source. Panelboards shall also indicate color coding of the branch circuit phase conductors supplied. Clearly indicate the exact label legend to be furnished with each panelboard and switchgear on the shop drawings for each item of equipment prior to submission of shop drawings. EXAMPLE

PANEL “XYZ”
FED FROM “MDP – 2”
120/ 208/ 3PH/ 4W – 225A
BLACK-RED-BLUE
CONDUCTORS

E. Lamacoid plates shall be located at center of top of trim for branch circuit panels, switch gear, and centered at side for branch circuit switches. Fasten with self-tapping stainless steel screws or other approved method.

F. The building service disconnect(s) shall be marked with the maximum available fault current available at that location in accordance with NEC Article 110. If a fault current study is not required by this contract, the Contractor shall obtain fault current availability data from the utility company. This requirement applies to both new and existing services if any distribution equipment is changed.

END OF SECTION 260553

SECTION 262726 - WIRING DEVICES AND PLATES

1. GENERAL

   A. This section of the specifications includes wiring devices, cover plates, weatherproof and dust-tight closures, communications devices and floor outlets.

   B. Wiring devices are listed by manufacturer and catalog numbers to establish the quality and type required. Equivalent devices of other manufacturers will be acceptable with prior approval of the Engineer. Submit cutsheets and/or samples of each type ten days prior to bid date for review and written approval to bid. Insofar as possible, standard application or special application devices shall be by one manufacturer.

2. MATERIALS

TYPE	**RATING**	**CONFIGURATION**	**COLOR**	**VENDOR - CAT. #**
RECEPTACLE - DUPLEX **COMMERCIAL GRADE**	125V, 20A	NEMA 5-20R	!	HUBBELL CR5362* GE 5362* LEVITON 5362*
	125V, 15A	NEMA 5-15R	!	HUBBELL CR5262** GE 5262** LEVITON 5262**
	* USE WHEN ON DEDICATED 20A CKT., OR CALLED OUT ** USE WHEN ON DEDICATED 15A CKT., OR WHEN MORE THAN ONE RECEPTACLE ON A CIRCUIT			
RECEPTACLE - DUPLEX G.F.I. (SHALL MEET U.L. 943 STANDARD)	125V, 20A	NEMA 5-20R	!	HUBBELL GFR5352A
RECEPTACLE - SIMPLEX	125V, 20A	NEMA 5-20R	!	HUBBELL 5361
RECEPTACLE - DUPLEX, SAFETY TYPE (WITH TAMPER-RESISTANT SCREWS)	125V, 20A	NEMA 5-20R	!	HUBBELL HBL-8300-SG
SWITCH, SINGLE POLE	120V, 20A	SPST	!	HUBBELL HBL-1221 GE 5951 LEVITON 1221

NOTES:

1. PROVIDE MATCHING CAP (PLUG) FOR ALL RECEPTACLES 30 AMP RATED AND ABOVE AS REQUIRED FOR EQUIPMENT.

2. ALL RECEPTACLES SHALL BE BACK OR SIDE-WIRED, CLAMPING TYPE

3. ALL RECEPTACLES INSTALLED IN DAMP OR WET LOCATIONS SHALL BE UL LISTED WEATHER RESISTANT TYPE.

! SEE ARTICLE 3, COLOR.

A. Small Motor Control Switches:

(1) For small line-to-neutral motor loads of 3/4 HP or less, single phase, rated at 120 volts, provide snap-type, H.P. rated motor starter switch with thermal overloads. Overload heaters sized to match the motor nameplate amperes and the ambient temperature shall be provided. Provide with NEMA 1, NEMA 3R or other enclosure suitable for the location and atmosphere. All manual starters in finished areas shall be in flush-mounted enclosures.

3. COLOR

A. Color of devices shall be as selected by the architect. Samples (devices, plates or both) may be required to be submitted with other architectural color items by the Contractor. The Contractor shall coordinate any such submission required with other trades, the Prime Contractor or as needed.

B. Where surface finishes next to the devices vary in color or shade throughout the project, the Contractor may be required to provide lighter or darker plates and devices to more closely match wall finishes. These variations are considered to be included in the original contract for construction.

4. PLATES AND COVERS

A. Unless otherwise specified or noted, all wiring device plates and covers shall be smooth thermoplastic, Hubbell "P" Series or equivalent G.E. or Leviton. Color shall match device unless otherwise indicated.

B. All kitchen, area plates shall be bright finish 302 stainless steel.

C. Cover plates shall be of one manufacturer insofar as possible.

D. Weatherproof plates for G.F.C.I. receptacles shall be cast aluminum, self-closing, gasketed, suitable for standard box mounting, U.L. listed for wet location use, cover closed. Vertical mounting - Hubbell WP26M, horizontal mounting - Hubbell WP26MH (die-cast zinc) or equivalent Leviton or G.E.

E. Weatherproof switch plates for toggle-handle switches shall be clear silicone rubber, for standard outlet boxes. Hubbell 1795 or equivalent G.E. or Leviton.

5. INSTALLATION

A. All wiring devices in dusty areas, exposed to weather and moisture shall be installed in Type "FS" or similar conduit fittings having mounting hubs, with appropriate cover plates.

B. Devices that have been installed before painting shall be masked. No plates or covers shall be installed until all finishing and cleaning has been completed.

C. Provide G.F.C.I. duplex feed-thru style receptacles in accordance with new U.L. Standard 943 where indicated or required by the National Electrical Code, whether specifically called out or not. When a G.F.C.I. receptacle is on a circuit with other non-G.F.C.I. receptacles, it shall always be placed at the homerun point of the circuit and shall be wired to ground-fault interrupt protect the downstream outlets on that circuit unless specifically indicated to the contrary. Provide a "G.F.C.I. protected" label on each downstream outlet.

D. GFCI devices shall be installed in a “readily accessible” location per NEC requirements. GFCI protected outlets required by plans or code shall be fed by a GFCI breaker or upstream GFCI device if they are not readily accessible.

E. Where surge suppression outlets are provided, they shall be ANSI Category "A" style. They shall be installed as dedicated-circuit outlets or where indicated with multiple outlets on a circuit, they shall be placed at the homerun point of that circuit and feed-thru wired to protect the downstream outlets on that circuit.

F. All receptacles shall be installed with ground prong at **top** position.

G. All outlets not provided with wiring devices shall be closed with a blank plate matching other plates in the area.

END OF SECTION 262726

SECTION 265113 – LED LIGHTING FIXTURES AND LAMPS

1. GENERAL

A. Furnish and install all lighting fixtures, as herein specified, complete with accessories for safe and effective operation. All fixtures shall be installed and left in an operable condition with no broken, damaged or soiled parts.

B. All items furnished shall comply with the latest standards applicable such as U.L., NEMA, etc., and shall bear labels accordingly. All fixtures shall be the color specified or as selected by the Architect. Wherever fixtures have evident damage, they shall be restored to new condition or shall be replaced. Likewise, fixtures showing dirt, dust or fingerprints shall be restored to new condition or shall be replaced.

C. A PDF copy of light fixture factory shop drawings and cuts, showing fixture dimensions, photometric data, installation data and, if applicable, air handling data, shall be submitted to the Engineer for written approval 30 days after bid date. (Submission shall be made via the University's online project management system.)

D. Locate pendant, surface mounted or chain-hung industrial fixtures in mechanical rooms and similar spaces to avoid ductwork and piping. Locate around and between equipment to maximize the available light. Request a layout from the Engineer if uncertain about an installation.

E. Alternate fixtures may be substituted for types specified by name or catalog number. Proposed substitutions must be submitted to the Engineer ten working days prior to bid date for written approval to bid. This written approval will only be issued in addendum form.

F. Where emergency battery packs are provided with fixtures (if any), they shall be connected to an unswitched power line and wired in accord with the manufacturer's recommendations. Test buttons and indicator lamps shall be visible and accessible with fixture door open, or shall be remotely flush mounted in the ceiling adjacent to the fixture.

G. Where remote emergency lighting transfer relays are provided, they shall be flush mounted in the ceiling adjacent to a controlled fixture. They shall be connected to an unswitched power line and installed in accord with the manufacturer's recommendations. Test buttons and indicator lamps shall be visible and accessible without removing ceiling tiles or access panels.

H. All reflecting surfaces, glass or plastic lenses, downlighting cones and specular reflectors shall be handled with care during installation to avoid fingerprints or dirt deposits. It is preferred that louvers be shipped and installed with clear plastic bags to protect louvers. At close of project, and after construction air filters are changed, remove bags. Any louver or cone showing dirt or fingerprints shall be cleaned with solvent recommended by the manufacturer to a like-new condition, or replaced as necessary in order to turn over to the Owner new fixtures at beneficial occupancy.

I. Refer to architectural details as applicable for recessed soffit fixtures or wherever fixture installations depend upon work of other trades. Coordinate all installations with other trades. Verify dimensions of spaces for fixtures, and if necessary, adjust lengths to assure proper fit and illumination of diffuser and/or area below.

J. Warranty shall start at Final Project Completion.

2. VOLTAGE

A. All lighting fixtures will be rated 120 volts.

3. LED FIXTURES

LED SOURCES

A. LED's shall be manufactured by a manufacturer who has produced commercial LEDs for a minimum of five (5) years.
B. Lumen Output – minimum initial delivered lumen output of the luminaire shall be as follows for the lumens exiting the luminaire in the 0-360 degree zone - as measured by IESNA Standard LM-79-08 in an accredited lab. Exact tested lumen output shall be clearly noted on the shop drawings.
C. Lumen output shall not decrease by more than 20% over the minimum operational life of 50,000 hours at the rated ambient operating temperature.
D. Individual LEDs shall be connected such that a catastrophic loss or the failure of one LED will not result in the loss of the entire luminaire.
E. LED Boards shall be suitable for field maintenance and have with plug-in connectors. LED boards shall be upgradable
F. Light Color/Quality:
    a) Correlated Color temperature (CCT) range as per specification, between 3000K, 3500K and 4000K shall be correlated to chromaticity as defined by the absolute (X,Y) coordinates on the 2-D CIE chromaticity chart.
    b) Color shift over 6,000 hours shall be <0.007 change in u' v' as demonstrated in IES LM80 report.
    c) The color rendition index (CRI) shall be 80 or greater
    d) LED boards to be tested for color consistency and shall be within a space of 2.5 MacAdam ellipses on the CIE chromaticity chart.

LED DRIVERS

A. Driver: Acceptable manufacturer: eldoLED, Sylvania, or Philips that meet or exceed the criteria herein.
B. Ten-year expected life while operating at maximum case temperature and 90 percent non-condensing relative humidity.

C. Driver should be UL Recognized under the component program and shall be modular for simple field replacement.
D. Electrical characteristics: 120 volt, UL Listed, CSA Certified, Sound Rated A+. Driver shall be > 80% efficient at full load across all input voltages. Input wires shall be 18AWG solid copper minimum.
E. Dimming: Driver shall be suitable for full-range dimming. The luminaire shall be capable of continuous dimming without perceivable flicker over a range of 100 percent to 0.1 percent of rated lumen output with a smooth shut off function unless specifically scheduled otherwise.
F. Dimming shall be controlled by a 0-10V signal unless specifically scheduled.
G. Driver shall include ability to provide no light output when the control signal drops below 0.5 V, and shall consume 0.5 watts or less in this standby.
H. Driver shall be capable of configuring a linear or logarithmic dimming curve.
I. Drivers shall track evenly across multiple fixtures at all light levels, and shall have an input signal to output light level that allows smooth adjustment over the entire dimming range regardless of the controller type
J. Flicker: Driver and luminaire electronics shall deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10). At all points within the dimming range from 100-0.1 percent luminaire shall have: Less than 1 percent flicker index at frequencies below 120 Hz and less than 12 percent flicker index at 120 Hz, and shall not increase at greater than 0.1 percent per Hz to a maximum of 80 percent flicker index at 800Hz
K. Driver disconnect shall be provided where required to comply with codes.

LED ELECTRICAL

A. THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 20 percent at any standard input voltage and meet ANSI C82.11 maximum allowable THD requirements.
B. Surge Suppression: The luminaire shall include surge protection to withstand high repetition noise and other interference. Withstand up to a 1,000 volt surge without impairment of performance as defined by ANSI C62.41 Category A. To reduce false circuit breaker tripping due to turn on inrush, the following statement ensures that electronic dimming driver will meet NEMA inrush recommendations.
C. Rush Current: Meet or exceed NEMA 410 driver inrush standard of 430 Amps per 10 Amps load with a maximum of 370 Amps2 – seconds.
D. RF Interference: The luminaire and associated on-board circuitry must meet Class A emission limits referred in Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 Non-Consumer requirements for EMI/RFI emissions
E. Driver must support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance.
F. Power Factor: The luminaire shall have a power factor of 90% or greater at all standard operating voltages and full luminaire output.

4. LIGHT FIXTURE GENERAL REQUIREMENTS

A. LED Recessed Lighting Fixtures - General Requirements

(1) The following are minimum requirements for recessed LED fixtures for lay-in grid, gypsum board, plaster and concealed spline ceilings. Surface-mounted LED fixture requirements shall be similar.

(2) Housings shall be a minimum of 4" depth, premium grade, constructed of a minimum 22 gauge die embossed or stiffened cold rolled pre-treated rust-resistant steel.

(3) All parts shall be finished with polyester powder or white baked enamel (85% minimum reflectance) painted after fabrication. All wiring shall be type TFN, or THWN and shall be covered by the steel driver cover or wiring channel. Exposed wiring is not acceptable. Connection wiring shall be accessible thru a hinged access plate above driver channel in top of unit.

(4) The complete light fixture unit shall be UL listed and labeled. Other agency listings may be acceptable with written approval from the Engineer.

(5) Fixture lens doors shall be reversible, hinged, painted after fabrication, with spring-loaded or other mechanically stable positive action latches.

(6) Lens shall be as specified for each fixture type. If a specific manufacturer and series number of lens is listed, the substitute shall be of the exact specification (thickness, prism configurations, transparency, efficiency, photometric distribution, hardness, vandal-resistance, etc.). Minimum average thickness of any prismatic lens shall be .125".

(7) Fixture trim and/or flanges shall conform with ceiling constructions as required. Verify all types prior to submission of shop drawings and indicate any special types on submittals. Fixtures installed in drywall or plaster ceilings to be provided with flange, screed and swing gate anchoring system.

(8) All fixtures shall be furnished with hold down clips to meet applicable seismic codes, four clips per fixture minimum or the equivalent thereof in the installation trim. Verify thickness of drywall or plaster ceilings prior to submission of shop drawings, to allow for proper trim adjustment.

(9) Support fixtures with one hanger wire at each end. Hanger wires shall be installed within 15° of plumb, maximum or additional support shall be provided. Wires shall be attached to the fixture body and to the building structure - not to the supports of other work or equipment.

(10) Each type of lay-in fixture shall be furnished with the proper housing flange or lip to suit the type of lay-in grid(s) being utilized on the project. The Contractor is to verify if narrow or

standard grid members are being furnished and provide the proper type of light fixture trim. Indicate any special trims on shop drawing submittals.

B. Industrial and Striplight LED Fixtures - General Requirements

(1) Units shall have die-formed heavy gauge cold rolled steel channels and die-embossed reflectors.

(2) Finishes to be coated with a gloss powder paint or baked enamel finish with a minimum 85% reflectance.

(3) Units to have aligner clips where required for a continuous row appearance. Where continuous rows exceed twelve feet in length, provide a "unistrut" channel or similarly adequate mounting to stiffen and align row.

(4) Units to have captive latches for all covers and wire guards where specified. Wire guards shall be heavy-duty #14 wire gauge minimum with corrosion-resistant plated or vinyl finish.

(5) Units to be UL listed.

(6) Mounting brackets and hanging mechanisms shall be as specified in fixture descriptions, or as required. Allow a generous safety margin with all support systems, as recommended by the manufacturer.

C. Recessed Downlight - General Requirements

(1) Fixture to have an extruded or die-cast aluminum housing. Retaining mechanism shall provide easy access to LED array and driver box.

(2) Unit to have a corrosion-resistant steel junction box with hinged access covers and thermal protector.

(3) Mounting/plaster frame to be heavy gauge steel with finishing trim friction support springs, for the required ceiling thickness. Trim to be of color as selected by the Architect.

(4) Optical system to consist of a sealed LED module with diffuser.

(5) Provide telescoping channel bar hangers that adjust vertically and horizontally.

(6) Fixtures to be UL listed for thru-branch circuit wiring, recessed, and damp locations. Where installed in plaster or drywall or other inaccessible ceiling type, they shall be U.L. listed for bottom access.

D. Exit Lights - General Requirements

(1) Housings and canopies shall be die-cast aluminum or corrosion resistant steel. Edge-lit clear acrylic panel shall be provided where scheduled. Mountings shall be wall or ceiling, universal type, to suit the installation conditions.

(2) Provide with stencil face, lettering color red, of sizes in accord with code, or as otherwise specified.

(3) Provide single or double face as scheduled, indicated on plans or as required by the local authority having jurisdiction. Single face exit lights shall not be readable from the reverse side; acrylic blade style lights shall be furnished with an opaque barrier to block the reverse text image. Adjust installation position if required for clear visibility, in accord with applicable codes.

(4) Complete unit to be finished in color as selected by the Architect. Provide directional arrows as indicated on plans, as scheduled to suit the means of egress or as required by the local authority having jurisdiction.

(5) All exit signs shall be long life LED type.

(6) Where emergency backup battery packs are provided with exit lights, they shall have capacities for continuous operation per applicable codes. They shall have reserve battery capacity to operate remote lamps where indicated.

5. LIGHTING FIXTURE SCHEDULE

A. Refer to the contract drawings for Lighting Fixture Schedule

6. CONTROLS

A. Refer to Specification 260923-Lighting Control Devices for switching and controls.

END OF SECTION 265113

SECTION 270610 – VOICE/DATA SYSTEM

PART 1 - GENERAL SPECIFICATIONS

1.1 RELATED DOCUMENTS

A. The Contractor is directed to examine each and every section of these specifications, all drawings relating to the Contract Documents, any and all Addenda, etc., for work described elsewhere that may relate to the provision of the work described herein. Materials and performance requirements are specified elsewhere herein that relate to these systems.

B. The use of proprietary or copyrighted names or reference to patented trade items within this specification or elsewhere in the Contract Documents is meant to establish a standard of quality and performance. In no way does such use establish a restrictive competitive bidding situation, or exclude materials or equipment that is truly equivalent to the standard of quality. All materials and equipment proposed for installation must meet or exceed all specified requirements and be approved. Known equals are listed, but will require cut sheets with performance parameters to be submitted for final approval at least 10 days prior to bid.

1.2 SUMMARY

A. Section Includes:

1. Work Area Outlets
2. 110 Copper Termination Block & Patch Panels
3. Racks, Cabinets and Cable Management
4. Horizontal Distribution Cable
5. Backbone & DAS Cabling Cable
6. Fiber Optic Termination Hardware
7. Patch Cords and Fiber Jumpers
8. Pathways & Penetrations
9. Audio Visual Infrastructure
10. Power (UPS and PDU)
11. Grounding and Bonding
12. Copper Cable Protection Units
13. Firestopping
14. Cable System Identification System

1.3 SCOPE OF WORK

A. The intent of this specification section is to cover the materials and installation of a structured cabling system and termination equipment as outlined herein and as detailed on the drawings. Work shall consist of

1. Work area outlets including faceplates, jacks (voice, data, CATV, A/V), and labels. Boxes and conduit are being provided by Div 26 contractor.
2. Voice and data copper station cabling from work area outlets to telecommunications rooms including termination testing and labeling.
3. Voice and data work area equipment cords.
4. Voice and data horizontal cross-connect jumpers and patch cables including labeling.

B. System Description -- Voice and Data station cabling (copper) system shall consist of:
1. Workstation outlet jacks.
2. Voice and data station cabling as specified herein from each workstation outlet to the termination equipment located in the Main Distribution Frame (MDF) or the Intermediate Distribution Frame (IDF).
3. Station Cable Termination Equipment in each MDF and IDF.
4. Final connections of the station cabling at the workstation outlet jack and the termination equipment in each MDF and IDF.
5. Cross connects / patch cable to connect work area outlets to backbone / network electronics.
6. Testing and labeling.

1.4 REGULATORY REFERENCES:

A. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the local Electrical Code and present manufacturing standards.

B. All materials shall be UL or ETL Listed and shall be marked as such. If UL/ETL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL/ETL has an applicable system listing and label, the entire system shall be so labeled.

C. All modular jacks, patch cords, consolidation point, and patch cords performance shall be verified (not just tested) by a third party to be category 6 (or 6A) component and channel compliant.

D. The cabling system described in this is derived from the recommendations made in recognized telecommunications industry standards. The following documents are incorporated by reference:

1. ANSI/TIA-568.0-D, Generic Communications Cabling for Customer Premises, September 2015
2. ANSI/TIA-568.1-D, Commercial Building Communications Infrastructure Standard September 2015

3. ANSI/TIA-568.2-D, Balanced Twisted-Pair Telecommunications Cabling and Components Standard, September 2018
4. ANSI/TIA-568.3-D, Optical Fiber Cabling Components Standard, September 2016
5. ANSI/TIA–569-D, Telecommunications Pathways and Spaces, November 2015
6. ANSI/TIA–606-C, Administration Standard for Communications Infrastructure, June 2017
7. ANSI/TIA–607-C, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, November 2015
8. ANSI/ TIA–758-B, Customer-Owned Outside Plant Telecommunications Infrastrucfure Standard, March 2014.
9. ANSI/TIA-1179-A, Healthcare Facilities Telecommunications Infrastructure Standard, August 2017
10. BICSI - TDMM, Building Industries Consulting Services International, Communications Distribution Methods Manual (TDMM) – 13th Edition.
11. National Fire Protection Agency (NFPA – 70)
12. FCC 47 CFR 68
13. NEMA 250
14. NEC 2017
15. ADA, Americans with Disabilities Act

E. If this document and any of the documents listed above are in conflict, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.

F. This document does not replace any code, either partially or wholly. The contractor must be aware of local codes that may impact this project.

1.5 APPROVED VENDORS

A. The Installation Vendors (Contractors) must at a minimum possess the following qualifications:

1. Be in business a minimum of five (5) years
2. Shall demonstrate satisfaction of sound financial condition and shall be adequately bonded and insured per owner's requirements.
3. Possess those licenses/permits required to perform communications installations in the specified jurisdiction
4. Personnel knowledgeable in local, state, province and national codes and regulations. All work shall comply with the latest revision of the codes and regulations. When conflict exists between local and national codes or regulations, the most stringent codes or regulations shall be followed.
5. Must possess and provide proof of current owners insurance certificates
6. Installers with RCDD on staff are preferred, at least one BICSI certified technician required.

7. Must have prior experience with this type of installation or work activity. The customer may, with full cooperation of the contractor, visit client installations to observe equipment operations and consult with references. Specified visits and discussion shall be arranged through the contractors; however, the contractor's personnel shall not be present during discussions with references. The contractor must provide a minimum of three (3) references of similar jobs, one within the past 6 months and one at least 3 years ago where the same solution was installed.
8. Documentation of ALL certifications to be provided in bid package
9. Outside Plant Projects – will be done by pre approved vendor according to demographic and size of project

1.6 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations necessary to complete the installation of this structured cabling system in compliance with the specifications and drawings. The Telecommunications contractor will provide and install all of the required material to form a complete system whether specifically addressed in the technical specifications or not.

B. The work shall include, but not be limited to the following:

1. Furnish and install a complete telecommunications wiring infrastructure.
2. Furnish, install, and terminate all UTP and Optical Fiber cable
3. Furnish and install all wall plates, jacks, patch panels, and patch cords.
4. Furnish and install all required cabinets and/or racks as required and as indicated.
5. Furnish any other material required to form a complete system.
6. Furnish and install j-hooks where needed for the horizontal distribution
7. Furnish and install all materials to build out the MDFs/IDFs as depicted on drawings
8. Telecommunications contractor is responsible for the basket tray in MDFs/IDFs. The basket tray for the horizontal distribution may be done by or in coordination with the electrical contractor
9. Perform link testing (100% of horizontal and/or backbone links/channels) and certification of all components.
10. Furnish test results of all cabling to the owner electronically, listed by each closet, then by workstation ID.
11. Adhere and comply with all requirements of Manufacturer Certification.
12. Provide owner training and documentation. (Testing documentation and As-built drawings)

1.7 SUBMITTALS

A. Under the provisions of this request for proposal, prior to the start of work the telecommunications contractor shall:

1. Submit copies of the certification of the company and names of staff that will be performing the installation and termination of the installation to provide proof of compliance of this spec.
2. Submit proof from manufacturer of contractor's good standing in manufacturer's program.
3. No substitutions/alternatives from the manufacturers listed in this document will be permitted. No substituted materials shall be installed except by written approval.
4. Product Data: For each type of product indicated.
    a. Submittals shall include manufacturer's data sheets (cut sheets) and be accompanied by a detailed bill of material, including part numbers and quantities.
5. Shop Drawings:
    a. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
    b. Wiring diagrams to show typical wiring schematics including the following:
        1) Cross-connects.
        2) Patch panels.
        3) Patch cords.
    c. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
    d. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
        1) Vertical and horizontal offsets and transitions.
        2) Clearances for access above and to side of cable trays.
        3) Vertical elevation of cable trays above the floor or bottom of ceiling structure.
        4) Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.
6. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.
7. Source quality-control reports.
8. Field quality-control reports.
9. Maintenance Data: For connectors to include in maintenance manuals.

B. Work shall not proceed without the Owner's approval of the submitted items.

1.8 QUALITY ASSURANCE

A. The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations necessary to complete the installation of this structured cabling system in compliance with the specifications and drawings. The contractor will provide and install all of the required material to form a

complete system whether specifically addressed in the technical specifications or not. All installers must be employees of the contractor.

1.9 DELIVERY, STORAGE AND HANDLING

A. Cable shall be stored according to manufacturer's recommendations as a minimum. In addition, cable must be stored in a location protected from theft, vandalism and weather. If cable is stored outside, it must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 40 degrees F., the cable shall be moved to a heated (50 degrees F. minimum) location. If necessary, cable shall be stored off site at the contractor's expense.
B. If the telecommunications contractor wishes to have a trailer on site for storage of materials, arrangements shall be made with the Owner.

1.10 DRAWINGS

A. It shall be understood that the electrical details and drawings provided with the specification package are diagrammatic. They are included to show the intent of the specifications and to aid the telecommunications contractor in bidding the job. The telecommunications contractor shall make allowance in the bid proposal to cover whatever work is required to comply with the intent of the plans and specifications.
B. The contractor shall verify all dimensions at the site and be responsible for their accuracy.
C. Prior to submitting the bid, the telecommunications contractor shall call the attention of the Engineer to any materials or apparatus the telecommunications contractor believes to be inadequate and to any necessary items of work

1.11 COORDINATION

A. Coordinate layout and installation of communications equipment with Owner's telecommunications and LAN equipment and service suppliers.
    1. Meet jointly with telecommunications and LAN equipment suppliers, Engineer, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
    2. Record agreements reached in meetings and distribute them to other participants.
    3. Adjust arrangements and locations of racks, sleeves, cross-connects, and patch panels in equipment rooms to accommodate and optimize arrangement and space requirements of utility demarcation, telephone and LAN equipment.
B. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

PART 2 - PRODUCTS

2.1 EQUIVALENT PRODUCTS

A. Due to the nature and type of communications all products and solutions in this document have a standard of quality listed. Substitutions are listed, but products MUST demonstrate performance equivalency.

2.2 WORK AREA OUTLETS

A. Work area cables shall each be terminated at their designated work area location in the connector types described in the subsections below. Included are modular telecommunication jacks. These connector assemblies shall snap into a faceplate.

B. The Telecommunications Outlet Assembly shall accommodate:
   1. A minimum of two (2) modular jacks unless specified. Additional copper cables as necessary.
   2. A blank filler will be installed when extra ports are not used.
   3. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation.
   4. The modular jack shall incorporate printed label strip on the dust cap module for identifying the outlet. Printed labels shall be permanent and compliant with ANSI/TIA–606-C standard specifications. **Hand printed labels shall not be accepted.**

C. Faceplates: Standard of quality is Legrand Part # OR-403HDJ14 (4 port) or OR-403HDJ12 (2 port)
   The faceplates shall:
   1. Be of the style as appropriate to fit the modular jack used
   2. Have mounting screws located under recessed designation windows.
   3. Comply with ANSI/TIA 606-C work area labeling standard.
   4. Workstation Outlets: Connector assemblies mounted in faceplate. Provide number of ports as shown on the Drawings.
   5. Retain one of first two subparagraphs below, or retain both as required to match Division 26 Section "Wiring Devices."
   6. Plastic Faceplate: High-impact plastic.
   7. For use with snap-in jacks accommodating any combination of UTP, F/UTP, optical fiber, and coaxial work area cords.
   8. Acceptable substitutions are Systimax and Panduit

D. Voice / Data Jacks: Standard of quality is Legrand Cat 6 for voice/data; Cat 6A for wireless access points

   1. Cat 6 Jacks: 100-ohm, unshielded balanced, twisted-pair connector; four-pair, eight-position modular. Comply with ANSI/TIA-568.2-D up to 250 MHz.
   2. All pair combinations must be considered, with the worst-case measurement being the basis for compliance. Modular jack performance shall be third-party verified by a nationally recognized independent testing laboratory.
   3. The modular jack shall be backwards compatible to Category 3, 5, and 5e.
   4. The modular jack shall be center tuned to category 6 test specifications.

Part Number	Description
OR-HDJ6-36	Legrand Category 6 T568A/B High Density (HD) Jack Blue (Data)
OR-HDJ6	Legrand Category 6 T568A/B High Density (HD) Jack Fog White (Voice)
OR-HDJ6 - xx	xx - Refer to systems plans for breakdown of systems by color.

5. **Cat 6A jacks (qty 2) to be used for each Wireless Access Points** (to accommodate for speeds in excess of 1 Gigabit transmission).

6. Jacks: 100-ohm, unshielded balanced, twisted-pair connector; four-pair, eight-position modular. Comply with ANSI/TIA-568.2-D up to 500 MHz.
7. The modular jack shall be backwards compatible to Category 3, 5e and 6.
8. The Wireless Access Point jacks shall be terminated in a 2-port surface mount box.
9. The modular jack shall be center tuned to category 6A test specifications.

Part Number	Description
OR-HDJ6A-43	Legrand Category 6A T568A/B High Density (HD) Jack Orange (Wireless Access Points)

10. Acceptable substitutions are Systimax and Panduit

2.3 110 COPPER TERMINATION BLOCK

A. The voice cross connect shall be a passive connection between the horizontal termination blocks and the backbone termination blocks. The wall mount frames shall be field terminated kits including all blocks, connecting blocks, and designation strips.

B. Management rings shall be mounted between vertical columns of blocks to provide management of cross-connect wire.

C. Backbone and horizontal blocks shall use 4-pair connecting blocks. Blocks shall be oriented so that backbone terminations are located on the left and horizontal frames are located on the right of the termination field when facing the frame assembly.

D. Standard of quality: Legrand

E. 110 Block Kits shall:
   1. include both the wiring block in a 50, 100 and 300 pair footprint and the connecting block C6110C5

2. be manufactured using fire retardant molded plastic.
3. support termination of 22-24 AWG solid conductor
4. wiring block shall contain back openings for the feed through of cable
5. have color-coded tips on the wiring block and color coding on the connector blocks for installation identification.
6. shall use standard termination practice requiring a single conductor 110 impact tool
7. have termination hardware that maintains the paired construction of the cable to facilitate minimum untwisting of the wires.
8. be backwards compatible to category 3, 5 and 5e

F. 110 Cross-Connect System Backboard Channels Shall
1. be available in 300 and 900 pair sizes.
2. allow the mounting of 110 100-pair blocks without legs.
3. include bottom trough and grounding bar.
4. be wall mountable.
5. be of cold roll steel construction.

G. 110 Wall Mount Vertical Trough Shall
1. be available in single channel or dual channel configurations.
2. in dual channel configuration shall be used to provide separation for different wiring media.
3. be available in 300 pair and 900 pair sizes.
4. be wall mountable.
5. be used with wall mountable backboard channels. Acceptable configurations include a 300 pair and a 900 pair.
6. be of cold roll steel construction.

Note: Project may require horizontal analog and backbone cables to be terminated on patch panels in IDF/MDF's. Contact Telecom Representative for details.

2.4 MODULAR PATCH PANELS

A. The Modular Patch Panels shall
1. meet category 6 or 6A component compliance and be verified by a third-party nationally recognized independent testing laboratory
2. be backward compatible to category 3, 5 and 5e
3. be center tuned to category 6 or 6A test specifications
4. Standard of Quality is Legrand

Part Number	Description
OR-PSAHJU48	48 Port unloaded 2RU Angled Panel (for HD Jacks)

5. Acceptable Substitutions are Systimax or Panduit

2.5 RACKS, CABINETS, AND CABLE MANAGEMENT

The equipment rack shall provide vertical cable management and support for the patch cords at the front and back of the rack. Waterfall cable management shall be provided at the top of the rack to maintain proper bend radius and cable support. Wire management shall also be mounted above each patch panel and/or piece of equipment on the rack. The rack shall include mounting brackets for cable tray ladder rack to mount to the top of the rack.

A. Free-Standing Rack shall:
   1. provide the necessary strain relief, bend radius and cable routing for proper installation of high performance cross connect products, meeting all specifications of ANSI/TIA 568-D.
   2. provide pre-drilled base for floor attachment of rack.
   3. be available in standard color of black or white.
   4. Provide channels with 10” depth for routing of horizontal cable
   5. Standard of quality for 2 and 4 post racks shall be Legrand.

Part Number	Description
OR-MM20710-B	Black 2 Post Rack, 7’ high with 10” channel depth
OR-MM20742ADJ12-B	Adjustable 4 Post MM Rack, 7’ high with tapped mounting holes
OR- MM20742ADJ38-B	Adjustable 4 Post MM Rack, 7’ high with square mounting holes

   6. Acceptable substitutions are Tripp Lite and Middle Atlantic

B. The vertical and horizontal cable management shall be utilized and installed with the 2 and 4 post racks.
   1. They shall include snap on covers/doors that can swing either direction.
   2. Standard of quality for cable management shall be Legrand MM20 for vertical and SHMC series for horizontal.

Part Number	Description
OR-MM20VMD706-B	Single Sided 6” Vertical Cable Management with door, 6” W x 10.25” D x 7’ H (for end of row or single racks)
OR- MM20VMD710-B	Single Sided Vertical Cable Management with door,10.5” W x 15”D x 7’ H (for between racks)
OR-SHMC2RU	2U Horizontal cable manager to be used between patch panels and/or switch gear
OR-SHMC4RU	4U Horizontal cable manager to be used to pass patch cords from one side of the rack to the other

   3. Acceptable substitutions are Tripp Lite and Middle Atlantic

C. Wall Mounted Cabinet shall:
   1. provide the necessary strain relief, bend radius and cable routing for proper installation of high performance cross connect products, meeting all specifications of ANSI/TIA 568-D.
   2. have wall mount braces with locator posts for easy wall mounting.
   3. have side access points that allow for access to manage/install distribution cables in the vertical channels.
   4. be lockable.
   5. contain integrated vertical cable management
   6. The standard of quality for wall mount cabinet shall be Legrand:

Part Number	Description
SWM12RUPL-26-26	26”W x 25”H x 28”D, plexi-glass door 12 RU; 200 lbs*
SWM26RUPL-26-26	26”W x 28”D x 49.5”H, plexi-glass door 26 RU; 300 lbs*

*weight capacity

   7. Acceptable substitutions are Tripp Lite and Middle Atlantic

D. Free-Standing Cabinet shall have full flat mesh front door with locking swing handles
   1. Standard of quality is Legrand

Part Number	Description
OR-QC422442	Legrand Server Cabinet, free-standing, 42U, 24” W, 42”D, with side panels (cabinet accessories to be specified)
OR-QC422942	Legrand Network Cabinet, free-standing, 42 RU, 29.5” W, 42” D with side panels (cabinet accessories to be specified).

   2. Acceptable substitutions are Middle Atlantic and Tripp Lite

2.6 HORIZONTAL DISTRIBUTION CABLE

A. All horizontal data station cable and voice cable shall terminate on modular patch panels (copper), or patch/splice cabinets (fiber) in their respective MDF or IDF as specified on the drawings.

B. Category 6 cable will be utilized for standard voice and data drops, and Category 6A cable will be utilized for wireless access points.

C. Copper or fiber cable that offers EPDs (Environmental Product Declaration) and / or HPDs (Health Product Declaration) to apply toward LEED certification are PREFERRED.

   1. Products covered by EPDs and HPDs contribute towards one (1) point each in the Material and Resources credit (MRc) category for projects pursuing those credits

2. Products that have both EPDs and HPDs will effectively contribute towards two (2) separate credits in the MR category

D. 100 OHM Category 6 UTP with fire-resistant thermoplastic jacket **with separator or divider** between pairs.

1. Physical Characteristics:
   a. Plenum
      1) Insulation FEP
      2) Jacket: FR, low smoke PVC
      3) Nominal Velocity of Propagation: 73
   b. Non Plenum
      1) Insulation: Polyolefin
      2) Jacket: FR PVC
      3) Nominal Velocity of Propagation: 70
   c. Solid annealed copper conductors
   d. 23 AWG copper conductors
   e. Low-dielectric thermoplastic insulation
   f. Pair-separator for improved performance
   g. Characteristic Impedance: 100 ± 15 Ohms
   h. Comply with UL 444
   i. Comply with NFPA 262
   j. Comply with ICEA S-90-661 for mechanical properties.
   k. Comply with ANSI/TIA-568.2-D for Category 6 UTP cables.
   l. Verified for Category 6 performance by an NRTL
   m. RoHS compliant materials

2. Performance Characteristics:
   a. Guaranteed electrical performance up to 400 MHz
   b. Guaranteed 3 dB margin over ANSI/TIA-568.2-D requirements for NEXT and PSNEXT
   c. Guaranteed 4 dB margin over ANSI/TIA-568.2-D calculated requirements for ACR and PSACR
   d. Printed with unique alpha-numeric code for each package of product
   e. Printed in both feet and meters with the units of length decrementing to indicate the amount of cable remaining in the box.
   f. Tip colors shall be a lighter version of the ring color.
   g. **4 pair UTP for Wireless Access Points for speeds in excess of 1 Gigabit transmission (see section F for 6A specification)**: Cat 6A with isolation wrap (no ground required) or actual shield (needs grounding).

3. Design Make:

   a. Standard of quality for Cat 6 is Superior Essex Datagain Cat 6 enhanced UTP.

Plenum Part Number	Description
66-240-2B	Data / Blue / CMP

66-240-4B	Voice / White CMP

Non-Plenum Part Number	Description
66-240-2A	Data / Blue / CMR
66-240-4A	Voice / White CMR

E. 100 OHM Category 6A UTP with fire-resistant thermoplastic jacket with separator or divider between pairs and isolation wrap.

1. Physical Characteristics:
   a. Plenum
      1) Insulation FEP
      2) Jacket: FR, low smoke PVC
      3) Nominal Velocity of Propagation: 73
   b. Non Plenum
      1) Insulation: Polyolefin
      2) Jacket: FR PVC
      3) Nominal Velocity of Propagation: 70
   c. Solid annealed copper conductors
   d. 23 AWG copper conductors
   e. Low-dielectric thermoplastic insulation
   f. Pair-separator for improved performance
   g. Characteristic Impedance: 100 ± 15 Ohms
   h. Comply with UL 444
   i. Comply with NFPA 262
   j. Comply with ICEA S-90-661 for mechanical properties.
   k. Comply with ANSI/TIA-568-C.2 for Category 6A UTP cables.
   l. Verified for Category 6A performance by an NRTL
   m. RoHS compliant materials

2. Performance Characteristics:
   a. Guaranteed electrical performance up to 400 MHz
   b. Guaranteed 3 dB margin over ANSI/TIA-568.2-D requirements for NEXT and PSNEXT
   c. Guaranteed 4 dB margin over ANSI/TIA-568.2-D calculated requirements for ACR and PSACR
   d. Printed with unique alpha-numeric code for each package of product
   e. Printed in both feet and meters with the units of length decrementing to indicate the amount of cable remaining in the box.
   f. Tip colors shall be a lighter version of the ring color.
   g. 4 pair UTP for Wireless Access Points for speeds in excess of 1 Gigabit transmission: Cat 6A with isolation wrap (no ground required) or actual shield (needs grounding).

3. Design Make:
   a. Standard of quality for Cat 6A Superior Essex 10GainXP Plenum (CMP) UTP w/ isolation wrap

Plenum Cat 6A Part #	Description
6H-272-2B	Wireless / Blue / CMP

Non-Plenum Cat 6A Part #	Description
6H-272-2A	Wireless / Blue / CMR

b. Acceptable Substitutions are Panduit or Systimax

2.7 BACKBONE CABLE

A. Intrabuilding multipair unsheilded twisted pair

1. General purpose 25 pair plenum Cat 5e (Superior Essex cmp part #51-478-48)
2. For higher pair counts when Cat 3 is acceptable; 100 pair category 3 plenum unshielded twisted pair (Superior Essex Category 3 cmp part number 18-799-36) may be used.

B. Fiber Optic Cables

1. Fiber cable that offers EPDs (Environmental Product Declaration) and / or HPDs (Health Product Declaration) to apply toward LEED certification are PREFERRED.

2. Products covered by EPDs and HPDs contribute towards one (1) point each in the Material and Resources credit (MRc) category for projects pursuing those credits

3. Products that have both EPDs and HPDs will effectively contribute towards two (2) separate credits in the MR category

4. **Multimode:** Armored Optical Fiber Plenum (OFCP) Tight Buffered With 10 Gigabit OM3 Laser Optimized 50/125 Optical Fibers
   a. Each Multimode Fiber shall be:

      1) Graded-index optical fiber wave-guide with nominal 50/125µm-core/cladding diameter.
      2) The fiber shall comply with the latest revision of ANSI/TIA-492AAAC.
      3) Attenuation shall be measured in accordance with ANSI/TIA-455-78.
      4) Information transmission capacity shall be measured in accordance with ANSI/TIA-455-204 or –455-220.
      5) The measurements shall be performed at 23°C ± 5°C.
      6) Maximum attenuation dB/km @ 850/1300 nm: 3.5/1.5
      7) Bandwidth: 1500 MHz-km @ 850nm for overfilled launch,
      8) Bandwidth 500 MHz-km @ 1300nm.
      9) Optical Fiber shall be laser optimized and guaranteed for 40/100 Gigabit Ethernet distances of 100 meters

10) Optical Fiber shall be laser optimized and guaranteed for 10 Gigabit Ethernet distances of 300m/300m for 850nm and 1300nm respectively
11) Optical Fiber shall be laser optimized and guarantee Gigabit Ethernet distances of 1000m/600m for 850nm and 1300nm respectively

b. Physical Characteristics:

1) Shall be suitable for use in indoor applications.
2) Shall be suitable for use in risers, plenums and horizontal applications.
3) Shall be available with a fiber strand count range from 6 to 144.
4) Shall meet NFPA 626
5) Shall comply with Telcordia GR-409.
6) Shall comply with the requirements of ICEA S-83-596.
7) Buffered fibers shall be color coded in accordance with TIA-598 with an overall aqua jacket.
8) Shall have a central strength member
9) Suitable for operation between -20°C to +75°C
10) Shall meet UL 1569, UL 1651
11) Shall be RoHS compliant
12) Shall have spiral wrapped aluminum armor and outer jacket

c. Design Make:

1) Standard of quality for Premise Distribution optical fiber cable with OM3 laser optimized 50/125 micron multi mode fiber is Superior Essex, part numbers below:

Part Number	Description
L4012N401	12 strand armored laser optimized 50 micron multi mode
L4024NK1Q	24 strand armored laser optimized 50 micron multi mode
L4048N401	48 strand armored laser optimized 50 micron multi mode

2) Acceptable Substitutions are Systimax and Corning

5. Single Mode: Armored Optical Fiber Plenum (OFCP) Tight Buffered With Enhanced (Low Water Peak) Single-mode Optical Fibers

a. Each Single-mode Fiber shall be:
1) Class IVa dispersion - unshifted single mode optical fibers with Low Water Peak complying with ANSI/ TIA-492CAAB-2000.
2) The zero dispersion wavelength shall be between 1300 nm and 1320 nm. The ANSI/TIA-455-168 maximum value of the dispersion slope shall be no greater than 0.090 ps/km-nm^2. Dispersion measurements shall be made in accordance with ANSI/TIA-455-169 or ANSI/TIA-455-175-B.
3) The nominal mode field diameter shall be 9.1 µm with a tolerance of $\pm$ 0.4 µm at 1310 nm when measured in accordance with ANSI/TIA-455-191-B.
4) Transmission Characteristics:

5) Maximum cabled attenuation dB/km @ 1310/1550 nm: 0.7/0.7
6) The cabled cutoff wavelength shall be ≤1260 nm when measured in accordance with ANSI/TIA-455-80-C
7) Distance vs. bandwidth using a Laser transmitter operating at a 1310 nm wavelength

b. Physical Characteristics:
1) Shall be suitable for use in indoor applications.
2) Shall be suitable for use in risers, plenums and horizontal applications.
3) Shall be available with a fiber strand count range from 6 to 144.
4) Shall comply with Telcordia GR-409.
5) Shall comply with the requirements of ICEA S-83-596.
6) Buffered fibers shall be color coded in accordance with TIA-598 with an overall yellow jacket.
7) Shall have a central strength member
8) Suitable for operation between -20°C to +75°C
9) Shall meet UL 1569, UL 1651
10) Shall have spiral wrapped aluminum armor and outer jacket

c. Design Make:
1) Standard of quality for Armored Plenum Single Mode Low Water Peak is Superior Essex

Superior Essex Part Numbers

Part Number	Description
L4012K401	12 strand, Single-Mode armored plenum optical fiber
L4024KK1Q	24 strand, Single-Mode armored plenum optical fiber

2) Acceptable Substitutions are TE Connectivity, Systimax and Corning

C. DAS (Distributed Antenna System)

1. Regardless of which DAS active equipment is to be installed, (Andrews, Mobile Access, Tyco Electronics, etc) standard of quality for copper 6A or helix copper DAS cabling & connectors as well as fiber shall be Superior Essex & Legrand.
2. DAS Integrator will be required to work with **certified cabling** contractor for pulling of and termination of all DAS copper and fiber cabling infrastructure.

a. RF Feeder Infrastructure

1) Cable
a) LHF Series – Low Loss High Flexible Foam Dielectric
b) HFSC Series – Super Flexible Foam Dielectric
c) FTTA – Fiber to the Antenna

2) Jumpers
d) Available in ⅜ inch and ½ inch diameters, jumper cables are used in areas that require extremely small bending radius, such as between

main feeders and antennas or between main feeders and RF equipment

3) Connectors
   e) DIN Series for LHF and HFSC
   f) N Series for LHF and HFSC

b. In Building Infrastructure

1) Cable – Available in Plenum or Riser
   g) DAS Hybrid – Fiber + Copper
   h) LHF Riser – Low Loss High Flexible Foam Dielectric
   i) LHF Plenum – Low Loss High Flexible Air Dielectric
   j) HFSC Riser – Super Flexible Foam Dielectric
   k) HFSC Plenum – Super Flexible Air Dielectric

2) Jumpers Available in Plenum or Riser
   a) Available in ½ inch diameters, jumper cables are used in areas that require an extremely small bending radius between main feeders and antennas or between main feeders and RF equipment.

3) Connectors
   a) DIN Series for LHF and HFSC
   b) N Series for LHF and HFSC

2.8 FIBER OPTIC TERMINATION HARDWARE

A. FIBER OPTIC ENCLOSURES
   1. Fiber optic termination hardware is rack mountable, lockable, and holds various coupler panels based on density requirements.
   2. Fusion Splicing (splice cassettes, pigtails, or splice on connectors) shall be the preferred termination style for any new installations, unless otherwise stated.
   3. Internal lighting for ease of use
   4. Pivot arms for fiber slack management
   5. Standard of quality is Legrand
   6. Acceptable Substitutions are Systimax and Corning
   7. Fiber Enclosures

Part Number	Description
OR-INFC01U-M4	1U combo splice/patch enclosure, holds 4 adapter panels,
OR-INFC02U-M4	2U combo splice/patch enclosure, holds 8 adapter panels,
OR-INFC04U-M4	4U combo splice/patch enclosure, holds 16 adapter panels,

B. Splice cassettes (used instead of standard fiber optic adaptor panels)

Part Number	Description

OR-M4LCD12-50ES2A1	Fusion Splice Cassette 50um Multimode 12 fiber LC
OR-M4LCD12-09S1A1	Fusion Splice Cassette Singlemode 12 fiber LC

Fan Out Kits (if needed to build up 250um fiber before termination)

Part Number	Description
OR-61500858	Breakout Kit 12 fiber

C. FIBER OPTIC ADAPTER PANELS (used w/ pigtail or splice on connector terminations)

Legrand Adapter panels will be of 6 duplex LC connectors (12 fibers) for both multimode and single mode connections.

Part Number	Description
OR-HDFP-LCD12LC	6-LC Duplex multimode, aqua adapters, ceramic sleeve 12 fiber
OR-HDFP-LCD12AC	6-LC Duplex Single mode, blue adapters, ceramic sleeve 12 Fiber
OR-HDFP-BLANK	Blank Filler modules

D. FIBER OPTIC PIGTAILS / CONNECTORS

1. For fiber **splicing**, utilize Legrand 12 strand LC fiber pigtails or fusion splice on connectors. Legrand part numbers:

2. When **mechanical** terminations are acceptable for MAC work, Utilize Legrand LC single mode (OR-205KNT9SA-09) and multimode (OR-205KNT9GA-50T) Infinium Connectors for standard terminations.

Part Number	Description
OR-P1TC4ZRSZZZ001M	12 strand Single mode LC fusion splice pigtail
OR-P1TF4ZRGZZZ001M	12 strand Multimode LC fusion splice pigtail
OR-205KNF9SA-09	Single mode fusion splice on connector,
OR-205KNF9FA-50T	Multi Mode fusion splice on connector
OR-205KNT9SA-09	LC Single mode Infinium mechanical connectors
OR-205KNT9GA-50T	LC Multimode Infinium mechanical connectors

3. Acceptable Substitutions are Systimax and Corning

2.9 PATCH CORDS & FIBER JUMPERS

A. The contractor shall provide factory terminated and tested UTP and optical fiber patch cords and equipment cords for the complete cabling system. The UTP patch cables shall meet the requirements of ANSI/TIA 568-D for patch cord testing.

B. Copper (UTP) patch cords shall:

1. Standard of quality is Legrand **Cat 6**; OR-MC6-zz-xx (zz=length; xx = color) and **Cat6A** for WAPs; OR-MC6A-zz-xx
2. Standard lengths include, 3 ft, 5 ft, 7 ft, 9 ft, 10 ft, 15 ft.
3. use 8 position connector with impedance matched contacts and designed using dual reactance.
4. be constructed of 100 ohm, 4 pair, 24 AWG, stranded conductor, unshielded twisted pair copper per the requirements of the ANSI/TIA 568.2-D.
5. meet TIA category 6 component specifications in ANSI/TIA 568.2-D
6. 100% factory tested to meet category 6 performance and
7. ETL or any other nationally recognized 3rd party verification
8. be capable of universal T568A or T568B wiring schemes.
9. Modular connector shall maintain the paired construction of the cable to facilitate minimum untwisting of the wires.
10. have "snagless" protection for the locking tab to prevent snagging and to protect locking tab in tight locations and provide bend relief
11. be backwards compatible to Category 3, 5 and 5e
12. be manufactured by an ISO 9001 registered company.
13. Provide one 10 foot Cat6 patch cord for every switch port.
14. Provide one 7 foot Cat6 patch cord for every workstation phone and computer.
15. Provide one 3 foot Cat6A patch cord for every wireless access point
16. The contractor shall include the labor cost in the quote to install all patch cords in the wiring closets as well as the workstation and wireless access points.
17. **Cat 6A copper patch cords for Wireless Access Points** for speeds in excess of 1 Gigabit transmission: Cat 6A Standard of Quality is Legrand. OR-MC6A-zz-xx
18. Acceptable substitutions are Quiktron, Systimax and Panduit

C. Fiber jumper cords shall:

1. Standard of quality for Multimode duplex 5 meter 50 um 10 gig aqua for multimode applications is Legrand LC to LC (OR-P1DF2LRGZGZ005M).
2. Provide four (4) duplex LC-LC 5 meter jumpers per switch in each TR.
3. Standard of quality for Single Mode duplex 5 meter for single mode applications is Legrand LC to LC (OR-P1DC2IRSZSZ005M).
4. Provide two (2) duplex LC-LC 5 meter jumpers per rack in each TR.
5. Acceptable substitutions are Quiktron, Systimax and Corning

2.10 PATHWAYS & PENETRATIONS

A. Conduit

1. All conduit work shall meet the requirements of the National Electrical Code.
2. All voice, data and video wiring inside rooms shall be protected by metallic conduit or other means such as Legrand/Wiremold or troughs in the floor. Aluminum is not acceptable in caustic environments. EMT conduit shall be used for all interior wiring. All conduits are to be concealed.
3. No more than an equivalent of two 90-degree bends are allowed in a run between junction boxes or pull boxes.
4. Entrance to junction boxes or distribution panels shall be adjacent to the corners.
5. In major renovation and new construction projects where the MDF/IDF are not in alignment, the contract shall include provisions for installation of four riser conduits (4 inches minimum diameter) from the MDF to each IDF. A pull string and appropriate junction pull box shall also be provided in each conduit run to facilitate future installation of cable(s). Maxcell fabric innerduct should be used to create multiple pathways in each 4" conduit.
6. All conduits in slab shall be a minimum of 1 inch. All exceptions shall be determined during the design stage of the project and shall be subject to the approval of the engineer.
7. All sleeves must protrude 4 inches AFF and below and be capped at both ends. Coordinate with customer for the number of conduits entering the facility. All sleeves must be bonded to the telecommunications bonding system.
8. No horizontal conduit run shall be more than 100 feet between pull boxes.
9. Pull boxes must be installed every 180 degrees or 100 feet of the conduit run. All conduit stubs must be bonded to the telecommunications grounding system.

B. Conduit/Raceway Capacity

1. Conduit shall be sized using industry standard guidelines for telecommunications distribution methods. Guidelines can be found in the Building Industry Consulting Service International (BICSI) Telecommunications Distribution Methods Manual and/or cabling manufacturers' guidelines. Utilize Maxcell fabric innerduct to maximize conduit fills

Part Number / Series	Description
MXC4003 series	Standard 4" 3 Cell fabric innerduct
MXP4003 series	Plenum 4" 3 Cell fabric innerduct
MXR4003 series	Riser 4" 3 Cell fabric innerduct
MXD4003 series	Detectable 4" 3 Cell fabric innerduct
MXC3456 series	Standard 3" 3 Cell fabric innerduct
MXP3456 series	Plenum 3" 3 Cell fabric innerduct
MXR3456 series	Riser 3" 3 Cell fabric innerduct
MXD3456 series	Detectable 3" 3 Cell fabric innerduct

C. Cable Trays

1. Standard of quality for basket tray is **Cablofil.**

2. All cable trays shall be designed to accommodate all types of cabling. Note that installation shall be in non-return air plenum space only. All telecommunications pathways (Caddy J-hooks, basket tray or Legrand/Wiremold raceways) shall be used for communications medium (voice, data and fiber optic cabling) only.

3. The minimum dimensions for a cable tray shall be 12 inches wide and 4 inches deep. The tray must consist of continuous, rigid, welded steel or stainless steel wire mesh cable management system. The cable tray systems are defined to include, but are not limited to, straight sections, supports and accessories. Wire mesh cable tray will have continuous Safe-T-Edge T-welded top side wire to protect cable insulation and installers. Basket tray shall be spliced using EDRNs on the sides as well as an SWK washer/nut in the bottom of the tray.

4. Contract documents shall show cross section of the communication wire way or cable tray. The drawing must show reference to other utilities in the building. All sections of the cable tray must be bonded together with approved bonding methods and devices. For installation of other types of “approved” low voltage cables in the cable tray, a separate tray or at minimum a divider in the basket tray to prevent interference from unshielded cables is required.

5. Supports for cable trays larger than 12 inches in width are to be installed according to the manufacturer specifications. A single support is not acceptable. All supports are to be fastened to the building structure above. If the cable tray will be of a wall mount type, it must be installed properly to provide proper permanent support at trays maximum capacity.

6. Radius Drop outs shall be used whenever multiple cables are exiting the tray.

7. STI’s EZ Path’s (44, 33 or 22 series) shall be used in conjunction with the tray whenever cabling is going through a fire rated wall.

8. Cable trays must maintain a minimum of 6-inch clearance from obstructions above the tray and a minimum of 8 feet AFF. Trays are to provide access via the most direct path to all communications outlets on the floor.

9. Install sweeping factory 90's for all turns. Use end-of tray terminations where wire drops down to walls to prevent abrasions and cuts from metal tray edges. Use a trapeze supported cable tray mounting method suspended by manufacturer recommended size all-thread. Fasten all-thread to ceiling anchors, allowing no bends in all-thread. Support the cable tray in this manner at every section-to-section junction and at 5 feet to 6 feet intervals (mid span) between joints. Whenever possible, the tray should be no closer than 6 inches from the

structural ceiling, ducts or pipes, considering all other possible obstructions. A minimum of 5 inches distance from lighting, especially fluorescent lighting, is desired.

10. Coordinate layout and installation of cable tray with other trades. Revise locations and elevations from those indicated as required to suit field conditions and as approved by the Architect. Basket tray installation in the TRs shall be installed as depicted on the drawings by the Telecommunications Contractor. The basket tray that is to be installed for the horizontal and backbone distribution will be provided and installed by the electrical contractor.

11. Storage and Handling: Avoid breakage, denting and scoring finishes. Damaged products will not be installed. Store cable trays and accessories in original cartons and in clean dry space; protect from weather and construction traffic. Wet materials will be unpacked and dried before storage.

12. Refer to the drawings for the size and location of the tray to be installed.

13. Ground cable trays at end of continuous run. Ground continuous cable tray runs every 60 feet. Cable trays that are not UL Classified will be grounded per NEC requirements and manufacturer recommendations.

14. Ground cable trays against fault current, noise, lightning, and electromagnetic interference by mounting grounding wire to each 10' cable tray section with grounding clamp.

D. Open Top Cable Supports (J-hooks)

1. Standard of quality is Erico/**Caddy HP** series of j-hook
2. All open top cable supports (J-hooks) must be suspended from or attached to the structural ceiling or walls with hardware or other installation aids from Caddy specifically designed to support their weight. When used, Caddy J hooks shall be located on 48 to 60 inch centers to adequately support and distribute the cables weight. These types of supports may typically hold up to fifty 0.25-inch diameter cables.
3. No other cables shall be run in the same j-hooks along with the voice and data cables. A separate painted (white, red, blue, green) Caddy j-hook system must be provided to facilitate the installation of other low voltage cabling.
4. For larger quantities of cables that convene at the Telecommunications Closet, provide Cablofil cable trays or other special ERICO/CADDY supports that are specifically designed to support the required cable weight and volume.
5. No plastic j-hooks will be allowed.
6. Substituted material must demonstrate product equivalency.

E. Floor Mounted Assemblies (Floor Boxes and Poke Throughs)

1. All Floor Mounted Assemblies including floor boxes, poke through, floor outlets, floor mounted whips, tombstones, etc. shall be sized using industry standard guidelines for telecommunications distribution methods; specifically relating to cable fill ratios and limitations. Guidelines can be found in the Building Industry Consulting Service International (BICSI) Telecommunications Distribution Methods Manual and/or through individual cabling manufacturers' installation guidelines.

2. Standard of quality for all Poke-throughs and floor boxes is the Evolution series from Legrand/Wiremold.

3. Floor boxes Shall:

    a. be used in concrete, raised floor and wood floor applications and are fully adjustable both pre and post concrete pour.
    b. have removable dividers and a tunnel feature that allows all compartments to be connected.
    c. have removable modules through the top or back of the floor box.
    d. The floor box hinge must is able to open to a full 180^{o} and lie flat on the floor surface providing easy access to interior modules. Cable egress doors lock in position when open and will automatically close around wires to protect cabling and avoid tripping hazards.
    e. accept single, double or triple wall plates as well as accommodate power, communications and A/V devices.
    f. be designed to maintain up to a 2 hour fire rating.

4. Poke throughs Shall
    a. provide the interface between power, communication and audio/ visual (A/V) cabling in an above grade concrete floor and the workstation or activation location where power communication and/or A/V device outlets are required.
    b. provide recessed device outlets that will not obstruct the floor area. The poke-thru device shall be compatible with the complete line of workstation connectivity outlets and modular inserts.
    c. permit all wiring to be completed at floor level.

        1) The 6AT, and 6ATCFF units shall mount in a 6" [152mm] cored hole, actual 6 1/16" [154mm] core hole.
        2) The 8AT units shall mount in an 8" [203mm] cored hole, actual 8 1/16" [205mm] core hole. Use is defined by the UL Fire Resistance Directory as a minimum spacing of "2 ft. [610mm] on center and not more than one device per each 65 sq. ft. [6m2] of floor area in each span."

F. Wall Boxes (A/V, Power, Data behind flat screens)

1. Standard of quality for all wall boxes is the Evolution series from Legrand/Wiremold.
2. Wall Boxes Shall:
   a. be used for TVs, Monitors, & Digital Signage for use in new construction and renovation construction projects.
   b. be compatible with complete line of workstation connectivity outlets and modular inserts, and most audio/video manufacturers' products.
   c. provide the interface between power, communication and audio/video (A/V) cabling new construction and renovation location where power and communication and/or A/V device outlets are required.
   d. provide recessed device outlets that will not obstruct the wall area.
   e. permit all wiring to be completed at box level

G. Conference/Collaboration/Training Room Solutions (Table Boxes; Cable Retractors, Under-table cable management)

1. Standard of quality is Wiremold/Legrand Integreat series

2. **Table Boxes / Table penetrations**:
   a. Cover: Brushed, anodized aluminum cover in a black or aluminum finish with beveled edges and "soft-touch" handle.
      1) Cover contains a "pocket" door which fully recesses into the box when open, giving access to connections without obstructing work surface. A finishing plate hides hardware on activation surface and permits labeling of the AVIP plates.
      2) Cover flange allows for 1/4-inch [6.4mm] of forgiveness in the cut out opening.
   b. Activation Surface: Adjustable downward in 1/2-inch [12.7mm] increments, from one (1) inch to four (4) inches [25mm to 102mm] to allow cover to close even when large style connectors are used.
   c. Provide table boxes with a 12 foot SJT cord for easy connection to electrical infrastructure.
   d. Supply tables boxes with a cable grommet kit that can accommodate up to eight (8) pull out connections. Boxes shall also be capable of accepting up to five (5) Wiremold AVIP connectors.
   e. Provide table boxes with two (2) 15 amp receptacles in top compartment and one (1) 15 amp receptacle on underside of box.

3. **Cable Retractors**: InteGreat™ Series cable retractors; mounts directly to InteGreat™ Series A/V Table Box or underside of conference room table using a horizontal mounting bracket.
   a. Cable Retractors with Category 6 Cable: Catalog No. TBCRCAT6; loaded with 12 feet [3.66m] of Cat6 cable that extends out five (5) feet [1.52m] from retractor. Supply retractor with a female input from building infrastructure and a male connector on the output side.
   b. Cable Retractors with VGA Cable: Catalog No. TBCRVGA; loaded with 12 feet [3.66m] of VGA cable that extends out five (5) feet [1.52m] from retractor.

Supply retractor with a female input from building infrastructure and a male connector on the output side.

c. Cable Retractors with HDMI Cable: Catalog No. TBCRHDMI; loaded with 12 feet [3.66m] of HDMI cable that extends out five (5) feet [1.52m] from retractor. Supply retractor with a female input from building infrastructure and a male connector on the output side. Provide input side with mounting tab that allows installer to cable tie HDMI to retractor to minimize chances of loose connections.
d. Cable Retractors with 3.5MM Audio Cable: Catalog No. TBCR3.5MM; loaded with 12 feet [3.66m] of audio cable that extends out five (5) feet [1.52m] from retractor. Supply retractor with a female input from building infrastructure and a male connector on the output side.
e. Cable Retractor Horizontal Mounting Brackets: Catalog No. TBCRHMK; permits retractor to mount horizontally under conference room table, enabling cable access through a table grommet. Multiple retractors can be mounted to each other by attaching the mounting brackets to each other.

4. **Under Table Cable Management Kit**: InteGreat™ Series under table cable management kit provides clean cable management for power, communication and A/V cables on horizontal underside of table.
   a. Under Table Cable Management Kit: Catalog No. UTCM5; includes five (5) feet [1.524mm] length of divided base, five (5) feet [1.524mm] length of mounting hinge rail and four (4) latching clips; black, nonmetallic construction.
   b. Transition Channels: InteGreat™ Series transition channels continue cable management and protection from underside of the table to the floor, where cables can gain access to building infrastructure. Channel fits directly into under table cable management kit on underside of table and mates with poke-thru device or over floor raceway for smooth transition to building infrastructure.
   c. Transition Channels: Catalog No. MRTC; consists of aluminum center spline with steel mounting plate and four (4) screws, black aluminum side channels, black nonmetallic bottom boot and two (2) black nonmetallic transition covers.

Part Number / Series	Description
EFB Series	Evolution Floor Box
6AT Series	Evolution Poke Throughs 6”
8AT Series	Evolution Poke Throughs 8”
EFSB2 Series	Evolution 2 Gang Wall Box
EFSB4 Series	Evolution 4 Gang Wall Box
TB Series	Integreat A/V Table Box
TBCRCAT6	InteGreat Cable Retractor Cat 6
TBCRVGA	InteGreat Cable Retractor VGA
TBCRHDMI	InteGreat Cable Retractor HDMI
UTCM5	InteGreat Under Table Cable Mgmt.
MRTC	InteGreat Transition Channel

5. Substituted materials for floor boxes, poke throughs, wall boxes and conference room applications must be able to demonstrate product equivalency.

2.11 AUDIO/VISUAL INFRASTRUCTURE

For applications involving patient rooms, classrooms, conference rooms, collaborative work spaces, etc., that require HDMI, USB, Display Port, VGA, and other digital and/or analog A/V connections, the cabling infrastructure shall utilize Quiktron as the standard of quality. Substituted materials for all A/V applications must be able to demonstrate product equivalency.

A. HDMI-to-HDMI, HDMI-to-DVI, DVI-to-HDMI and DVI-to-DVI

1. Direct (native signal) connections (point-to-point) shall be HDMI High Speed Rated and designed and tested to handle video resolutions of 1920 x 1080p or greater, including advanced display technologies such as 4K, UltraHD, 3D, and Deep Color
2. Direct (native signal) connections (point-to-point) shall not exceed 20 meters in total combined length and may be CMP, CMR, CM, CL3 or CL2 rated as appropriate to the installation and applicable code
1. Connections less than 20 meters in total combined length shall be a certified copper cable or connectivity solution, except when:
   a. Direct (native signal) connections (point-to-point) that require a form factor different than that typically available in a quality copper assembly may leverage the selection of “media conversion” and other solutions offered for such situations, and will include as acceptable alternatives RapidRun™, RapidRun Optical™ HDMI-over-Coax, HDBaseT, HDMI-over-UTP.

2. Connections greater than 20 meters in total combined length shall be certified connectivity solutions, as best serves the form factor needed, from the selection defined below:
   a. RapidRun Optical™
   b. HDMI-over-UTP, HDMI w/ serial RS232-over-UTP, HDMI w/ VGA-over-UTP, HDMI w/ VGA and Stereo Audio-over-UTP, HDMI w/ VGA, Audio, and Composite Video-over-UTP or HDMI-over-Coax
3. In installations where it is determined that insufficient bus power (Vbus) exists for reliable performance, the Quiktron HDMI Power Inserter may be used

B. Universal Serial Bus (USB)

1. USB connections (point-to-point) less than 5 meters total length shall be Quiktron USB 2.0 rated for all applications

a. Systems specifically requiring USB 3.0 or faster speed transfer ability (SuperSpeed or SuperSpeed Plus) may include Quiktron USB 3.0 cables, which may not exceed 3 meters total combined length

2. USB connections (point-to-point) more than 5 meters in total length shall be Quiktron connectivity solutions, as best serves the form factor needed for installation, from the selection defined below:
   a. USB connections greater than 5 meters but less than 12 meters in length shall be Quiktron USB Active Extender Cable solutions, or
   b. USB connections greater than 5 meters but less than 100 meters in length shall be Quiktron USB 1.1 over Cat 5 SuperBooster or Quiktron USB 2.0 over Cat 5 SuperBooster solutions as required by the system design

3. USB external hubs shall be Quiktron USB 3.0 SuperSpeed rated with dedicated power supply (powered hubs)
   a. No more than four (4) tiers of USB connectivity shall be allowed without inclusion of a powered hub to restore full USB bus (V_{bus}) power for proper operation of downstream devices and links

C. DisplayPort

1. DisplayPort cables shall be Quiktron DisplayPort rated 1.1 performance or greater, and

2. DisplayPort point-to-point direct connections shall not be more than 10 meters in total combined length

3. DisplayPort point-to-point direct connections greater than 10 meters in total combined length shall be transported via DisplayPort-to-HDMI conversion (dongle) and shall then use an HDMI connection solution approved for connections of HDMI signals beyond 20 meters as detailed above (see HDMI), or

4. DisplayPort point-to-point direct connections greater than 10 meters in length shall be transported via RapidRun Optical

D. D-sub 15, mini sub D15, mini D15, DB-15, HDB-15, HD-15 or HD15, hereafter collectively called VGA

1. VGA direct (native signal) connections (point-to-point) shall be designed and tested to support video resolutions of up to QXGA (2048x1536) and pass Extended Display Identification Data (EDID) signals

2. VGA direct (native signal) connections (point-to-point) shall not exceed 50 meters in total combined length without appropriate signal conditioning and may be CMP, CMR, CM, CL3 or CL2 rated as appropriate to the installation and applicable code

3. VGA direct (native signal) connections (point-to-point) shall be certified connectivity solutions, as best serves the form factor needed, from the selection defined below:
   a. RapidRun™
   b. RapidRun Optical ™

c. Select or Select w/audio
d. Premium Shielded or Premium Shielded w/audio

2.12 POWER – UPS AND PDU OPTIONS

A. UPS (Uninterrupted Power Supply)

1. Standard of quality for Communications Rack Online UPS is Tripp Lite. Substituted material must be able to demonstrate product equality

2. Provide true online battery back-up, power conditioning UPS, rack mounted in each TR to serve network electronics as indicated on the drawings. UPS shall have the following features:
   a. 5000/3000/2200/1500 VA capacity as indicated
   b. Output operating range—280V (5000VA)/120V (<3000VA) nominal
   c. Communications—Unit shall provide an Ethernet based SNMP management interface, through the LAN to provide remote diagnostics and alarm conditions.
   d. Expandability—Unit shall provide for the connection if external battery packs in modules to extend the total unit run-time.
   e. Complete battery independence- Battery independent restart ensures automatic UPS power-up without user interaction after lengthy power outages, even when batteries are completely drained\discharged.
   f. Cord Length - 10'.
   g. Transfer Time- zero transfer time to battery.
   h. Battery Type- maintenance free sealed lead acid with electrolyte: leakproof.
   i. LED Status- On battery/Replace Battery/and overload indicators.
   j. Audible Alarms.
   k. Filtering -full time multi- pole noise filtering
   l. All UPS units shall be rack mountable with proper mounting hardware and support.
   m. UPS External battery Packs for 2200 or 3000 VA Tripp Lite for systems that specify extended run time such as the phone system.

3. UPS Sizes

   a. 1500 VA UPS (Tripp Lite part number SU1500RTXLCD2U) – Used in podiums, credenzas, conference rooms or classrooms
      1) Output Power Capacity- 1350W/ 1500VA.
      2) Nominal Output Voltage- 120V.
      3) Output Connections - (6) NEMA 5-15R
      4) Nominal Input Voltage- 120V.
      5) Input connections- NEMA 5-15P.

   b. 2200 VA UPS (Tripp Lite part number SU2200RTXLCD2U). Used in podiums, credenzas, conference rooms, classrooms and IDFs
      1) Output Power Capacity - 1800 wattts/2200VA.
      2) Nominal Output Voltage- 120V.
      3) Output Connections- (6) NEMA 5-15\20R and (1) NEMA L5-20R.

4) Nominal Input Voltage- 120V.
5) Input connections - NEMA 5-20P.
6) Rack Mounted - 2U rack space.
7) Backup time- 12 minutes at half load (925 watts) 4 minutes at full load (1800 watts.)
8) Surge energy Rating – 570 joules.

c. 3000 VA UPS (Tripp Lite part number SU3000RTXLCD3U) Used in IDFs and MDFs
1) Output Power Capacity- 2700 wattts/3000VA.
2) Nominal Output Voltage- 120V.
3) Output Connections- (4) NEMA 5-15R and (4) NEMA 5-15\20R and (1) NEMA L5-30.
4) Nominal Input Voltage- 120V.
5) Input connections- NEMA L30P.
6) Rack Mounted - 2U rack space.
7) Backup time- 11 minutes at half load (1350 watts) 4 minutes at full load (2700 watts.)
8) LED Status- On battery/Replace Battery/and overload indicators.
9) Surge energy Rating - 570 joules.

d. 5000 VA UPS (Tripp Lite part number SU5000RT4U) – Used in MDFs
1) Output Power Capacity--3800 Watts/5000 VA
2) Max Configurable Power--3800 Watts/ 5000 VA
3) Nominal Output Voltage--120V, 208V
4) Power factor equals 75% or greater
5) Output Voltage Distortion--Less than 2%
6) Output Frequency--(sync to mains) 50/60 Hz +/- 3 Hz user adjustable +/- 0.1
7) Other Output Voltages--240
8) Crest Factor--3 : 1
9) Topology--Double Conversion Online
10) Waveform Type--Sine wave
11) Output Connections--(8) NEMA 5-15\20R, (2) NEMA L6-30R, (2) NEMA L6-20R
12) Bypass--Internal Bypass (Automatic and Manual)
13) Nominal Input Voltage--208V
14) Input Frequency--50/60 Hz +/- 5 Hz (auto sensing)
15) Input Connections--NEMA L14-30P
16) Input voltage range for main operation--100 - 140VAC (L1-N:L2-N)
17) Input voltage adjustable range for mains operation--85 - 136V
18) Other Input Voltages--240
19) Interface Port(s)--RJ-45 10/100 Base-T
20) Control panel LED status display with load and battery bar-graphs and On Line : On Battery : Replace Battery : Overload and Bypass Indicators
21) Alarm when on battery : distinctive low battery alarm : overload continuous tone alarm
22) Emergency Power Off (EPO)

23) Surge energy rating 365 Joules
24) Filtering Full time multi-pole noise filtering : 0.3% IEEE surge let-through : zero clamping response time : meets UL 1449

B. PDU Standard of quality is Tripp Lite part number PDUMV20NET SWITCHED/IP FEATURE SET REQUIRED. Substituted material must be able to demonstrate product equivalency.

1. Raceway and all components shall be UL listed. The base and cover shall be ivory in color, and shall be attached to the cable ladder of the rack system or wall field as per the drawings.
2. Electrical outlet strip shall have (13) NEMA 5-15\20 outlets.
3. Provide all attachment hardware required to securely attach the outlet strip to the back of the vertical cable ladder or wallfield. Refer to the detailed drawings for required locations.
4. All power strips shall be equipped with surge protection.
5. All power strips shall be come with adjustable mounting brackets for 2 or 4 post installation.
6. Strips shall be 20A-120V with NEMA 5·20P on a 15 foot line cord.
7. Install and test all outlets prior to project completion.
8. Provide outlet strip with attached cord and 3-prong plug.
9. All power strips will plug into UPS units unless otherwise specified.

2.13 COPPER CABLE PROTECTION UNITS

A. All copper circuits shall be provided with protection between each building with an entrance cable protector panel. All building-to-building circuits shall be routed through this protector. The protector shall be connected with a #6 AWG copper bonding conductor between the protector ground lug and the TC ground point.

B. Standard of quality of protection units is Circa.

C. The two most frequently used lightning protectors are listed below.

D. Circa Protector -- “Circa”, part number 1900A1-100, and Circa 3B3S-300 “Red” modules -100 for 100 pair.

E. Use Circa ,part number 1880ENA1/NSC-6 for single drops of 6-pair or less. Use Circa, part number 3B1E gas protector modules.

Part Number / Series	Description
1890BC1-25	25 Pair Protector
1890BC1-50	50 Pair Protector

1900A1-100K	100 Pair Protector
3B1E	Solid State Protector Module for 189B1
2626QC/QC	Protection Block (66 connection must add gas modules 3B1E (black) or 3B3E (red))
4B1E	Gas state Protector 5 Pin Black with Heat Coil
4B3S-75	Protector Module 5 Pin Red Solid state with Heat Coil
3B3S-300	Protector module 5 Pin Red Solid state w/o Heat coil
4B1S-300	Protector Module 5 Pin Black Solid state with Heat Coil
1880ENA1/NSC-6	6 Pair Protector

2.14 FIRESTOP

A. Standard of quality is EZ Path Fire rated cable pathway devices shall be used in fire-rated construction for ALL low-voltage, video, data and voice cabling, optical fiber raceways and certain high-voltage cabling where frequent cable moves, adds and changes may occur. Pathways required for high voltage cabling will be detailed on the prints. Such devices shall:

1. Meet the hourly fire-rating of fire rated wall and or floor penetrated.
2. Be tested for the surrounding construction and cable types involved.
3. Have UL Systems permitting cable loads from; “Zero to 100% Visual Fill.” This requirement eliminates need for fill-ratio calculations to be made by cable technicians to ensure cable load is within maximum allowed by UL System.
4. Not have inner fabric liner that tightens around and compresses cables tightly together encouraging potential cable damage or interference.
5. Be “Zero-Maintenance”, zero-maintenance is defined as; No action required by cabling technician to open and/or close pathway for cable moves, adds or changes, such as, but not limited to:
    a. Opening or closing of doors.
    b. Spinning rings to open or close fabric liner.
    c. Removal and or replacement of any material such as, but not limited to, firestop caulk, putty, pillows, bags, foam muffins, foam, foam plugs, foam blocks, or foam closures of any sort.
    d. Furnish letter from manufacturer certifying compliance with this definition of “Zero-Maintenance”.
6. Pathways shall be engineered such that two or more devices may be ganged together for larger cable capacities.
7. Pathways shall be engineered to be re-enterable so they can be retrofitted and removed from around existing cables without cutting and re-splicing them.
8. Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed.

9. Cable pathway shall replace conduit sleeves in walls and floors, and;
10. When installed individually in floors, devices shall pass through core-drilled opening utilizing tested floor plates.
11. When installed individually in floors, devices shall pass through core-drilled opening utilizing tested floor plates.
12. When multiple units are ganged in floors, devices shall be anchored by means of a tested grid.
13. When installed individually in walls, devices shall pass through core drilled opening utilizing tested wall plates or integrated flanges.
14. When multiple units are ganged in walls, devices shall be anchored by means of a tested grid.
15. Cable tray shall terminate at each barrier (wall) and resume on the other side such that cables pass independently through devices. Cable tray shall be properly supported on each side of the barrier (wall). Cable tray shall NOT pass through the barrier (wall).
16. Substituted material must demonstrate product equivalency.

B. As an alternate to using a fire-rated or non-rated cable pathway device for single low voltage cables (up to 0.27 in. (7 mm) O.D) penetrating one or two-hour, gypsum board/stud wall assemblies or non-rated assemblies, either as a through-penetration or as a membrane-penetration, a fire-rated EZ Path individual cable grommet may be substituted. The product shall consist of a molded, two-piece, plenum-rated grommet having a foam fire and smoke sealing membrane that conforms to the outside diameter of the individual cable. The grommet product shall be capable of locking into place to secure the cable penetration within the wall assembly. The grommet shall be UL Classified and tested to the requirements of ASTM E814 (UL1479) and CAN/ULC S115.

17. Acceptable Products from STI:

Part Number / Series	Description
EZD22	2” EZ Path Firestop Device
EZD33FWS	3” EZ Path Firestop Device
EZDP133CWK	3” EZ Path Firestop Device Kit (for 4” conduit)
EZDP33FWS	3” EZ Path Firestop Device Kit (square mount)
EZP433W	3” Ganging Accessory (Qty 4) for 3” EZ Paths
EZD44S	6” EZ Path Firestop Device
EZDP44S	6” EZ Path Firestop Device Kit (square or round mount)
EZP544W	Ganging Accessory (Qty1-5) for 6” EZ Paths
EZGxxxxx	Grid for riser applications
RFG2	Individual Cable EZ firestop grommet (10 pack)

2.15 GROUNDING AND BONDING

A. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor. The TBB shall be installed independent of the building's electrical and building ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA-607 Telecommunications Bonding and Grounding Standard.

B. The main entrance facility/equipment room in each building shall be equipped with a PBB (Primary Bonding Busbar) formerly known as the telecommunications main grounding bus bar (TMGB). Each telecommunications room shall be provided with a SBB (Secondary Bonding Busbar formerly known as the telecommunications ground bus bar (TGB). The PBB shall be connected to the building electrical entrance grounding facility. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.

C. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the TR or ER shall be grounded to the respective SBB or PBB using a minimum #6 AWG stranded copper bonding conductor and compression connectors.

D. All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.

E. Standard of quality for all grounding and bonding products shall be Legrand.

F. Acceptable substitutions are Erico and Panduit

PART 3 - EXECUTION

3.1 WORK AREA OUTLETS

A. Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturer's bend radius. In hollow wall installations where Caddy box-eliminators are used, excess wire can be stored in the wall. No more than 12" of UTP and 36" of fiber slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

B. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA 568.1-D document, manufacturer's recommendations and best industry practices.

C. Pair untwist at the termination shall not exceed 12 mm (one-half inch).

D. Bend radius of the twisted-pair horizontal cable shall not be less than 4 times the outside diameter of the cable.

E. The cable jacket shall be maintained to within 25mm (one inch) of the termination point.

F. Data jacks, unless otherwise noted in drawings, shall be located in the bottom position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the right-most position(s).

G. Voice jacks shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).

3.2 HORIZONTAL DISTRIBUTION CABLE INSTALLATION

A. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.

B. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

C. Cable raceways shall not be filled greater than the ANSI/TIA 569-D maximum fill for the particular raceway type or 40%.

D. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

E. Where transition points, or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

F. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.

G. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60 inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

H. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

I. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

J. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.

K. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

L. Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification and ANSI/TIA 606-C. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.

M. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.

N. Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.

3.3 HORIZONTAL CROSS CONNECT INSTALLATION

A. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA 568-D standard, manufacturer's recommendations and best industry practices.

B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).

C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

D. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

E. The cable jacket shall be maintained as close as possible to the termination point.

F. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.4 OPTICAL FIBER TERMINATION HARDWARE

A. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

B. Each cable shall be individually attached to the respective splice enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

C. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

D. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

E. A maximum of 12 strands of fiber shall be spliced in each tray

F. All spare strands shall be installed into spare splice trays.

3.5 BACKBONE CABLE INSTALLATION

A. Backbone cables shall be installed separately from horizontal distribution cables

B. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

C. Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits

D. Where backbone cables are installed in an air return plenum, riser rated cable shall be installed in metallic conduit.

E. Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.

F. All backbone cables shall be securely fastened to the sidewall of the TR on each floor.

G. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.

H. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.

I. Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

3.6 COPPER TERMINATION HARDWARE

A. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA-568-D standard, manufacturer's recommendations and best industry practice.

B. Pair untwist at the termination shall not exceed 12 mm (one-half inch).

C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

D. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

E. The cable jacket shall be maintained to within 25 mm (one inch) of the termination point.

F. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.7 RACKS

A. Racks shall be securely attached to the concrete floor using a minimum 3/8" hardware or as required by local codes.

B. Racks shall be placed with a minimum of 36 inch clearance from the walls on all sides of the rack. When mounted in a row, maintain a minimum of 36 inches from the wall behind and in front of the row of racks and from the wall at each end of the row.

C. All racks shall be grounded to the telecommunications ground bus bar in accordance with Section 2.11 of this document.

D. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.

E. Wall mounted termination block fields shall be mounted on 4' x 8' x .75" void free plywood. The plywood shall be mounted vertically 12" above the finished floor. The plywood shall be painted with two coats of white fire retardant paint.

F. Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame 18" from the finished floor.

3.8 FIRESTOP SYSTEM

A. All firestop systems shall be installed in accordance with the manufacturer recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cable system acceptance.

3.9 GROUNDING SYSTEM

A. The TBB shall be designed and/or approved by a qualified PE, licensed in the state that the work is to be performed. The TBB shall adhere to the recommendations of the ANSI/TIA 607-C standard, and shall be installed in accordance with best industry practice.

B. Installation and termination of the main bonding conductor to the building service entrance ground shall be performed by a licensed electrical contractor.

3.10 IDENTIFICATION AND LABELING

A. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the successful contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme. Labeling shall follow the guidelines of ANSI/TIA-606-C.

B. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of ANSI/TIA-606-C. Furnish electronic record of all drawings, in software and format selected by Owner.

E. Cable and Wire Identification:

1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

    a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
    b. Label each unit and field within distribution racks and frames.

3. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

4. Both ends of all backbone cable shall be labeled. Labels will be self laminating and machine generated. The label shall contain the following information:

a. The Origination (TR it is feeding from).
b. The Destination (TR it is feeding).
c. Number of pairs or fibers

5. Both ends of all horizontal cables shall be labeled. Labels shall be self-laminating and machine generated. The cable, workstation faceplate, panel ports and block positions shall be labeled with the room number, location in room, outlet type & # (data D1, D2, etc). In rooms with multiple outlets, label clockwise as you enter the room: 1, 2, 3 e.g. a data port at the first drop location to the left of Room 216 door would be (216-1 D1). When terminating workstation cables in the TR, organize and label the cables in numeric room number order at the patch panel.

6. CNS will approve all labeling schematics prior to installation. "As-Built" drawing with all outlets identified shall be provided.

F. Labels shall be self-laminating or computer-printed type with printing area and font color that contrasts with cable jacket color. Handwritten labels will not be acceptable.

1. Cables use flexible vinyl or polyester that flex as cables are bent.

2. All labeling methodology, identification logic, and materials will be approved by customer prior to installation.

3. If existing labeling scheme is in place, all labeling will defer to currant scheme as to stay consistent with facility.

3.11 TESTING AND ACCEPTANCE

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA 568D; marginal passes (*PASS) are not acceptable. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

2. All cables shall be tested in accordance with this document, the ANSI/TIA standards, the Legrand Certification Program Information Manual and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

B. Copper Channel Testing

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category performance.

2. Horizontal cabling shall be tested using a Level III test unit for category 6 performance compliance.

3. The basic tests required are:

    a. Wire Map
    b. Length
    c. Attenuation
    d. NEXT (Near end crosstalk)
    e. Return Loss
    f. ELFEXT Loss
    g. Propagation Delay
    h. Delay skew
    i. PSNEXT (Power sum near-end crosstalk loss)
    j. PSELFEXT (Power sum equal level far-end crosstalk loss)

4. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.

5. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA 568-D Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.

6. Category 6 Performance

    Shall meet the channel requirements outlined below for a 100-meter, 4-connector channel.

    Channel Margin Guarantees

Parameter	Margin vs. TIA-568-C.2
Insertion Loss	3%
NEXT	5 dB
PSNEXT	5 dB
Return Loss	3 dB
ACRF	5 dB
PSACRF	5 dB
ACR	5 dB
PSACR	5 dB

C. Fiber Testing

1. Testing procedures shall be in accordance with the following:
    a. ANSI/TIA 568-D
    b. ANSI/TIA 568.1-D
    c. ANSI/TIA 526-7-A, Method A.1
    d. ANSI/TIA 526-14-C, Method B
    e. TSB-140 Tier 1 fiber testing is required. Tier 2 Fiber Testing is recommended
    f. ANSI-TIA-1152-A determines the copper field test instrument values.
2. Preparation
    a. Properly clean all connectors, adapters, and jumpers prior to testing.
    b. Insure that the testing jumpers are of the same fiber core diameter and connector type as the fibers to be tested.
    c. The power meter shall be properly calibrated prior to testing. Contractor to provide written confirmation of the calibration, with the power meter serial number, to the Owner, if requested. If this documentation is not available upon request, the Contractor shall re-test all optical fiber cables after documented calibration of the power meter is accomplished.
3. Test Equipment
    a. Optical power meter and source (Certification tester Fluke or Agilent preferred). Suitable OTDR with launch cable for Tier 2 testing. OTDR Launch Cable length recommendation is 75 meters for MMF and 300 meters for SMF systems.
4. Testing
    a. All Multimode fibers shall be tested to the requirements of ANSI/ TIA-568-D, TIA-525-14A (Method A.1) and TSB-140. Optical fibers shall be tested at both 850 nm and 1300 nm wavelengths for end-to-end insertion loss .and Bi –Directional (MTR to TR-1, TR-1 to MTR)
    b. All Single-mode fibers shall be tested to the requirements of ANSI/ TIA-568-D, TIA-526-7 (or Method A.1) and TSB-140. Optical fibers shall be tested at both 1310 nm and 1550 nm wavelengths for end-to-end insertion loss and Bi-Directional (MTR to TR-1, TR-1 to MTR)
    c. Insure that the power meter and light source are set to the same wavelength prior to testing each fiber.

d. Connect an appropriate test jumper to the light source and power meter.
e. Power on both the power source and light meter, allowing them to stabilize.
f. Record the reference power reading in dB. If the jumper is removed from the light source for any reason, the reference power reading must be re-established.
g. Insert a second appropriate jumper, using an appropriate adapter, between the first jumper and the power meter. Record the power reading in dB.
h. Reference TSB-140 for additional recommendations and testing guidelines.
i. Provide written documentation of all test results to owner. Provide electronic copy of test results, in original tester format, to manufacturer when registering project for warranty on-line.

3.12 SYSTEM DOCUMENTATION

A. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Engineer for approval. Documentation shall include the items detailed in the sub-sections below.

B. Documentation shall be submitted within ten (10) working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor, etc.). This is inclusive of all test result and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the request of the Engineer, the telecommunications contractor shall provide copies of the original test results.

C. The Engineer may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

3.13 TEST RESULTS

A. Test documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words “Project Test Documentation”, the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration

date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

B. The field test equipment shall meet the requirements of ANSI/TIA 568-C including applicable TSB's and amendments. The appropriate Level III tester shall be used to verify Category 6 cabling systems.

C. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. The telecommunications contractor must furnish this information in electronic form (format to be determined by the end user).

D. Test documentation shall also be provided to the manufacturer within three weeks after the completion of the project. Test results shall be uploaded when registering the project for warranty using the manufacturer's on-line system. Test results shall be in the tester's original format from an approved tester listed on manufacturer's website. All test results must show a PASS; marginal passes (*PASS) are not accepted.

E. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

3.14 AS-BUILT DRAWINGS

A. The drawings are to include cable routes and outlet locations. Outlet locations shall be identified by their sequential number as defined elsewhere in this document. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD rel. 14) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.

B. The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD rel. 14) form.

PART 4 - WARRANTY AND SERVICES

4.1 WARRANTY

A. A warranty shall be provided for all internal infrastructure wiring as it pertains to voice and data networking for both copper and fiber systems. All installations must

be performed according to the manufacturer's System Warranty and Performance Application.

B. The warranty will combine an extended product and applications assurance warranty for a minimum of 25 years.

C. An Extended Product Warranty shall be provided which warrants functionality of all components used in the system from the date of registration. The Extended Product Warranty shall warrant the installed horizontal and/or backbone copper, and both the horizontal and the backbone optical fiber portions of the cabling system.

D. The Application Assurance Warranty shall cover the failure of the wiring system to support the applications that are designed for the link/channel specifications of ANSI/TIA-568.1-D. These applications include, but are not limited to, 10BASE-T, 100BASE-T, 1000BASE-T, and 155 Mb/s ATM.

E. The contractor shall provide a warranty on the physical installation.

4.2 CONTINUING MAINTENANCE

A. The contractor shall furnish an hourly rate with the proposal submittal, which shall be valid for a period of one year from the date of acceptance. This rate will be used when cabling support is required to affect moves, adds, and changes to the system (MACs). MACs shall be performed by a certified Contractor and shall be added to the warranty when registered with manufacturer.

4.3 FINAL ACCEPTANCE & SYSTEM CERTIFICATION

A. Completion of the installation, in-progress and final inspections, receipt of the test and as-built documentation, and successful performance of the cabling system for a two week period will constitute acceptance of the system. Upon successful completion of the installation and subsequent inspection, the end user shall be provided with a certificate, from the manufacturer, registering the installation.

SECTION 283100 - FIRE ALARM SYSTEM

1. GENERAL

A. SCOPE AND RELATED DOCUMENTS

(1) The work covered by and the intent of this section of the specifications includes the furnishing of all labor, equipment, materials, testing, programming and performance of all operations in connection with the installation of the Fire Alarm System expansion as shown on the drawings, as herein specified and as required by the applicable codes.

(2) The requirements of all other applicable conditions of the Contract, Supplementary Conditions and General Requirements, apply to the work specified in this section.

(3) The complete installation shall conform to the applicable sections of NFPA-71, NFPA-72A, B, C, D, Local Code Requirements and National Electrical Code (Article 760). The requirements of any local fire department and the Authority Having Jurisdiction shall also be observed in the system installation and device layout.

(4) The work included in this section shall be coordinated with related work specified elsewhere in these specifications.

B. QUALITY ASSURANCE

(1) Every component, device, transmitter, software, etc., that are included in the work, to make up a complete Fire Alarm System shall be listed as a product by the manufacturer under the appropriate category by the Underwriters' Laboratories, Inc. (UL), and shall bear the "U.L." label.

(2) The system power, signal and controls wiring shall be UL listed for Power Limited Applications per NEC 760. All circuits shall be marked in accordance with NEC Article 760.

C. GENERAL

(1) Furnish and install a complete digital multiplex Fire Alarm System as described herein and as shown on the plans; to be wired, connected, completely tested, and left in first class operating condition. The system shall use individually-addressable digital multiplex device circuit(s) with individual device supervision, appliance circuit supervision, incoming normal and stand-by power supervision. In general, systems shall include a control panel, manual pull stations, automatic fire detectors, horns, flashing lights, annunciator (if indicated), raceways, all wiring, connections to devices, connections to valve tamper switches, water flow switches and mechanical controls, outlet boxes, junction boxes, and all other necessary materials for a complete, operating system.

The fire alarm control panel shall allow for loading or editing of any special instructions or operating sequences as required. No special tools, modems, or an off-board programmer

shall be required to program the system to facilitate future system expansion, building parameter changes, or changes as required by local codes. All instructions shall be stored in a resident non-volatile programmable memory.

(2) All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name of each component. Any catalog numbers specified under this section are intended only to identify the type, quality of design, materials, and operating features desired.

The listing of specific catalog numbers and equipment parameters is not intended to limit competition among other manufacturers that propose to supply equivalent equipment and services. Fire alarm systems as manufactured by Siemens/Cerberus, Edwards, Honeywell or Notifier will be acceptable. Simplex is not allowed.

(3) Equipment submissions for shop drawing review must include a minimum of the following:

a. Complete descriptive data indicating UL listing for all system components.

b. Complete sequence of operations of the system.

c. Complete system wiring diagrams for components capable of being connected to the system and interfaces to equipment supplied by others.

d. A copy of any state or local Fire Alarm System equipment approvals.

e. An Autocad (latest version) produced wiring diagram illustrating the basic floor plan of the building, showing all system wiring and equipment, as well as zoning boundaries and schedule of zone legends as intended to appear on annunciators. Provide three CD-Rom copies of as-built drawings and all system operational software at close of project, to be included in operation and maintenance manuals.

(4) No work shall be done until the drawings are approved by the local reviewer.

D. OPERATION

(1) The system alarm operation subsequent to the alarm activation of any manual station, automatic detection device, or sprinkler flow switch shall be as follows:

a. 1) The appropriate initiating device circuit indicator (red color) shall flash on the control panel until the alarm has been silenced at the control panel. Once silenced, this same indicator shall latch on. A subsequent alarm received after silencing shall flash the subsequent zone alarm indicator on the control panel and resound alarms and flashing signals. These same conditions shall occur at any remote annunciator.

2) A pulsing alarm tone shall occur within the control panel until silenced.

b. All alarm indicating appliances shall sound in a temporal code pattern until silenced by an alarm silence switch at the control panel (or the remote annunciator, if any).

c. All doors normally held open by door control devices shall close. Doors shall also be released in the event of incoming normal power failure.

d. A supervised signal to notify the local fire department or an approved central station (as required by local codes) shall be activated.

e. A supervised signal shall directly activate, shut down or reconfigure the air handling systems as required by NFPA or as otherwise indicated herein. Provide necessary interlock wiring as required to control mechanical equipment..

f. The Contractor(s) shall coordinate with each other as necessary to provide all required auxiliary contacts, DDC systems interfaces, equipment, etc., as needed to shut down or otherwise control air handling systems per NFPA and all applicable codes.

g. The system shall be wired with two circuits to all Notification devices so that when an alarm is acknowledged, silencing the audibles, the visual units shall continue in operation until the main control panel has been reset. If local codes require other than this arrangement, the system shall be wired in accordance with the code that is applicable.

(2) The alarm indicating appliances shall be capable of being silenced only by authorized personnel operating the alarm silence switch at the main control panel or by use of a similar key operated switch at the remote annunciator (where remote units are provided). A subsequent alarm shall reactivate the signals. Operation of the alarm silence switch shall be indicated by trouble light and audible signal.

(3) The activation of any standpipe water valve tamper switch or sprinkler zone valve tamper switch shall activate a distinctive system supervisory audible signal and illuminate a "Sprinkler Supervisory Tamper Switch" indicator at the system controls (and the remote annunciator[s]). There shall be a distinction in the audible trouble signals between valve tamper switch activation and opens or grounds on fire alarm circuit wiring.

a. Activating the trouble silence switch will silence the supervisory audible signal while maintaining the "Sprinkler Supervisory Tamper" indicator showing the tamper contact is still activated.

b. Restoring the valve to the normal position shall cause the audible signal and visual indicator to pulse at a fixed rate.

c. Activating the trouble silence switch shall silence the supervisory audible signal and restore the system to normal.

(4) Include with the control panel, as an auxiliary function, a built-in test mode that, when activated, will cause the following operation sequence:

a. The city connection circuit shall be disconnected.

b. Control relay functions shall be bypassed.

c. The control panel shall show a trouble condition.

d. The panel shall automatically reset itself.

e. Any momentary opening of an initiating or indicating appliance circuit shall cause the audible signals to sound for a minimum of two seconds to indicate the trouble condition.

(5) A manual evacuation switch shall be provided to operate the system indicating appliances and/or initiate "Drill" procedures.

(6) Activation of an auxiliary bypass switch shall override the automatic functions either selectively or throughout the system and initiate a trouble condition at the control panel.

(7) Include any and all detection equipment and interface relays as required to provide a 100% code approved and supervised pre-action Fire Suppression system. Coordinate with the Fire Protection installer as required.

E. SUPERVISION

(1) The system shall contain Class "B" (Style "B") independently supervised initiation circuits as required for the zoning indicated. Circuits shall be arranged so that a fault in any one zone shall not affect any other zone. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit.

(2) There shall be supervisory initiation circuit(s), as required, for connection of all sprinkler valve tamper switches. Wiring methods which require any fire alarm initiation circuits to perform this function shall be deemed unacceptable; i.e., sprinkler and standpipe tamper switches (N/C contacts) shall NOT be connected to circuits with fire alarm initiation devices (N/O contacts). These independent initiation circuit(s) shall be each labeled "Sprinkler Supervisory Tamper Switch" and shall differentiate between tamper switch activation and wiring faults. Provide individual annunciation for the main post indicator valve and each tamper switch as indicated by the zoning schedule on the plans or as otherwise required by codes. For these circuits and all exterior underground copper circuit wiring, provide proper surge suppression and protection for circuit.

(3) There shall be independently supervised and independently fused indicating appliance circuits as required for alarm audible signals and flashing alarm lamps.

(4) All auxiliary manual controls shall be supervised so that all switches must be returned to the normal (automatic) position to clear system trouble.

(5) Each independently supervised circuit shall include a discrete (amber color) "Trouble" indicator to indicate disarrangement conditions, per each circuit.

(6) The incoming power to the system shall be supervised so that any power failure shall be audibly and visually indicated at the control panel and the annunciator. A green color "power on" indicator shall be displayed continuously while incoming power is present.

(7) The system batteries shall be lead-acid type, supervised so that disconnection or failure of a battery shall be audibly and visually indicated at the control panel (and the annunciator).

(8) Wiring to a remote annunciator (if provided for system) shall be supervised for open and ground conditions. An independent annunciator trouble indicator shall be activated and an audible trouble signal shall sound at the control panel.

F. POWER REQUIREMENTS

(1) The control panel shall receive 120 VAC power via a dedicated circuit. The incoming circuit shall have suitable overcurrent protection within the control panel, as well as at the circuit source. If additional circuits are required for this or other control units, they shall be provided by the Contractor.

(2) If the facility is equipped with an emergency standby power generator, the fire alarm equipment shall be connected to this system, per N.E.C.

(3) The system control panel and auxiliary equipment, such as power supplies shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of time as required by codes for the building occupancy. There shall be reserve battery capacity to drive all alarm appliances for five minute indication at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operating shall be automatic. Batteries, once discharged, shall recharge at a rate that will provide a minimum of 70% capacity in 12 hours, or sooner if required by codes.

(4) All circuits requiring system operating power shall be 24 VDC and shall be individually fused at the control panel.

(5) Power supplies for Notification signals, whether in the main panel or within remote power supply cabinets, shall be designed to provide a minimum of 20% spare capacity for future signals.

G. FIRE ALARM CONTROL PANEL

(1) Where shown on the plans, provide and install the Fire Alarm Control Panel. Construction shall be modular with solid state, microprocessor based electronics. All visual indicators shall be high contrast, light-emitting diode type.

(2) The control panel shall contain the minimum following features as per plans:

- Minimum Capacity of 120 Control or Monitor Points or greater, to Suit Building Requirements, expandable to 1000 points
- Initiation Device Circuits
- Alarm Indicating Appliance Circuit
- Supervised Annunciator Circuits
- Local Energy City Connection, if required
- Form C Alarm Contacts (2.0 Amps ea., minimum of two unless otherwise required)
- Earth Ground Supervision Circuit
- Automatic Battery Charger, of proper rating
- Standby Battery, Lead/Acid Type
- Resident non-volatile programmable operating system for all operating requirements
- Supervised Manual Evacuation Switch
- Internal power supplies as required for auxiliary functions as indicated
- Auxiliary contacts or relays for auxiliary functions as indicated
- All Custom Software and Programming as required to suit the project requirements

H. SYSTEM SOFTWARE AND PROGRAMMING

(1) Provide all programming and software necessary to place annunciators and controls in full operation. System set-up shall allow for changes in annunciator legends without rewiring or addition of programming or electronics. Furnish initial programming and reprogramming as needed to accommodate changes in the system up to the time of system acceptance by the engineer without extra charge.

I. REMOTE ANNUNCIATOR

(1) Where indicated on the plans, provide and install annunciator/control panel. The panel shall be of vandal-resistant construction and shall contain a liquid crystal illuminated display for alphanumeric indication of all required functions. The panel shall also contain the following control functions, activated by a master system enable key switch on front panel:

a. Remote system reset switch, to complement main control panel reset switch.

b. Remote alarm signal silence switch.

c. Remote manual evacuation switch, to initiate fire drill functions, same as at main control panel.

d. Remote trouble silence switch to silence trouble alarms in annunciator panel and main control panel.

e. Install panel on properly sized outlet box, 54" AFF to centerline. Panel shall contain tamper-resistant LED test switch in panel, local audible alarm, system power on, trouble

LED indicators and master system enable key switch, keyed alike with the main control panel.

(2) Annunciator legends shall be custom, to display both zone number and brief legend indicating the area or device associated with that zone. The legends shall be electronically generated on an alphanumeric display panel. The fire alarm system vendor shall coordinate the legends with the Engineer at shop drawing review.

(3) Wiring between main control panel and annunciator(s) shall be fully supervised, and accomplished over twisted shielded pair and/or THWN wiring as required by the manufacturer, per N.E.C. and NFPA.

J. PERIPHERAL DEVICES

Note: On fully digital multiplex systems, provide addressable devices, bases or modules for devices listed herein. Each device shall be an individual address on the system. Addressable bases or modules shall be U.L. listed for the device served.

(1) MANUAL PULL STATION

a. Manual stations shall be double action and shall be constructed of high impact, red lexan or cast metal with raised white lettering and a smooth high gloss finish. The manual pull station shall have a hinged front with key lock. Stations shall be keyed alike with the fire alarm control panel. When the station is operated, the handle shall lock open in a protruding manner. Furnish one key for each manual station to owner at close of project, during instruction period. Install within 60" of each exit, per code, whether indicated on the drawings or not.

(2) CEILING-MOUNTED SMOKE DETECTORS, PHOTOELECTRIC TYPE

a. Furnish and install where indicated on the plans or required, ceiling-mounted smoke detectors. Provide separate outlet-box mounted base with auxiliary relay, or standard base, as required.

b. Smoke Detectors shall be listed to U.L. Standard 268 and shall be compatible with their control equipment. Detectors shall be listed for this purpose by Underwriters' Laboratories, Inc. The detectors shall obtain their operating power from the fire alarm panel supervised detection loop. Loss of the operating voltage shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal to be generated at the control panel. Detectors shall be capable of being reset at the main control panel.

c. No radioactive materials shall be used. Detector construction shall provide mounting base with twist-lock detector head. Contacts between the base and head shall be of the bifurcated type using spring-type, self-cleaning contacts. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble

signal at the control panel. Detector design shall provide full solid state construction, and compatibility with other normally open fire alarm detection loop devices such as heat detectors, pull stations, etc.

d. To minimize nuisance alarms, voltage and RF transient problems, suppression techniques shall be employed as well as a smoke verification circuit and an insect screen. The detector head shall be easily disassembled to facilitate cleaning.

e. Remote LED alarm indicators shall be installed where required.

f. Smoke detectors (and all other system electronics) shall be shielded to protect circuitry from EMI problems generated by power fields, cellular phones, etc.

g. Special Note: The Contractor installing smoke detectors shall use care in the final positioning of all devices. They shall not be installed closer than 36" from an air diffuser or return grille, closer than 24" from a ceiling/wall intersection, or similar location that would diminish detector performance. Refer to and comply with NFPA 72E, "Standard On Automatic Fire Detectors".

h. Provide smoke detector at each fire alarm system control component, as required by code.

(3) AUTOMATIC HEAT DETECTORS (RATE-OF-RISE TYPE)

a. Automatic heat detectors shall be combination rate-of-rise and fixed-temperature type. When the fixed-temperature portion is activated, the units shall be non-restorable and give visual evidence of such operation. Heat detectors shall be 135, 165 or 195NF, as indicated on plan. Where not indicated, provide 165º F units. Provide as indicated or required.

(4) AUTOMATIC HEAT DETECTORS (FIXED TEMPERATURE TYPE)

a. Where indicated on the plans, provide automatic heat detectors of the non-restorable type, of the temperature rating as indicated or required. Detector heads shall be mounted to an outlet-box mounted base. Provide auxiliary contacts as needed. Provide as indicated or required.

(5) AUDIBLE AND VISUAL UNITS

a. Audible signals shall be polarized and shall be operated by 24 VDC. Each audible assembly shall include separate wire leads for in/out wiring for each leg of the associated signal circuit. T-tapping of signal device conductors to signal circuit conductors will not be accepted. The audible visual units shall be equipped with a xenon-type strobe which shall be semi-flush mounted on 4" square outlet box. Each audible device shall produce a minimum sound pressure level of 92db at 36" on axis. Provide units as manufactured by Wheelock, Inc., or approved equivalent. Locate as indicated or required. All audible tones

for same function shall be identical, per NFPA. Provide sufficient audible units to comply with code for required coverage. Provide temporal coded signals.

b. The output intensity of all visual units, their locations and mountings shall be in compliance with the latest version of the Americans with Disabilities Act requirements.

c. Audible units and visual units shall be wired to separate Notification circuits, allowing for silencing of audibles with alarm acknowledgment, continuing operation of strobes until system reset. Addressable devices may be used to fulfill this requirement.

d. Provide system-wide synchronization of all visual devices, so that all strobes flash at the same rate and at the same time, complying with A.D.A.

(6) VISUAL UNITS

a. Stand-alone visual indicating units shall be xenon type strobe matching audio-visual units. These devices shall be UL listed and be or wall mounted. A high-impact clear lens shall project out from backplate. Lettering, if any, shall be oriented upright to the standing viewer. Candela output values of all visual units shall be selected for the covered spaces geometry and size, complying with A.D.A. and NFPA.

(7) DOOR HOLDERS

a. Magnetic door holders shall be 24 volt A.C., and shall have an approximate holding force of 25 lbs or greater, if required to restrain door. The door-mounted portion shall have a plated steel pivot mounted armature with shock absorbing bearing. Unit shall be capable of being either surface, flush, semi-flush or floor mounted as required. Door holders shall be UL listed for their intended purpose. Where door mounted, locate armature 6" down from top and 6" in from strike side of leaf. Where door swing prevents direct contact between armature and holder pole piece, provide non-removable plated chain to close gap as tightly as possible. Verify holder positioning with Architect prior to mounting any devices. Unless otherwise indicated, provide semi-flush mounted holders 6" below top of door leaf as noted above, with blocking in wall to support force of door impact against holder and outlet box. Provide at all needed locations as indicated or required. Coordinate with architectural hardware schedule, as applicable to project.

(8) DUCT SMOKE DETECTORS

a. Duct smoke detectors shall be of the solid state photoelectric type, operating on the light scattering photodiode principle. The detectors shall ignore invisible airborne particles or smoke densities that are below the set alarm point. No radioactive materials shall be used. The basic construction of duct smoke detectors shall be the same as that previously described for ceiling-mounted smoke detectors. Duct housing couplings shall be slotted to insure proper alignment of the sampling and exhaust tubes. Detector shall have an alarm status LED visible through a transparent cover, panel or in housing.

b. The Contractor shall furnish air duct smoke detectors with template to the sheetmetal or air handling unit installer for installation. Coordinate length of sampling probe required and furnish appropriate length. Probe tube shall be located in accord with manufacturer's recommendations, to give maximum sampling rate of airflow. Provide multiple detectors, as required, if a single device will not provide adequate sensing due to duct size or air velocity. Wire multiple detectors on a single air handling system as a single zone or address unless otherwise required by prevailing codes. Field verify quantity of detectors needed to provide NFPA-compliant coverage of the air handling unit and provide as required.

c. Detector supervised power and alarm wiring (from F.A. control panel) is to be provided by the Contractor. Interlock wiring from auxiliary contacts to stop or otherwise control air handling unit fan motor(s) is to be provided by the Contractor. Provide auxiliary contacts as required. Zone wiring and indication for air duct smoke detectors shall be maintained separate from area detection devices. Detector shall be capable of being reset at the main control panel, and at a local test/reset station.

d. Where air duct smoke detectors are located in other than Mechanical Rooms or in spaces not easily visible, a remote alarm/power indicating LED key reset station shall be installed. These remotes shall be ganged together, if required, and labeled accurately as to which unit is reporting an alarm condition.

e. Where air duct smoke detectors are indicated to be furnished at concealed air handling units above ceilings or smoke damper locations, furnish as outlined above. Also provide remote indicating alarm LED flush in corridor wall at 7'-0" A.F.F. immediately below installation, or as close as practical to installation. The Contractor is to provide control wiring, E.P. switches, etc., as required to operate smoke dampers, as well as the required operating circuit. Coordinate all requirements with the installer of smoke dampers.

f. Ionization - type detectors shall not be utilized for air duct smoke detection.

g. All air duct smoke detector installations and materials shall be in accord with U.L., NFPA, and any other applicable codes.

(9) WEATHERPROOF DEVICES AND EXPLOSION-PROOF DEVICES

a. Where the anticipated atmosphere or installation conditions require weather-proof, explosion-proof or other specially housed devices, they shall be U.L.-listed and NFPA-compliant and provided as indicated or required. Verify installation conditions and indicate type of device on shop drawing submission.

(10) END OF LINE RESISTOR

a. End-of-line devices (if required) shall be flush-mounted, located at 7'-0" A.F.F. in corridor walls or as indicated.

(11)GUARDS FOR DEVICES

a. Where detectors, manual stations, signals, etc., require or are indicated to be furnished with a guard, utilize a U.L. listed unit, compactly covering and compatible with the device. Provide as indicated or required. Guards shall not diminish the performance of any device.

(12)DIGITAL ALARM COMMUNICATOR/TRANSMITTER

a. Provide a U.L.-listed and NFPA-compliant digital alarm communicator/transmitter (D.A.C.T.). Install at telephone terminal board or telephone service entrance and provide supervised wiring to fire alarm control panel as required. This unit may be semi-flush mounted at the F.A.C.P. location with prior approval by the Engineer. It may also be integrated within the main control panel, if U.L.-listed for the purpose.

b. The installation and connection of the D.A.C.T. shall be in compliance with all provisions of N.F.P.A. 71 and all other applicable codes. The installation and connection shall be acceptable to the Authority Having Jurisdiction, as well as the telephone company (or companies) over whose lines the signal(s) will be transmitted. Include any costs associated with telephone company work and services required in bid. Telephone connection shall be in compliance with NFPA 71, chapter five.

c. The D.A.C.T. shall be capable of transmitting all information relative to system status changes due to alarm, trouble, water flow, and any other information as required by current codes applicable to the facility. This information shall be transmitted to a U.L. listed Central Receiving Station, that also is maintained in accord with the requirements of NFPA 71. Connect system to transmit signals as required by local codes.

d. As a part of this contract, the services of a Central Receiving Station shall be engaged for a period of one year from the date of substantial completion, this date as defined elsewhere in these documents. The Central Receiving Station facility selected shall be in full compliance with NFPA and other applicable requirements. The Contractor shall initiate this service, provided on a contract basis, and shall include any costs associated with this provision in his bid. The actual beginning date of the contract with the central receiving station may be adjusted at the discretion of the Engineer, but in no case shall be for less than one year. The contractor shall notify the owner in writing by certified mail that this service has been contracted for and explain the provisions of this service adequately. A copy of this communication and the return receipt shall be forwarded to the Architect and the Engineer.

(13)REMOTE POWER SUPPLY UNITS FOR PERIPHERAL

a. Provide remote power supply(ies) as required for proper system operation.

b. Remote power supplies shall be provided with local intelligence compatible with the digital multiplex network, so they have a unique address, providing the ability to monitor the supply for loss of power, shorts, grounds and other supervisory functions.

c. Where required by the fire alarm system manufacturer, remote power supplies shall be provided that will provide sufficient current to drive audio/visual or other required devices.

d. These units shall be located in electrical closets, mechanical rooms or similar spaces. They shall not be installed in finished areas, storage rooms, etc., without the permission of the Engineer. All locations shall be indicated on the shop drawing submissions.

e. Provide dedicated 120 volt power circuit(s) from nearby panelboards as required, whether indicated on the plans or not.

K. INSTALLATION

(1) Provide and install the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations. All wiring shall be in a completely separate conduit system from power wiring or other raceway systems. Minimum conduit size shall be 3/4" trade size. Maximum wire fill shall be 40%, for any raceway system.

(2) All junction boxes shall have coverplates painted red and labeled "Fire Alarm". A consistent wiring color code shall be maintained throughout the installation. The number of wiring splices shall be minimized throughout. Excessive wire splicing (as determined by the Engineer), shall be cause for rejection of the work.

(3) All circuit breakers and disconnects serving fire alarm equipment shall be marked in red and clearly labeled as Fire Alarm Circuits.

(4) Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate tradesmen or other contractors.

(5) The Contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of installation.

(6) The manufacturer's authorized representative shall provide on-site supervision of installation, and shall perform the initial "power-up" of the system after he has thoroughly checked the installation.

(7) Operation and maintenance manuals submitted for this project shall list names, license numbers, and telephone numbers of at least two installers that are employed full time by the supplier/manufacturer to install and test fire alarm systems in the installation location.

A floor plan drawing indicating fire alarm devices and wiring only, shall be provided by the manufacturing company for job site use. These drawings shall be approved by the State Fire

Marshal's Office or Local Authority Having Jurisdiction, as appropriate and in accord with code requirements. A copy of this drawing shall be submitted to the Engineer for his review, approval and project records.

L. TESTING

(1) The completed fire alarm system shall be fully tested in accordance with NFPA-72H by the contractor in the presence of the Owner's representative and the Local Fire Marshal. Upon completion of a successful test, the Contractor shall certify the test results in writing to the Fire Marshal, Owner, General Contractor, Architect and Engineer. Provide one week's written advance notice of the test to all concerned parties.

(2) All auxiliary devices the fire alarm system is connected to, including tamper switches, flow switches, elevator controls, remote receiving stations, etc., shall be fully tested for proper operation where interfacing with the fire alarm system.

(3) The Contractor shall provide a minimum of three hours of instructional time to the Owner in the operation and maintenance of all equipment and components. A receipt shall be obtained from the Owner that this has been accomplished, and a copy forwarded to the Engineer. Provide additional training time if required by the Owner at no charge to the contract or as direct charge to the Owner.

M. WARRANTY

(1) The Contractor shall unconditionally guarantee (except for vandalism or misuse) the completed fire alarm system wiring and equipment to be free from inherent mechanical, software and electrical defects for a period of one year from the date of substantial completion.

(2) The equipment manufacturer shall make available to the Owner a maintenance contract proposal to provide a minimum of two inspections and tests per year in compliance with NFPA-72H guidelines.

END OF SECTION 283100

SECTION 31 1000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Protection of existing trees.
2. Clearing and grubbing.
3. Removal of trees and other vegetation.
4. Topsoil stripping.

1.3 DEFINITIONS

A. Remove: Remove and legally dispose of items indicated. Removal includes digging out and off-site disposing of stumps and roots or burning if allowed by local ordinance

B. Tree Protection Zone: The area surrounding individual trees or groups of trees to be protected during construction and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

C. Topsoil: Friable, clay loam surface soil, found in varying depths.

1.4 MATERIALS OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees, plantings and other improvements adjoining the construction that might be misconstrued as damage caused by the Work.

1.6 PROJECT CONDITIONS

A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.

1. Protect existing improvements on adjoining properties and on Owner's property.
2. Restore existing improvements damaged by clearing operations to their original condition.

C. The conditions existing at the time of inspection for bidding purposes will be maintained by the Owner to the extent practical. However, minor variations may occur due to natural occurrences prior to the start of clearing work.

D. Do not commence site-clearing operations until erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 TREE PROTECTION FENCING

A. Tree protection fencing shall conform to standard and specification 3.38-2 (plastic fence) of the Virginia Erosion and Sediment Control Handbook.

PART 3 – EXECUTION

3.1 PROTECTION OF EXISTING TREES AND VEGETATION

A. Install tree protection fencing as indicated. Erect and maintain a temporary fence around the drip line of individual trees or around the perimeter drip line of groups of trees to remain.

1. Do not store construction materials, debris, topsoil or other excavated material within the tree protection zone.
2. Do not permit vehicles or other equipment within the tree protection zone.
3. Maintain tree protection zones free of weeds and trash.

B. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark,

smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line.

C. Provide protection for roots over 1-1/2inch diameter that are cut during construction operations. Coat cut faces with acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

D. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to Landscape Architect.

3.2 SITE CLEARING

A. General: Remove trees, shrubs, grass and other vegetation as required to permit installation of the Work. Cut minor roots and branches of trees indicated to remain in a clean and careful manner, where such roots and branches obstruct installation of the Work.

B. Clearing and Grubbing: Clear site of trees, shrubs and other vegetation within the clearing limits indicated.

1. Completely remove stumps, roots, and other debris.
2. Use only hand methods for grubbing inside drip line of trees indicated to remain.
3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact to a density equal to adjacent original ground.

C. Selective Clearing: Clear areas designated as “Selective Clearing” of all ground covers, underbrush and trees less than 6-inches in diameter at breast height. Coordinate extent of material removed with Landscape Architect.

1. Remove trees that appear to be dying or weakening for any reason and at any point during construction up to and including Substantial Completion at the Landscape Architect’s direction.

3.3 TOPSOIL STRIPPING

A. Remove heavy growths of grass from areas before stripping.

B. Strip topsoil to whatever depths are encountered, but to a minimum of at least 4 inches.

C. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other material.

1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.

D. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.

E. Temporarily stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion.

1. Do not stockpile topsoil within tree protection zones.
2. Stockpile surplus topsoil to allow for respreading deeper topsoil.

F. Dispose of unsuitable or excess topsoil in a legal manner off-site.

3.4 DISPOSAL OF WASTE MATERIALS

A. Burning on Owner's Property: Burning is not permitted.

B. Removal from Owner's Property: Remove waste materials generated by clearing operations from Owner's property and dispose of in a legal manner off-site at the contractors expense.

1. Remove waste materials and debris from the site in a manner to prevent spillage. Pavements and the area adjacent to the site shall remain free from mud, dirt and debris at all times.
2. Clean up debris resulting from site clearing operations continuously with the progress of the work.

END OF SECTION 31 1000

SECTION 31 2000 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

B. Refer to Section 31 1000 for topsoil stripping and Section 32 9200 for topsoil placement.

1.2 SUMMARY

A. This Section includes the following:

1. Excavation, filling, backfilling, and grading indicated and necessary for proper completion of the work.

2. Preparing of subgrade for building slabs, walks, and pavements.

3. Drainage/porous fill course for support of building slabs.

4. Excavating and backfilling of trenches.

5. Excavating and backfilling for underground mechanical and electrical utilities and buried mechanical and electrical appurtenances.

1.3 SUBMITTALS

A. VDOT approved Job Mix for stone.

B. Imported fill (if required): Submit location of borrow pit and a sample of the soil for approval to the Owner's Geotechnical Engineer a minimum of fourteen (14) working days prior to use

C. Geotextile Fabric

D. Copy of Blasting Permit, approved by authorities having jurisdiction, for record purposes.

1.4 DEFINITIONS

A. Excavation: Removal of all material encountered to design subgrade elevations indicated for cut areas and to subsoil elevations in fill areas. Excavation also includes subsequent respreading, moisture conditioning, compaction, and grading of satisfactory materials removed.

B. Unauthorized Excavation: Removal of materials beyond the limits indicated in the definition of "Excavation" without specific direction of Architect.

C. Additional Excavation: Removal, disposal and replacement of materials beyond the limits indicated in the definition of "Excavation" at the direction of the Architect. Refer to Part 3 of this Section for requirements of Additional Excavation.

D. Subgrade: The undisturbed earth (in cut) or the compacted soil layer (in fill) immediately below granular subbase, drainage fill, or topsoil materials.

E. Subsoil: The undisturbed earth immediately below the existing topsoil layer.

F. Building Pad: The area extending 10 feet beyond the exterior limits of the building/column footings and down to undisturbed soils at a one horizontal to one vertical slope.

G. Structures: The area extending a minimum of ten (10) feet beyond the edge of foundations, slabs, curbs, underground tanks, piping or other man-made stationary features occurring above or below ground surface.

H. Pavements: The area extending 10 feet beyond the exterior limits of paved areas and down to undisturbed soils at a one horizontal to one vertical slope. The area extending 3 feet beyond the exterior limits of walks and down to undisturbed soils at a one horizontal to one vertical slope

I. Subbase Material: Artificially graded mixture of crushed gravel or crushed stone meeting VDOT specifications. Material type is indicated on the drawings.

J. Drainage/Porous Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel meeting the requirements of VDOT No. 57 Stone.

K. Rock: Hard bed rock, boulders or similar material requiring the use of rock drills and/or explosives for removal. The criteria for classification of general excavation as rock is any material which cannot be dislodged by a Caterpillar D-8 Tractor, or equivalent, equipped with a single tooth hydraulically operated power ripper. The criteria for trench rock shall be that a Caterpillar 345 Backhoe, or equivalent, with a proper width bucket cannot remove the material.

1.5 ADDITIONAL WORK

A. This Project is Unclassified.

B. The risks of concealed, unknown, or unanticipated subsurface conditions from existing ground surface to the design subgrade elevations in cut areas and to subsoil elevations in fill areas shall be included in the Contract Amount and shall not be considered as grounds for additional costs to the Contract.

C. The risks of concealed, unknown, or unanticipated subsurface conditions below the elevations stated above identified as additional excavation shall also be included in the Base Bid Contract amount and shall not be considered as grounds for additional cost to the Contract. The work includes the establishment of acceptable bearing conditions in both cut and fill situations.

D. Rock Excavation: Any required rock excavation shall be included in the Base Bid Contract amount and shall not be considered as grounds for additional costs to the Contract.

E. Time extensions will not be granted for Additional Excavation or Rock Excavation.

1.6 EARTHWORK BALANCE ADJUSTMENTS

A. Adjustments of grades may be allowed with prior written approval of the Architect in order to accommodate shortfall or surplus of material that may occur. Should adjustments be allowed, maintenance of designed drainage patterns and required adjustments to drainage structures shall be a Contract responsibility. **No additional payment will be made for these adjustments**.

B. Any surplus material remaining shall be removed from the site and disposed of in a legal manner as a contract responsibility. Importation of any required material shall be a contract responsibility. **No additional payment will be made for either required import or export of materials**.

1.7 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.

B. Environmental Compliance:

1. Comply with the requirements of the latest edition of the Virginia Erosion and Sediment Control Handbook for erosion control during earthwork operations.

2. Comply with the permit conditions for all work performed within wetlands.

C. Testing and Inspection Service: Owner will employ and pay for an independent Geotechnical testing and inspection laboratory to perform soil testing and inspection service during earthwork operations. Cooperate with Owner's Geotechnical Engineer as required for testing and inspection of work. These services do not relieve the responsibility for compliance with Contract Document requirements.

1.8 PROJECT CONDITIONS

A. Bidders and interested parties (prior to receipt of bids) are encouraged to conduct their own soil and subsurface investigations, examinations, tests, and exploratory borings to determine the nature of the soil conditions underlying the project site. Contact the Owner's office to make an appointment to enter the site for the purpose of conducting your own investigation prior to bid.

B. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner of others except when permitted under the following conditions and then only after arranging to provide acceptable temporary utility services.

1. Notify Architect not less than 48 hours in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without receiving Architect's written permission.

3. Existing utilities across or along the line of work are indicated only in an approximate location. Locate all underground lines and structures. Call "Miss Utility" at 1-800-552-7001 prior to construction. If utilities are marked that are not shown on the plans, locate utility vertically and horizontally and provide information to architect. Repair and correct any damage to underground lines and structures.

1.9 SAFETY

A. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

1. Operate warning lights as recommended by authorities having jurisdiction and governing regulations and standards.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Work within the road right-of-way shall meet all requirements of the latest edition of the Virginia Department of Transportation Work Area Protection Manual.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups CL, GC, SC, GW, GP, GM, SM, SW, and SP.

B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups CH, OL, OH, MH, ML and PT.

C. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 4 inches in any dimension (2 inches for material used in trench backfill), debris, waste, frozen materials, organics, vegetation and other deleterious matter.

D. Imported material for structural fill shall comply with ASTM D2487 soil classification groups CL, ML, SC, SM, SP, SW, GC, GM, GP, or GW.

2.2 ACCESSORIES

A. Non-woven Geotextile Fabric (for drainage): Mirafi 140N, SRW NM 4.5, Nilex 4546, or equivalent.

B. Woven Geotextile Fabric (for reinforcement): Mirafi 600X, Nilex BX 2020 Geogrid, Terra Tex, or equivalent.

PART 3 – EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Section 02230 "Site Clearing."

C. Protect and maintain erosion and sedimentation controls during earthwork operations.

3.2 DEWATERING

A. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrade and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collecting or runoff areas. Do not use utility trench excavations as temporary drainage ditches.

B. Should any springs or running water be encountered in the excavation, notify the Architect and provide discharge by trenches (or other acceptable means) and drain to an appropriate point of disposal. Provide temporary drainage facilities to minimize the flow of rainwater onto adjacent property. Repair any damage to property or to subgrade as a result of construction and/or dewatering (or lack thereof) operations at no additional cost to the Contract. If permanent provision must be made for disposal of water other than as indicated, the Contract price shall be adjusted.

C. Soils encountered may require disking, scarifying, moisture conditioning, harrowing, pulverizing or other special or careful handling when utilized as fill. No additional payment will be made for these operations.

3.3 EXPLOSIVES

A. Blasting may be done only if authorized by the Owner and local authorities having jurisdiction. When explosives are used, experienced powdermen or persons who are licensed or otherwise authorized to use explosives shall execute the work. Explosives shall be stored, handled, and used in accordance with local regulations and with the "Manual of Accident Prevention in Construction" of the Associated General Contractor of America, Inc. Correct any damage to foundations or other work caused by use of explosives. Meeting the requirements of the blasting permit, if issued, is a Contract responsibility.

1. Pre-blast inspections are required in accordance with all prevailing jurisdictional guidelines. These inspections and associated costs are the sole responsibility of the Contractor. Any damage resulting from blasting operations to onsite or offsite structures and appurtenances and costs associated therewith are the sole responsibility of the Contractor. Blasting operations in the vicinity of existing structures and new and/or in-progress construction shall also be performed in accordance with the constraints of the most recent edition of the Virginia Statewide Fire Prevention Code, NFPA 495 and/or local ordinances as applicable.

3.4 EXCAVATION

A. Excavation consists of removal, placement and disposal of material encountered when establishing required subgrade or finish grade elevations.

1. Excavation includes removal and disposal of pavements and other obstructions visible on ground surface; underground structures, utilities and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.

B. Rock Excavation:

1. If rock is encountered in grading, remove to depths as follows:

a) Under surfaced areas, to 6" under the respective subgrade for such areas.

b) Under grass and planted areas - 12" below finished grade.

c) Under footings – Two feet below bottom of footing, One foot outside of perimeter of footing.

d) Under trenches – 6" below bottom of trench.

3.5 EXCAVATION FOR BUILDING PAD AND STRUCTURES

A. Conform to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction and for review.

B. Excavations for footings and foundations: Do not disturb bottoms of excavation. Excavate by hand to elevations required just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

1. Where rock is encountered, carry excavation to required elevations and backfill with crushed stone prior to installation of footing.

C. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Structures: Conform to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot plus a sufficient distance to permit placing and removal of concrete formwork, installation of services, other construction and for review. Do not disturb bottom of excavations intended for bearing surface.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Cut surface under pavements to comply with cross-sections, elevations and grades as indicated.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.

B. Excavate trenches to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

1. Where rock is encountered, carry excavation to required elevations and backfill with VDOT #57 crushed stone prior to installation of pipe.

2. For pipes or conduit less than 6 inches in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.

3. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 1/4 of the circumference). Fill depressions with tamped sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads ensure continuous bearing of pipe barrel on bearing surface.

3.8 EXCAVATION STABILITY

A. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

B. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

3.9 SUBGRADE INSPECTION

A. Notify Architect when mass, trench and footing excavations have reached required subgrade. The Architect will arrange for an inspection of conditions by the Owner's Geotechnical Engineer. *Alternative procedures for arranging this review may be implemented at the Owner's written option*.

B. If the Owner's Geotechnical Engineer determines that the subgrade bearing conditions are unacceptable, the Architect will authorize additional excavation until suitable bearing conditions are encountered.

C. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.

2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.

3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Under supervision of the Owner's Geotechnical Engineer, proofroll subgrade in cut areas below the building pad and pavement(s) with a loaded dump truck or other approved pneumatic tired vehicle. Should any unstable sub-soil be encountered below pavement or structures, break up the top eight inches of ground surface, pulverize, moisture-condition to optimum moisture content,

and compact to percentage of maximum density as stated in Percentage of Maximum Density Requirements. Perform this work at no additional cost and/or time to the Contract.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.10 ADDITIONAL EXCAVATION

A. Additional Excavation (Mass): Remove excavated materials and dispose of off-site . Replace this excavated material with satisfactory material placed and compacted according to the requirements of the "Placement and Compaction" section.

B. Additional Excavation in Trenches: Remove excavated materials and dispose of off-site. Replace this excavated material with stone.

C. Additional Excavation in Footings: Remove excavated materials and dispose of off-site. Replace this excavated material with lean concrete/flowable fill or with stone extending 12 inches laterally beyond the footing in all directions.

D. The quantity of material removed as Additional Excavation (Mass, Trench or Footing) shall be calculated (on an in-situ basis) by a surveyor licensed in the Commonwealth of Virginia and employed by the Contractor. The Owner's Project Representative shall review the quantity calculated within 48 hours of receiving the survey notes.

E. Protect the subgrade during construction. During wet conditions, the subgrade soils may become saturated and soften, possibly resulting in damage to the subgrade if disturbed by equipment. Correct subgrade damaged in this manner. **No additional payment will be made to correct subgrade damaged in this manner**.

3.11 UNAUTHORIZED EXCAVATION

A. Correct Unauthorized Excavation as follows:

1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to Architect.

2. Elsewhere, backfill and compact unauthorized excavations as indicated for authorized excavations of same classification unless otherwise directed by Architect.

3.12 STORAGE OF EXCAVATED MATERIALS

A. Temporarily stockpile excavated materials acceptable for use as backfill and fill. Place, grade, and shape stockpiles for proper drainage. Cover to prevent windblown dust.

1. Stockpile excavated materials away from edge of excavations. Do not store within the drip line of trees to remain.

3.13 BACKFILL AND FILL

A. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance by local authority having jurisdiction of construction below finished grade, including perimeter insulation.
2. Review, approval, and recording of the locations of underground utilities.
3. Removal of concrete formwork.
4. Removal of shoring and bracing (including backfilling of voids with satisfactory materials).
5. Removal of trash and debris from excavation.
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow or ice.

C. Ground Surface Preparation: Remove vegetation, debris, obstructions, and deleterious materials from ground surface prior to placement of fills.

D. Bench sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material. Plow, scarify, bench or break up sloped surfaces flatter than 1 vertical to 4 horizontal so fill material will bond with existing material.

E. Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials indicated in Part 2 of this Section.

1. Under grassed areas, use satisfactory excavated or borrow material.
2. Under walks, curbs, and pavements, use satisfactory excavated or borrow material.
3. Under building slabs, use satisfactory excavated or borrow materials and drainage/porous fill material as indicated.

3.14 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.

D. Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

E. Place and compact initial backfill of **satisfactory soil**, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the utility pipe or conduit.

G. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

H. Place and compact final backfill of satisfactory soil to final subgrade elevation.

I. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

J. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

K. Do not backfill trenches until any required testing and inspections have been completed and Architect authorizes backfilling. Backfill carefully to avoid damage or displacement of pipe systems.

L. Under piping and conduit and equipment, use crushed stone where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.

M. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

3.15 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percentage points of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percentage points and is too wet to compact to specified dry unit weight.

B. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations. Maintain the moisture content of the structural fill materials to within 3 percentage points of the optimum moisture content until permanently covered.

C. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to required density.

1. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

2. Work wet materials as directed by the Owner's Geotechnical Engineer. Base bids on working material daily for a maximum of five days of acceptable weather.

3. No additional payment will be made for these operations.

4. Time extensions will not be granted for working wet material on site.

3.16 COMPACTION OF SOIL BACKFILL AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

C. Control soil and fill compaction, providing minimum percentage of density indicated for each area classification indicated below. Correct improperly compacted areas or lifts as directed by Architect if soil density tests indicate inadequate compaction.

D. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density at a moisture content within 3 percentage points of optimum in accordance with ASTM D698:

1. Under structures, building pad and pavements, compact each layer of backfill or fill material at 95 percent maximum density. This includes ground under future expansion areas.

2. Under grass or unpaved areas, compact each layer of backfill or fill material at 90 percent maximum density.

E. Seal all fill areas at the end of each working day, utilizing a smooth drum roller.

3.17 GRADING

A. General: Rough grading of areas within the Project, including cut and fill sections and adjacent transition areas, shall be reasonably smooth, compacted and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from either blade-grader or motor patrol except as otherwise indicated. The finished subgrade surface from the grassed areas generally shall be not more than 0.2 feet above or below the final grade or approved cross section, with due allowance for topsoil.

B. The tolerance for areas within 10 feet of building perimeter, walks and all areas to be paved shall not exceed 0.10 feet above or below the established subgrade. Finish all ditches, swales and gutters to drain readily. Unless otherwise indicated, evenly slope the subgrade to provide drainage away from building walls in all directions at a grade not less than ¼ inch per foot. Provide rounding at top and bottom of cut and fill slopes and at other breaks in grade.

C. Protection of Graded Areas: Protect newly graded areas and areas of cut, fill and design/subgrade elevations from the actions of the elements and from deterioration as a result of construction operations and weather conditions (frost, rains, snow, sleet, hail, etc.). Repair any settlement or washing that occurs prior to or after acceptance of the work. Fill to required subgrade levels any areas where settlement occurs. Protect trees to remain, and, at all areas of the Site where construction operations are in progress, provide protection for the safety of occupants of the existing facilities.

D. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.

2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

E. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus, or minus **1 inch.**

2. Walks: Plus, or minus **1 inch**.

3. Pavements: Plus, or minus **1/2 inch.**

F. Grading inside Building Lines: Finish subgrade to a tolerance of **1/2 inch** when tested with a 10-foot straightedge.

3.18 PAVEMENT SUBBASE COURSE:

A. General: Place subbase material, in layers of indicated thickness, over subgrade surface to support a pavement base course.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least at 12” width of shoulder simultaneously with compacting and rolling each layer of subbase course.

D. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

E. When a compacted subbase course is 6” thick or less, place material in a single layer. When more than 6” thick, place material in equal layers, except no single layer more than 6” or less than 3” in thickness when compacted.

F. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

G. On prepared subgrade, place subbase and base course under pavements and walks as follows:

1. Place base course material over subbase course under hot-mix asphalt pavement.

2. Shape subbase and base course to required crown elevations and cross-slope grades.

3. Place subbase and base course 6 inches or less in compacted thickness in a single layer.

4. Place subbase and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.

5. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

H. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.19 BUILDING SLAB DRAINAGE COURSE

A. General: Place drainage/porous fill material, over subgrade surface to support concrete building slabs and sidewalks areas indicated.

B. Place drainage course on subgrades free of mud, frost, snow, or ice.

C. Placing: Place drainage/porous fill material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.

D. When a compacted drainage course is indicated to be 6 inches thick or less, place material in a single layer. When indicated to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

3.20 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.

1. If in the opinion of the Architect, based on testing service reports and inspection, subgrade or fills have been placed that are below required density, perform additional compaction and testing until required density is obtained.

B. The Owner will engage, and pay for, the services of a Geotechnical Engineer whose function shall be to afford complete engineering control by testing of the conditions of all footing subgrades, the placement of all structural fills under structures, building pad and pavement areas, and all compaction where required, and to observe the proof rolling of the building pad and pavement areas.

C. The Owner's Geotechnical Engineer will be present as deemed necessary during all phases of the Work requiring filling, compaction operations or testing. The Geotechnical Engineer will provide the Architect with written certification that fill and compaction was completed with accepted materials in accordance with the Documents, and give a professional opinion regarding shrinkage or settlement of fill and safe load bearing capacity of fill.

D. Site Preparation and Proofrolling: The Owner's Geotechnical Engineer will determine if any additional excavation or in-place densification is necessary to prepare a subgrade for fill placement for slab or pavement support.

E. Fill Placement and Compaction: The Owner's Geotechnical Engineer will witness all fill operations and take sufficient in-place density tests to verify that the indicated degree of fill compaction is

achieved. The Owner's Geotechnical Engineer will observe and approve borrow materials used and shall determine if their existing moisture contents are suitable/acceptable.

F. Footing Excavation Review: The Owner's Geotechnical Engineer will review the footing excavations for the building foundations. He will verify that the design bearing pressures are available and that no loose or soft areas exist beneath the bearing surfaces of the footing excavations.

G. The Owner's Geotechnical Engineer will submit two (2) copies each of his reports, recommendations and/or opinions to the Architect/Engineer and the Owner. Pertinent information will be provided to the Contractor as required.

3.21 EROSION CONTROL:

A. Provide erosion control methods in accordance with requirements of authorities having jurisdiction, the Virginia Erosion and Sediment Control Handbook, and as indicated in the Contract Documents.

3.22 PROTECTION

A. Repair and reestablish grades in settled, eroded, and rutted areas to indicated tolerances.

B. Reconditioning Compacted Areas: Where subsequent construction operations or adverse weather disturbs completed compacted areas, scarify surface, reshape, and compact to required density prior to further construction.

C. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

D. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

E.

3.23 DISPOSAL OF WASTE MATERIALS

A. Removal from Owner's Property: Remove excess and/or waste materials, including trash and debris, and dispose of it off Owner's property in a legal manner.

B. Dispose of excess material and materials not acceptable for use as backfill or fill legally offsite.

C. Do not remove topsoil from site until it has been demonstrated to the Owner's satisfaction that it is excess.

END OF SECTION 31 2000

SECTION 313116 - TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section includes soil treatment for termite control.

1.3 SUBMITTALS

A. Product data and application instructions.

B. Certification that products used comply with U.S. Environmental Protection Agency (EPA) regulations for termiticides.

1.4 QUALITY ASSURANCE

A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for preparing substrate and application.

B. Engage a professional pest control operator who is licensed according to regulations of governing authorities to apply soil treatment solution.

C. Use only termiticides that bear a federal registration number of the EPA and are approved by local authorities having jurisdiction.

1.5 JOB CONDITIONS

A. Restrictions: Do not apply soil treatment solution until excavating, filling, and grading operations are completed, except as otherwise required in construction operations.

B. To ensure penetration, do not apply soil treatment to frozen or excessively wet soils or during inclement weather. Comply with handling and application instructions of the soil toxicant manufacturer.

1.6 WARRANTY

C. Warranty: Furnish written warranty, executed by Applicator and Contractor, certifying that applied soil termiticide treatment will prevent infestation of subterranean termites. If subterranean termite activity is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

D. Warranty Period: 5 years from date of Substantial Completion. Also, include a renewable warranty for the Owner's future consideration.

E. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT SOLUTION:

A. Use an emusible concentrate insecticide for dilution with water, specially formulated to prevent infestation by termites. Fuel oil will not be permitted as a diluent. Provide a working solution of one of the following chemical elements and concentrations:

1. Cypermethrin (Demon TC) 0.5% in water emulsion.

B. Other solutions may be used as recommended by Applicator and if acceptable to local governing authorities. Use only soil treatment solutions that are not injurious to planting.

PART 3 - EXECUTION

3.1 APPLICATION

A. Surface Preparation: Remove foreign matter that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and foundations. Toxicants may be applied before placing compacted fill under slabs if recommended by toxicant manufacturer.

B. Application Rates: Apply soil treatment solution as follows:

1. Under slab-on-grade structures, treat soil before concrete slabs are placed, using the following application rates:
   a) Apply 4 gallons of chemical solution per 10 linear feet (5.1 L of chemical solution per meter) to soil in critical areas under slab, including entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers.

b) Apply 1 gallon of chemical solution per 10 sq. ft. (4.1 L of chemical solution per sq. m) as an overall treatment under slab and attached slab areas where fill is soil or unwashed gravel. Apply 1-1/2 gallon of chemical solution per 10 sq. ft. (6.1 L of chemical solution per sq. m) to areas where fill is washed gravel or other coarse absorbent material.

c) Apply 4 gallons of chemical solution per 10 linear feet (5.1 L of chemical solution per meter) of trench for each 12 inches (300 mm) of depth from grade to footing, along outside edge of building. Dig a trench 6 to 8 inches (150 to 200 mm) wide along outside of foundation to a depth of not less than 12 inches (300 mm). Punch holes to top of footing at not more than 12 inches (300 mm) o.c. and apply chemical solution. Mix chemical solution with the soil as it is being replaced in the trench.

2. Under crawlspace and basement structures, treat soil along exterior and interior walls of foundations with shallow footings as specified above for exterior of slab-on-grade structures.
3. Treat soil under or around crawlspace structures as follows:
   a) Apply 4 gallons of chemical solution per 10 linear feet (5.1 L of chemical solution per meter) of trench along inside of foundation walls, along both sides of interior partitions, and around piers and plumbing. Do not apply an overall treatment in crawlspaces.
   b) Apply 4 gallons of chemical solution per 10 linear feet (5.1 L of chemical solution per meter) of trench, for each 12 inches (300 mm) of depth from grade to footing, along outside of foundation walls, including part beneath entrance platform porches, etc.
   c) Apply 4 gallons of chemical solution per 10 linear feet (5.1 L of chemical solution per meter) along the inside and outside of foundation walls of porches.
   d) Apply 1 gallon of chemical solution per 10 sq. ft. (4.1 L of chemical solution per sq. m) of soil surface as an overall treatment only where attached concrete platform and porches are on fill or ground.
4. At hollow masonry foundations or grade beams, treat voids at rate of 2 gallons per 10 linear feet 2.6 L per meter, poured directly into the hollow spaces.
5. At expansion joints, control joints, and areas where slabs will be penetrated, apply at rate of 4 gallons per 10 linear feet (5.1 L per linear m) of penetration.

B. Post signs in areas of application to warn workers that soil termiticide treatment has been applied. Remove signs after areas are covered by other construction.

C. Reapply soil treatment solution to areas disturbed by subsequent excavation, landscape grading, or other construction activities following application.

D. Allow not less than 12 hours drying time after application before beginningconcrete placement or other construction activities.

END OF SECTION 313116

SECTION 32 1216 - ASPHALT PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hot-mix asphalt paving over prepared subbase.
2. Hot –mix asphalt patching.
3. Hot-mix asphalt overlays.
4. Asphalt surface treatments
   a) Coal tar sealant

1.3 SUBMITTALS

A. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

B. Material Certification: Certification signed by Contractor certifying that each material complies with requirements.

C. Traffic maintenance and Work Area Protection Plan: Submit a plan indicating sequencing and measures to be used for the maintenance and protection of traffic during operations within or immediately adjacent to existing roadways open to vehicular traffic. The Enginer and the Virginia Department of Transportation must approve this plan prior to commencement of work within the Right-of-Way.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Asphalt paving materials and installation shall conform to the requirements of the latest edition of the Virginia Department of Transportation (VDOT) Road and Bridge Specifications and Road and Bridge Standards.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:

1. Prime and Tack Coats: Minimum ambient temperature of 50 deg F (10 deg C), and when temperature has not been below 35 deg F (1 deg C) for 12 hours immediately prior to application.
2. Asphalt Base Course: Minimum surface temperature of 40 deg F (4 deg C) and rising at time of placement.
3. Asphalt Surface Course: Minimum surface temperature of 40 deg F (4 deg C) and rising at time of placement.

1.6 TESTING AND INSPECTION

A. Within the road Right-of-Way and in the bus loop, VDOT inspectors shall observe the asphalt placement. Coordinate the necessary inspection schedule with the local Residency.

B. The Owner's testing agency will observe the asphalt placement in the parking lots and on-site areas not in Right-of-Way.

PART 2 - PRODUCTS

2.1 ASPHALT-AGGREGATE MIXTURE

A. General: Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with the requirements of the VDOT Road and Bridge Specifications and as recommended by local paving authorities to suit project conditions.

2.2 ASPHALT MATERIALS

A. Tack Coat: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.

B. Prime Coat: Asphalt emulsion prime conforming to VDOT requirements.

2.3 AUXILIARY MATERIALS

A. Paving Geotextile: Nonwoven polypropylene, specifically designed for paving applications, resistant to chemical attack, rot, and mildew.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.

B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.

C. Notify Enginer in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected.

3.2 MAINTENANCE AND PROTECTION OF TRAFFIC

A. Utilize flagmen, barricades, warning signs and warning lights as required by the Virginia Work Area Protection Manual.

3.3 PATCHING AND REPAIRS

A. Patching: Saw cut perimeter of patch and excavate existing pavement section to sound base. Recompact new subgrade. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically.

1. Tack coat faces of excavation and allow to cure before paving.
2. Fill excavation with dense-graded, hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.

B. Leveling Course: Install and compact leveling course consisting of dense-graded, hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches (75 mm) thick.

C. Crack and Joint Filling: Remove existing filler material from cracks or joints to a depth of 1/4 inch (6 mm). Refill with asphalt joint-filling material to restore watertight condition. Remove excess filler that has accumulated near cracks or joints.

D. Tack Coat: Apply uniformly to existing surfaces of previously constructed asphalt or Portland cement concrete paving and to surfaces abutting or projecting into new, hot-mix asphalt pavement. Apply at a uniform rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m) of surface.

1. Allow tack coat to cure undisturbed before paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillage and clean affected surfaces.

3.4 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

C. Prime Coat: For asphalt sections less than 4" thick, apply uniformly over surface of compacted-aggregate base at a rate of 0.15 to 0.50 gal./sq. yd. (0.7 to 2.3 L/sq. m). Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure for 24 hours minimum.

1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use just enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
2. Protect primed substrate from damage until ready to receive paving.

3.5 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt mix on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness, when compacted.

1. Place hot-mix asphalt base course in number of lifts and thickness indicated.
2. Spread mix at minimum temperature of 225 deg F (107 deg C).

B. Place paving in consecutive strips not less than 10 feet (3 m) wide, except where infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete asphalt base course for a section before placing intermediate or surface courses.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

A. Construct joints between old and new pavement, or between successive days work, to ensure continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat.
2. Offset longitudinal joints in successive courses a minimum of 6 inches (150 mm).
3. Offset transverse joints in successive courses a minimum of 24 inches (600 mm).
4. Construct transverse joints as required by the VDOT Road and Bridge Specifications.
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.

3.7 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

B. Breakdown Rolling: Accomplish breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Repair surfaces by loosening displaced material, filling with hot-mix asphalt, and rerolling to required elevations.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling, while hot-mix asphalt is still hot enough to achieve indicated density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 95 percent of reference laboratory density according to ASTM D 1559.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm. Surface course average density shall be 95 percent of reference laboratory density.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while still hot, with back of rake or smooth iron. Compact thoroughly using tamper or other satisfactory method. Edges adjacent to curbs and curb and gutter sections shall be flush with the edge of concrete.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials. Remove paving course over area affected and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch (13 mm).
2. Surface Course: Plus 1/4 inch (6 mm), no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch (6 mm).
2. Surface Course: 3/16 inch (3 mm).

3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

C. Check surface areas at intervals as directed by Enginer.

3.9 FIELD QUALITY CONTROL

A. Within the VDOT Right-of-Way and in the bus loop, coordinate required inspections with the local Residency of the Virginia Department of Transportation.

B. Testing Agency: Owner will engage a qualified independent testing agency to perform field inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with requirements.

D. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with requirements.

END OF SECTION 32 1216

SECTION 32 1313 - SITE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 DESCRIPTION OF WORK:

A. Extent of Portland cement concrete paving is shown on drawings, including:

1. Walkways and Stairs

1.3 SUBMITTALS

A. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

B. Material Certification: Certification signed by Contractor certifying that each material complies with requirements.

C. Concrete scoring plan. (unless shown in the drawings)

1.4 JOB CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

1. Use flexible spring steel forms or laminated boards to form radius bends as required.
2. Coat forms with a nonstaining form release agent that will not discolor or deface surface of concrete.

B. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185.

C. Reinforcing Steel: ASTM A 615, Grade 60, deformed

D. Concrete Materials: Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.

E. Expansion Joint Materials: Comply with requirements of applicable Division 7 sections for preformed expansion joint fillers and sealers.

F. Antispalling Compound: Combination of boiled linseed oil and mineral spirits, complying with AASHTO M-233.

G. Liquid-Membrane Forming and Sealing Curing Compound: Comply with VDOT Road and Bridge Specifications.

2.2 CONCRETE MIX, DESIGN, AND TESTING

A. Comply with requirements of applicable Division 3 sections for concrete mix design, sampling and testing, and quality control or VDOT Road and Bridge Specifications whichever is more stringent.

B. Design mix to produce normal-weight concrete consisting of Portland cement, aggregate, water-reducing or high-range water-reducing admixture (superplasticizer), air-entraining admixture, and water to produce the following properties:

1. Comply with the requirements of VDOT Std. Class A3 Concrete, unless otherwise indicated.

PART 3 - EXECUTION

3.2 SURFACE PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

B. Proof-roll prepared subbase surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving,

3.3 FORM CONSTRUCTION

A. Set forms to required grades and lines, braced and secured. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances:

1. Top of forms not more than 1/8 inch in 10 feet.
2. Vertical face on longitudinal axis, not more than 1/4 inches in 10 feet.

C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.4 REINFORCEMENT

A. Locate, place and support reinforcement as specified in Division 3 sections, unless otherwise indicated.

3.5 CONCRETE PLACEMENT

A. General: Comply with requirements of applicable Division 3 sections for mixing and placing concrete or VDOT Road and Bridge Specifications whichever is more stringent.

B. Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

C. Place concrete by methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.

D. Deposit and spread concrete in a continuous operation between transverse joints as far as possible. If interrupted for more than 1/2 hour, place a construction joint.

E. Fabricated Bar Mats: Keep mats clean and free from excessive rust, and handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

F. Place concrete in 2 operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

G. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to Engineer.

H. Curbs and Gutters: Automatic machine may be used for curb and gutter placement. If machine placement is to be used, submit revised mix design and laboratory test results that meet or exceed minimums indicated. Machine placement must produce curbs and gutters to required cross-section, lines, grades, finish, and jointing as indicated for formed concrete. If results are not acceptable, remove and replace with formed concrete meeting requirements.

3.6 JOINTS

A. General: Construct expansion, weakened-plane (contraction), and construction joints true to line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

B. Weakened-Plane (Contraction) Joints: Provide weakened-plane (contraction) joints, sectioning concrete into approximately 10' areas or as shown on drawings. Construct weakened-plane joints for a depth equal to at least 1/4 concrete thickness, as follows:

1. Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
2. Sawed Joints: Form weakened-plane joints with powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.

C. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for more than 1/2 hour, except where such placements terminate at expansion joints.

1. Construct joints as indicated or, if not indicated, use standard metal keyway-section forms.

D. Expansion Joints: Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks, and other fixed objects, unless otherwise indicated.

E. Locate expansion joints at 50 feet o.c. for each pavement lane unless otherwise indicated.

F. Extend joint fillers full width and depth of joint, not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.

G. Provide joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.

H. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

I. Fillers and Sealants: Comply with requirements of applicable Division 7 sections for preparation of joints, materials, installation, and performance.

J. Refer to Drawings for scoring patterns for:

1. Selected sidewalk areas
2. Service Areas
3. Patios
4. Courtyard

3.7 CONCRETE FINISHING

A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 10-ft. straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

C. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2-inch radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

D. After completion of floating and when excess moisture or surface sheen has disappeared, complete troweling and finish surface as follows:

1. Broom finish by drawing a fine-hair broom across concrete surface perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Engineer.

E. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Engineer.

3.8 CURING

A. Protect and cure finished concrete paving in compliance with applicable requirements of Division 3 sections. Use membrane-forming curing and sealing compound or approved moist-curing methods.

3.9 REPAIRS AND PROTECTIONS

A. Repair or replace cracked, broken or defective concrete curbs and curb and gutter, as directed by Engineer.

B. Replace cracked, broken or defective concrete sidewalks.

C. Repair or replace cracked, broken or defective concrete pavement, as directed by Engineer.

D. Drill test cores where directed by Engineer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.

E. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

F. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just before final inspection.

END OF SECTION 32 1313

SECTION 32 9200 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Fine grading and preparing lawn areas (including courtyards)
2. Topsoil Placement
3. Soil amendments
4. Fertilizers
5. Seeding
6. Lawn Restoration

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Lawns: All areas disturbed by construction and not otherwise covered by paving, buildings or other structures.

1.4 SUBMITTALS

A. Certification by product manufacturer that the following products supplied comply with requirements:

1. Grass Seed
   a) Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
   b) Blue Tag Certification tag for each bag of seed.

B. Installers qualifications

1. Provide a list, with references, of the past three projects of a similar magnitude.

C. Topsoil Amendment Plan.

1. Provide copy of topsoil testing report.
2. List of amendments proposed for topsoil, including application rates.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer, who has successfully completed lawn establishment projects similar in size and complexity to this project. The installer's primary business (defined as a minimum of 60% of total billings) shall be establishment of lawns.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.7 COORDINATION AND SCHEDULING

A. Planting Season: Sow lawn seed during normal planting seasons for type of lawn work required.

1. Spring Planting Season: March 15 through May 15
2. Fall Planting Season: September 15 through November 15

B. Weather Limitations: Proceed with planting only when existing and forecast weather conditions are suitable for work.

C. Lawn Seeding Schedule

1. Refer to the drawings for early seeding requirements for specified lawn areas.
2. If job completion schedule does not allow seeding within a normal planting season, provide interim temporary seeding necessary to stabilize site. Complete permanent seeding during the next planting season.

1.8 LIMITS OF SEEDING

A. Spread topsoil and seed all lawn areas.

B. Hydroseed all slopes 3:1 and steeper

1.9 LIMITS OF LAWN RENOVATION

A. All existing lawn areas disturbed by construction activities.

B. The areas under the existing modular buildings removed by the Owner.

1.10 PAYMENT PROCEDURES FOR LAWNS AND GRASSES

A. Establish a line item in the Schedule of Values for Lawn Maintenance. This line item shall represent a minimum of thirty percent (30%) of the total value of the seeding for the project.

B. Lawn maintenance will be paid on a monthly basis, following the satisfactory maintenance of the lawns.

PART 2 – PRODUCTS

2.1 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1" or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
    a) Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes.

B. Have topsoil tested by a certified soil testing laboratory to determine the type and quantity of soil amendments necessary. Add amendments to topsoil as necessary to meet these requirements.

2.2 INORGANIC SOIL AMENDMENTS

A. If the topsoil analysis indicates the need for inorganic soil amendments, the following standards apply:

B. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

1. Class: Class O, with a minimum 95 percent passing through No. 8 (2.36-mm) sieve and a minimum 55 percent passing through No. 60 (0.25-mm) sieve.
2. Provide lime in form of dolomitic limestone.

C. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 (3.35-mm) sieve and a maximum 10 percent passing through No. 40 (0.425-mm) sieve.

D. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

E. Aluminum Sulfate: Commercial grade, unadulterated.

F. Perlite: Horticultural perlite, soil amendment grade.

G. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.

H. Sand: Clean, washed, natural or manufactured, free of toxic materials.

I. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

J. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.3 ORGANIC SOIL AMENDMENTS

A. If the topsoil analysis indicates the need for organic soil amendments, the following standards apply:

B. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch (19-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
3. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.
4. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
5. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.4 HERBICIDES

A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.5 FERTILIZER

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in topsoil analysis reports from a qualified soil-testing agency.
2. Minimum Composition: No less than 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

2.6 SEED

A. Grass Seed: All grass seed must be fresh, clean, and dry.

B. Seed Species

Proportion by Weight	Grass Species	Min. % Germination	Min. % Pure Seed	Max. % Weed Seed
10%	Kentucky bluegrass (Poa pratensis).	80	85	0.50
90%	Turf Type Tall Fescue (Festuca arundinacea).	85	98	0.50

C. Varieties shall be selected from the 2003-2004 list of recommended turfgrass varieties, published by Virginia Tech.

D. All seed shall be Blue Tag certified by the Oregon State Seed Laboratory. Tags must be attached to each bag delivered on site.

2.7 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Peat Mulch: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.

C. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 percent of dry weight.

D. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

2.8 EROSION-CONTROL MATERIALS

A. Erosion-Control Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, a minimum of 0.92 lb/sq. yd. (0.5 kg/sq. m), with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and for conditions affecting performance of the Work. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Protect adjacent and adjoining areas from hydroseed overspraying.

3.3 TOPSOIL PLACEMENT FOR LAWNS

A. Limit subgrade preparation to areas that will be planted in the immediate future.

B. Loosen subgrade to a minimum depth of 4 inches. Remove stones, sticks and roots larger than 2 inches in any dimension from subgrade. Completely remove trash and other extraneous debris from subgrade.

C. Have topsoil tested by a certified soil testing laboratory to determine the type and quantity of soil amendments necessary.

D. Sift topsoil to remove stones and other objects larger than 1” in any dimension. Maximum object size for topsoil shall be achieved by sifting not by hand removal or raking following placement of topsoil.

E. Mix soil amendments and fertilizers with topsoil at rates required by soil testing. Delay mixing fertilizer if planting does not follow placing of planting soil within 4 days. Either mix soil before spreading or apply soil amendments on surface of spread topsoil and mix thoroughly into top 4 inches (100 mm) of topsoil before planting.

F. Mix lime with dry soil prior to mixing fertilizer.

G. Spread topsoil to a minimum depth of six inches (6”).

3.4 SEEDING LAWNS

A. Sow seed with a spreader or a seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in 2 directions at right angles to each other.

B. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

C. Sow seed at the following rates:

1. Seeding Rate: 240 lbs./acre.

D. Rake seed lightly into top 1/4 inch of topsoil, roll lightly, and water with fine spray.

E. Hydroseed all slopes 3:1 or steeper.

F. Protect seeded areas 3:1 slope/grade or steeper against erosion by providing erosion-control blankets installed and stapled according to manufacturer's recommendations.

G. Protect seeded areas less than 3:1 slope/grade against erosion by spreading straw mulch after completion of seeding operations. Spread uniformly at a minimum rate of 2 tons per acre (45 kg per 100 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into topsoil by suitable mechanical equipment.

3.5 LAWN RENOVATION

A. Renovate existing lawn. Limits of existing lawn to be renovated are indicated on the drawings.

B. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish lawn where settlement or washouts occur or where minor regrading is required.

C. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.

D. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

E. Mow, de-thatch, core aerate, and rake existing lawn.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches of existing soil. Provide new planting soil to fill low spots and meet finish grades.

J. Apply seed and protect with straw mulch as required for new lawns.

K. Water newly planted areas and keep moist until new lawn is established.

3.6 MAINTENANCE OF NEW LAWNS

A. Begin maintenance of lawns immediately after each area is planted and continue for a period of one year after the date of Final Completion. Maintain all grassed areas as necessary to ensure a satisfactory lawn is achieved.

B. Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

1. Replant bare areas with same materials as for lawns.
2. Replace disturbed mulch.

C. Watering: Provide and maintain temporary hoses, and lawn-watering equipment to convey water from a water source to keep lawns uniformly moist to a depth of 4 inches.

1. Provide a source of water for irrigation. Utilize temporary irrigation meters, a well or water trucks as necessary for the water source.

2. Water seeded areas as necessary to promote vigorous growth of grass but at the minimum rate of 1 inch per week.

3. Water sodded areas per the requirements of the grower. Maintain moist soil to a depth of at least four inches.

D. At a minimum, the following fertilizer applications are required:

1. By November 30, 2001, apply 15-5-10 commercial fertilizer at the rate of 200 lbs. per acre over all seeded and sodded areas.

2. By March 30, 2002, apply 15-5-10 commercial fertilizer at the rate of 350 lbs. per acre over all seeded and sodded areas.
3. By November 30, 2002, apply 15-5-10 commercial fertilizer at the rate of 200 lbs. per acre and apply lime at 2000 lbs. per acre over all seeded and sodded areas.
4. Provide written acknowledgement that this requirement has been met prior to requesting Substantial Completion.

E. Mow lawns as soon as there is enough top growth to cut with mower set at indicated height. Repeat mowing as required to maintain indicated height without cutting more than 40 percent of the grass height (minimum of 3 mowings). Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain following grass height:

1. Mow grass to a finished height of 2 to 3 inches high.

F. Apply pre-emergent herbicide to lawns areas. Apply 60 – 90 days after planting.

3.7 SATISFACTORY LAWN

A. Seeded lawns shall be considered satisfactory/acceptable provided requirements, including maintenance, have been met and a healthy, uniform, close stand of grass is established, free of weeds, bare spots exceeding 5 by 5 inches (125 by 125 mm), and surface irregularities.

B. Sodded lawns shall be considered satisfactory/acceptable provided requirements, including maintenance, have been met and a healthy, well-rooted, even-colored, viable lawn is established, free of weeds, open joints, bare areas and surface irregularities.

C. Replant lawns that do not meet requirements and continue maintenance until lawns are satisfactory/acceptable.

D. Substantial Completion of the building and the remainder of the project may be achieved (pending prior Engineer and Owner approval) before achieving a satisfactory/acceptable lawn. Continue to replant and maintain unsatisfactory/unacceptable lawn areas until acceptance is obtained. Warranties for lawns shall begin at the time of acceptance of the lawn.

3.8 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from sidewalks and paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period as needed until lawn is established.

END OF SECTION 32 9200

SECTION 32 9300 - EXTERIOR PLANTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Trees
2. Shrubs
3. Groundcovers
4. Other Plant Materials
5. Stakes & Guys

1.3 SUBMITTALS

A. Installers Qualifications: Provide a list, with references, of the past three projects of similar scope.

B. Product Data: For each type of product indicated.

C. Plant Material Certifications:

1. Certificates of inspection as required by governmental authorities.
2. Label data substantiating that plant materials comply with specified requirements.

D. Planting Schedule:

1. Typewritten planting schedule.
2. Once accepted, revise dates only as approved in writing and submitted to Engineer.

E. Maintenance Schedules: Typewritten instructions recommending procedures for maintenance of landscape work for one full year. Submit prior to completion of project.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer, who has successfully completed planting projects similar in size and complexity to this project. The installer's primary business (defined as a minimum of 60% of total billings) shall be exterior plant installation.

B. Installer's Field Supervision: Installer to maintain an experienced full-time supervisor on the project site when exterior planting is in progress.

C. Exterior Plant Materials:

1. Provide plant materials of quantity, size, genus, species, and variety indicated on the Drawings.
2. All plant materials and work shall comply with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock."
3. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Engineer, together with proposal for use of equivalent material.
4. The Engineer may inspect plant materials either at place of growth or on site before planting, for compliance with requirements for genus, species, variety, size, and quality. Engineer retains right to further inspect trees for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees immediately from project site.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials:

1. Deliver packaged materials in containers showing weight, analysis, and name of manufacturer or grower.
2. Protect materials from deterioration during delivery, and while stored at site.

B. Exterior Plant Materials

1. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.
2. Deliver exterior plant materials after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set plant materials in shade, protect from weather and mechanical damage, and keep roots moist and free from frost.

3. Do not remove container-grown stock from containers until planting time.
4. Balled and burlapped material shall be freshly dug.
5. Handle planting stock by root ball.

1.6 PROJECT CONDITIONS

A. Examine the subgrade, verify the elevations, and observe the conditions under which work is to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

B. Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate as required.

C. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Engineer before planting.

D. Provide all necessary safeguards for the protection of all planted areas until provisional inspection/acceptance is accomplished.

E. Planting Restrictions: Plant during one of the following periods.

1. Spring Planting: Unfrozen soil conditions March 1-June 1st.
2. Fall Planting: September 1-November 1st or until frozen soil conditions prevent work.
3. Summer Planting: June 1 – September 1 with approved irrigation system.

F. Coordination with Lawns: Install plant materials after finish grades are established and before planting lawns, unless otherwise acceptable to the Engineer.

1. When planting exterior plants after lawns, protect lawn areas and promptly repair damage caused by planting operations.

1.7 WARRANTY

A. Warranty exterior plant materials for a period of one year after date of Final Completion against defects including death and unsatisfactory growth, except for abuse or damage by others, or unusual phenomena or incidents which are beyond Contractor's control.

1. The Contractor shall provide written notice to the Engineer of any practice which will affect the warranty if not remedied promptly. The Engineer will render an opinion of the conflict if necessary.
2. Make replacements of all dead plants or plants in impaired condition (more than 25% dead or dying) condition in early spring/fall following installation. Replacements of dead or rejected plants should again be made prior to the expiration of the warranty period.

1.8 MAINTENANCE

A. The Contractor is responsible for maintaining all exterior plant material for a period of one year after the date of Final Completion.

B. Remove all stakes and guy wires at the end of the 12 month guarantee period.

PART 2 – PRODUCTS

2.1 EXTERIOR PLANT MATERIALS

A. General: Provide nursery-grown plant materials complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Label at least one tree and one shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

2.2 PLANTS

A. Annuals: Provide healthy, disease-free plants of species and variety indicated. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom

B. Perennials: Provide healthy, field-grown plants from a commercial nursery of species and variety shown or listed.

C. Vines: Provide plants with heavy, well-branched tops, with not less than three runners and a vigorous well-developed root system.

2.3 FERTILIZER

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium. Revise fertilizer mix to remedy deficiencies found in soil.

1. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium. Revise fertilizer mix to remedy deficiencies found in soil.

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.4 MULCHES

1. Organic Mulch: Six (6) month old well rotted double shredded native hardwood bark mulch not larger than 4" in length and 1/2" in width, free of woodchips and sawdust.

2.5 WATER

1. Free of substances harmful to plant growth.

2.6 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of ~~4~~ percent organic material content. Topsoil shall be fertile, friable, natural topsoil of loamy character, without admixture of subsoil material, obtained from a well-drained arable site, reasonably free from clay, lumps, coarse sands, stones, plants, roots, sticks and other foreign materials.

B. Topsoil Source:

1. Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
   a) Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land**,** bogs or marshes.
2. Import topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land**,** bogs or marshes.

3. Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

    a) Surface soil may be supplemented with imported or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes.

2.7 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

1. Class: Class T, with a minimum 99 percent passing through No. 8 (2.36-mm) sieve and a minimum 75 percent passing through No. 60 (0.25-mm) sieve.
2. Class: Class O, with a minimum 95 percent passing through No. 8 (2.36-mm) sieve and a minimum 55 percent passing through No. 60 (0.25-mm) sieve.
3. Provide lime in form of dolomitic limestone.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 (3.35-mm) sieve and a maximum 10 percent passing through No. 40 (0.425-mm) sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.

G. Sand: Clean, washed, natural or manufactured, free of toxic materials.

H. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.8 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch

(19-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; bio-solids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum peat moss: Sphagnum peat moss shall be partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.

C. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.

1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with at least 0.15 lb (2.4 kg) of ammonium nitrate or 0.25 lb (4 kg) of ammonium sulfate per cubic foot (cubic meter) of loose sawdust or ground bark.

E. Manure: Well-rotted, unleached, poultry, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.9 MISCELLANEOUS PRODUCTS

A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Tree save areas as indicated shall be tagged and approved by the Engineer prior to any clearing and/or thinning.

B. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

D. Lay out individual tree and shrub locations and areas for multiple exterior plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Engineer's acceptance of layout before planting. Make minor adjustments as required.

E. Lay out exterior plants at locations indicated. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

3.3 PLANTING BED ESTABLISHMENT

A. Loosen subgrade of planting beds to a minimum depth of 4 inches (100 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off of Owner's property.

1. Apply fertilizer directly to subgrade before loosening.
2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
    a) Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    b) Mix lime with dry soil before mixing fertilizer.

B. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Restore planting beds if eroded or otherwise disturbed after finish grading and before planting.

3.4 TREE AND SHRUB PLANTING

A. Set all plant materials plumb and in center of pit or trench as per detail.

1. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
2. Carefully remove root ball from container without damaging root ball or plant.
3. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
4. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling and maintain plumb while working backfill around roots and placing layers above roots. Tamp final layer of backfill. Remove injured roots by cutting cleanly, do not break.
5. Dish top of backfill to allow for mulching.

B. Organic Mulching: Apply 3-inch (75-mm.) average thickness of organic mulch extending 12 inches (300 mm) beyond edge of planting pit or trench. Do not place mulch within 3 inches (75 mm) of trunks or stems.

3.5 TREE AND SHRUB PRUNING

A. Prune, thin, and shape trees and shrubs as indicated.

3.6 PERENNIAL AND GROUND COVER PLANTING

A. Set out and space ground cover and plants as indicated in details.

B. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

3.7 CLEANUP AND PROTECTION

A. During exterior planting, keep adjacent pavings and construction clean and work area in an orderly condition.

B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

3.8 DISPOSAL

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 32 9300

SECTION 33 3000 - SANITARY SEWERAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section includes sanitary sewerage system piping and appurtenances from a point 5 feet outside the building to the point of disposal.

1.3 SUBMITTALS

A. Product data for sewer piping specialties.

B. Shop drawings for precast concrete sanitary manholes, including frames and covers.

C. Shop drawings for cast-in-place concrete or field-erected masonry sanitary manholes, including frames and covers.

D. Inspection and test reports specified in the "Field Quality Control" Article

1.4 QUALITY ASSURANCE

A. Environmental Compliance: Comply with applicable portions of local environmental agency regulations pertaining to sanitary sewerage systems, and to the requirements of the Virginia Erosion and Sediment Control Handbook for erosion control during installation.

B. Utility Compliance: Comply with the requirements of the latest edition of the Fluvanna County Public Works, and Commonwealth of Virginia Department of Health Specifications and Regulations.

1.5 DELIVERY, STORAGE, AND HANDLING

1. Do not store plastic structures in direct sunlight.
2. Do not store plastic pipe or fittings in direct sunlight.
3. Protect pipe, pipe fittings, and seals from dirt and damage.

4. Handle precast concrete manholes and other structures according to manufacturer's rigging instructions.

1.6 PROJECT CONDITIONS

A. Site Information: Perform site surveys, research public utility records, and verify existing utility locations. Verify that sanitary sewerage system piping may be installed in compliance with original design and referenced standards.

B. Locate existing structures and piping to be closed and abandoned.

C. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted under the following conditions and then only after arranging to provide acceptable temporary utility services.

1. Notify Engineer not less than 48 hours in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without receiving Engineer's written permission.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate with interior building sanitary drainage piping.

B. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. General: Provide pipe and pipe fitting materials compatible with each other. All materials shall comply with the requirements of the latest edition of the Fluvanna County Public Works, and Commonwealth of Virginia Department of Health Specifications and Regulations.

B. PVC (Polyvinyl Chloride) Sewer Pipe and Fittings: ASTM D 3034, SDR 35, elastomeric gasket joints.

1. Gaskets: ASTM F 477, elastomeric seal.

C. Ductile-Iron Pipe: AWWA C151, Class 50 minimum, for push-on joints.

1. Standard-Pattern, Ductile-Iron and Cast-Iron Fittings: AWWA C110, for push-on joints.
2. Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.
3. Pipe and Fitting Interior Coating: AWWA C104, asphaltic-material seal coat, minimum 1-mil (0.025-mm) thickness.
4. Gaskets: AWWA C111, rubber.

2.2 MANHOLES

A. Precast Concrete Manholes: Shall comply with the latest edition of the Fluvanna County Public Works, and Commonwealth of Virginia Department of Health Specifications and Regulations.

B. Manhole Steps shall comply with the latest edition of the Local Utility Standards.

C. Manhole Frames and Covers: Shall comply with the latest edition of the Local Utility Standards.

2.3 CLEANOUTS

A. General: Provide cast-iron ferrule and countersunk brass cleanout plug, with round cast-iron access frame and heavy-duty, secured, scoriated cast-iron cover.

B. Sewer pipe fitting and riser to cleanout: 4" dia. ductile iron pipe.

PART 3 - EXECUTION

3.1 PREPARATION OF FOUNDATION FOR BURIED SANITARY SEWERAGE SYSTEMS

A. Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation, throughout the length of the pipe.

B. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid, and backfill with clean sand or pea gravel to indicated level.

C. Install pipe bedding as required by the latest edition of the Fluvanna County Public Works, and Commonwealth of Virginia Department of Health Specifications and Regulations.

3.2 PIPE INSTALLATION

A. Install the sanitary sewerage system in accordance with the requirements of the latest edition of the Local Utility Standards.

B. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

C. Use manholes for changes in direction, except where a fitting is indicated. Use fittings for branch connections, except where direct tap into existing sewer is indicated.

D. Use proper size increasers, reducers, and couplings, where different size or material of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.

E. Install piping pitched down in direction of flow, at minimum slope of 2 percent, except where indicated otherwise.

F. Extend sanitary sewerage system piping to connect to building sanitary drains, of sizes and in locations indicated.

3.3 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. Join and install PVC pipe as follows:

1. Pipe and gasketed fittings, joining with elastomeric seals, in accordance with ASTM D 3212.
2. Installation in accordance with ASTM D 2321.

B. Join different types of pipe with standard manufactured couplings and fittings intended for that purpose.

3.4 MANHOLES

A. Install precast concrete manholes in accordance with the latest edition of the Local Utility Standards.

B. Provide rubber joint gasket complying with ASTM C 443 at joints of sections.

C. Apply bituminous mastic coating at joints of sections.

3.5 CLEANOUTS

A. Provide cleanouts as indicated, and as required by authorities having jurisdiction. Set cleanout frame and cover in concrete block 12 by 12 by 6 inches deep, except where location is in concrete paving. Set top of cleanout 1 inch above surrounding earth grades or flush with grade when installed in paving.

3.6 FIELD QUALITY CONTROL

A. Cleaning: Clear interior of piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.

1. In large, accessible piping, brushes and brooms may be used for cleaning.
2. Place plugs in ends of uncompleted pipe at end of day or whenever work stops.
3. Flush piping between manholes, if required by local authority, to remove collected debris.

B. Interior Inspection: Inspect piping to determine whether line displacement or other damage has occurred.

1. Make inspections after pipe between manholes and manhole locations has been installed and approximately 2 feet of backfill is in place, and again at completion of project.
2. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects correct such defects, and reinspect.

C. Test new piping systems and parts of existing systems that have been altered, extended, or repaired for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to the requirements of the Local Utility Standards.
3. Schedule tests, and their inspections by authorities having jurisdiction, with at least 24 hours' advance notice.
4. Submit separate reports for each test.

END OF SECTION 33 3000

SECTION 33 4100 - STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY:

A. This Section includes the roof drainage collection system, the storm sewerage system piping and appurtenances from a point 5 feet outside the building to the point of disposal, and the outfall structures of the underground detention.

1.3 SUBMITTALS

A. Product data for:

1. Concrete pipe
2. Polyethylene pipe
3. Ductile iron pipe
4. Frames and covers.
5. Grates
6. Couplings for connection into concrete pipe.

B. Certification, signed by material producer and contractor, that standard precast and cast in place concrete storm drainage manholes and Drop Inlets comply with VDOT standards and specifications.

C. VDOT approved job mix for bedding stone.

D. Shop drawings for:

1. Non-standard precast or cast-in-place concrete storm drainage manholes and Drop Inlets.
2. Trench drain system.
3. Cleanouts
4. Underdrains
5. Stormwater Management Basin Outlet structures, including: Riser pipe, outfall pipe, riser anchoring, anti-seep collars, trash rack and anti-vortex device.

E. Record drawings of installed storm drainage system.

1.4 QUALITY ASSURANCE

A. Environmental Compliance: Comply with applicable portions of local environmental agency regulations pertaining to storm sewerage systems.

B. Utility Compliance: Comply with state and local regulations and standards pertaining to storm sewerage systems.

C. All materials shall be new and free of defects (i.e. pipe shall not have chipped spigots or bells).

1.5 PROJECT CONDITIONS

A. Site Information: Perform site surveys, research public utility records, and verify existing utility locations. Verify that storm sewerage system piping may be installed in compliance with original design and referenced standards.

B. Locate existing structures and piping to be closed and abandoned.

C. Existing Utilities: Do not interrupt existing storm sewer serving facilities occupied by the Owner of others except when permitted under the following conditions and then only after arranging to provide acceptable temporary storm sewer services.

1. Notify Engineer not less than 48 hours in advance of proposed storm sewer interruptions.
2. Do not proceed with storm sewer interruptions without receiving Engineer's written permission.

D. Existing utilities across or along the line of work are indicated only in an approximate location. Locate all underground lines and structures. Call "Miss Utility" at 1-800-552-7001 prior to construction. If utilities are marked that are not shown on the plans, locate utility vertically and horizontally and provide information to Engineer.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate with interior building storm drainage piping.

B. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials used for construction of the storm sewerage system shall comply with the requirements of the latest edition of the Virginia Department of Transportation Road and Bridge Standards and Road and Bridge Specifications.

2.2 PIPE AND FITTINGS

A. Provide pipe and pipe fitting materials compatible with each other. Pipe materials are indicated on the drawings.

B. Reinforced Concrete Pipe (RCP): Shall conform to the requirements of ASTM C76/AASHTO M170, Class III, unless otherwise indicated. All RCP shall be gasketed.

C. O-Ring Gasket Reinforced Concrete Pipe: Shall conform to the requirements of ASTM C76/AASHTO M170, Class III, unless otherwise indicated. Joints shall conform to the requirements of ASTM C443/AASHTO M198.

D. Corrugated Polyethylene Pipe (P.E.): Shall have a smooth lined interior and meet the requirements of ASTM F405 or AASHTO M252 for 10" diameter and smaller, and ASTM F667 or AASHTO M294 for 12" diameter and larger.

E. PVC Storm Sewer Pipe: Shall conform to the requirements of ASTM D3034, SDR-35 with bell and spigot ends for gasketed joints with ASTM F 477 elastrometric seals

1. Connections to the building downspouts shall be made with Schedule 40 PVC, with bell and spigot ends for gasketed joints with ASTM F 477 elastrometric seals.

F. Ductile Iron Storm Sewer Pipe: Shall conform to the requirements of AWWA C151, Class 52. Flanged joints shall conform to the requirements of AWWA C115.

2.3 MANHOLES

A. Precast Concrete Manholes: Comply with the requirements of the latest edition of the Virginia Department of Transportation's Road and Bridge Standards, and Road and Bridge Specifications.

B. Cast-in-Place Manholes: Comply with the requirements of the latest edition of the Virginia Department of Transportation's Road and Bridge Standards, and Road and Bridge Specifications.

C. Manhole Steps, Safety Slabs and Inlet Shaping: Comply with the requirements of the latest edition of the Virginia Department of Transportation's Road and Bridge Standards, and Road and Bridge Specifications.

D. Manhole Frames and Covers: Comply with the requirements of the latest edition of the Virginia Department of Transportation's Road and Bridge Standards, and Road and Bridge Specifications.

2.4 CLEANOUTS

A. Cast-iron ferrule and countersunk brass cleanout plug, with round cast-iron access frame and heavy-duty, secured, scoriated cast-iron cover.

2.5 DROP INLETS

A. Precast Concrete Drop Inlets: Comply with the requirements of the latest edition of the Virginia Department of Transportation's Road and Bridge Standards, and Road and Bridge Specifications.

B. Cast-in-Place Drop Inlets: Comply with the requirements of the latest edition of the Virginia Department of Transportation's Road and Bridge Standards, and Road and Bridge Specifications.

C. Drop Inlet Steps, Safety Slabs and Inlet Shaping: Comply with the requirements of the latest edition of the Virginia Department of Transportation's Road and Bridge Standards, and Road and Bridge Specifications.

D. Drop Inlet Frames and Grates: Comply with the requirements of the latest edition of the Virginia Department of Transportation's Road and Bridge Standards, and Road and Bridge Specifications.

E. Plastic Drain Basins: ADS or approved equal.

2.6 TRENCH DRAIN SYSTEM

A. Trench drainage system shall be manufactured by ACO Drain, or approved equal.

B. Trench drain grates shall be ductile iron, heelproof grates and shall be reinforced to support heavy duty (H20) loads, unless otherwise indicated on the plans.

C. Provide all fittings and miscellaneous connections necessary for a complete the trench drainage system per the manufacturer requirements.

2.7 CONCRETE AND REINFORCEMENT

A. Concrete: Conform to the requirements of VDOT Standard Class A3 concrete.

B. Reinforcement: Steel conforming to the following:

2. Fabric: ASTM A 185 welded wire fabric, plain.
3. Reinforcement Bars: ASTM A 615, Grade 60, deformed.

2.8 UNDERDRAINS

A. Underdrains and combination underdrains: Conform to the requirements of the latest edition of the VDOT Road and Bridge Specifications and the VDOT Road and Bridge Standards for the type of underdrain, unless otherwise indicated.

1. PVC underdrains shall conform to the requirements of ASTM F758, Type PS 28 or ASTM F949.
2. PE corrugated underdrain pipe shall conform to AASHTO M252.

B. Provide a filter fabric "sock" wrapping for all underdrain pipe.

2.9 END WALLS AND END SECTIONS

A. End walls: Conform to the requirements of the latest edition of the VDOT Road and Bridge Specifications and the VDOT Road and Bridge Standards.

B. End sections: Conform to the requirements of the latest edition of the VDOT Road and Bridge Specifications and the VDOT Road and Bridge Standards for the size of pipe indicated.

PART 3 - EXECUTION

3.1 GENERAL

A. Install the storm sewerage system in accordance with the latest edition of the Virginia Department of Transportation's Road and Bridge Standards and Road and Bridge Specifications.

3.2 PREPARATION OF FOUNDATION FOR BURIED STORM SEWERAGE SYSTEMS

A. Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation, throughout the length of the pipe.

B. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid, and backfill with clean sand or pea gravel to indicated level.

C. Install pipe bedding conforming to the requirements of the latest edition of the Virginia Department of Transportation's Road and Bridge Standards and Road and Bridge Specifications.

3.3 PIPE INSTALLATION

A. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

B. Use proper size increasers, reducers, and couplings, where different size or material of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.

C. Extend storm sewerage system piping to connect to building storm drains, of sizes and in locations indicated.

D. Join and install concrete pipe and fittings per VDOT specifications.

E. Join and install PE pipe and fittings per manufacturer’s recommendations.

F. Join different types of pipe with standard manufactured couplings and fittings intended for that purpose.

3.4 MANHOLES

A. General: Install manholes complete with accessories as indicated. Form continuous concrete or split pipe section channel and benches between inlets and outlet. Set tops of frames and covers flush with finish grade, unless otherwise indicated.

B. Place precast concrete manhole sections as indicated, and install in accordance with ASTM C 891.

C. Construct cast-in-place manholes as indicated.

D. Apply bituminous mastic coating at joints of sections.

3.5 CLEANOUTS

A. Install cleanouts and extension from sewer pipe to cleanout at grade as indicated. Set cleanout frame and cover in concrete block 12 by 12 by 6 inches deep or as indicated on the plans, except where location is in concrete paving. Set top of cleanout flush with finish grade.

3.6 DROP INLETS

A. Construct drop inlets to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.7 INLET SHAPING

A. Construct inlet shaping conforming to VDOT Standard IS-1 at all drop inlets and manholes.

3.8 TRENCH DRAIN INSTALLATION

A. Installation of the trench drain shall comply with the manufacturers recommendations.

B. Verify connection to the storm sewer system. Utilize manufacturers standard outlet connections to make connection to the storm sewer system.

C. Install trench drain system starting from the downstream end , working towards the upstream end.

D. Verify proper placement and alignment prior to placement of concrete.

E. Place concrete around suspended trench channel. Do not chute concrete directly against channel walls, as this may cause displacement. Work concrete under channels and vibrate with a finger-type vibrator.

F. Finish surface to be flush with the adjoining surfaces and to allow for positive drainage into the grates.

G. Install grate tops.

3.9 FIELD QUALITY CONTROL

A. Cleaning: Clear interior of piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.

1. In large, accessible piping, brushes and brooms may be used for cleaning.
2. Place plugs in ends of uncompleted pipe at end of day or whenever work stops.
3. Flush piping between manholes and drop inlets to remove collected debris. Flush pipes through an approved erosion and sediment control measure.

B. Interior Inspection: Inspect piping to determine whether line displacement or other damage has occurred.

1. Make inspections after pipe between manholes and manhole locations has been installed and approximately 2 feet of backfill is in place, and again at completion of project.

2. If inspection indicates poor alignment, debris, displaced pipe, infiltration, or other defects correct such defects and reinspect.

END OF SECTION 33 4100

SECTION 33 46 13 - FOUNDATION DRAINAGE SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section includes underground foundation drainage systems, as follows:

1. Footing drainage system.

1.3 SUBMITTALS

A. Product data for each type of foundation drainage material required.

B. Shop drawings for interfacing with total site drainage system.

C. Certification signed by Contractor and foundation drainage system Installer that installed materials conform to requirements and system was successfully checked and tested prior to covering with filter fabric and drainage fill.

PART 2 - PRODUCTS

2.1 DRAINAGE PIPE AND FITTINGS

A. Provide drainage pipes complete with bends, reducers, adapters, couplings, collars, and joint materials.

1. Perforated Polyvinyl Chloride Pipe: ASTM D 2729.
2. Perforated Polyethylene Pipe: ASTM F405.

2.2 SOIL & MISCELLANEOUS MATERIALS

A. General: Bedding, backfill, and porous fill materials are indicated in Section 31 2000, Earthwork.

B. Filter Fabric: Manufacturer's standard non-woven geotextile fabric of polypropylene or polyester fibers, or a combination thereof.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine adjacent surfaces to receive foundation drainage system to verify suitability. Do not begin installation until subsurface conditions are satisfactory to accept drainage system.

3.2 INSTALLATION

A. Inspect pipe trench for line, level (or slope as required) and pipe support conditions.

B. Laying Drain Pipe: Lay drain pipe solidly bedded. Provide full bearing for each pipe section throughout its length to true grades and alignment, and continuos slope in direction of flow.

1. Lay perforated pipe with perforations down and joints tightly closed in accordance with pipe manufacturer's recommendations. Provide collars and couplings as required.
2. Provide recesses in excavation bottom to receive bells for drain pipe having bell and spigot ends. Lay pipe with bells facing up slope and with spigot end entered fully into adjacent bell. Seal joint in accordance with requirements of local building official.

C. Testing Drain Lines: Test and check lines before backfilling to assure free flow. Remove obstructions, replace damaged components, and retest system until satisfactory.

D. Drainage Fill: Place drainage fill (material indicated in Section 02300) over drain lines after satisfactory testing. Completely cover drain lines to a width of at least 6 inches on each side and above top of pipe to within 12 inches of finish grade. Place fill material in layers not exceeding 3 inches in loose depth and compact each layer placed.

1. Overlay drainage fill material with one layer of filter fabric, overlapping edges at least 4 inches.

E. Fill to Grade: Install fill material over compacted drainage fill at footing drains, placing material in layers not exceeding 6 inches in loose depth and thoroughly compacting each layer, as indicated in Section 02300.

END OF SECTION 33 46 13

ADDITION AND RENOVATIONS

MULTIPURPOSE ROOM

FLUVANNA COUNTY
CRA PROJECT No. 3430
AUGUST 28, 2020
IFB# 2021-01

IMAGE FOR GRAPHIC REPRESENTATION ONLY. IMAGE MAY VARY FROM ACTUAL PROJECT REQUIREMENTS.

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STRUCTURAL ENGINEER
DMWPV
110 Third Street
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CIVIL ENGINEER
TIMMONS GROUP
608 Preston Avenue
Suite 200
Charlottesville, VA 22903
434-295-5624
www.timmons.com

LEGEND

MATERIALS

- UNDISTURBED EARTH
- CONTROLLED FILL
- CONCRETE
- GRANULAR FILL
- CONC MASONRY UNIT
- FACE MASONRY UNITS
- WOOD BLOCKING
- RIGID INSULATION
- BATT INSULATION

ARCHITECTURAL DRAWING NO. DESIGNATIONS

- A1.1 — INDICATES FLOOR PLANS; INDICATES SHEET NUMBER
- A2.1 — INDICATES ELEVATIONS; INDICATES SHEET NUMBER
- A3.1 — INDICATES SECTIONS; INDICATES SHEET NUMBER
- A4.1 — INDICATES LARGE SCALE PLANS; INDICATES SHEET NUMBER
- A5.1 — INDICATES GENERAL DETAILS; INDICATES SHEET NUMBER
- A6.1 — INDICATES SCHEDULES AND FRAME ELEVATIONS; INDICATES SHEET NUMBER
- I4.1 — INDICATES INTERIOR LARGE SCALE LAYOUTS; INDICATES SHEET NUMBER
- I7.1 — INDICATES FLOOR PATTERN LAYOUTS; INDICATES SHEET NUMBER

SYMBOLS

SECTION
SECTION OR DETAIL NO.
SHEET NO.

BUILDING SECTION
SECTION INDICATOR
BUILDING SECTION SHEET NO.

DETAIL
DETAIL NO.
DETAIL SHEET NO.

EXTERIOR ELEVATION
ELEVATION NO.
ELEVATION SHEET NO.

INTERIOR ELEVATION
ELEVATION NO.
ELEVATION SHEET NO.

DOOR TAG
DOOR NUMBER

WINDOW TAG
WINDOW ELEVATION

WALL TYPE TAG
WALL IDENTIFICATION

MILLWORK SECTION
SECTION OR DETAIL NO.
DETAIL SHEET NO.

ROOM TAG
ROOM NAME
BLDG. & ROOM NO.

NORTH ARROW

ARCHITECTURAL ABBREVIATIONS

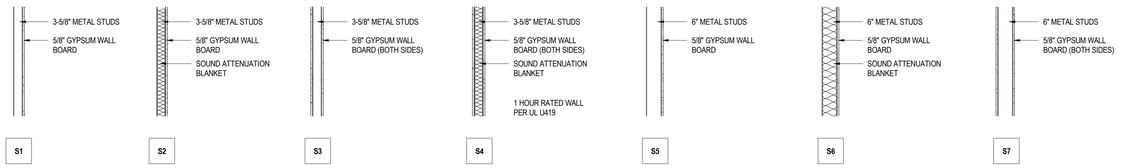
THIS ABBREVIATION LIST IS A STANDARD AND NOT ALL ABBREVIATIONS ARE NECESSARILY USED ON THIS PROJECT

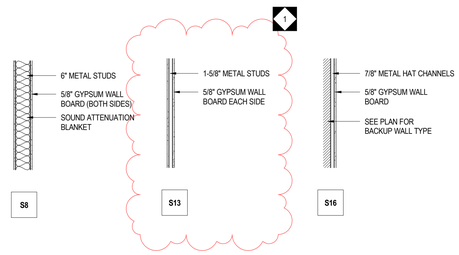
ABV	ABOVE
AC	ACOUSTICAL
ACT	ACOUSTICAL CEILING TILE
AED	AUTOMATED EXTERNAL DEFIBRILLATOR
AFF	ABOVE FINISH FLOOR
ALUM	ALUMINUM
ALT	ALTERNATE
AP	ACCESS PANEL
ARCH	ARCHITECT(URAL)
BD	BOARD
BIT	BITUMINOUS
BLDG	BUILDING
BLK	BLOCK(ING)
BM	BENCH MARK
BOT	BOTTOM
BRG	BEARING
BSMT	BASEMENT
CLR	CLEAR
CL	CENTERLINE
CJ	CONTROL JOINT
CLG	CEILING
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CONTR	CONTRACTOR
COORD	COORDINATE
CT	CERAMIC TILE
DEMO	DEMOLITION
DET	DETAIL
DF	DRINKING FOUNTAIN
DIM	DIMENSION
DN	DOWN
DR	DOOR
DS	DOWNSPOUT
DWG	DRAWING
EA	EACH
EC	ELECTRICAL CONTRACTOR
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATOR
ENT	ENTRANCE
EQ	EQUAL
EQUIP	EQUIPMENT
EX	EXISTING
EXP	EXPOSED
EXT	EXTERIOR
EW	EACH WAY
FD	FLOOR DRAIN
FE	FIRE EXTINGUISHER (CABINET)
FFE	FINISHED FLOOR ELEVATION
FIN	FINISH(ED)
FL	FLOOR
FRP	FIBERGLASS REINFORCED PANEL
FRT	FIRE RETARDANT
FT	FOOT or FEET
GA	GAUGE
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GFCMU	GROUND FACE CONCRETE MASONRY UNIT
GL	GLASS
GCMU	GLAZED CONCRETE MASONRY UNIT
GWB	GYPSUM WALL BOARD
GWBAR	GYPSUM WALL BOARD ABUSE RESISTANT
GWBMR	GYPSUM WALL BOARD MOISTURE RESISTANT
GWBFR	GYPSUM WALL BOARD FIRE RATED
HC	HANDICAPPED
HDW	HARDWARE
HGT	HEIGHT
HP	HIGH POINT
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HVAC	HEATING, VENTILATION & AIR CONDITIONING
ID	INSIDE DIAMETER
INFO	INFORMATION
INSUL	INSULATION
INT	INTERIOR
INV	INVERT
JST	JOIST
JT	JOINT
KIT	KITCHEN(ETTE)
LAM	LAMINATE
LAV	LAVATORY
LB	POUND
LF	LINEAL FEET
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LP	LOW POINT
MFR	MANUFACTURER
MAT	MATERIAL
MAX	MAXIMUM
MC	MECHANICAL CONTRACTOR
MECH	MECHANICAL
MEP	MECHANICAL, ELECTRICAL, PLUMBING
MIN	MINIMUM
MISC	MISCELLANEOUS
MO	MASONRY OPENING
MTD	MOUNTED or MOUNTING
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OPNG	OPENING
OPP	OPPOSITE
PTN	PARTITION
PC	PLUMBING CONTRACTOR
PL	PLATE
PLAM	PLASTIC LAMINATE
PLWD	PLYWOOD
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PTD	PAINTED
QT	QUARRY TILE
R	RISER or RADIUS
RD	ROOF DRAIN
REC	RECESSED
RECT	RECTANGLE
REINF	REINFORCED or REINFORCING
REQD	REQUIRED
RM	ROOM
RO	ROUGH OPENING
RWC	RAIN WATER CONDUCTOR
SCH	SCHEDULE
SECT	SECTION
SF	SQUARE FEET
SFCMU	SPLIT FACE CONCRETE MASONRY UNIT
SFRM	SPRAY-APPLIED FIRE RESISTIVE MATERIAL
SH	SHEATHING
SIM	SIMILAR
SJ	SCORE JOINT
SPECS	SPECIFICATIONS
SQ	SQUARE
SS	STAINLESS STEEL
STD	STANDARD
STR	STRUCTURAL
SYN	SYNTHETIC
T	TREAD
TG	TEMPERED GLASS
THK	THICK(NESS)
TOM	TOP OF MASONRY
TOP	TOP OF PLANK
TOS	TOP OF STEEL
TYP	TYPICAL
UL	UNDERWRITERS LABORATORIES
UNO	UNLESS NOTED OTHERWISE
VCT	VINYL COMPOSITION TILE
VERT	VERTICAL
VIF	VERIFY IN FIELD
WP	WATERPROOFING
W/	WITH
WD	WOOD
WG	WIRE GLASS

ABBREVIATION SYMBOLS

@	AT
℄	CENTER LINE
Ø	DIAMETER
+/-	PLUS OR MINUS

INTERIOR STUD WALL TYPES





GYPSUM WALL BOARD LOCATION SCHEDULE	
ABUSE RESISTANT GYPSUM BOARD	• ALL CLASSROOMS AND OFFICES • ALL LOCATIONS SCHEDULED TO RECEIVE GYPSUM WALL BOARD UNLESS NOTED OTHERWISE • EXPOSED LAYER AT MULTIPLE LAYERS OF GYPSUM WALL BOARD
GYPSUM WALL BOARD	• ALL APPLICATIONS ABOVE 8'-0" FINISH FLOOR • ALL MULTIPLE LAYER WALLS, EXCEPT THE EXPOSED LAYER
MOLD & MOISTURE RESISTANT GYPSUM BOARD	• PAINTED WALLS & CEILINGS IN TOILET ROOMS, LOCKER ROOMS & SHOWERS
CEMENTITIOUS BACKER UNIT	• AT WALLS SURROUNDING SHOWERS AND TUBS SCHEDULED TO RECEIVE CERAMIC TILE

GENERAL NOTES: WALL TYPES

1. ALL INTERIOR WALLS WHICH ARE NOT TAGGED OR OTHERWISE DETAILED SHALL BE TYPE M1.

2. ALL WALLS SHALL EXTEND TO WITHIN 2" OF UNDERSIDE OF FLOOR, ROOF OR ROOF STRUCTURE. AT ALL NON-RATED WALLS, INSTALL COMPRESSIBLE FILLER IN JOINT BETWEEN TOP OF PARTITION AND UNDERSIDE OF STRUCTURE ABOVE. AT ALL FIRE-RATED WALLS, INSTALL FIRESTOPPING IN JOINT BETWEEN TOP OF PARTITION AND UNDERSIDE OF STRUCTURE ABOVE.

3. PROVIDE THROUGH-PENETRATION FIRE STOP SYSTEMS FOR ALL BUILDING UTILITIES PENETRATING FIRE-RESISTANCE RATED WALL ASSEMBLIES. RATED AT THE SAME FIRE-RESISTANCE RATING AS THE ASSEMBLIES IN WHICH IT IS PENETRATING. OPENINGS IN FIRE-RATED ASSEMBLIES SHALL BE LIMITED TO MINIMUM SIZES TO ACCOMMODATE PENETRATIONS TO ENSURE MAXIMUM INTEGRITY OF THE ASSEMBLIES FIRE-RATING.

4. AT STUD WALLS WITH GYPSUM WALL BOARD, PANELS TO EXTEND TO UNDERSIDE OF DECK ABOVE UNLESS NOTED OTHERWISE.

5. REFER TO CODE ANALYSIS DRAWINGS FOR LOCATION AND EXTENT OF FIRE-RESISTANCE-RATED ASSEMBLIES.

6. SEE SECTIONS, STRUCTURAL DRAWINGS AND ELEVATIONS FOR FURTHER DETAIL OF WALL CONSTRUCTION.

DRAWING LIST

Sheet Number	Sheet Name
GENERAL	
CS.1	COVER SHEET
CS.2	GENERAL INFORMATION
DEMOLITION	
D1.0	DEMOLITION PLAN, ALTERATION NOTES & LEGEND
ARCHITECTURAL	
A1.1	SUB-BASEMENT FLOOR PLAN
A1.2	SUB-BASEMENT REFLECTED CEILING PLAN AND ROOF PLAN
A2.1	EXTERIOR ELEVATIONS
A3.1	BUILDING SECTIONS
A4.1	LARGE SCALE PLANS, SECTIONS AND DETAILS
A5.1	DETAILS
A6.1	ROOM FINISH & SIGNAGE SCHEDULE
A6.2	DOOR SCHEDULE, HOLLOW METAL FRAME ELEVATIONS AND DETAILS
A6.3	ALUMINUM WINDOW ELEVATIONS AND STOREFRONT DETAILS
INTERIORS	
I4.1	OVERALL SUB-BASEMENT FLOORPLAN
I4.2	LARGE SCALE LAYOUTS - ELEVATIONS AND DETAILS
I7.1	OVERALL FINISH & FLOOR PATTERN PLANS
STRUCTURAL	
S0	GENERAL STRUCTURAL NOTES
S1.0	FOUNDATION PLAN
S1.1	ROOF FRAMING PLAN
S2.0	FOUNDATION DETAILS
S3.0	FRAMING DETAILS
S3.1	FRAMING DETAILS
MECHANICAL	
M-001	MECHANICAL LEGEND
M-100	MECHANICAL NEW WORK PLAN
M-200	MECHANICAL SCHEDULES, DETAILS, AND CONTROLS
PLUMBING	
P-001	PLUMBING LEGEND
P-100	UNDERGROUND PLUMBING PLAN
P-101	FIRST FLOOR PLUMBING PLAN
P-200	PLUMBING RISER
ELECTRICAL	
E-001	ELECTRICAL LEGEND
E-100	LIGHTING PLANS
E-200	POWER/SYSTEMS PLANS
E-201	HVAC POWER PLAN
E-300	ELECTRICAL DETAILS
E-400	PANEL SCHEDULES
T-001	COMMUNICATIONS LEGEND
T-100	AUDIOVISUAL PLANS
T-200	AUDIOVISUAL DETAILS
T-201	AUDIOVISUAL FLOW DIAGRAMS
T-202	AUDIOVISUAL FLOW DIAGRAMS
CIVIL	
C0.0	COVER
C1.0	NOTES AND DETAILS
C2.0	EXISTING CONDITIONS & DEMO PLAN
C3.0	LAYOUT PLAN AND GRADING PLAN

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

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WHITE SULPHUR SPRINGS, WEST VIRGINIA

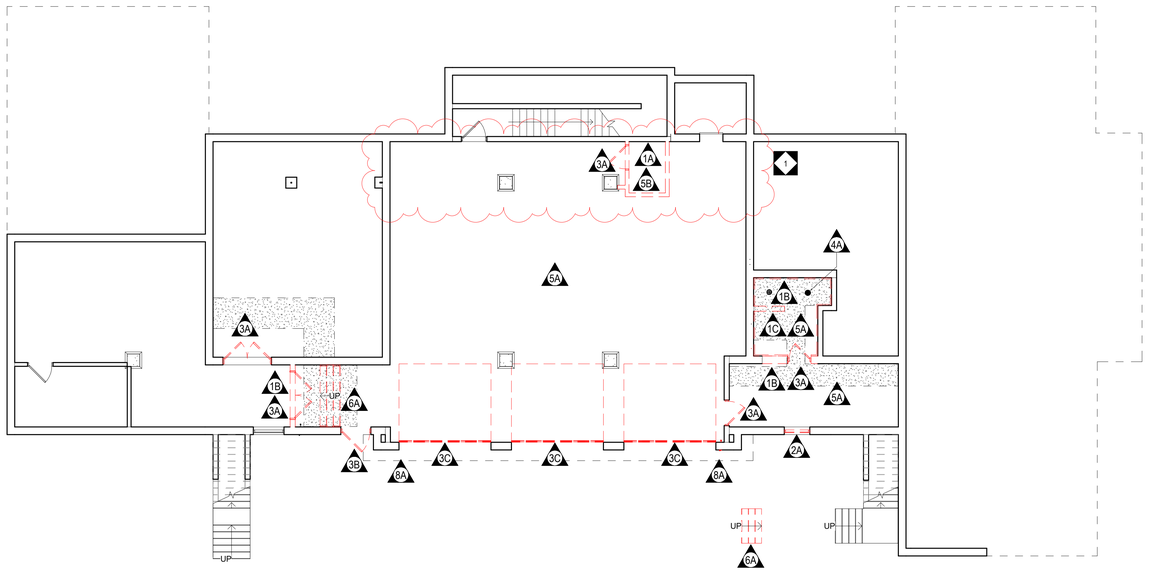
ADDITION AND RENOVATIONS
MULTIPURPOSE ROOM
FLUVANNA COUNTY
132 MAIN STREET
PALMYRA, VA 22963

GENERAL INFORMATION

PLOT SCALE: 1/2" = 1'-0"
FILENAME: CRA PROJECT No. 3430
DATE: AUGUST 28, 2020

PROJECT 3430

CS.2



1 / D1.0 SUB-BASEMENT DEMOLITION PLAN
1/8" = 1'-0"

REMOVE EXISTING CONCRETE SLAB IN ITS ENTIRETY. PREPARE SUB-BASE TO RECIEVE NEW GRANULAR FILL. VAPOR BARRIER AND REINFORCED CONCRETE. REFER TO MEP DRAWINGS FOR FULL EXTENT OF REQUIRED REMOVAL AND REPLACEMENT.

ALTERATION LEGEND

TAG	REMARK
0 - ROOF	
0A	Not Used
1 - WALL	
1A	REMOVE EXISTING PARTITION AND ALL RELATED COMPONENTS IN ITS ENTIRETY. PATCH AND REPAIR ALL EXISTING SUBSTRATES AND SURFACES TO REMAIN. PREPARE SURFACES TO RECEIVE NEW SCHEDULED WORK AND FINISHES.
1B	REMOVE EXISTING MASONRY PARTITION AND ALL RELATED COMPONENTS IN ITS ENTIRETY. PATCH AND REPAIR ALL EXISTING SUBSTRATES AND SURFACES TO REMAIN. PREPARE SURFACES TO RECEIVE NEW SCHEDULED WORK AND FINISHES.
1C	REMOVE EXISTING THICK SET CERAMIC TILE WAINSCOT IN ITS ENTIRETY. GRIND ALL MORTAR RESIDUE OFF DOWN TO FACE OF EXISTING CMU. PROVIDE SMOOTH CLEAN FINISH TO RECEIVE NEW CONSTRUCTION AND FINISHES. PATCH AND REPAIR ALL EXISTING SUBSTRATES AND SURFACES TO REMAIN. PREPARE SURFACES TO RECEIVE NEW SCHEDULED WORK AND FINISHES.
2 - WINDOW	
2A	REMOVE EXISTING WINDOW, HARDWARE, FRAME AND ALL ASSOCIATED COMPONENTS IN ITS ENTIRETY. PREPARE ALL SURFACES TO RECIEVE NEW CONSTRUCTION.
3 - DOOR	
3A	REMOVE EXISTING DOOR, HARDWARE, FRAME AND ALL ASSOCIATED COMPONENTS IN ITS ENTIRETY. PREPARE ALL SURFACES TO RECIEVE NEW CONSTRUCTION.
3B	REMOVE EXISTING DOOR, TRANSOM WINDOW, HARDWARE, FRAME AND ALL ASSOCIATED COMPONENTS IN ITS ENTIRETY. PREPARE ALL SURFACES TO RECIEVE NEW CONSTRUCTION.
3C	REMOVE EXISTING OVERHEAD DOOR, TRACK, HARDWARE, FRAME, DOOR OPENERS AND ALL ASSOCIATED COMPONENTS IN ITS ENTIRETY. PATCH AND PREPARE ALL SURFACES TO RECIEVE NEW CONSTRUCTION.
4 - FLOOR	
4A	REMOVE EXISTING RESILIENT FLOORING IN ITS ENTIRETY, PATCH AND PREPARE EXISTING FLOOR SURFACE TO RECEIVE NEW CONSTRUCTION
5 - CEILING	
4A	REMOVE EXISTING SUSPENDED ACOUSTICAL TILE CEILING, GRID, HANGERS AND ALL ASSOCIATED COMPONENTS IN ITS ENTIRETY
5A	REMOVE EXISTING SUSPENDED ACOUSTICAL TILE CEILING, GRID, HANGERS AND ALL ASSOCIATED COMPONENTS IN ITS ENTIRETY
5B	REMOVE EXISTING GYPSUM BOARD CEILING, FRAMING, HANGERS AND ALL ASSOCIATED COMPONENTS IN ITS ENTIRETY
6 - STAIR	
6A	
7 - EQUIPMENT/CASEWORK	
7A	NOT USED
8 - MISCELLANEOUS	
8A	REMOVE EXISTING CORNICE, TRIM, FRAMING, FLASHING AND ALL RELATED COMPONENTS. PATCH AND PREPARE EXISTING MANSORY WALL TO RECEIVE NEW CONSTRUCTION.
9 - MEP	
9A	NOT USED

ALTERATION NOTES:

1. EXISTING CONDITIONS AS INDICATED ON THE ALTERATION DRAWING(S) MAY VARY WITH ACTUAL CONDITIONS. BEFORE START OF WORK, VERIFY EXISTING CONDITIONS AS RELATED TO COMPLETION OF NEW PROJECT AND/OR SITE IMPROVEMENTS.

2. REFER TO CIVIL AND MEP DRAWINGS FOR ADDITIONAL ALTERATION WORK INCLUDING REMOVAL, DISCONNECT AND/OR CAPPING OF EXISTING SERVICES SUCH AS WATER, GAS, SEWER, ELECTRIC, ETC.

3. BEFORE START OF ALTERATION WORK, REVIEW AND PREPARE AN OWNER APPROVED LIST OF EXISTING ITEMS TO REMAIN AS OWNER'S PROPERTY. DESIGNATED ITEMS TO BE REMOVED AND STORED IN SECURE, CLEAN, DRY ON-SITE LOCATION. ITEMS TO BE MAINTAINED AS EXISTING AND IN REUSABLE CONDITION.

4. REMAINING DISTURBED CONSTRUCTION, MATERIALS OR FINISHES SHALL BE PATCHED, REPAIRED OR REPLACED AS REQUIRED TO MATCH THE ORIGINAL CONDITION AND AS IT IS RELATED TO COMPLETION OF NEW PROJECT AND/OR SITE IMPROVEMENTS.

5. OWNER RESERVES THE RIGHT TO SALVAGE AND REMOVE ANY EXISTING ITEMS BEFORE START OF ALTERATION WORK.

GENERAL DEMOLITION NOTES:

D1. DASHED LINES INDICATE GENERAL EXISTING CONSTRUCTION TO BE REMOVED. GENERAL CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL EXISTING CONDITIONS RELATING TO THE DEMOLITION REQUIRED FOR INSTALLATION OF NEW CONSTRUCTION SHOWN ELSEWHERE.

D2. SEE STRUCTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND FOOD SERVICE DRAWINGS FOR OTHER DEMOLITION WORK REQUIRED. ANY DEMOLITION OF MECHANICAL, ELECTRICAL, OR PLUMBING EQUIPMENT SHOWN ON THESE DRAWINGS, IS FOR COORDINATION ONLY. COORDINATE ALL WORK BY OTHER CONTRACTORS INCLUDING CAPPING AND DISCONNECTING OF BUILDING SERVICES SUCH AS WATER, WASTE, ELECTRIC, DUCTWORK, ETC.

D3. BEFORE DEMOLITION AND THROUGHOUT CONSTRUCTION, GENERAL CONTRACTOR SHALL BE RESPONSIBLE TO REVIEW WITH OWNER'S REPRESENTATIVE ALL ITEMS BEING REMOVED BY THEIR TRADES. ALL ITEMS DESIGNATED DURING THIS REVIEW TO REMAIN OWNER'S PROPERTY, SHALL BE MAINTAINED IN GOOD CONDITION AND TURNED OVER TO OWNER. ALL ITEMS DESIGNATED TO BE REUSED AS PART OF NEW CONSTRUCTION SHALL BE MAINTAINED IN A REUSABLE CONDITION AND STORED ON SITE BY CONTRACTOR IN A CLEAN, DRY LOCATION UNTIL INSTALLATION. ALL REMAINING ITEMS AND MATERIALS DEEMED TO BE TRASH SHALL BE DISPOSED OF PROPERLY BY LAW, OFF SITE BY THE RESPONSIBLE CONTRACTOR.

D4. EXISTING CONDITIONS AS THEY APPEAR IN THESE CONTRACT DOCUMENTS MAY VARY WITH ACTUAL CONDITIONS BECAUSE OF WORK PERFORMED WITH OWNER'S STAFF AND BY OTHER CONTRACTORS (I.E. ASBESTOS ABATEMENT CONTRACTOR) PRIOR TO CONTRACT. PORTIONS OF DEMOLITION WORK MAY BE INCLUDED IN THE SCOPE OF WORK OF ANOTHER CONTRACT AND NOT PART OF THIS PROJECT. GENERAL CONTRACTOR SHALL VERIFY THE ACTUAL SCOPE OF DEMOLITION IN THEIR CONTRACT PRIOR TO SUBMITTING A BID.

D5. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL EXISTING BUILDING DIMENSIONS AND CONDITIONS, INCLUDING FINISHES AND MATERIALS, SYSTEMS SHOWN AND DESIGNATED AS EXISTING ON CONTRACT DRAWINGS PRIOR TO STARTING DEMOLITION AND CONSTRUCTION. ANY DISCREPANCIES IN INFORMATION INDICATED ON CONTRACT DRAWINGS SHALL BE DIRECTED IN WRITING TO THE ATTENTION OF THE ARCHITECT PRIOR TO STARTING OF DEMOLITION AND CONSTRUCTION. VERIFICATION OF CLEARANCES REQUIRED FOR ALL NEW EQUIPMENT, PIPING, DUCTWORK AND RELATED COMPONENTS SHALL BE THE CONTRACTORS RESPONSIBILITY.

D6. DEMOLITION WORK SHOWN ON THE DEMOLITION CONTRACT DRAWINGS SHALL BE FOR THE BUILDING RECEIVING MAJOR DEMOLITION WORK, AND DOES NOT REPRESENT THE DEMOLITION FOR THE PROJECT IN ITS ENTIRETY. REFER TO CONTRACT DRAWINGS FOR ADDITIONAL DEMOLITION WORK, IF. ANY, FOR EACH ROOM OR BUILDING COMPONENT.

D7. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL DEMOLITION CONDITIONS RELATED TO ACCEPTED ALTERNATE BIDS. INCLUDING FINISHES AND MATERIALS, SYSTEMS SHOWN AND DESIGNATED AS EXISTING OR NEW ON THE CONTRACT DRAWINGS PRIOR TO STARTING OF DEMOLITION AND CONSTRUCTION. ANY DISCREPANCIES IN INFORMATION INDICATED ON CONTRACT DRAWINGS SHALL BE DIRECTED IN WRITING TO THE ATTENTION OF THE ARCHITECT PRIOR TO STARTING OF DEMOLITION AND CONSTRUCTION.

D8. OWNER RESERVES THE RIGHT TO SALVAGE AND REMOVE ANY EXISTING ITEMS BEFORE START OF DEMOLITION WORK.

D9. DEMOLITION DRAWINGS INDICATE EXISTING SLABS TO BE REMOVED IN THEIR ENTIRETY. REFER TO MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS FOR ANY SAWCUTTING AND PATCHING OF CONCRETE SLABS THAT NEEDS TO OCCUR AS PART OF THEIR WORK. IN ADDITON, REFER TO STRUCTURAL DRAWINGS FOR SAWCUTTING AND PATCHING THAT NEEDS TO OCCUR TO ACCOMODATE INSTALLATION OF NEW FOOTINGS, PIERS ETC.

D10. GENERAL CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY EXISTING LOAD BEARING WALLS AND PROVIDE TEMPORARY SHORING AND SUPPORT UNTILL NEW STRUCTURE CAN BE INSTALLED.

D11. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ASBESTOS CONTAINING MATERIALS AND DISPOSING OF THEM OFF SITE IN ACCORDANCE WITH STATE LOCAL AND LAWS.

D12. WHERE EXTERIOR WALLS ARE SCHEDULED TO BE REMOVED, THEY ARE TO BE REMOVED DOWN TO TOPS OF EXISTING FOOTINGS. REMOVE EXISTING FOOTINGS WHERE THEY INTERFERE WITH NEW CONSTRUCTION.

GENERAL ALTERATION NOTES:

R1. GENERAL CONTRACTOR IS RESPONSIBLE FOR VERIFICATION AND RECORDING OF ALL EXISTING BUILDING DIMENSIONS AND CONDITIONS RELATED TO THE WORK, INCLUDING BUT NOT LIMITED TO FINISHES, MATERIALS AND SYSTEMS SHOWN AND DESIGNATED AS EXISTING IN CONTRACT DOCUMENTS. ANY DISCREPANCIES FROM INFORMATION INDICATED ON CONTRACT DOCUMENTS SHALL BE DIRECTED TO THE ATTENTION OF THE ARCHITECT. VERIFICATION OF CLEARANCES REQUIRED FOR ALL NEW EQUIPMENT, PIPING, DUCTWORK, AND RELATED COMPONENTS SHALL BE THE CONTRACTORS RESPONSIBILITY.

R2. GENERAL CONTRACTORS RESPONSIBILITY TO REVIEW WITH THE OWNERS REPRESENTATIVE, ALL ITEMS REQUIRING REMOVAL BEFORE THE START OF WORK. OWNER RESERVES THE RIGHT TO SALVAGE ANY ITEM. ALL REMAINING ITEMS SHALL BE DISPOSED OF OFF SITE.

R3. WHERE EXISTING WALL OPENINGS ARE INDICATED TO BE CLOSED, USE MATERIALS AND FINISHES TO MATCH ADJACENT EXISTING FINISHES. MASONRY SHALL BE TOOTHED INTO THE EXISTING COURSING TO ACHIEVE A UNIFORM JOINT PATTERN TO MATCH THE EXISTING.

R4. ALL NEW MASONRY WALLS AND INFILLS THAT ARE IN CONTINUANCE WITH EXISTING MASONRY WALLS SHALL BE TOOTHED INTO THE EXISTING COURSING TO ACHIEVE A UNIFORM JOINT PATTERN TO MATCH THE EXISTING, FIELD VERIFY WALL THICKNESS.

R5. IN ALL RENOVATED AREAS OF THE WORK, THE INTENT OF THESE CONTRACT DOCUMENTS IS TO PROVIDE A LEVEL OF QUALITY FOR ALL PATCHED SURFACES EQUAL TO THAT OF NEW SURFACES, INCLUDING BUT NOT LIMITED TO PLASTER, GYPSUM WALL BOARD AND MASONRY.

R6. ALL EXISTING MATERIALS AND FINISHES DISTURBED OR INTERRUPTED BY THE WORK SHALL BE REPLACED OR "FILLED IN" TO ACHIEVE UNIFORM COLOR, TEXTURE, PATTERN AND APPEARANCE TO MATCHING ADJACENT MATERIALS AND FINISHES. TRANSITIONS BETWEEN EXISTING TO EXISTING AND NEW TO EXISTING MATERIALS AND FINISHES SHALL BE ACHIEVED IN STRAIGHT HORIZONTAL AND OR VERTICAL LINES BETWEEN DIFFERENT AND OR NEW MATERIALS AND FINISHES.

R7. PATCH ALL HOLES IN FLOORS, WALLS AND CEILINGS, LEVEL WITH EXISTING ADJACENT SURFACES TO RECEIVE NEW FINISHES AND/OR CONSTRUCTION TO COMPLETE THE WORK. MATCH THE EXISTING ADJACENT MATERIALS, PATTERNS AND FINISHES.

R8. PATCH, REPAIR OR REPLACE ALL EXISTING FINISHES AND MATERIALS DISTURBED DURING CONSTRUCTION OR AS A RESULT OF DEMOLITION OR REMOVAL OF AN ITEM. ALL REPAIR OR REPLACEMENT SHALL MATCH ADJACENT EXISTING AND/OR NEW FINISHES, PATTERNS AND MATERIALS. SEE ROOM FINISH SCHEDULE FOR NEW FINISHES.

R9. PREPARE EXISTING REMAINING WORK SUBSTRATES TO RECEIVE NEW FINISHES AS INDICATED ON THE ROOM FINISH SCHEDULE. SUBSTRATE PREPARATION SHALL BE IN CONFORMANCE WITH THE INSTALLATION REQUIREMENTS OF EACH NEW FINISH.

R10. ALL WALLS SHOWN WITH MASONRY HATCHING WITHIN THE EXISTING BUILDING SHALL BE NEW AND TOOTHED INTO EXISTING MASONRY. MATCH EXISTING COURSING, JOINT PATTERN AND THICKNESS UNLESS NOTED OTHERWISE.

R11. MASONRY WALLS AND INFILLS THAT ARE IN CONTINUANCE WITH EXISTING MASONRY WALLS SHALL BE TOOTHED INTO THE EXISTING COURSING TO ACHIEVE A UNIFORM JOINT PATTERN TO MATCH THE EXISTING WORK. MATCH EXISTING WALL THICKNESS.

R12. AT THE DEMOLITION OF AN EXISTING ITEM, REMOVE ALL TRACES OF THE DEMOLISHED ITEMS COMPONENTS FROM THE SURFACE OF THE REMAINING FLOOR, WALLS AND CEILING. AT THE REMOVED FASTENERS IN ALL EXISTING MASONRY WALLS AND FLOORS, PATCH HOLE WITH GROUT LEVEL WITH EXISTING ADJACENT SURFACES IN ORDER TO RECEIVE NEW FINISHES.

R13. AT EXISTING FLOORS: CUT IN PLACE CONSTRUCTION TO RECEIVE NEW WORK. REPLACE WITH MATERIALS TO MATCH EXISTING REMAINING MATERIALS. PATCH FLUSH TO ADJACENT EXISTING ELEVATIONS. APPLY CEMENTITIOUS UNDERLAYMENT TO PRODUCE A UNIFORM SURFACE IN ALL AREAS RECEIVING NEW FINISHES AS INDICATED ON THE ROOM FINISH SCHEDULE. PATCHED JOINTS SHALL NOT TELEGRAPH THRU THE NEW FINISH. SEE DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND OTHER FINISHES.

R14. AT EXISTING FLOORS: WHERE WALLS ARE SCHEDULED FOR DEMOLITION AND EXTEND TO BELOW THE CONTINUOUS CONCRETE FLOOR SLAB, THE WALL SHALL BE DEMOLISHED TO BELOW THE FLOOR THICKNESS. THE FLOOR SHALL BE PATCHED WITH CONCRETE AND GRANULAR FILL TO MATCH THE EXISTING THICKNESS. PROVIDE NEW VAPOR BARRIER TO THE PATCHED AREA. PATCH FLUSH TO ADJACENT EXISTING ELEVATIONS. APPLY CEMENTITIOUS UNDERLAYMENT TO PRODUCE A UNIFORM SURFACE IN ALL AREAS RECEIVING NEW FINISH AS INDICATED ON ROOM FINISH SCHEDULE. PATCHED JOINTS SHALL NOT TELEGRAPH THRU THE NEW FINISH.

R15. PAINT EXISTING METALS: AT EXISTING DOOR FRAMES TO REMAIN AND OTHER PAINTED METAL COMPONENTS INDICATED. REMOVE ALL DIRT, LOOSE PAINT AND RUST, SAND ENTIRE FRAME, PRIME AND PAINT. COLOR SELECTION BY ARCHITECT. WHERE THE EXISTING PAINT IS INCOMPATIBLE WITH NEW PAINT COATINGS, THE EXISTING PAINT SHALL BE COMPLETELY REMOVED.

R16. PAINT SURFACES: WHERE PATCHING OCCURS IN THE WORK OF AN EXISTING PAINTED SURFACE, THE PATCHED AREA SHALL BE SPACKLED, PRIMED AND INTERMEDIATE PAINT COATS APPLIED OVER THE PATCH. APPLY FINAL PAINT COAT OVER ENTIRE UNBROKEN SURFACE CONTAINING THE PATCH. THE UNBROKEN SURFACE SHALL BE FROM THE INTERSECTION OF THE WALL TO FLOOR TO THE INTERSECTION OF THE WALL TO CEILING AND FROM THE RIGHT SIDE WALL TO WALL INTERSECTION TO THE LEFT SIDE WALL TO WALL INTERSECTION. PROVIDE ADDITIONAL SPACKLING AND/OR PAINT COATS UNTIL THE PATCH AREAS BLEND INVISIBLY INTO THE ADJACENT EXISTING SURFACE. UNBROKEN CEILING SURFACES SHALL BE FROM CEILING TO WALL INTERSECTION AND OR NEW BULKHEAD CEILING ELEVATION CHANGE FOR THE ENTIRE PERIMETER OF THE CEILING AREA. APPLY PAINT COATS AS DESCRIBED FOR THE WALLS.

R17. AT EXISTING CERAMIC TILE: AT DEMOLISHED ITEMS AND DAMAGED AREAS, FILL ALL HOLES IN EXISTING CERAMIC WALL AND FLOOR TILE THAT ARE UP TO 1" WITH A COLOR EPOXY GROUT TO MATCH THE EXISTING CERAMIC TILE COLOR. REMOVE AND REPLACE EXISTING TILES AT HOLES THAT ARE OVER 1" AND AT ALL BROKEN AND MISSING WALL AND FLOOR TILES WITH A NEW TILE TO MATCH EXISTING COLOR AND SIZE.

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

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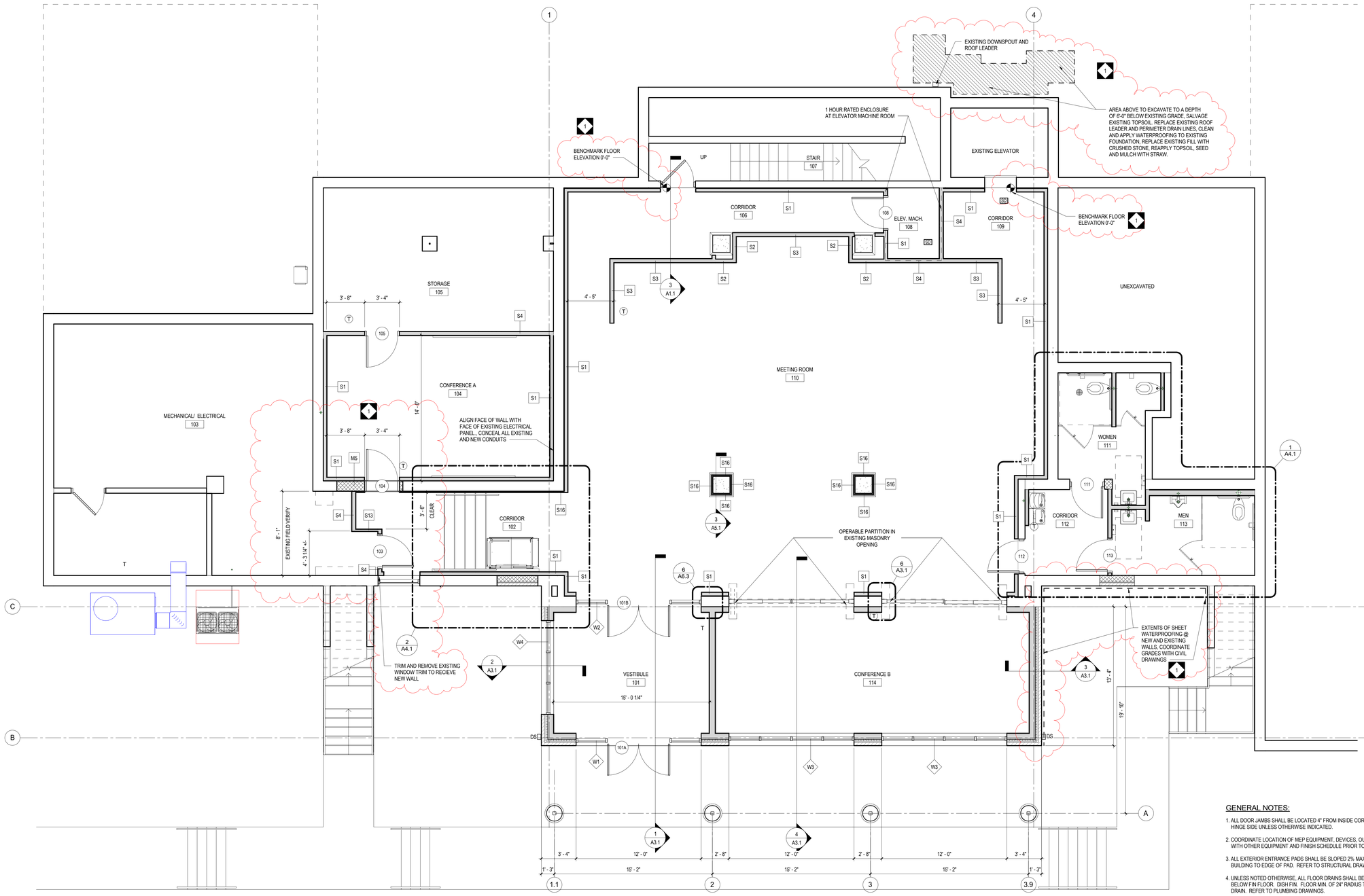
DEMOLITION PLAN, ALTERATION NOTES & LEGEND

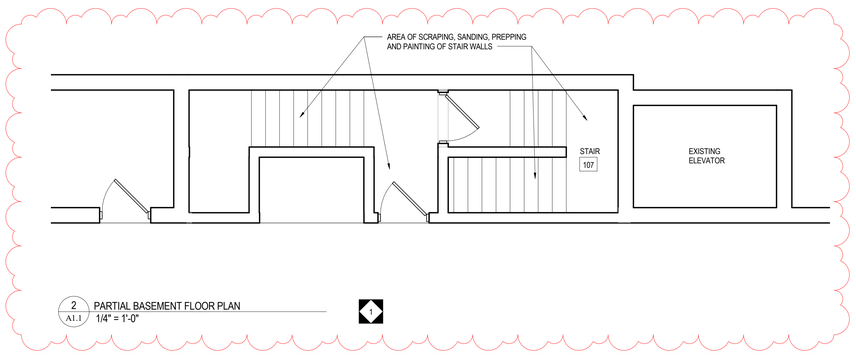
PLOT SCALE: 1/8" = 1'-0"
FILENAME: CRA PROJECT No. 3430
DATE: AUGUST 28, 2020

PROJECT 3430

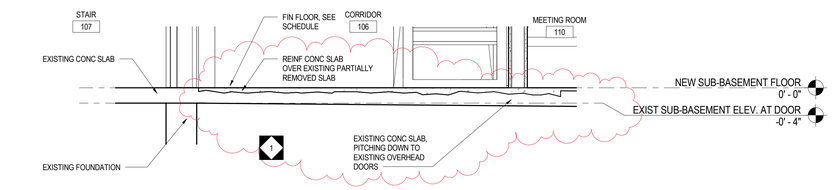
D1.0



1 A1.1 SUB-BASEMENT FLOOR PLAN
1/4" = 1'-0"



2 A1.1 PARTIAL BASEMENT FLOOR PLAN
1/4" = 1'-0"



3 A1.1 SECTION DETAIL
3/4" = 1'-0"

NORTH

GENERAL NOTES:

1. ALL DOOR JAMBS SHALL BE LOCATED 4" FROM INSIDE CORNER OF WALL ON HINGE SIDE UNLESS OTHERWISE INDICATED.
2. COORDINATE LOCATION OF MEP EQUIPMENT, DEVICES, OUTLET BOXES, ETC. WITH OTHER EQUIPMENT AND FINISH SCHEDULE PRIOR TO INSTALLATION.
3. ALL EXTERIOR ENTRANCE PADS SHALL BE SLOPED 2% MAX AWAY FROM THE BUILDING TO EDGE OF PAD. REFER TO STRUCTURAL DRAWINGS.
4. UNLESS NOTED OTHERWISE, ALL FLOOR DRAINS SHALL BE SET 1/4" MAX. BELOW FIN FLOOR. DISH FIN. FLOOR MIN. OF 24" RADIUS TO TOP OF FLOOR DRAIN. REFER TO PLUMBING DRAWINGS.
5. UNLESS NOTED OTHERWISE, WHERE DIFFERENT FLOOR ELEVATIONS OCCUR ON OPPOSITE SIDES OF INTERIOR MASONRY WALLS, PROVIDE COLD FLUID APPLIED WATERPROOFING (CFAWP) ON THE BACKFILLED FACE OF WALL. APPLY CFAWP FROM UNDERSIDE OF CONC. SLAB TO TOP OF FOOTING BELOW. CFAWP NOT TO INTERFERE WITH INSTALLATION OF CONC. SLAB VAPOR BARRIER.
6. GC TO PROVIDE ALL LOUVERS COORDINATE WITH MEP DRAWINGS.
7. ALL WALL LAYOUT DIMENSIONS ARE FROM FACE OF STUD & FACE OF CMU UNLESS OTHERWISE NOTED.

REVISIONS

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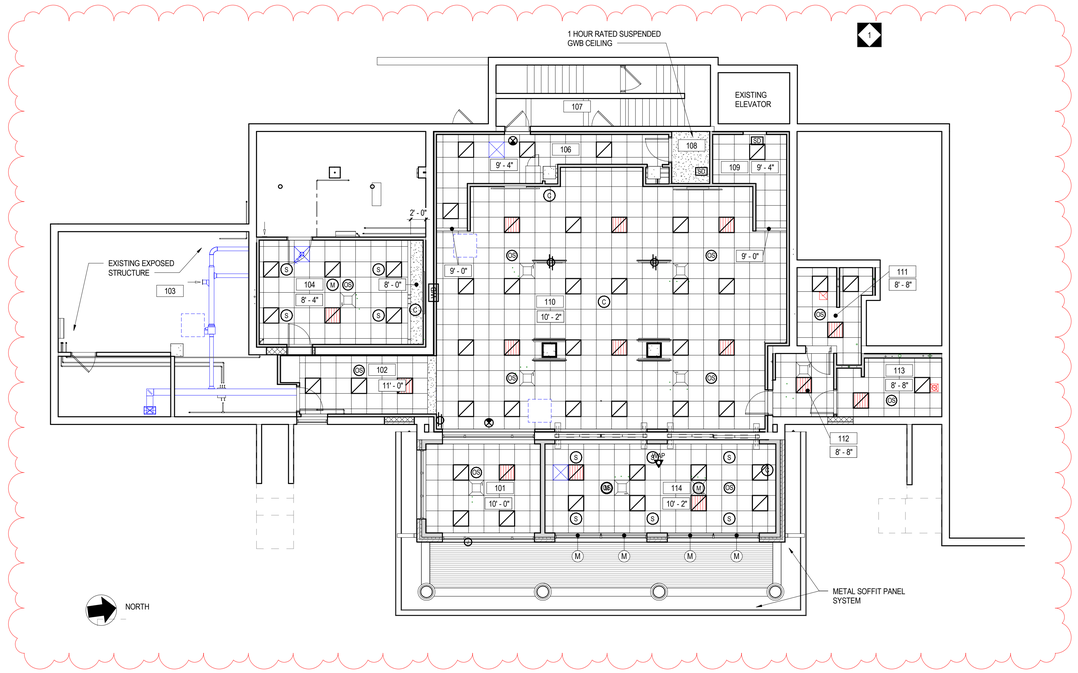
SUB-BASEMENT FLOOR PLAN

PLOT SCALE: As indicated
FILENAME: CRA PROJECT No. 3430
DATE: AUGUST 28, 2020

PROJECT 3430

A1.1



2 A1.2 SUB-BASEMENT REFLECTED CEILING PLAN
1/8" = 1'-0"

REFLECTED CEILING PLAN GENERAL NOTES:

1. UNLESS NOTED OTHERWISE, GYPSUM BULKHEADS TO BE 3 5/8" METAL STUDS AT 16" O/C WITH 5/8" GWB EACH SIDE, EXTENDING MIN 2" BELOW ADJACENT CEILING.

2. CEILING GRID SHALL BE COORDINATED WITH MEP EQUIPMENT AND DEVICES.

3. UNLESS NOTED OTHERWISE, ALL VISIBLE STRUCTURAL STEEL, ROOF/ FLOOR DECK, DUCTWORK, PIPING, CONDUIT, HANGER WIRES, ETC AT EXPOSED LOCATIONS OR ABOVE CEILING CLOUDS SHALL BE PAINTED.

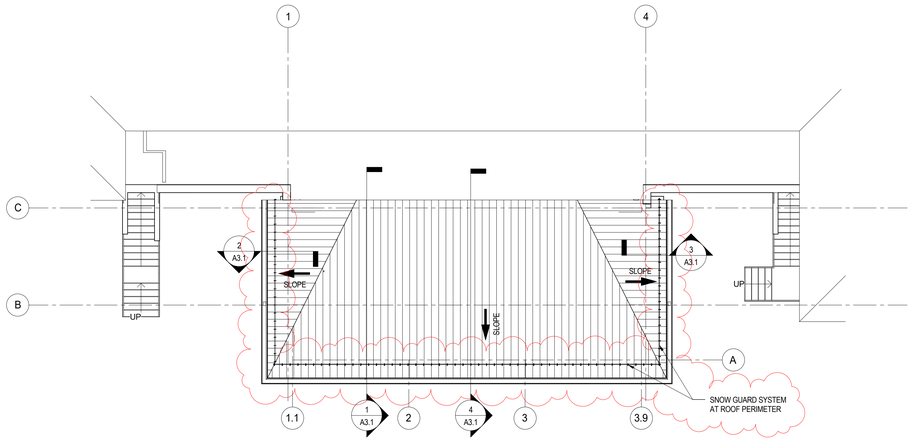
4. REFER TO ROOM FINISH SCHEDULE FOR CEILING TYPES.

5. ALL VISIBLE HANGER WIRES, STRUCTURE AND BRACING AT EXPOSED CEILING GRID OR CEILING CLOUD LOCATIONS SHALL BE INSTALLED PLUMB AND LEVEL.

6. FOR WINDOWS THAT REQUIRE TWO OR MORE ROLLER SHADES, EACH ROLLER SHADE SHALL TERMINATE AT THE CENTER OF THE WINDOW MULLION. REFER TO HOLLOW METAL AND ALUMINUM FRAME ELEVATIONS FOR FOR DIMENSIONS AND WINDOW MULLION DESIGN AND ROLLER SHADE BREAKS.

LEGEND

- 2' X 4' SUSPENDED CEILING SYSTEM
- 2' X 4' SECOND LOOK SUSPENDED CEILING SYSTEM
- 2' X 2' SUSPENDED CEILING SYSTEM
- GYPSUM WALLBOARD
- LINEAR METAL SOFFIT
- STEEL LINTEL - PAINTED
- 2' X 4' LIGHT FIXTURE
- 1' X 4' LIGHT FIXTURE
- 2' X 2' LIGHT FIXTURE
- SEE MEP DRAWINGS
- SEE MEP DRAWINGS
- RECESSED DOWN LIGHT
- PENDANT LIGHT FIXTURES
- (M) ROLLER SHADE - MANUAL
- (MB) ROLLER SHADE - MANUAL BLACKOUT W/ DUAL ROLLER
- (E) ROLLER SHADE - MOTORIZED
- (EB) ROLLER SHADE - MOTORIZED BLACKOUT W/ DUAL ROLLER



1 A1.2 PARTIAL ROOF PLAN
1/8" = 1'-0"

LEGEND		ROOF PLAN NOTES:
LP	LOW POINT	1. COORDINATE ROOF-MOUNTED EQUIPMENT & PENETRATIONS. REFER TO MEP DRAWINGS.
HP	HIGH POINT	2. PROVIDE ROOFING MANUFACTURERS' STANDARD DETAILS FOR ALL PENETRATIONS & FLASHING AS PER ROOFING MANUFACTURERS' WARRANTY.
OD	OVERFLOW DRAIN	3. CRICKETS AND SADDLES SHALL HAVE A MINIMUM OF TWO TIMES THE SLOPE OF THE PRIMARY TAPERED SYSTEM OR STRUCTURAL SLOPE.
→	FLOW DIRECTION	4. ROOF MOUNTED EQUIPMENT CURBS AND SUPPORTS SHALL BE FURNISHED AND INSTALLED BY THE EQUIPMENT SUPPLIER.
	INDICATES STANDING SEAM ROOF SYSTEM WITH 4" NAIL BASE INSULATION	

REVISIONS

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1	9/14/20		Addendum 1

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SUB-BASEMENT REFLECTED CEILING PLAN AND ROOF PLAN

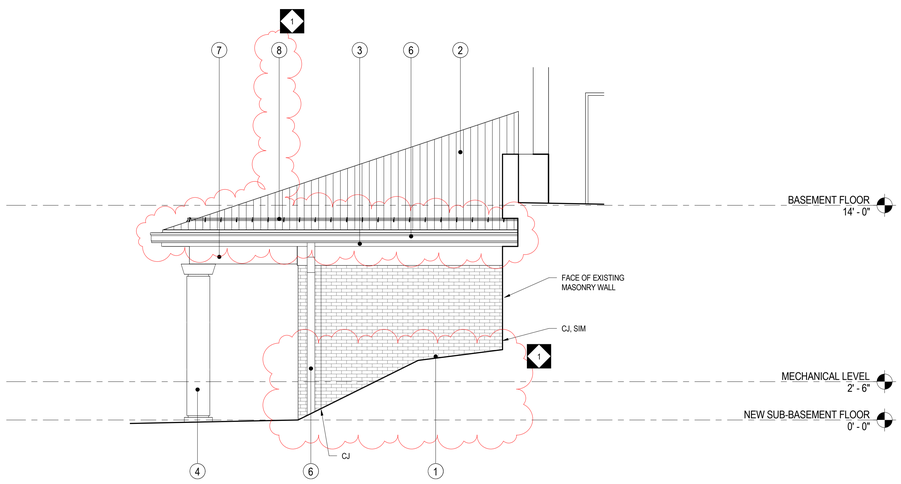
PLOT SCALE: 1/8" = 1'-0"
FILENAME: CRA PROJECT No. 3430
DATE: AUGUST 28, 2020

PROJECT 3430

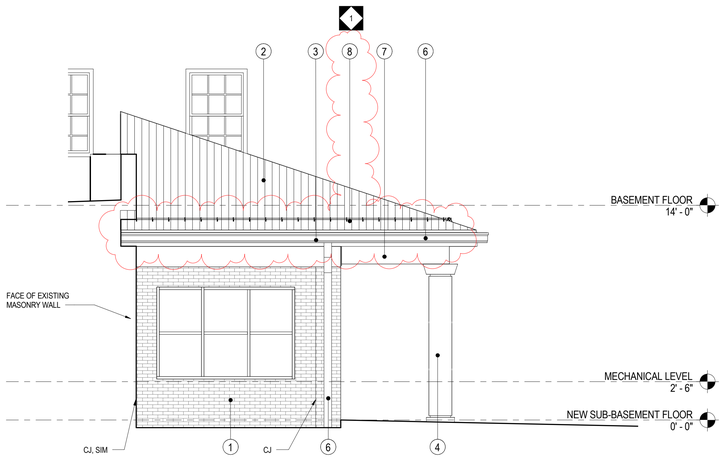
A1.2

1 A2.1 PARTIAL EAST ELEVATION
1/4" = 1'-0"

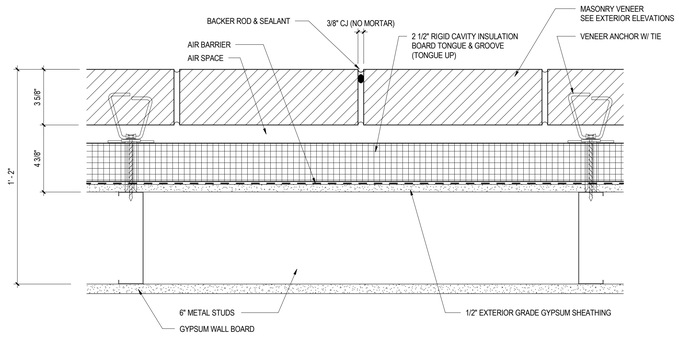
ELEVATION LEGEND	
TAG	ELEVATION NOTE
1	BRICK VENEER - MATCH EXISTING BRICK FOR COLOR AND SIZE
2	STANDING SEAM METAL ROOF PANEL SYSTEM
3	METAL FASCIA, PREFINISHED, REFER TO SECTIONS
4	COLUMN WRAP
5	ALUMINUM STOREFRONT AND GLAZING SYSTEM
6	PREFINISHED METAL GUTTER AND DOWNSPOUT SYSTEM
7	METAL TRIM, PREFINISHED, REFER TO SECTIONS
8	SNOW GUARD SYSTEM



2 A2.1 PARTIAL NORTH ELEVATION
1/4" = 1'-0"



3 A2.1 PARTIAL SOUTH ELEVATION
1/4" = 1'-0"



4 A2.1 TYPICAL EXTERIOR WALL CONTROL JOINT DETAIL - METAL STUD BACK UP
3" = 1'-0"

REVISIONS

#	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
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EXTERIOR ELEVATIONS

PLOT SCALE: As indicated
FILENAME: CRA PROJECT No. 3430
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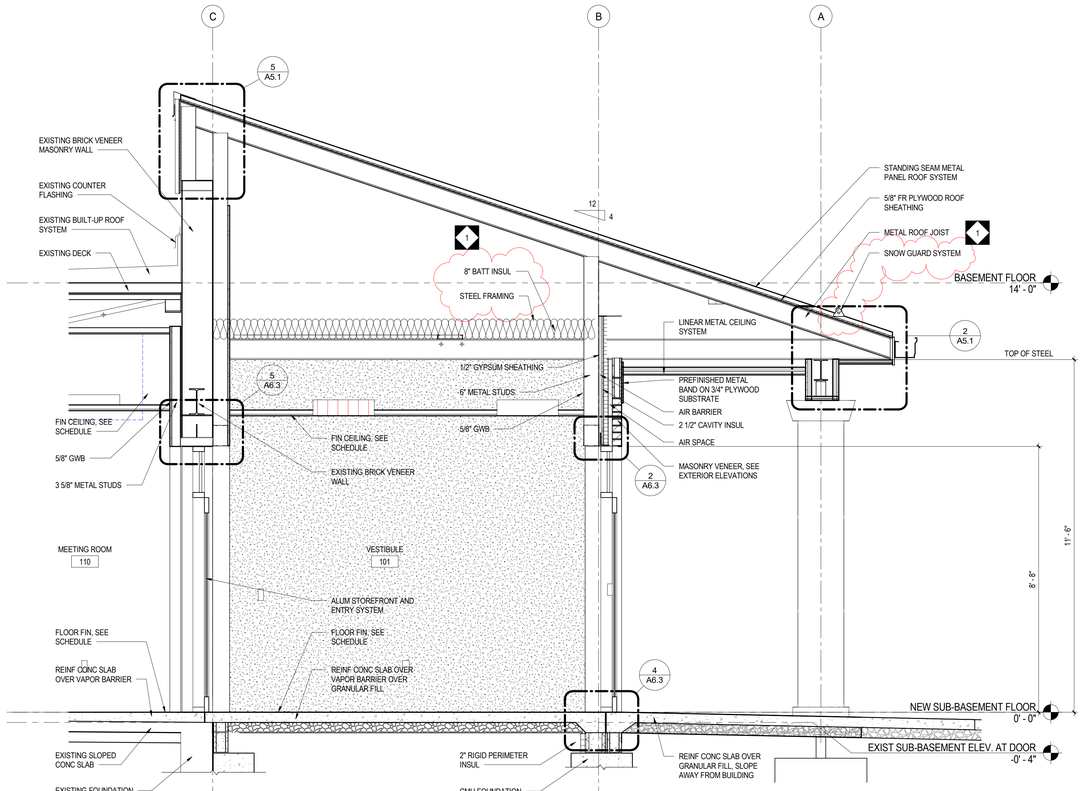
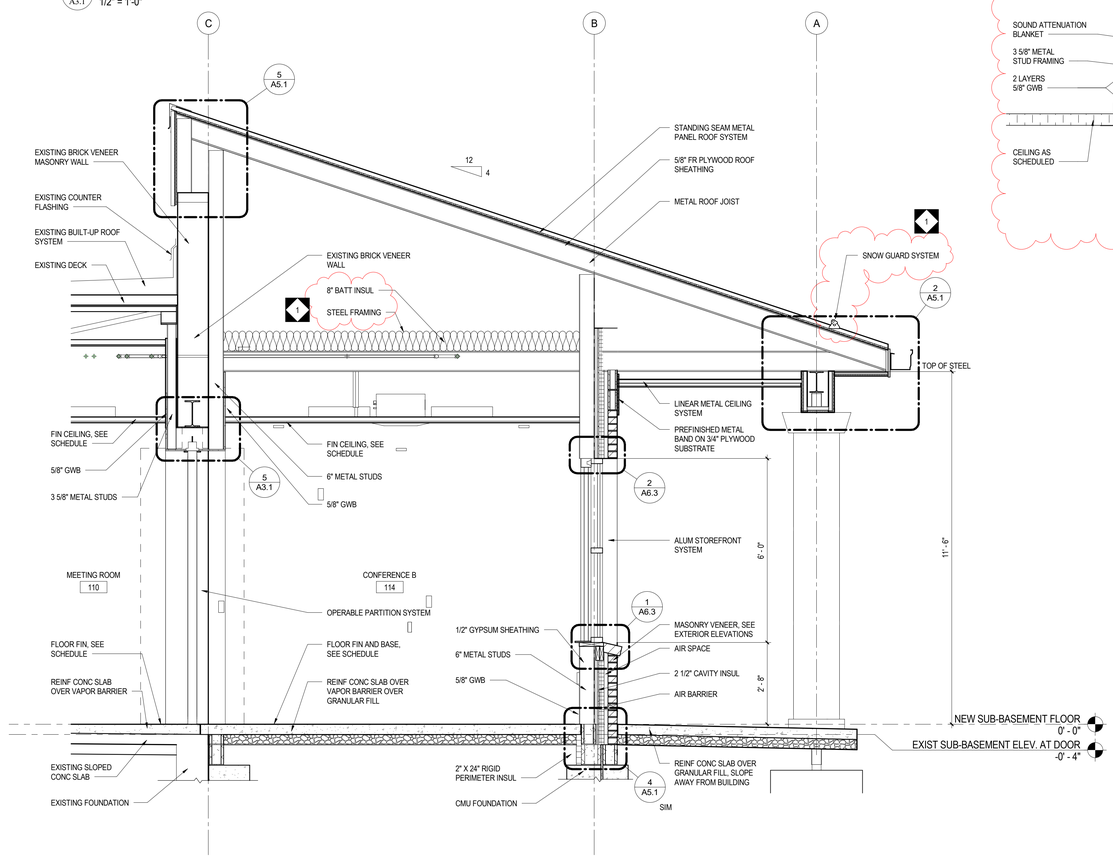
PROJECT 3430

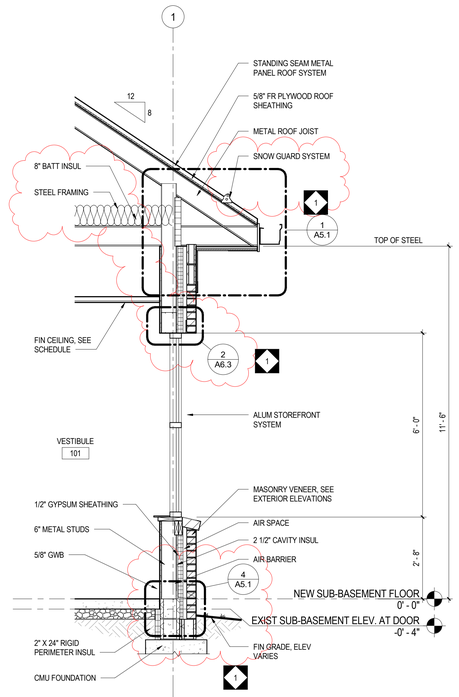
A2.1



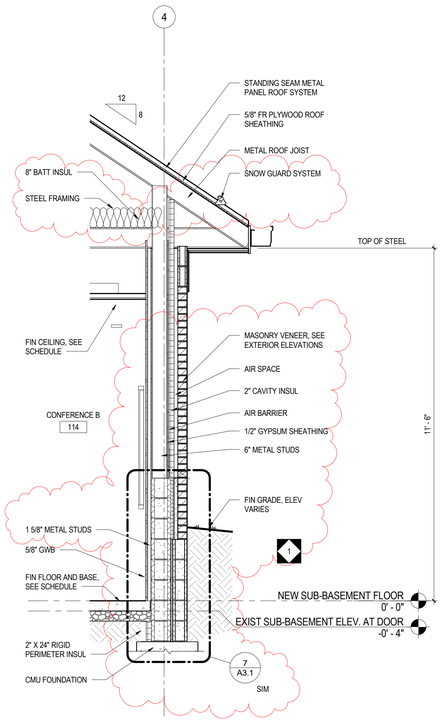
1 A3.1 WALL SECTION AT VESTIBULE
1/2" = 1'-0"



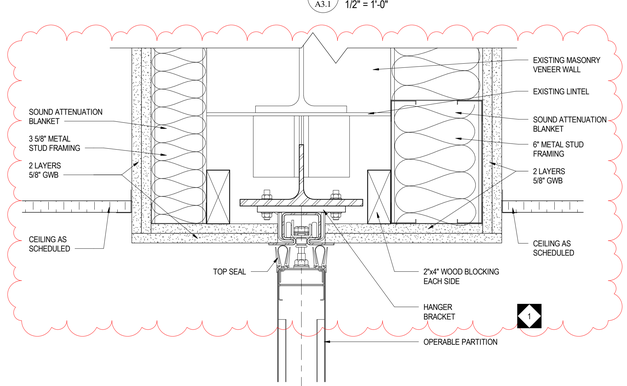
4 A3.1 WALL SECTION AT CONFERENCE ROOM
1/2" = 1'-0"



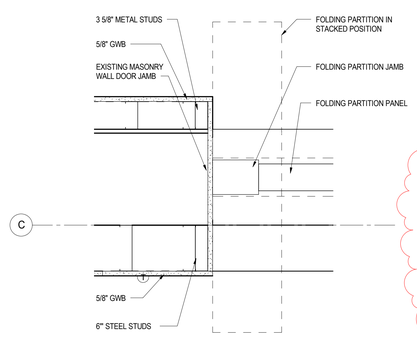
2 A3.1 WALL SECTION
1/2" = 1'-0"



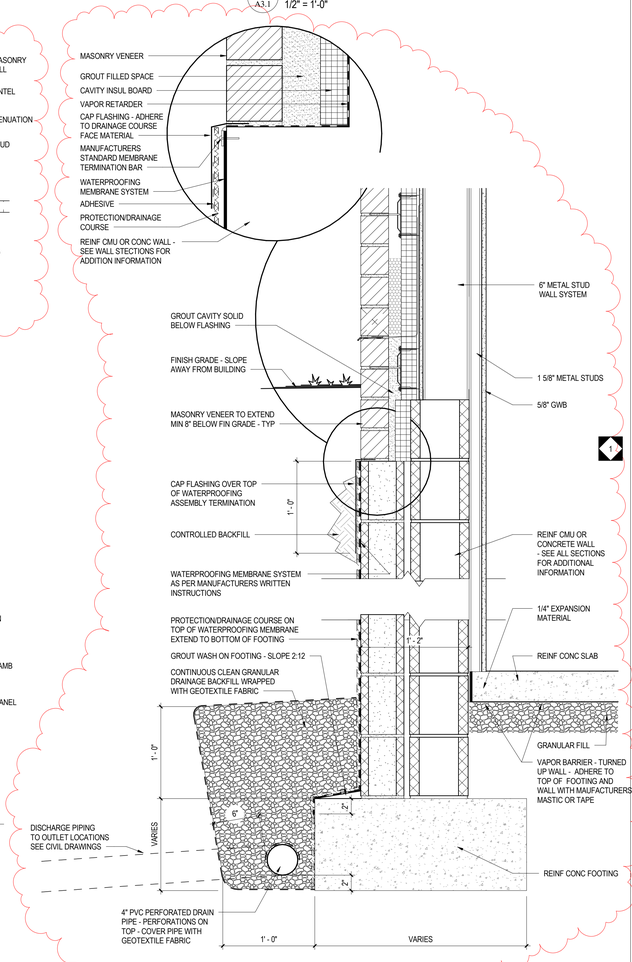
3 A3.1 WALL SECTION
1/2" = 1'-0"



5 A3.1 TYPICAL OPERABLE PARTITION DETAIL
3" = 1'-0"



6 A3.1 FOLDING PARTITION JAMB DETAIL
1 1/2" = 1'-0"



7 A3.1 TYPICAL MASONRY WATERPROOFING DETAIL
1 1/2" = 1'-0"

REVISIONS

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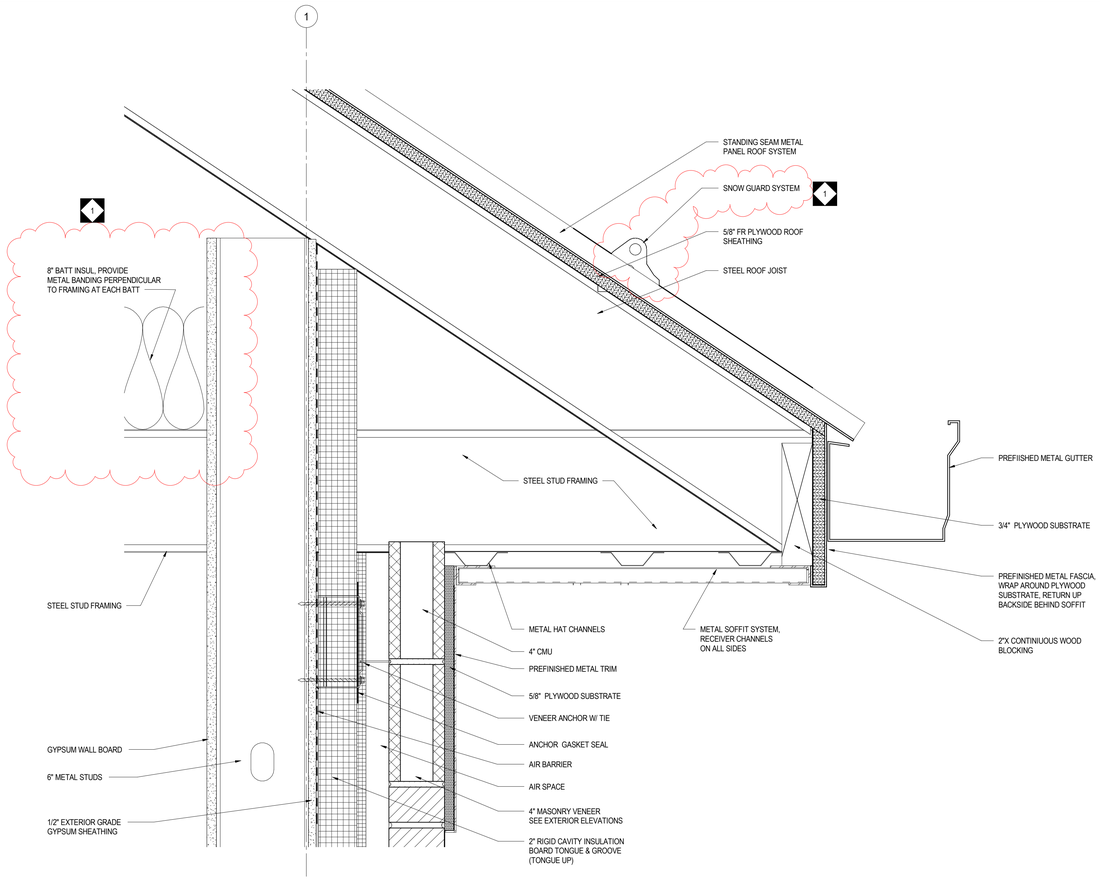
BUILDING SECTIONS

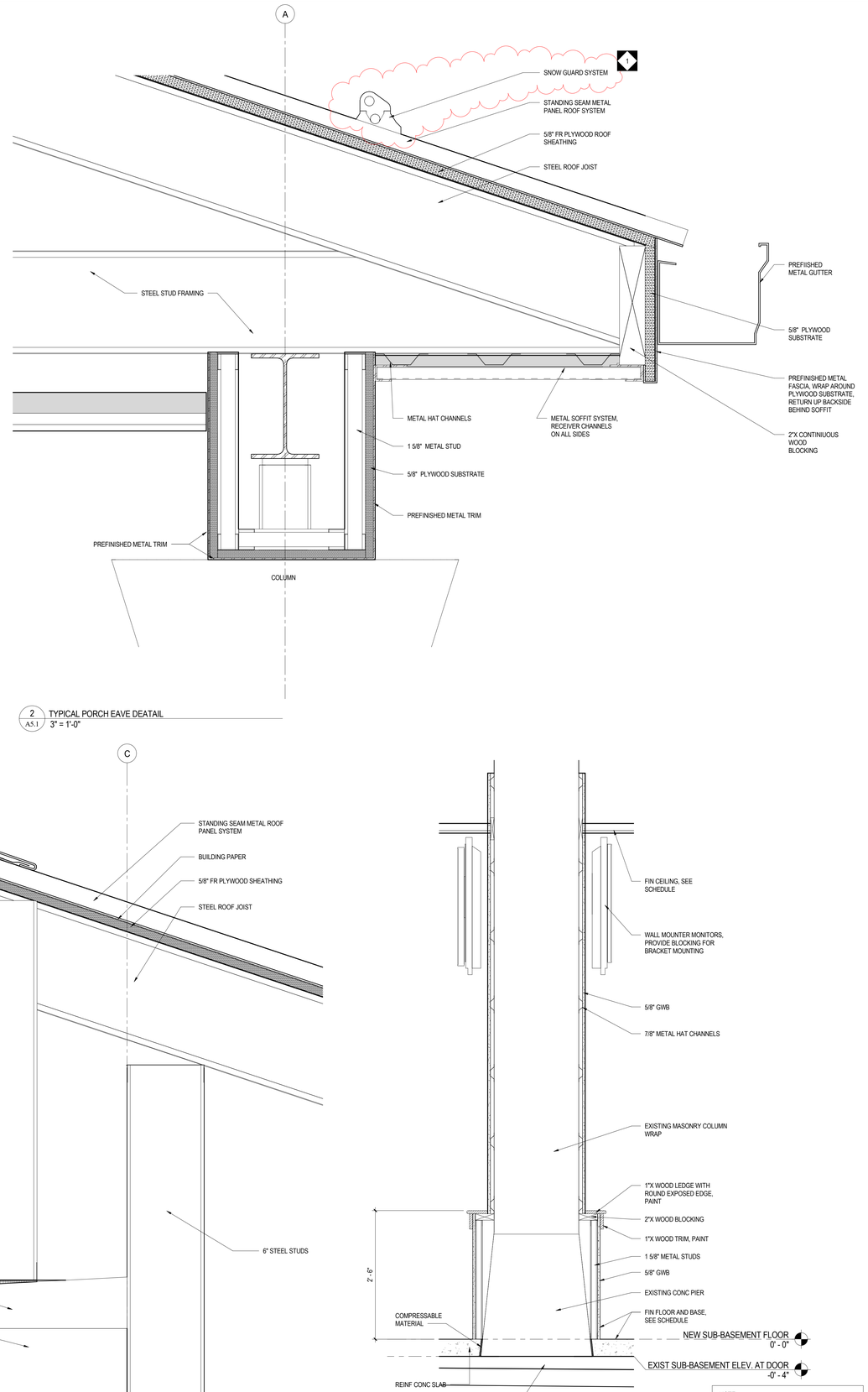
PLOT SCALE: As indicated
FILENAME: CRA PROJECT No. 3430
DATE: AUGUST 28, 2020

PROJECT 3430

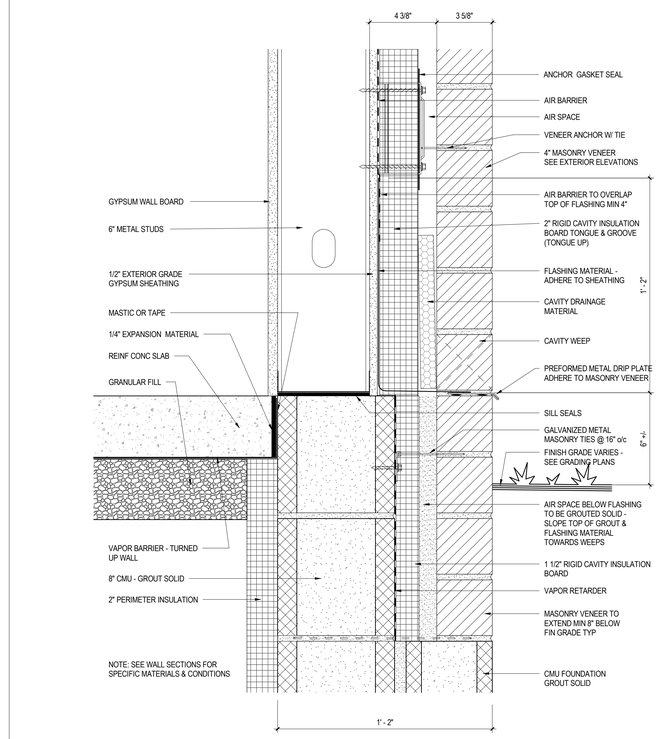
A3.1



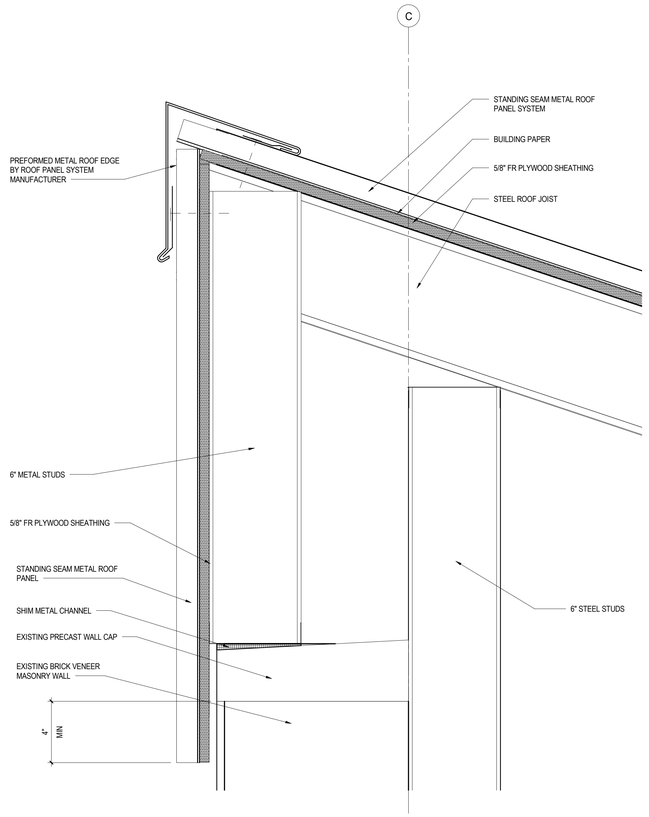
1 A5.1 TYPICAL EAVE DETAIL
3" = 1'-0"



2 A5.1 TYPICAL PORCH EAVE DEATAIL
3" = 1'-0"



4 A5.1 TYPICAL STUD BASE FLASHING DETAIL
3" = 1'-0"



5 A5.1 ROOF EDGE DETAIL
3" = 1'-0"

3 A5.1 TYPICAL SECTION AT EXISTING COLUMN
1" = 1'-0"

NOTE:
DETAILS WITHIN THIS DRAWING, TITLED AS "TYPICAL", INDICATE COMMON NON-SPECIFIC CONDITIONS OCCURRING THROUGHOUT BUILDING. THE LARGE SCALE ALLOWS A MORE COMPREHENSIVE LEVEL OF DETAIL TO BE SHOWN. SPECIFIC CONSTRUCTION CONDITIONS WILL VARY ACCORDING TO MATERIAL AND DIMENSIONS, MORE ACCURATELY SHOWN AS PART OF INDIVIDUAL SECTIONS AND DETAILS THROUGHOUT THE CONSTRUCTION DOCUMENTS.

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

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ADDITION AND RENOVATIONS
MULTIPURPOSE ROOM
FLUVANNA COUNTY
132 MAIN STREET
PALMYRA, VA 22963

DETAILS

PLOT SCALE: As indicated
FILENAME: CRA PROJECT No. 3430
DATE: AUGUST 28, 2020

PROJECT 3430

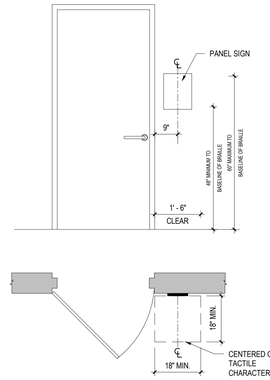
A5.1

ROOM FINISH SCHEDULE

NUMBER	NAME	COLOR SCHEME	FLOOR	BASE	WALLS			CEILING FINISH	REMARKS
					WALL FINISH	WAINSCOT FINISH	WAINSCOT HEIGHT		
7	EXISTING ELEVATOR		ETR	ETR	ETR			ETR	
101	VESTIBULE		EM	RB	PNT			ACT	
102	CORRIDOR		CPT1/CPT2	RB	PNT			ACT/PNT	R2,R10,R77
103	MECHANICAL/ ELECTRICAL		ETR	ETR	ETR			ETR	
104	CONFERENCE A		CPT1/CPT2	RB	PNT			ACT/PNT	R2,R53, R77
105	STORAGE		ETR	ETR	ETR			ETR	
106	CORRIDOR		CPT1/CPT2	RB	PNT			ACT/PNT	R2,R53, R77
107	STAIR		ETR	ETR	PNT			ETR	
108	ELEV. MACH.		ETR	ETR	ETR			ETR	
109	CORRIDOR		CPT1/CPT2	RB	PNT			ACT	R2,R53
110	MEETING ROOM		CPT1/CPT2	RB/WD	PNT/WD			ACT	R2,R27,R52,R53
111	WOMEN		PT1	--	PT1/PT2			ACT	R52,R56
112	CORRIDOR		PT1	PT1	PNT			ACT	
113	MEN		PT1	--	PT1/PT2			ACT	R52,R56
114	CONFERENCE B		CPT1/CPT2	RB	PNT			ACT	R2,R53

SIGNAGE SCHEDULE

ORIGINAL ROOM#	ORIGINAL ARCHITECTURAL ROOM NAME	SIGN TO READ ROOM#	SIGN TO READ ROOM NAME	SIGN TYPE	ADA	FEMALE	MALE	TRANSGENDER	DIRECTIONAL ARROW LEFT	DIRECTIONAL ARROW RIGHT	QTY	REMARKS
EXIST SUB-BASEMENT ELEV. AT DOOR												
7	EXISTING ELEVATOR	--	--	4D						•	1	PLACE @ ELEVATOR
101	VESTIBULE	--	--	--							0	
102	CORRIDOR	--	--	--							0	
103	MECHANICAL/ ELECTRICAL	TBD	MECHANICAL ROOM	1A							1	PLACE ON ADJACENT WALL NEXT TO DOOR 103
104	CONFERENCE A	TBD	CONFERENCE ROOM A	1C							1	PLACE @ DOOR 104
105	STORAGE	TBD	STORAGE	1A							1	PLACE @ DOOR 105
106	CORRIDOR	--	--	--							0	
107	STAIR	--	--	--							0	
108	ELEV. MACH.	TBD	ELEVATOR MECHANICAL	1A							1	PLACE @ DOOR 108
109	CORRIDOR	--	--	--							0	
110	MEETING ROOM	--	--	4A/4B							2	4A VERIFY PLACEMENT IN FIELD, 4B PLACE @ DOOR 101B
111	WOMEN	TBD	WOMEN'S	2A	•	•					1	PLACE @ DOOR 111
112	CORRIDOR	TBD	RESTROOMS	2A	•	•	•				1	PLACE @ DOOR 112
113	MEN	TBD	MEN'S	2A	•		•				1	PLACE @ DOOR 113
114	CONFERENCE B	TBD	CONFERENCE ROOM B	1C							1	PLACE SIGN ON ADJACENT WALL FROM THE MAN DOOR @ FOLDING PARTITION



1 A6.1 PANEL SIGN - INSTALL DETAIL (TYP)
1/2" = 1'-0"

ROOM FINISH SCHEDULE LEGEND

FLOOR FINISH

CPT	CARPET
EM	ENTRANCE MAT
PT	PORCELAIN TILE

FLOOR REMARKS

R1:	NOT USED
R2:	SEE FLOOR PATTERN PLANS FOR VARYING FLOOR MATERIALS.
R3-9:	NOT USED
R10:	T=CPT, R=CPT, L=CPT, NOSING=RUBBER.
R11-R25:	NOT USED

BASE FINISH

PT	PORCELAIN TILE
RB	RUBBER
WD	WOOD PANELING

BASE REMARKS

R26:	NOT USED
R27:	RUBBER BASE NOT REQUIRED AT WOOD ACCENT WALL. REFER TO ELEVATIONS.
R28-R50:	NOT USED

WALL FINISH

PNT	PAINT
PT	PORCELAIN TILE
WD	WOOD PANELING

WALL REMARKS

R51:	NOT USED
R52:	SEE INTERIOR ELEVATIONS FOR VARYING WALL MATERIALS.
R53:	PROVIDE ACCENT WALL.
R54-55:	NOT USED
R56:	PROVIDE FULL HEIGHT PORCELAIN TILE AT BATHROOM WALLS.
R57-R75:	NOT USED

CEILING FINISH

ACT	ACOUSTICAL CEILING TILE
PNT	PAINTED GYPSUM WALLBOARD

CEILING REMARKS

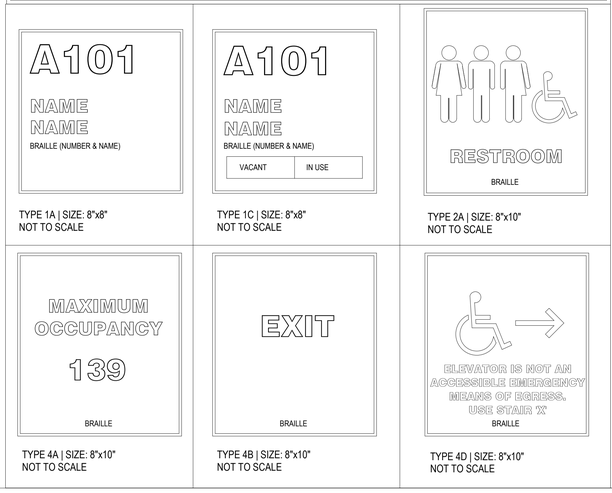
R76:	NOT USED
R77:	SEE REFLECTED CEILING PLANS FOR VARYING CEILING MATERIALS AND HEIGHTS.
R78-R100:	NOT USED

GENERAL NOTES

1. REFER TO SPECIFICATIONS FOR DETAILED DESCRIPTION OF FINISH SYSTEM/TYPES.
2. REFER TO WALL TYPES FOR MASONRY LOCATIONS AND DETAILS.
3. GYPSUM WALLBOARD BULKHEADS AND SOFFITS SHALL BE PAINTED.
4. ALL HOLLOW METAL DOOR AND FRAMES, INTERIOR AND EXTERIOR, SHALL BE PAINTED.
5. ALL INTERIOR AND EXTERIOR FERROUS METAL SHALL BE PAINTED INCLUDING LINTELS, RAILINGS, GRILLES AND LOUVERS. (DOES NOT INCLUDE FACTORY OR PRE-FINISHED ITEMS)
6. T=TREAD, R=RISER, L=LANDING
7. SEE I7 DRAWINGS FOR MATERIAL TRANSITIONS & FLOOR PATTERN PLANS.
8. ETR = EXISTING TO REMAIN
9. EXIST = EXISTING

GENERAL NOTE IN REFERENCE TO A6.1

1. INSTALL SIGNS LEVEL, PLUMB, AND AT THE HEIGHT INDICATED, WITH SIGN SURFACES FREE FROM DISTORTION OR OTHER DEFECTS IN APPEARANCE.
2. TACTILE CHARACTERS SHALL BE 48 INCHES MINIMUM ABOVE THE FLOOR, MEASURED TO THE BASELINE OF THE LOWEST TACTILE CHARACTER AND 60 INCHES MAXIMUM ABOVE THE FLOOR, MEASURED TO THE BASELINE OF THE HIGHEST TACTILE CHARACTER.
3. WHERE A TACTILE SIGN IS PROVIDED AT A DOOR, THE SIGN SHALL BE ALONGSIDE THE DOOR AT THE LATCH SIDE. WHERE A TACTILE SIGN IS PROVIDED AT DOUBLE DOORS WITH ONE ACTIVE LEAF, THE SIGN SHALL BE LOCATED ON THE INACTIVE LEAF. WHERE A TACTILE SIGN IS PROVIDED AT DOUBLE DOORS WITH TWO ACTIVE LEAVES, THE SIGN SHALL BE TO THE RIGHT OF THE RIGHT HAND DOOR. WHERE THERE IS NO WALL SPACE ON THE LATCH SIDE OF A SINGLE DOOR, OR TO THE RIGHT SIDE OF DOUBLE DOORS, SIGNS SHALL BE ON THE NEAREST ADJACENT WALL.
4. SIGNS CONTAINING TACTILE CHARACTERS SHALL BE LOCATED SO THAT A CLEAR FLOOR AREA 18 INCHES MINIMUM BY 18 INCHES MINIMUM, CENTERED ON THE TACTILE CHARACTERS, IS PROVIDED BEYOND THE ARC OF ANY DOOR SWING BETWEEN THE CLOSED POSITION AND 45 DEGREE OPEN POSITION.
   a. **EXCEPTION:** SIGNS WITH TACTILE CHARACTERS SHALL BE PERMITTED ON THE PUSH SIDE OF DOORS WITH CLOSERS AND WITHOUT HOLD OPEN DEVICES.
5. GENERAL CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR REGARDING NUMBERING FOR ELECTRICAL PANELS.



REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

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MULTIPURPOSE ROOM
FLUVANNA COUNTY
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PALMYRA, VA 22963

ROOM FINISH & SIGNAGE SCHEDULE

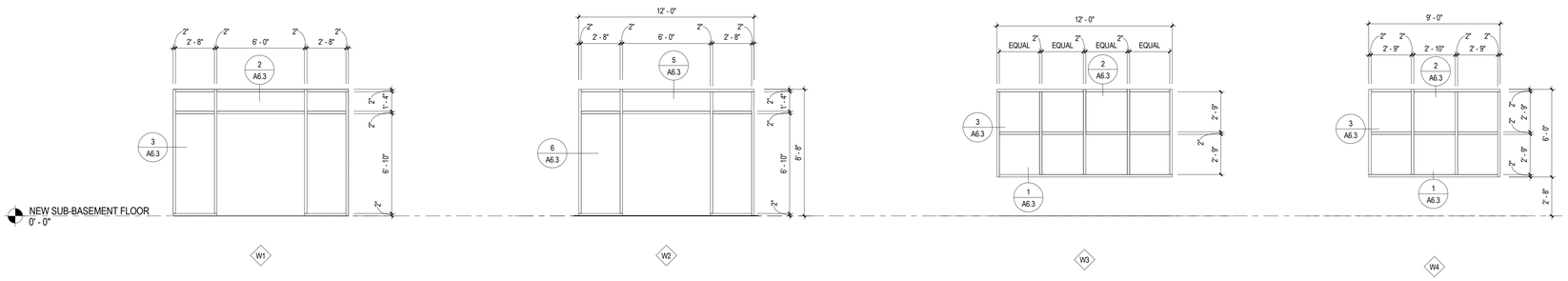
PLOT SCALE: 1/2" = 1'-0"
FILENAME: CRA PROJECT No. 3430
DATE: AUGUST 28, 2020

PROJECT 3430

A6.1

ALUMINUM STOREFRONT ELEVATIONS

NOTE: 1. ALL GLASS TO BE TEMPERED ADJACENT TO A DOOR WHERE THE NEAREST EXPOSED EDGE OF THE GLAZING IS WITHIN A 24 INCH ARC OR EITHER VERTICAL EDGE OF THE DOOR IN A CLOSED POSITION.
2. GLASS LITES GREATER THAN 9 SQUARE FEET WHERE THE BOTTOM EDGE IS WITHIN 18 INCHES OF THE FINISHED FLOOR AND THE TOP EDGE EXTENDS ABOVE 36 INCHES AFF SHALL BE TEMPERED.
3. GLASS WHERE THE FINISHED FLOOR OR GRADE ON THE OPPOSING SIDE OF GLASS IS GREATER THAN 30 INCHES SHALL BE TEMPERED TO A HEIGHT OF 42 INCHES AFF.
4. ANY PORTION OF GLASS WITHIN CONSTRAINTS OF ABOVE REQUIREMENTS THE ENTIRE PANEL SHALL BE TEMPERED.

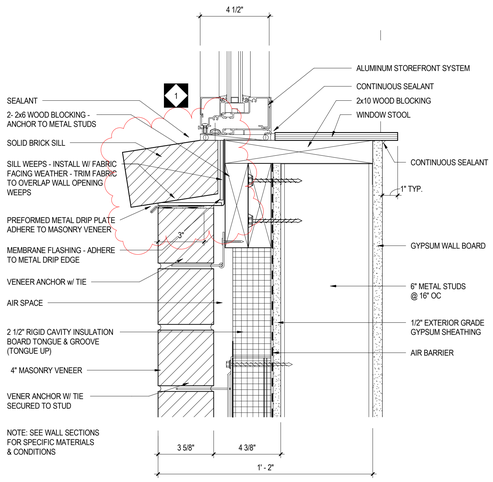


GLAZING LEGEND

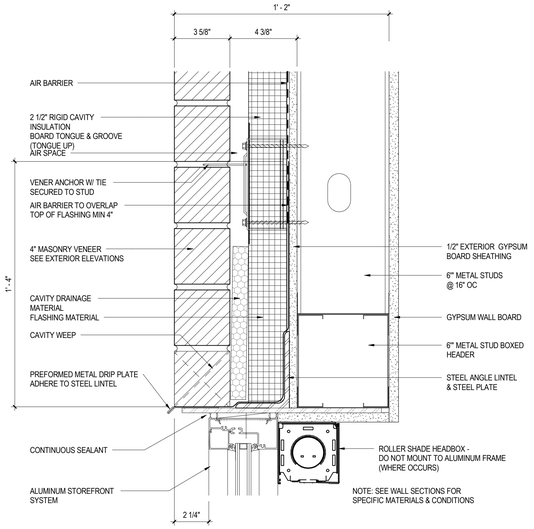
- CLEAR GLAZING
- ACID ETCHED GLAZING
- SPANDREL PANEL
- LAMINATED GLAZING

ALUMINUM STOREFRONT DETAILS

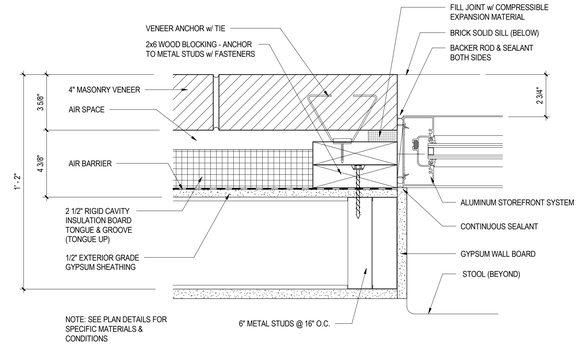
NOTE: 1. CONCRETE MASONRY UNITS INDICATED ARE DIAGRAMATIC IN NATURE AND ARE NOT SPECIFIC TO ANY MANUFACTURER. MASONRY CONTRACTOR SHALL INCORPORATE SHAPES AND OR CUT UNITS AS REQUIRED TO MEET DETAIL REQUIREMENTS.
2. LINTELS INDICATED TO BE COORDINATED WITH STRUCTURAL DRAWINGS.



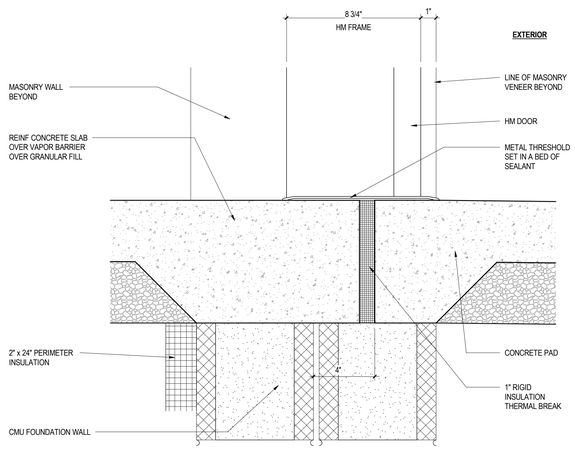
1 A6.3 TYPICAL SILL DETAIL AT METAL STUD FRAMING
3" = 1'-0"



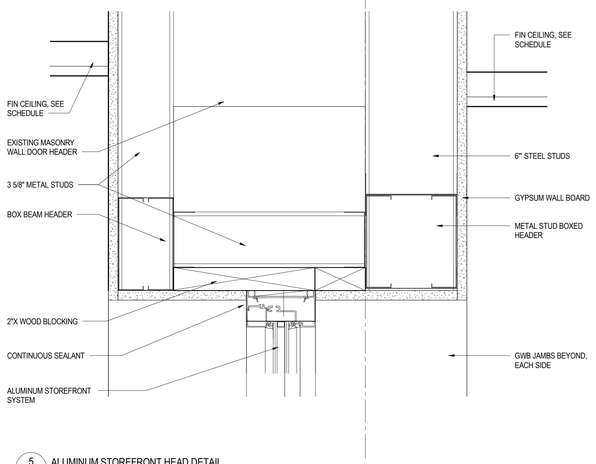
2 A6.3 TYPICAL HEAD DETAIL AT METAL STUD FRAMING
3" = 1'-0"



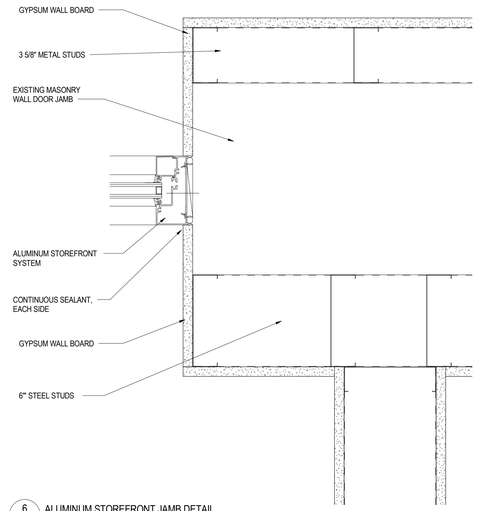
3 A6.3 TYPICAL JAMB DETAIL AT METAL STUD FRAMING
3" = 1'-0"



4 A6.3 EXTERIOR THRESHOLD DETAIL
3" = 1'-0"



5 A6.3 ALUMINUM STOREFRONT HEAD DETAIL
3" = 1'-0"



6 A6.3 ALUMINUM STOREFRONT JAMB DETAIL
3" = 1'-0"

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

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ALUMINUM WINDOW ELEVATIONS AND STOREFRONT DETAILS

PLOT SCALE: As indicated
FILENAME: CRA PROJECT No. 3430
DATE: AUGUST 28, 2020

PROJECT 3430

A6.3

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110 THIRD STREET NE
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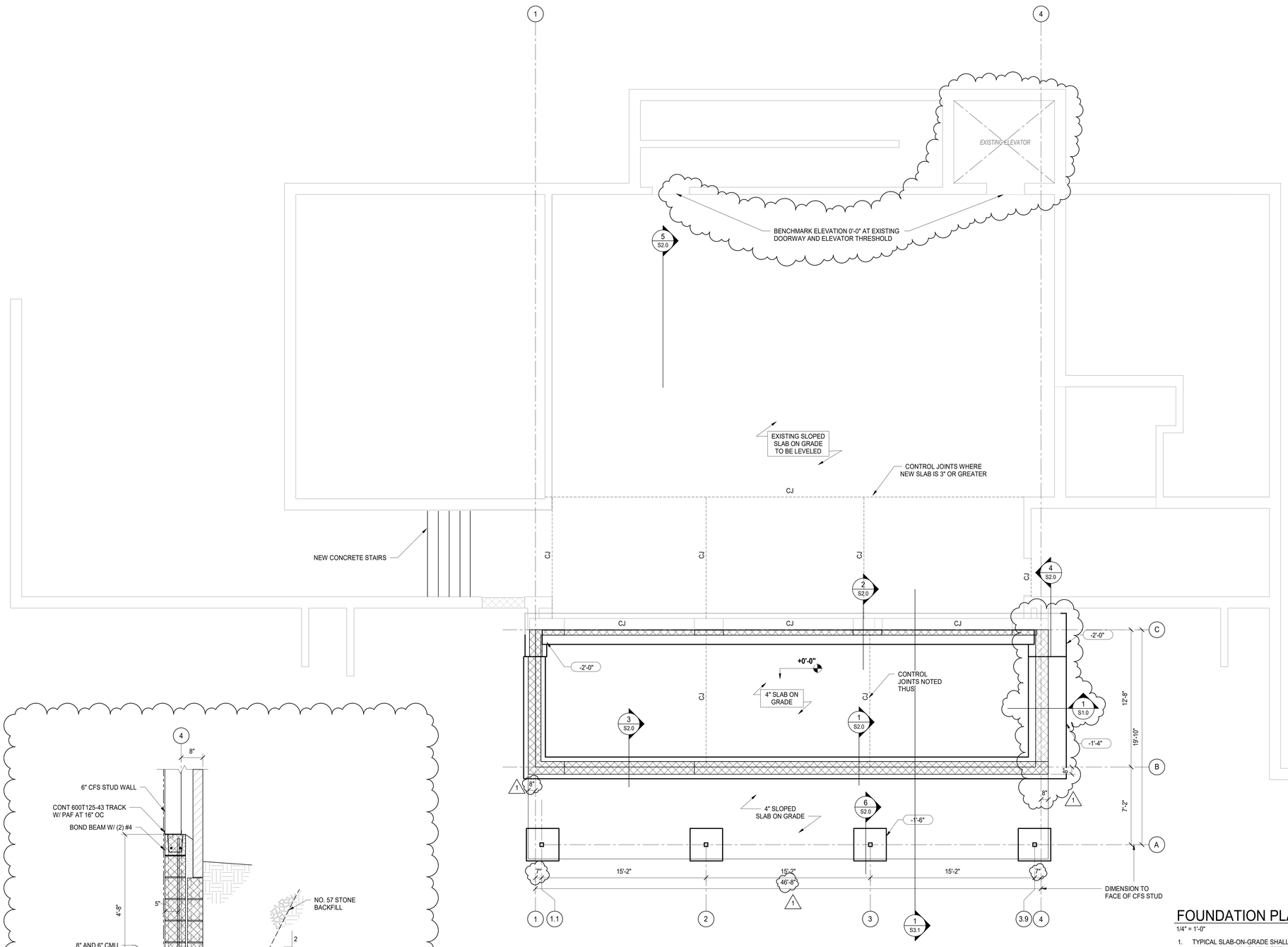
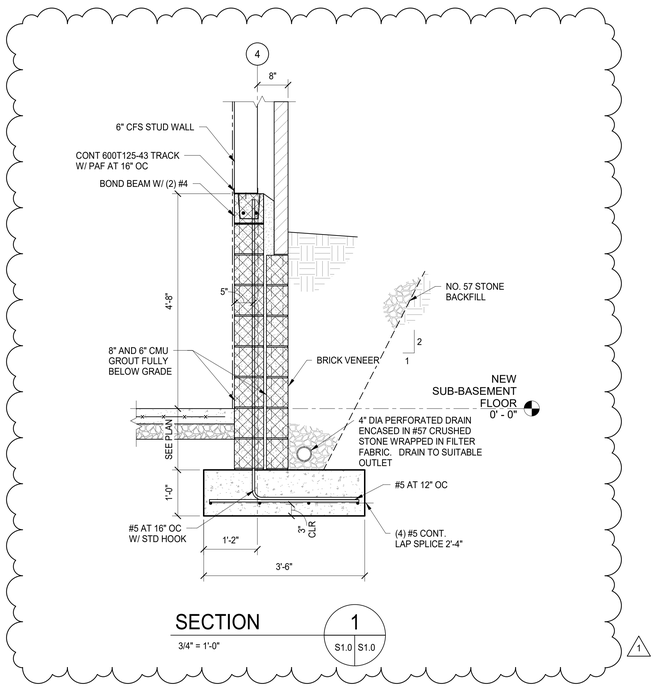
434.293.5171





SECTION 1 — S1.0 | S1.0
3/4" = 1'-0"

FOUNDATION PLAN
1/4" = 1'-0"

1. TYPICAL SLAB-ON-GRADE SHALL BE 4" NORMAL WEIGHT CONCRETE WITH 6X6-W1.4XW1.4 WWF AT MID-DEPTH, OVER VAPOR BARRIER/RETARDER (REF ARCH DWGS), OVER 4" POROUS FILL.
2. REFER TO DRAWING S201 FOR TYPICAL FOUNDATION DETAILS.
3. TOP OF FOOTING ELEVATIONS INDICATED THUS (-X'-XX") RELATIVE TO NEW SUB-BASEMENT FLOOR LEVEL.
4. TOP OF SLAB ELEVATION INDICATED THUS -X'-XX" RELATIVE TO NEW SUB-BASEMENT FLOOR LEVEL.
5. FOOTING EXCAVATIONS MAY REQUIRE ADDITIONAL UNDERCUT (AS INDICATED BY THE OWNER'S ON-SITE GEOTECHNICAL ENGINEER). BACKFILL EXCAVATION TO DESIGN SUBGRADE USING FLOWABLE FILL OR CONCRETE.
6. GROUT ALL CMU SOLID BELOW GRADE.

COMMONWEALTH OF VIRGINIA
Stephen D. Barber
Lic. No. 025731
08-28-20
PROFESSIONAL ENGINEER

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/2020		Addendum 1

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FOUNDATION PLAN
PLOT SCALE: As indicated
FILENAME:
DATE: 9/10/2020

PROJECT
S1.0

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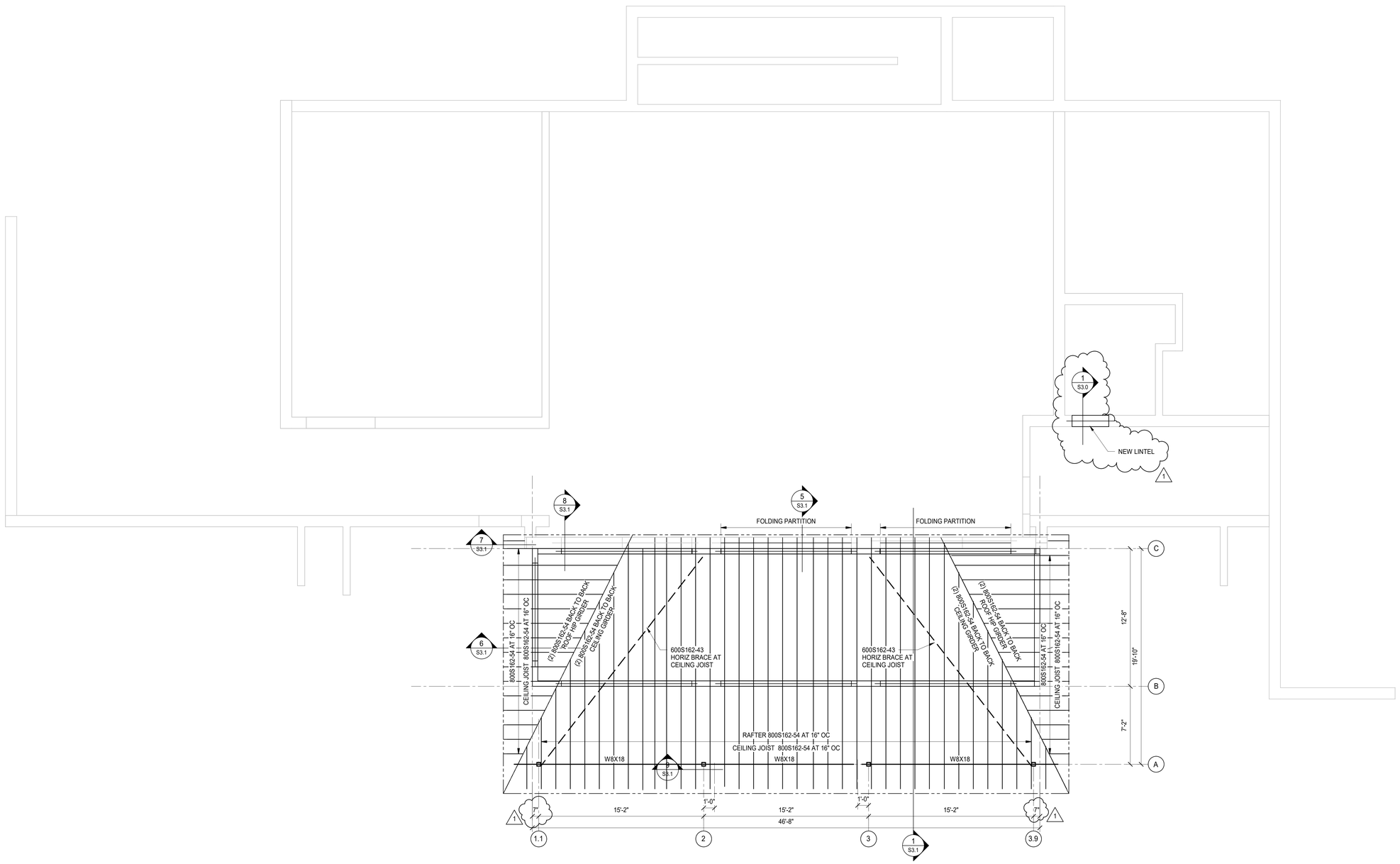

ROOF FRAMING PLAN

1/4" = 1'-0"

1. TYPICAL EXTERIOR WALLS TO BE S600X162-43 STUDS AT 16" OC.
2. PROVIDE 19/32" APA RATED ROOF SHEATHING (OSB OR PLYWOOD). ATTACH TO LGST WITH HILTI SCREWS (S-WW 10-24X17/16 PWH #3 WINGS) AT THE FOLLOWING PATTERN UNO:
   a. SUPPORTED PANEL EDGES AT 6" OC
   b. INTERMEDIATE SUPPORTS AT 12" OC
3. LAY PANELS PERPENDICULAR TO TRUSS FRAMING MEMBERS AND STAGGER JOINTS 48".
4. REFER TO ARCHITECTURAL DRAWINGS AND MECHANICAL DRAWINGS FOR DIMENSIONS FOR MECHANICAL AND OTHER PENETRATIONS THROUGH ROOF AND/OR CEILING.
5. SPACE JOISTS OR BEAMS EQUALLY BETWEEN COLUMNS UNLESS NOTED OTHERWISE.

COMMONWEALTH OF VIRGINIA
Stephen D. Barber
Lic. No. 025731
08-28-20
PROFESSIONAL ENGINEER

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
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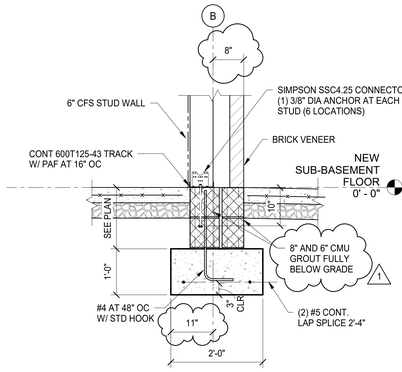
ROOF FRAMING PLAN

PLOT SCALE: As indicated
FILENAME:
DATE: 9/10/2020

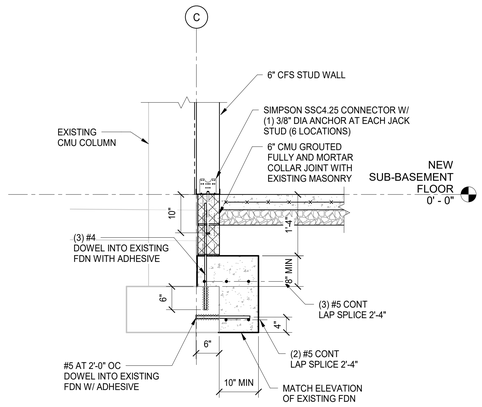
PROJECT

S1.1



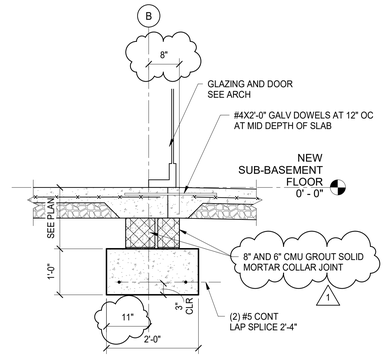
TYPICAL CFS WALL FOUNDATION

SECTION 1 — 3/4" = 1'-0" — S1.0 | S2.0



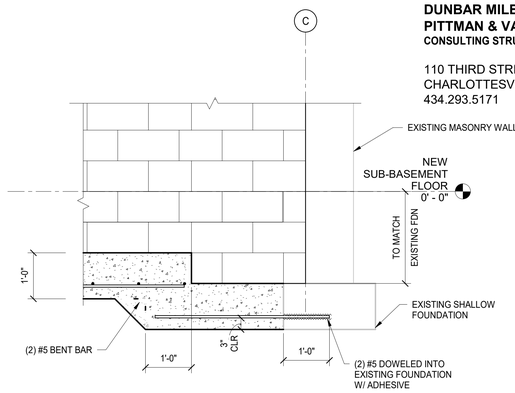
TYPICAL CFS WALL AT EXISTING WALL

SECTION 2 — 3/4" = 1'-0" — S1.0 | S2.0



FOUNDATION AT CURTAIN WALL/DOOR

SECTION 3 — 3/4" = 1'-0" — S1.0 | S2.0



WALL FOUNDATION AT EXISTING WALL

SECTION 4 — 3/4" = 1'-0" — S1.0 | S2.0

TYPICAL SLAB-ON-GRADE CONSTRUCTION JOINT DETAIL

3/4"=1'-0"

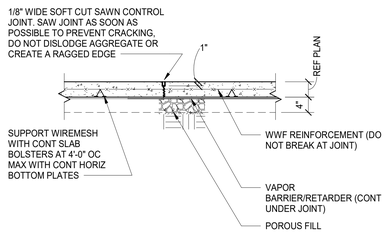
TYP REINF AT RE- ENTRANT CORNERS

3/4"=1'-0"

TYPICAL BOND BREAK AT SLAB-ON-GRADE

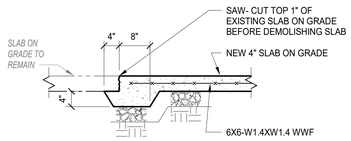
3/4"=1'-0"

NOTE:
AT CONTRACTOR'S OPTION, 1.5 POUNDS PER CUBIC YARD POLYPROPYLENE MICRO FIBER REINF MAY BE SUBSTITUTED FOR 6X6-W1.4XW1.4 WWF IN 4" SLAB ON GRADE ONLY.



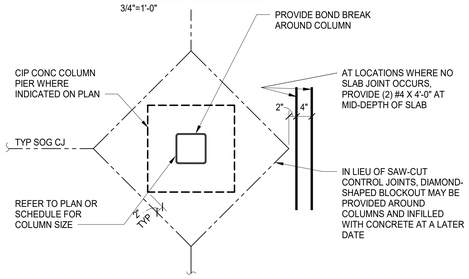
TYPICAL SLAB-ON-GRADE AND CONTROL JOINT DETAIL

3/4"=1'-0"



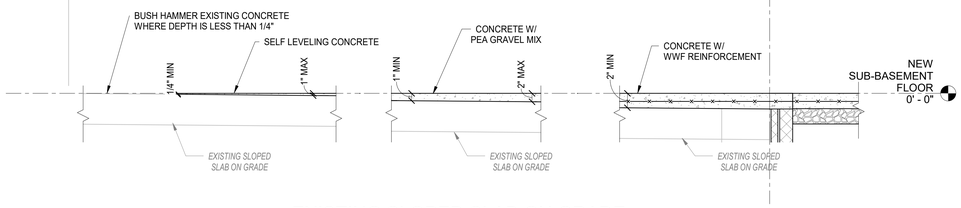
TYPICAL SLAB-ON-GRADE REPAIR DETAIL

3/4"=1'-0"



TYPICAL DIAMOND SLAB JOINT AT COLUMNS

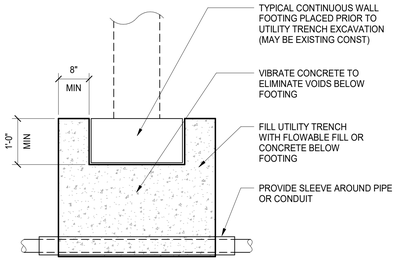
NO SCALE



EXISTING SLOPED SLAB ON GRADE

NOTE: TREAT EXISTING SLAB ON GRADE WITH A BONDING AGENT PRIOR TO CONCRETE PLACEMENT

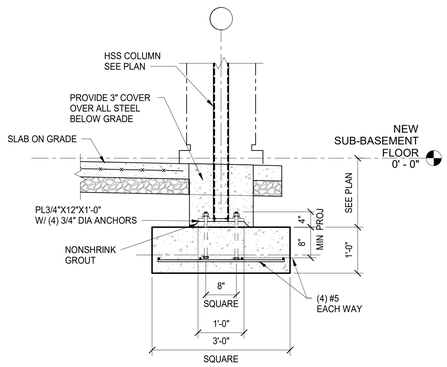
SECTION 5 — 3/4" = 1'-0" — S1.0 | S2.0



NOTE:
THIS ONLY APPLIES AT LOCATIONS WHERE A NARROW UTILITY TRENCH IS EXCAVATED PERPENDICULAR TO A CONTINUOUS WALL FOOTING.

TYPICAL DETAIL AT UNDERMINED FOOTING

3/4"=1'-0"



TYPICAL COLUMN FOUNDATION

SECTION 6 — 3/4" = 1'-0" — S1.0 | S2.0

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Lic. No. 025731
08-28-20
PROFESSIONAL ENGINEER

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/2020		Addendum 1

CRABTREE ROHRBAUGH & ASSOCIATES - ARCHITECTS
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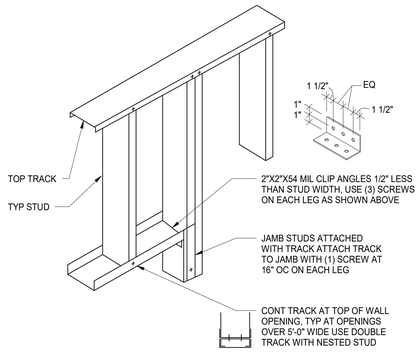
FOUNDATION DETAILS

PLOT SCALE: 3/4" = 1'-0"
FILENAME:
DATE: 8/28/2020

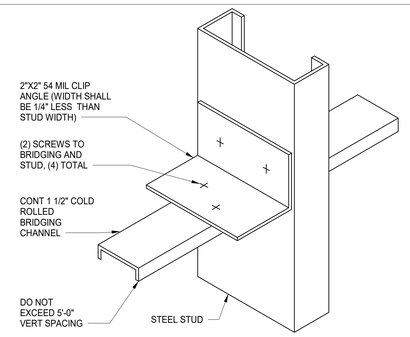
PROJECT

S2.0



TYPICAL HEAD CONNECTION

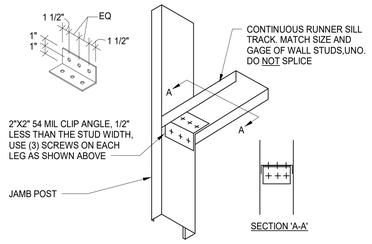
NON-LOAD BEARING EXTERIOR STEEL STUD WALL



TYPICAL STEEL STUD WALL BRIDGING DETAIL (STUDS 6" DEEP OR LESS)

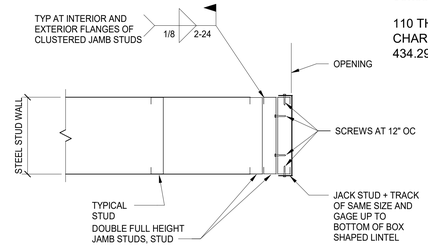
NO SCALE

NOTES:
1. APPLIES AT ALL EXTERIOR STEEL STUD WALLS.
2. APPLIES AT INTERIOR STEEL STUD BEARING WALLS.
3. APPLIES AT ALL INTERIOR STUD PARTITION WALLS THAT DO NOT HAVE SHEATHING ON EACH FACES.



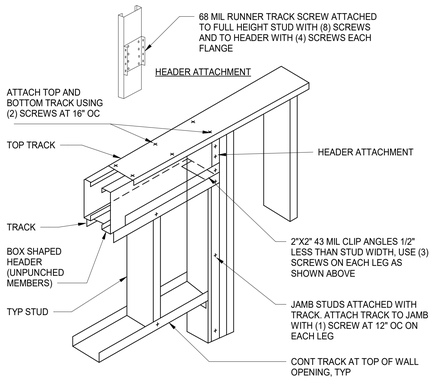
TYPICAL SILL CONNECTION

SILL CONNECTION USING SCREW ATTACHED CLIP ANGLE



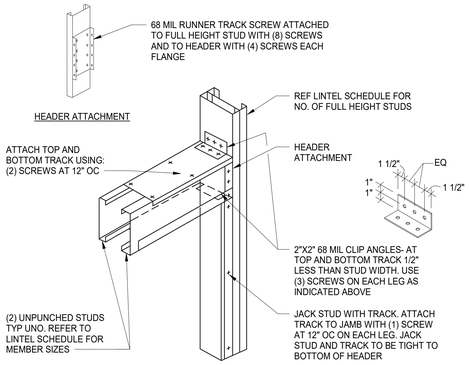
TYPICAL DETAIL AT EXTERIOR STEEL STUD WALL JAMB CONDITION

NO SCALE



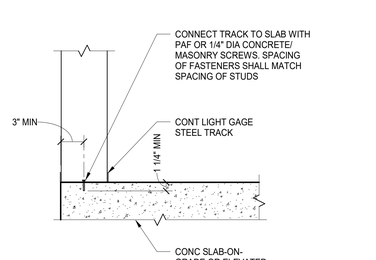
TYPICAL BOXED HEADER CONNECTION

LOAD BEARING HEADER - TWO MEMBER BOXED



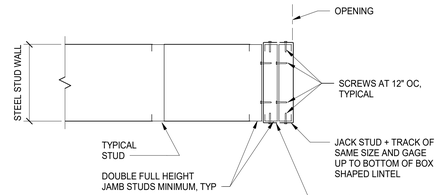
TYPICAL BOXED HEADER CONNECTION

HEADER AT TOP OF OPENINGS



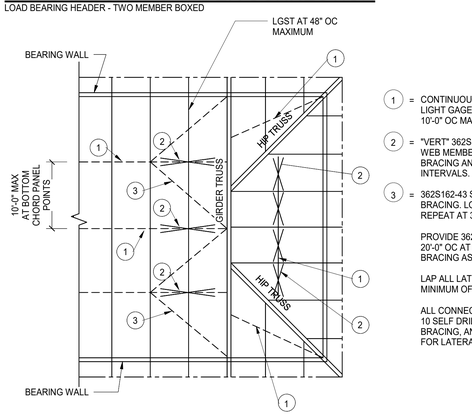
TYPICAL CONNECTION OF LIGHT GAGE STEEL TRACK TO CONCRETE

NO SCALE



TYPICAL DETAIL AT EXTERIOR STEEL STUD WALL JAMB CONDITION

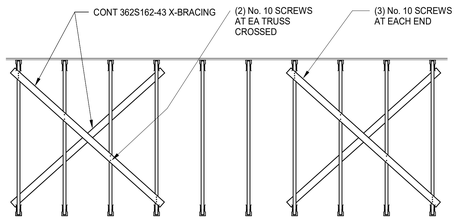
NO SCALE



LIGHT GAGE STEEL BRACING AT ENDS OF HIP ROOFS (PLAN VIEW)

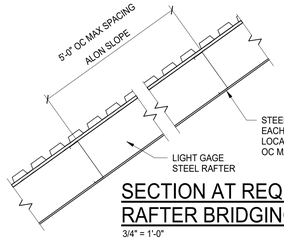
NO SCALE
REFER TO TYPICAL GABLE ROOF TRUSS BRACING DIAGRAM FOR ALL OTHER DETAILS.

NOTE: TRUSS MANUFACTURER SHALL DESIGN COMPLETE BRACING SYSTEM AND PROVIDE PLANS AND DETAILS OF BRACING AS PART OF SHOP DRAWING SUBMITTAL.



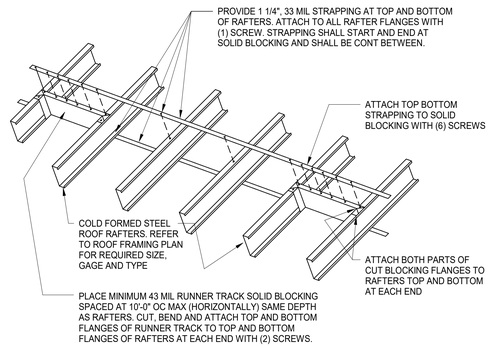
DIAGONAL X- BRACING AT TRUSS WEB MEMBERS (ELEVATION VIEW)

NO SCALE



SECTION AT REQUIRED RAFTER BRIDGING

3/4" = 1'-0"

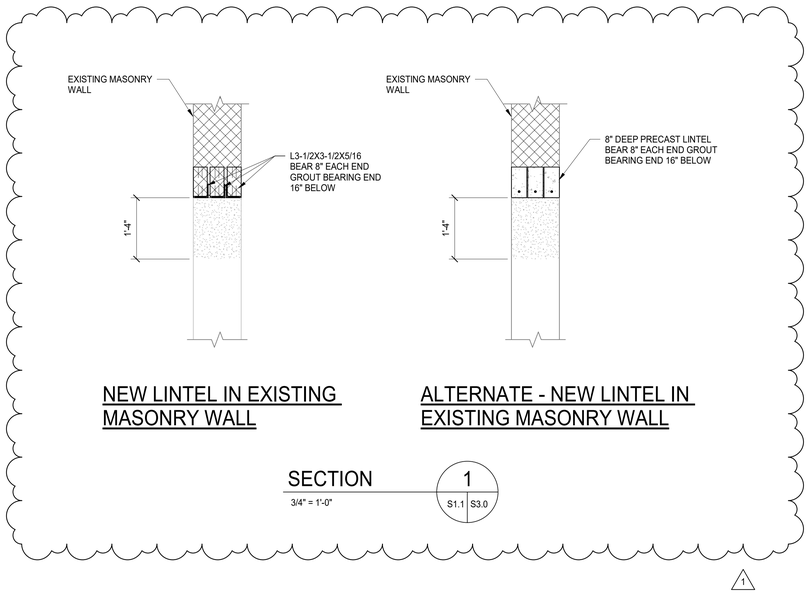


NOTES

1. RAFTER BRIDGING IS REQUIRED AT ALL RAFTERS AND IS NOT SHOWN ON ROOF FRAMING PLANS. BRIDGING SHALL BE INSTALLED AS REQUIRED BY MANUFACTURER OF RAFTERS TO SUPPORT ALL LOADS AS INDICATE ON DRAWINGS, BUT SHALL NOT BE SPACED MORE THAN 5'-0" OC ALONG SLOPE OF RAFTERS.
2. BRIDGING SHALL BE INSTALLED PRIOR TO INSTALLATION OF ROOF SHEATHING.
3. TOP STRAPPING MAY BE OMITTED AT CONTRACTOR'S OPTION, IF ROOF SHEATHING IS CONTINUOUSLY ATTACHED TO RAFTER TOP FLANGES. IT IS RECOMMENDED THAT TOP STRAPPING BE INSTALLED TO BRACE TOP FLANGES FOR STABILITY DURING ERECTION.

TYPICAL REQUIRED RAFTER AND CEILING JOIST BRIDGING

NO SCALE



NEW LINTEL IN EXISTING MASONRY WALL

ALTERNATE - NEW LINTEL IN EXISTING MASONRY WALL

SECTION 1 — S1.1 | S3.0
3/4" = 1'-0"

1

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REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/2020		Addendum 1

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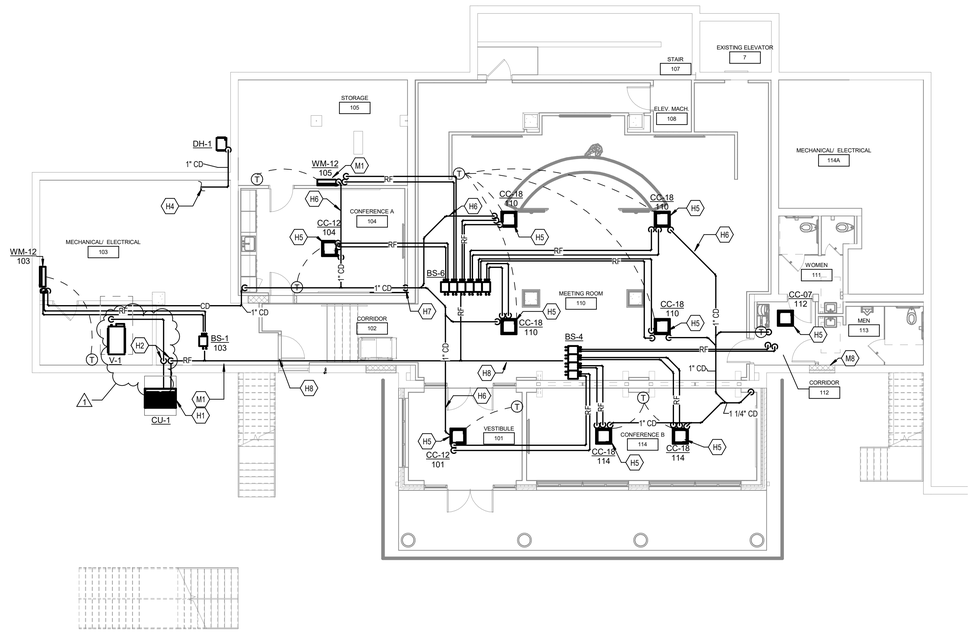
CR

FRAMING DETAILS

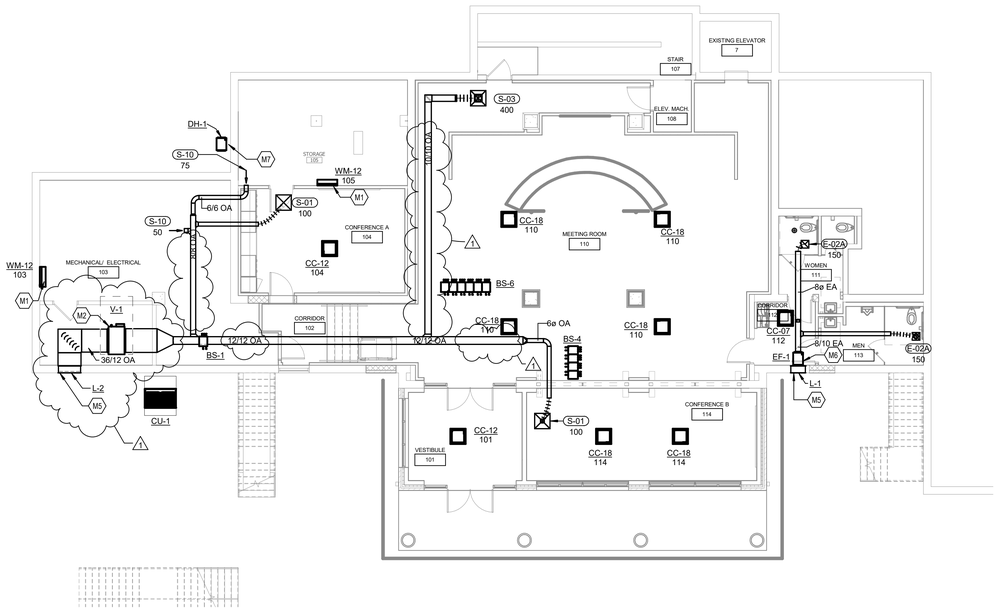
PLOT SCALE: 3/4" = 1'-0"
FILENAME:
DATE: 9/10/2020

PROJECT

S3.0



1 M-100 FIRST FLOOR HYDRONICS NEW WORK
1/8" = 1'-0"



2 M-100 FIRST FLOOR AIR DISTRIBUTION NEW WORK
1/8" = 1'-0"

TAGGED NOTES

H1 MOUNT NEW VRF CONDENSING UNIT ON EXISTING CONCRETE PAD. EXPAND EXISTING CONCRETE PAD AS REQUIRED TO FIT NEW CONDENSING UNIT. PIPING TO RUN THROUGH EXISTING PENETRATION IN WALL, SEAL AIRTIGHT AROUND PIPING. MOUNT DISCONNECT ON WALL.

H2 REFRIGERANT PIPING TO BE ROUTED UP WALL TO 10'-6" TO BE ABOVE NEW CEILING.

H4 ROUTE 1" CONDENSATE PIPING THRU MECHANICAL ROOM WALL AND DRAIN TO FLOOR DRAIN. SEAL WALL PENETRATION AIR TIGHT.

H5 MOUNT CASSETTE IN NEW CEILING. REFER TO VRF CASSETTE PIPING SCHEMATIC FOR DETAILS.

H6 ROUTE CONDENSATE PIPING IN BETWEEN JOISTS AS HIGH AS POSSIBLE.

H7 CONDENSATE PIPING TO CONNECT TO EXISTING PIPE. DROP IN CORNER.

H8 VRF MANUFACTURER TO SPECIFY PIPE SIZE. NOT ALL REFRIGERANT PIPES ARE SHOWN. REFER TO VRF MANUFACTURER'S INSTALL DRAWINGS.

M1 MOUNT NEW WALL MOUNTED UNIT 6'-0" ABOVE FINISHED FLOOR.

M2 NEW DOAS-1 UNIT TO BE MOUNTED FROM THE STRUCTURE ABOVE.

M5 NEW LOUVER TO BE INSTALLED IN EXTERIOR WALL. REFER TO LOUVER SCHEDULE.

M6 EXHAUST FAN TO BE MOUNTED TIGHT TO LOUVER.

M7 PROVIDE NEW DEHUMIDIFIER IN CRAWL SPACE. MOUNT DEHUMIDIFIER TO STRUCTURE. PIPE CONDENSATE OUTSIDE. REFER TO DEHUMIDIFIER SCHEDULE.

M8 DEMOLISH EXISTING ABANDONED DUAL TEMPERATURE CONNECTION FROM DEMOLISHED CABINET FAN COIL UNIT. PATCH AND PAINT WALL PER ARCHITECTURAL REQUIREMENTS.

R,G,D RUNOUT SCHEDULE

MARK	DUCT BRANCH SIZE
E-02A	8"Ø
S-01	6"Ø
S-03	10"Ø
S-10	8"X6"

REVISIONS

#	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

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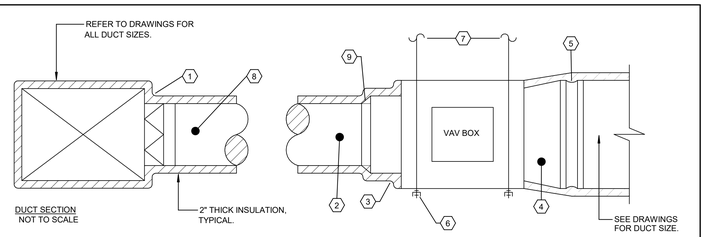
BRYAN LEE HARRISON
PROFESSIONAL ENGINEER

MECHANICAL NEW WORK PLAN

PLOT SCALE: 1/8" = 1'-0"
FILENAME:
DATE: AUGUST 28, 2020

PROJECT
Fluvanna Co.

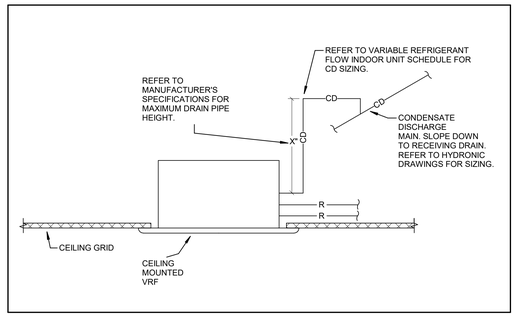
M-100



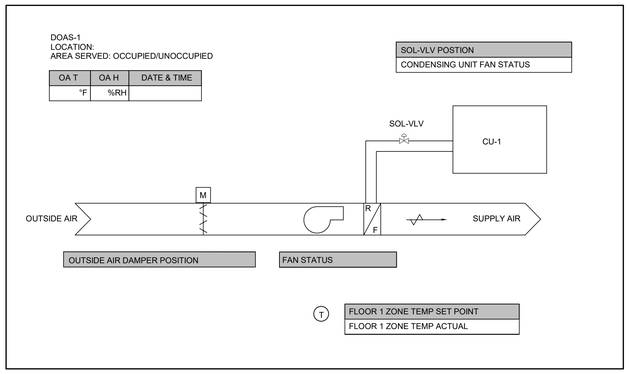
TAG NOTES: (X)

1. HIGH EFFICIENCY DUCT TAKE-OFF - EQUAL TO UNIT INLET SIZE.
2. MAINTAIN A MINIMUM OF THREE DUCT DIAMETERS BETWEEN TAKE-OFF AND VAV UNIT. NO FLEXIBLE DUCTWORK ALLOWED ON THE INLET SIDE OF THE UNIT.
3. MAINTAIN INSULATION TO EDGE OF VAVUNIT.
4. PROVIDE TRANSITION BETWEEN VAV UNIT AND DUCT.
5. PROVIDE FLEXIBLE CONNECTION BETWEEN VAV UNIT AND DUCT.
6. UNI-STRUT WITH ISOLATION PAD.
7. SUPPORT UNIT FROM STRUCTURE.
8. REFER TO RUNOUT SCHEDULE ON PLANS FOR DUCTWORK SIZE.
9. TRANSITION DUCTWORK TO VAV BOX INLET SIZE.

1 M-200 VAV BRANCH DUCT CONNECTION DETAIL
NOT TO SCALE

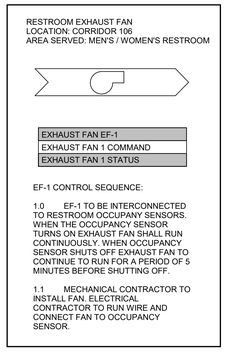


2 M-200 VRF CASSETTE PIPING SCHEMATIC
NOT TO SCALE



1. DOAS-1

1.1. These units shall be provided with factory controls. The DOAS-1 unit shall run when based on occupancy, schedule shall be fully adjustable. The DOAS-1 unit shall provide room neutral outside air when the building is occupied. The unit will shall activate electric auxillary heating when outside air temperature is below 40 deg F.



EF-1 CONTROL SEQUENCE:

1.0 EF-1 TO BE INTERCONNECTED TO RESTROOM OCCUPANY SENSORS. WHEN THE OCCUPANCY SENSOR TURNS ON EXHAUST FAN SHALL RUN CONTINUOUSLY. WHEN OCCUPANCY SENSOR SHUTS OFF EXHAUST FAN TO CONTINUE TO RUN FOR A PERIOD OF 5 MINUTES BEFORE SHUTTING OFF.

1.1 MECHANICAL CONTRACTOR TO INSTALL FAN, ELECTRICAL CONTRACTOR TO RUN WIRE AND CONNECT FAN TO OCCUPANCY SENSOR.

INDOOR MECHANICAL DEHUMIDIFICATION UNITS

MARK	MODEL	MANUFACTURER	CAPACITY	VOLTAGE	PHASE	MCA	MOCP	COMMENTS
DH-1	QUEST 70	QUEST	70 PT/DAY	120 V	1	12 A	15	PROVIDE NEC COMPLIANT MEANS OF DISCONNECTION. REMOTE HUMIDITY SENSOR LOCATION TO BE VERIFIED WITH OWNER PRIOR TO INSTALLATION.

VENTILATION UNIT SCHEDULE

MARK	MANUFACTURER	MODEL #	SERVICE	LOCATION	PHYSICAL DATA				SUPPLY FAN						COOLING CAPACITY TOTAL (MBH)	HEATING CAPACITY (MBH)	SUPPLY FAN			ELECTRICAL			REMARKS
					WIDTH (IN.)	LENGTH (IN.)	HEIGHT (IN.)	WEIGHT (LBS)	TOTAL SA CFM	MIN. OA CFM	FAN MOTOR TYPE	# OF FANS	FAN RPM	E.S.P. (" WC)			MOTOR OUTPUT (W)	VOLT.	PH.	FLA	MCA	MOCP	
V-1	DAIKIN	FXM48	MEETING ROOM	EXTERIOR	45	30	19	190	635	635	ECM DIRECT	1	1750	0.88	48.0	30.0	380.0	208 V	3	2 A	2 A	15	ALL

VENTILATION UNIT SCHEULE - AUXILLARY ELECTRIC HEATER SCHEDULE

MARK	CFM	HEATING CAPACITY ELECTRIC	EAT ELECTRIC	LAT ELECTRIC	INPUT (KW)	ELECTRICAL			REMARKS
						VOLTAGE	PHASE	FLA	
V-1	700	61434.0	15	70	18 W	208 V	3	50 A	ALL

REMARKS:

1. CONTRACTOR SHALL COORDINATE TO ENSURE MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES ARE MAINTAINED.
2. PROVIDE GFI OUTLET.
3. PROVIDE SINGLE POINT CONNECTION.
4. PROVIDE INTEGRAL DISCONNECT. FIELD-INSTALLED DISCONNECTS ARE ACCEPTABLE, AND SHALL BE PROVIDED BY MECHANICAL CONTRACTOR AND INSTALLED BY ELECTRICAL CONTRACTOR.
5. PROVIDE WITH OPTIONAL AIR FILTER. STATIC SHALL BE MODELED AT HALF LIFE OF FILTER.

VARIABLE REFRIGERANT FLOW INDOOR UNIT SCHEDULE

MARK	MANUFACTURER	MODEL #	TYPE	MINIMUM NOMINAL COOLING (MBH)	SENSIBLE COOLING (MBH)	MINIMUM NOMINAL HEATING (MBH)	AIRFLOW (CFM)	SOUND (dB)	CD PIPE SIZE	DIMENSIONS (IN)			WEIGHT (LBS)	ELECTRICAL				REMARKS
										LENGTH	WIDTH	HEIGHT		VOLTAGE	PHASE	MCA	MOCP	
CC-07	DAIKIN	FXZQ07TAVJU	CONCEALED CEILING CASSETTE UNIT	7.5	5.5	8.5	300	30	3/4	24	24	11	34	208 V	1	1 A	15	ALL
CC-12	DAIKIN	FXZQ12TAVJU	CONCEALED CEILING CASSETTE UNIT	12.0	7.8	13.5	350	30	3/4	24	24	11	36	208 V	1	1 A	15	ALL
CC-18	DAIKIN	FXZQ18TAVJU	CONCEALED CEILING CASSETTE UNIT	18.0	13.0	20.0	500	32	3/4	24	24	11	41	208 V	1	1 A	15	ALL
WM-12	DAIKIN	FXAQ12PVJU	WALL MOUNTED UNIT	12.0	8.9	13.5	290	38	1	31	12	10	26	208 V	1	1 A	15	ALL

REMARKS:

1. COOLING PERFORMANCE IS FOR 95 DEG. F. OUTDOOR, 70 DEG. F DB / 61 DEG. F WB INDOOR.
2. HEATING PERFORMANCE IS FOR 6 DEG. F OUTDOOR, 68 DEG. F INDOOR.
3. CONTRACTOR SHALL COORDINATE TO ENSURE MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES ARE MAINTAINED.
4. TEMPERATURE SENSOR FOR UNIT TO BE MOUNTED IN THE SPACE.
5. PROVIDE SINGLE POINT CONNECTION.
6. PROVIDE INTEGRAL DISCONNECT. FIELD-INSTALLED DISCONNECTS ARE ACCEPTABLE, AND SHALL BE PROVIDED BY MECHANICAL CONTRACTOR AND INSTALLED BY ELECTRICAL CONTRACTOR.
7. PROVIDE CONDENSATE PUMP.

VARIABLE REFRIGERANT FLOW OUTDOOR UNIT SCHEDULE

MARK	MANUFACTURER	MODEL #	TYPE	TOTAL COOLING CAPACITY (MBH)	MINIMUM NOMINAL HEATING (MBH)	SOUND (dB)	NOMINAL SIZE (IN)				ELECTRICAL						REMARKS
							LENGTH	WIDTH	HEIGHT	WEIGHT (LBS)	VOLTAGE	PHASE	MCA	MOCP	MCA	MOCP	
CU-1	DAIKIN	REYQ192TTJU	VRV-IV-HEAT RECOVERY	153.0	106.0	65	31	86	67	1210	208 V	3	43 A	50	31 A	35	ALL

REMARKS:

1. COOLING PERFORMANCE IS FOR 95 DEG. F. OUTDOOR, 70 DEG. F DB / 61 DEG. F WB INDOOR.
2. HEATING PERFORMANCE IS FOR 6 DEG. F OUTDOOR, 68 DEG. F INDOOR.
3. CONTRACTOR SHALL COORDINATE TO ENSURE MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES ARE MAINTAINED.
4. OUTDOOR UNIT HEATING CAPACITY IS BASED ON FULLY HEATING INDOOR UNITS. OUTDOOR UNIT COOLING CAPACITY IS BASED ON FULLY COOLING INDOOR UNITS.
5. UNIT WILL HAVE SINGLE POINT CONNECTION
6. PROVIDE INTEGRAL WALL MOUNTED DISCONNECT.
7. PROVIDE LOW AMBIENT HEATING ACCESSORY.

REGISTERS, GRILLES, AND DIFFUSERS

MARK	MANUFACTURER	MODEL #	TYPE	GRILLE SIZE	PANEL SIZE	DUCT INLET SIZE	DUCT BRANCH SIZE	MAX CFM	P.D.	NOISE CRITERIA	THROW PATTERN	REMARKS
E-02A	TITUS	TDC-AA	ALUMINUM LOUVERED FACE DIFFUSER	10"X10"	12"X12"	8"Ø	8"Ø	225	0.05	25	-	ALL
S-01	TITUS	TDC-AA	ALUMINUM LOUVERED FACE DIFFUSER	22"X22"	24"X24"	6"Ø	6"Ø	100	0.05	25	4-WAY	ALL
S-03	TITUS	TDC-AA	ALUMINUM LOUVERED FACE DIFFUSER	22"X22"	24"X24"	10"Ø	10"Ø	400	0.05	25	4-WAY	ALL
S-10	TITUS	350FL	ALUMINUM SIDEWALL GRILLE	6"X6"	8"X8"	6"X6"	6"X6"	75	0.09	25	SINGLE DEFLECTION	ALL

REMARKS:

1. ARCHITECT TO SELECT COLOR. PROVIDE FULL COLOR OPTIONS.
2. REFER TO ARCHITECTURAL PLANS FOR MOUNTING TYPE (LAY-IN, GYP, ETC.)

VARIABLE REFRIGERANT CONTROLLER UNIT SCHEDULE

MARK	MANUFACTURER	MODEL #	DIMENSIONS (IN.)			WEIGHT (LBS)	ELECTRICAL				REMARKS
			LENGTH	WIDTH	HEIGHT		VOLTAGE	PHASE	MCA	MOCP	
BS-1	DAIKIN	BSQ36TVJ	15	12	8	27	208 V	1	1 A	15	ALL
BS-4	DAIKIN	BS4Q54TVJ	19	15	12	49	208 V	1	1 A	15	ALL
BS-6	DAIKIN	BS6Q54TVJ	19	23	12	68	208 V	1	1 A	15	ALL

REMARKS:

1. PROVIDE SINGLE POINT CONNECTION.
2. CONTRACTOR SHALL COORDINATE TO ENSURE MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES ARE MAINTAINED.
3. PROVIDE INTEGRAL DISCONNECT.

EXHAUST FAN SCHEDULE

MARK	MANUFACTURER	MODEL #	SERVICE	TYPE	AIRFLOW (CFM)	E.S.P.	DRIVE	RPM	FAN HP	ELECTRICAL DATA			SONES	REMARKS
										VOLTAGE	PHASE	HZ		
EF-1	GREENHECK	CSP-A390	RESTROOMS	SQUARE INLINE CENTRIFUGAL FAN	300	0.59	DIRECT	1350	0	208 V	1	60	4.5	ALL

REMARKS:

1. PROVIDE SINGLE POINT CONNECTION.
2. FAN TO BE MOUNTED UP AGAINST LOUVER.
3. REFER TO EXHAUST FAN CONTROLS FOR CONTROLS.

LOUVER SCHEDULE

MARK	MANUFACTURER	MODEL #	SERVICE	DEPTH (IN)	CFM	WIDTH (IN)	HEIGHT (IN)	FREE AREA	VELOCITY (FPM)	APD (IN. WG.)	BIRD SCREEN	DRAINABLE BLADE	REMARKS
L-1	GREENHECK	EDK-402	EF-1	4	300	16	16	0.6	460	0.03	Yes	Yes	ALL
L-2	GREENHECK	EDK-402	V-1	4	700	36	12	0.6	460	0.03	Yes	Yes	ALL

REMARKS:

1. ARCHITECT TO SELECT COLOR. PROVIDE FULL COLOR PALETTE.
2. PROVIDE GRAVITY BACKDRAFT DAMPER.

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

CRABTREE ROHRBAUGH & ASSOCIATES - ARCHITECTS
250 WEST MAIN STREET, SUITE 200
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434-975-7262
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TOWSON, MARYLAND
WHITE SULPHUR SPRINGS, WEST VIRGINIA
www.cra-architects.com

ADDITION AND RENOVATIONS
MULTIPURPOSE ROOM
FLUVANNA COUNTY
132 MAIN STREET
PALMYRA, VA 22963

CR

COMMONWEALTH OF VIRGINIA
BRYAN LEE HARRISON
REGISTERED
PROFESSIONAL ENGINEER

MECHANICAL SCHEDULES, DETAILS, AND CONTROLS

PLOT SCALE: 1/8" = 1'-0"
FILENAME:
DATE: AUGUST 28, 2020

PROJECT
Fluvanna Co.

M-200

PLUMBING GENERAL NOTES

A COORDINATE THE LOCATION OF DRAINS, THERMOSTATS, GAS OUTLETS, ETC., WITH ALL CASEWORK EQUIPMENT, MECHANICAL ROOM EQUIPMENT, ETC., PRIOR TO COMMENCING INSTALLATION. WORK NOT SO COORDINATED SHALL BE REMOVED AND PROPERLY INSTALLED AT THE EXPENSE OF THE CONTRACTOR.

B THE CONTRACTOR SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO INSURE THAT THEY DO NOT INTERRUPT ANY EXISTING SERVICE. FOR SAFETY PURPOSES, PAY PARTICULAR ATTENTION TO THIS PRECAUTION RELATIVE TO NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, TYPE, ETC., OF EACH UNDERGROUND OR OVERHEAD UTILITY. ALL WORK SHALL BE PERFORMED IN ACCORD WITH ALL FEDERAL, STATE AND/OR LOCAL RULES, REGULATIONS, STANDARD AND SAFETY REQUIREMENTS. UTILITIES SHALL BE INSTALLED IN ACCORD WITH THE APPLICABLE MUNICIPALITY OR UTILITY COMPANY STANDARDS. IN ALL CASES, THE MOST STRINGENT REQUIREMENT SHALL APPLY.

C WHERE WORK IS REQUIRED ABOVE EXISTING LAY-IN, PLASTER OR GYPSUM BOARD CEILINGS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL AND REINSTALLATION (OR REPLACEMENT, IF DAMAGED) OF ALL CEILING OR TILE AND GRID MEMBERS NECESSARY TO PERFORM HIS WORK. NEW TILE AND GRID SHALL MATCH THE SURROUNDING AREAS. ALL PATCHING WORK SHALL MATCH ADJACENT SURFACES.

D ALL NEW WORK SHALL BE HUNG FROM STRUCTURE, NOT FROM THE WORK OF OTHER TRADES, WHETHER EXISTING OR NEW.

E COORDINATE ALL WORK WITH PROJECT PHASING REQUIREMENTS.

F PATCH, REPAIR AND PAINT OR PROVIDE WALL COVERING FOR (TO OWNER'S STANDARDS) EXISTING WALLS, CEILINGS, ETC., THAT ARE TO REMAIN IF DAMAGED DURING CONSTRUCTION. REPAIRS SHALL MATCH ADJACENT SURFACES TO THE SATISFACTION OF THE ARCHITECT AND OWNER.

G OBSERVE ALL APPLICABLE CODES, RULES AND REGULATIONS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT. (CITY, COUNTY, LOCAL, FEDERAL, MUNICIPALITY, UTILITY COMPANY, COMMONWEALTH OF KENTUCKY, ETC.)

H CONTRACTOR SHALL BE AWARE OF UNSEEN PLUMBING WORK DURING DEMOLITION. IF ITEMS ARE UNCOVERED DURING DEMOLITION THEN FIELD VERIFY THE USE OF THE ITEMS AND PLAN AN ALTERNATE ROUTE TO RUN THESE ITEMS. THEN CONTACT THE ENGINEERS TO REVIEW THE ROUTING.

I IF AREA OF CONSTRUCTION HAS A POST TENSION FLOOR SLAB, CONTRACTOR SHALL USE ULTRA SOUND OR OTHER APPROVED METHODS TO SURVEY THE EXISTING FLOOR STRUCTURE BEFORE MAKING ANY AND ALL FLOOR PENETRATIONS.

J WHERE FIRE PROOFING IS SPRAYED ON EXISTING STRUCTURE ALL EXISTING CONDUITS, WATER, HYDRONIC, STEAM, CHILLED WATER, FIRE PROTECTION LINES, MED GAS, ETC. SHALL BE LOWERED TO BE BELOW FULL THICKNESS OF FIRE PROOFING WITH NO INTERFERENCE.

K ALL PENETRATIONS OF FIRE AND SMOKE RATED ASSEMBLIES SHALL BE APPROPRIATELY FIRE STOPPED PER AN APPROVED U.L. LISTED STANDARD. CONTRACTOR SHALL PAY PARTICULAR ATTENTION TO INSULATED PIPING PENETRATIONS.

L ALL WORK REQUIRING DOWNTIME OF ANY AREA IN THE BUILDING SHALL BE SCHEDULED 2 WEEKS IN ADVANCE, AND SHALL COMPLY WITH INTERIM LIFE SAFETY MEASURES.

M ALL PIPING IN ROOMS WITH CEILINGS SHALL BE ABOVE CEILING EXCEPT AS NOTED.

N IN ACCORDANCE WITH K.R.S. ALL PLUMBING WORK SHALL BE CONSTRUCTED IN COMPLIANCE WITH PLANS APPROVED BY AND BEARING THE APPROVAL STAMP OF THE KENTUCKY DIVISION OF PLUMBING AND/OR THE DIVISION OF WATER. THE CONTRACTOR SHALL NOT BEGIN WORK UNTIL HE HAS RECEIVED SUCH APPROVED PLANS.

O LOCATIONS OF PIPING AND EQUIPMENT ARE APPROXIMATE AND SUBJECT TO MINOR ADJUSTMENTS IN THE FIELD. DO NOT SCALE THE DRAWINGS.

P ALL OFFSETS IN PIPING ARE NOT NECESSARILY SHOWN. PROVIDE ADDITIONAL OFFSETS WHERE NECESSARY.

Q THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COMPANY FEES OR OTHER COSTS THAT ANY UTILITY COMPANY MAY REQUIRE TO COMPLETE THEIR WORK. (GAS, SEWER, WATER, ETC.).

R INSTALL ALL PIPING AND EQUIPMENT IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTION. IF IN CONFLICT WITH THE DESIGN INDICATED IN CONTRACT DOCUMENTS, ADVISE THE ENGINEERS PRIOR TO INSTALLATION FOR CLARIFICATION. PROVIDE RECOMMENDED ACCESS AND SERVICE CLEARANCES FOR ALL EQUIPMENT.

S SEAL AIRTIGHT AROUND ALL DUCTS AND PIPING PENETRATIONS THROUGH WALLS, FLOORS AND ROOF. PROVIDE FIRE STOPPING IN FIRE PARTITION.

T THE CONTRACTOR SHALL RELOCATE OR AVOID ANY EXISTING EQUIPMENT APPURTENANCES, ETC., THAT CONFLICT WITH NEW WORK.

U WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH ANY OTHER BUILDING SYSTEM, CONTACT THE ENGINEERS BEFORE INSTALLATION. REFER ALSO TO ARCHITECTURAL WALL INTERIOR AND EXTERIOR WALL ELEVATIONS, CEILING HEIGHTS AND OTHER DETAIL OF THESE DOCUMENTS.

V DOUBLE WIDTH TURNING VANES SHALL BE INSTALLED IN ALL SUPPLY, RETURN, AND EXHAUST DUCTWORK ELBOWS. TURNING VANES NOT REQUIRED FOR KITCHEN EXHAUSTS.

W ANY VIBRATING, OSCILLATING OR OTHER NOISE OR MOTION PRODUCING EQUIPMENT SHALL BE ISOLATED FROM SURROUNDING SYSTEMS IN AN APPROVED MANNER. NOISY OR STRUCTURALLY DAMAGING INSTALLATIONS SHALL BE SATISFACTORILY REPLACED OR REPAIRED AT THE INSTALLING CONTRACTOR'S EXPENSE. THE FINAL DECISION ON THE SUITABILITY OF A PARTICULAR INSTALLATION'S ACCEPTABILITY SHALL BE THAT OF THE ENGINEER.

X DEVIATIONS IN SIZE, CAPACITIES, FIT, FINISH, ETC. FOR EQUIPMENT FROM THAT USED AS BASIS OF DESIGN SHALL BE THE RESPONSIBILITY OF THE PURCHASER OF THAT EQUIPMENT. ANY PROVISIONS REQUIRED TO ACCOMMODATE A DEVIATION, WHETHER APPROVED BY THE ENGINEERS OR NOT, SHALL BE THE RESPONSIBILITY OF THE PURCHASER.

Y VALVES, BALANCING DAMPERS OR ANY MECHANICAL/ELECTRICAL ITEM REQUIRING ACCESS SHALL NOT BE LOCATED ABOVE A HARD CEILING. IF THIS IS NOT POSSIBLE, THEN AN APPROPRIATELY SIZED ACCESS DOOR SHALL BE PLACED UNDER THE ITEM TO ALLOW EASY MAINTENANCE AND ADJUSTMENT. ADDITIONALLY ALL SUCH ITEMS SHALL NOT BE LOCATED AN UNREASONABLE DISTANCE ABOVE THE CEILINGS. IN GENERAL ALL SUCH ITEMS UNLESS INDICATED OTHERWISE SHALL BE MOUNTED SIX TO TWELVE INCHES ABOVE THE CEILING. IF IN DOUBT, CONTACT ENGINEER PRIOR TO INSTALLING.

Z ALL MANHOLES, VAULTS AND SIMILAR UNDERGROUND STRUCTURES SHALL HAVE THE TOP ELEVATION SET FLUSH WITH FINISHED GRADE UNLESS SPECIFICALLY NOTED OTHERWISE.

AA WHEN RUNNING ANY TYPE OF PIPING BELOW A FOOTER, OR IN THE ZONE OF INFLUENCE THE PIPING SHALL BE BACKFILLED WITH CEMENTITIOUS FLOWABLE FILL PER SPECIFICATIONS. WHENEVER POSSIBLE, LOCATE PIPING OUTSIDE OF THE ZONE OF INFLUENCE. THE ZONE OF INFLUENCE IS THE AREA UNDER THE FOOTER WITHIN A 45 DEGREE ANGLE PROJECTING DOWN FROM THE BOTTOM EDGE OF THE FOOTER OF ALL SIDES OF THE FOOTER. ADDITIONALLY, GREASE TRAPS, MANHOLES, VAULTS AND OTHER UNDERGROUND STRUCTURES SHALL BE HELD AWAY FROM BUILDING WALLS FAR ENOUGH TO BE OUTSIDE OF THE ZONE OF INFLUENCE.

AC WORK IN CONFINED AREAS SHALL BE IN ACCORDANCE WITH THE OWNER'S SAFETY POLICY REQUIREMENTS.

PLUMBING DEMOLITION NOTES

A THE CONTRACTOR SHALL REFER TO THE ARCHITECTURAL PLANS FOR AREAS IN WHICH THE CEILING IS REMAINING. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING THE EXISTING CEILING AS REQUIRED AND REINSTALLATION. TEMPORARILY SUPPORT LIGHTS, DIFFUSERS, CEILING ETC. REPLACE BROKEN CEILING TILES WITH NEW AT NO ADDITIONAL COST TO OWNER. FIELED VERIFY EXACT REQUIREMENTS.

B ALL WALLS AND FLOOR SLABS SHALL BE REPAIRED TO MATCH EXISTING AND TO A LIKE NEW CONDITION. ALL RATED WALLS AND FLOOR SLABS SHALL BE PATCHED AND REPAIRED TO MAINTAIN RATING.

C ALL EXISTING BUILDING FINISHES SHALL BE PROTECTED DURING THE DEMOLITION PHASE.

D HEAVY DASHED LINES INDICATE ITEMS FOR REMOVAL (UON) AND LIGHT SOLID LINES INDICATE EXISTING ITEMS TO REMAIN.

E COORDINATE DISPOSAL OF ALL FIXTURES, DEVICES, ETC. (INDICATED FOR DEMOLITION) WITH THE OWNER.

F ALL OUTAGES SHALL BE SCHEDULED THROUGH THE PROJECT REPRESENTATIVE FOR PROPER COORDINATION. A REQUEST FOR AN OUTAGE SHALL BE SUBMITTED IN WRITING A MINIMUM OF TWO WEEKS IN ADVANCE.

G ALL DUCTWORK, PIPING, CONDUIT, ETC. SHALL BE INSTALLED A MINIMUM OF 4" ABOVE THE TOP OF THE CEILING GRID PER UK STANDARDS.

PLUMBING HAZARDOUS MATERIALS NOTES

A THE CONTRACTOR IT IS HEREBY ADVISED THAT IS POSSIBLE THAT ASBESTOS AND/OR OTHER HAZARDOUS MATERIALS ARE OR WERE PRESENT IN THIS BUILDING(S). ANY WORKER, OCCUPANT, VISITOR, ETC., WHO ENCOUNTERS ANY MATERIAL OF WHOSE CONTENT THEY ARE NOT CERTAIN SHALL PROMPTLY REPORT THE EXISTENCE AND LOCATION OF THAT MATERIAL TO THE OWNER. FURTHERMORE, THE CONTRACTOR SHALL INSURE THAT NO ONE COMES NEAR TO OR IN CONTACT WITH ANY SUCH MATERIAL OR FUMES THEREFROM UNTIL ITS CONTENT CAN BE ASCERTAINED TO BE NON-HAZARDOUS.

B CMTA, INC. HAS NO EXPERTISE IN THE DETERMINATION OF THE PRESENCE OF ANY HAZARDOUS MATERIAL. THEREFORE, NO ATTEMPT HAS BEEN MADE BY CMTA TO IDENTIFY THE EXISTENCE OR LOCATION OF ANY SUCH HAZARDOUS MATERIAL. FURTHERMORE, CMTA NOR ANY AFFILIATE HEREOF WILL NOT OFFER OR MAKE ANY RECOMMENDATIONS RELATIVE TO THE REMOVAL, HANDLING OR DISPOSAL OF SUCH MATERIAL.

C IF THE WORK WHICH IS TO BE PERFORMED INTERFACES, CONNECTS OR RELATES IN ANY PHYSICAL WAY WITH OR TO EXISTING COMPONENTS WHICH CONTAIN OR BEAR ANY HAZARDOUS MATERIAL, ASBESTOS BEING ONE, THEN IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO CONTACT THE OWNER AND SO ADVISE HIM IMMEDIATELY.

D THE CONTRACTOR BY EXECUTION OF THE CONTRACT FOR ANY WORK AND/OR BY THE ACCOMPLISHMENT OF ANY WORK THEREBY AGREE TO BRING NO CLAIM RELATIVE TO HAZARDOUS MATERIALS FOR NEGLIGENCE, BREACH OF CONTRACT, INDEMNITY, OR ANY OTHER SUCH ITEM AGAINST CMTA, ITS PRINCIPALS, EMPLOYEES, AGENTS OR CONSULTANTS. ALSO, THE CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD CMTA, ITS PRINCIPALS, EMPLOYEES, AGENTS AND CONSULTANTS HARMLESS FROM ANY SUCH RELATED CLAIMS WHICH MAY BE BROUGHT BY ANY SUBCONTRACTORS, SUPPLIERS OR ANY OTHER THIRD PARTIES.

E THE CONTRACTOR IS DIRECTED TO THE SPECIFICATIONS FOR FURTHER INFORMATION.

PLUMBING PHASING NOTES

A THIS PROJECT INTERFACES EXTENSIVELY WITH EXISTING BUILDING SERVICES. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE AND PHASE ALL TIE-INS AND INTERRUPTIONS OF EXISTING SERVICES TO MINIMIZE OR ELIMINATE DOWNTIME. AS AN EXAMPLE, MAIN GAS SERVICE, WATER SERVICE, ELECTRICAL SERVICE, HVAC SERVICES, STEAM GENERATION, ETC., WILL BE AFFECTED AND REPLACED OR MOVED DURING THIS PROJECT. THE CONTRACTOR SHALL INSTALL ALL NEW SERVICES AND EQUIPMENT AND HAVE THEM TESTED AND FULLY AND RELIABLY FUNCTIONAL PRIOR TO INTERRUPTING, RELOCATING OR REMOVING ANY EXISTING SERVICES. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO BARE ANY AND ALL COSTS ASSOCIATED WITH THIS PHASING, INCLUDING TEMPORARY SERVICES, TEMPORARY RELOCATION, PREMIUM TIME WORK, ETC. CONTRACTOR SHALL COORDINATE ALL SAID WORK WITH THE OWNER AND APPLICABLE UTILITIES PER THE CONTRACT DOCUMENTS.

ABBREVIATIONS

AC	ALTERNATING CURRENT
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AFR	ABOVE FINISHED ROOF
AFUE	ANNUAL FUEL UTILIZATION EFFICIENCY
AHJ	AUTHORITY HAVING JURISDICTION
AMP	AMPERE (AMP, AMPS)
ANSI	AMERICAN NATIONAL STANDARD INSTITUTE
APD	AIR PRESSURE DROP
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR-CONDITIONING ENGINEERS
AVG	AVERAGE
BAS	BUILDING AUTOMATION SYSTEM
BHP	BREAK HORSEPOWER
BTU	BRITISH THERMAL UNIT
CAP	CAPACITY
CD	CONDENSATE DRAIN
CFM	CUBIC FEET PER MINUTE
C.I.	CAST IRON
CLG	CEILING
CLR	CLEAR
CO	CARBON MONOXIDE
COND	CONDENS (-ER, -ING, -ATION, -ATE)
CONT	CONTINU (-ED, -OUS)
CU FT	CUBIC FEET
CU IN	CUBIC INCHES
CV	VALVE FLOW COEFFICIENT
dB	DECIBEL
DB	DRY BULB
DC	DIRECT CURRENT
DD	DUCT SMOKE DETECTOR
DDC	DIRECT DIGITAL CONTROLS
DEG	DEGREE (-S)
DIA	DIAMETER (-S)
DN	DOWN
DWG	DRAWING
EC	ELECTRICAL CONTRACTOR
ELEV	ELEVA (-TION, -TOR)
ENGR	ENGINEER
EQ	EQUAL
ESP	EXTERNAL STATIC PRESSURE
ETR	EXISTING TO REMAIN
EVAP	EVAPORAT (-E, -ING, -ED, -OR, -ION)
EWT	ENTERING WATER TEMPERATURE
EXP	EXPANSION
EXT	EXTERIOR
FA	FREE AREA

ABBREVIATIONS (CONTINUED)

FL	FLOOR
FLA	FULL LOAD AMPS
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FPC	FIRE PROTECTION CONTRACTOR
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FT	FEET **OR** FOOT
FUT	FUTURE
FV	FACE VELOCITY
GA	GAGE/GAUGE
GAL	GALLON (-S)
GC	GENERAL CONTRACTOR
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR	GRAINS
H	HUMIDITY
HD	HEAD
HG	MERCURY
HORIZ	HORIZONTAL
HP	H (-ORSEPOWER, -EAT PUMP)
HR	HOUR (-S)
HVAC	HEATING, VENTILATING, & AIR-CONDITIONING
Hz	HERTZ
ID	I (-DENTIFICATION, -NSIDE DIAMETER, -NSIDE DIMENSION)
IN	INCH (-ES)
INSUL	INSULAT (-ED, -ION)
INT	INTER (-IOR, -ERVAL)
IPS	IRON PIPE SIZE
kW	KILOWATT
kWh	KILOWATT HOUR
LBS	POUNDS
LF	LINEAR FEET/FOOT
LRA	LOCKED ROTOR AMPS
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MBH	BTU PER HOUR [THOUSANDS]
MCA	MINIMUM CIRCUIT AMPS
MFG	MANUFACTURER
MIN	MIN (-IMUM, -UTE)
MISC	MISCELLANEOUS
MOCP	MAXIMUM OVERCURRENT PROTECTION [AMPS]
MTG	MOUNTING
N/A	NOT APPLICABLE
NC	NOISE CRITERIA **OR** NORMALLY CLOSED
NEBB	NATIONAL ENVIRONMENTAL BALANCING BUREAU
NIC	NOT IN CONTRACT

ABBREVIATIONS (CONTINUED)

NO	NORMALLY OPEN **OR** NUMBER
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DI (-AMETER, -MENSION)
CFCI	CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED, OWNER INSTALLED
OR	OPEN RECEPTACLE
OZ	OUNCE (-S)
PC	PLUMBING CONTRACTOR
PD	PRESSURE DROP
PH	PHASE [ELECTRICAL]
PLBG	PLUMBING
PPM	PARTS PER MILLION
PRS	PRESSURE REDUCING STATION
PRV	PRESSURE REDUCING VALVE (STEAM, WATER, GAS)
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	PPSI GAUGE
RLA	RUNNING LOAD AMPS
RPM	REVOLUTIONS PER MINUTE
SQ	SQUARE
SQ FT	SQUARE FEET **OR** FOOT
SQ IN	SQUARE INCH **OR** INCHES
TAB	TESTING AND BALANCING
TBD	TO BE DETERMINED
TE	TOP ELEVATION
TEMP	TEMPERATURE
TPA	TRAP PRIMER ADAPTER
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
V	VOLT (-AGE, -S)
VAR	VARI (-ABLE, -IES)
VAV	VARIABLE AIR VOLUME
VEL	VELOCITY
VFD	VARIABLE FEQUENCY DRIVE
W	WATT (-AGE, -S)
WB	WET BULB
WBT	WET BULB TEMPERATURE
WPD	WATER PRESSURE DROP
WT	WEIGHT
W/	WITH
W/O	WITHOUT
%	PERCENT
ΔP	DIFFERENTIAL PRESSURE
ΔT	TEMPERATURE DIFFERENCE
℄	CENTERLINE

GENERAL SYMBOLS

(#)	TAGGED NOTE DESIGNATOR
1	REVISION TRIANGLE
ROOM NAME 101.01	ROOM TAG
TAG XXX-# INSTANCE XXXX	EQUIPMENT TAG
XXX ##"	DOMESTIC WATER RISER TAG
XXX ##"	SANITARY, WASTE, & VENT RISER TAG
XXX ##	FIRE SUPPRESSION RISER TAG
	POINT OF CONNECTION / CONNECT TO EXISTING
	POINT OF DEMOLITION
--D(XXX)--	PIPING TO BE DEMOLISHED - (XXX) DENOTES SYSTEM
—E(XXX)—	EXISTING PIPING - (XXX) DENOTES SYSTEM
—A(XXX)—	ABANDONED IN PLACE PIPING - (XXX) DENOTES SYSTEM

VALVE SYMBOL LEGEND

	TWO-WAY CONTROL VALVE
	THREE-WAY CONTROL VALVE
	AUTOMATIC AIR VENT (AAV)
	MANUAL AIR VENT (MAV)
	MANUAL BALANCING VALVE (BV)
	BALL VALVE
	BUTTERFLY VALVE
	TRIPLE DUTY VALVE (TDV)
	STRAINER
	MANUAL ISOLATION VALVE
	GLOBE VALVE
	OS&Y (GATE) VALVE
	PRESSURE REDUCING VALVE (STEAM, GAS, WATER, ETC.)
	AUTO-FLOW CONTROL VALVE
	CHECK VALVE
	DOUBLE CHECK VALVE ASSEMBLY

PLUMBING PIPING LEGEND

	PIPE ELBOW TURNING UP
	PIPE ELBOW TURNING DOWN
	PIPE TEE; CONNECTION ON TOP
	PIPE TEE; CONNECTION ON BOTTOM
	PIPE CAP
—AVT—	ACID VENT
—AW—	ACID WASTE
—CA—	COMPRESSED AIR
—CAI/E—	COMBUSTION AIR INTAKE/EXHAUST
—CBS/R—	CHILLED BEAM SUPPLY/RETURN
—CD—	CONDENSATE DRAIN
—CO2—	CARBON DIOXIDE
—CST—	CLEAN STEAM PIPING
— DCW —	DOMESTIC COLD WATER (DCW)
—DHW— —DHW(#°F)—	DOMESTIC HOT WATER (DHW)
-DHR- —DHR(#°F)—	RECIRCULATED DOMESTIC HOT WATER (DHR)
—HPC—	HIGH PRESSURE STEAM CONDENSATE
—HPS(#)—	HIGH PRESSURE STEAM; (#) DENOTES PRESSURE
—HPS/R—	HEAT PUMP WATER SUPPLY/RETURN
—HRS/R—	HEAT RECOVERY SUPPLY/RETURN PIPING
—HWS/R—	HEATING WATER SUPPLY/RETURN
—LPC—	LOW PRESSURE STEAM CONDENSATE
—LPS(#)—	LOW PRESSURE STEAM; (#) DENOTES PRESSURE
—MPC—	MEDIUM PRESSURE STEAM RETURN
—MPS(#)—	MEDIUM PRESSURE STEAM; (#) DENOTES PRESSURE
—SPD—	STEAM CONDENSATE PUMPED DISCHARGE
—SVT—	STEAM VENT PIPING

PLUMBING SYMBOL LEGEND

	FLEXIBLE PIPE CONNECTION
	FLOW METER (VENTURI)
	PIPING UNION
	FLOW SWITCH
	PRESSURE SWTICH
	TAMPER SWITCH
	THERMOMETER
T	PETE'S PLUG; TEMPERATURE/PRESSURE PORT

PLUMBING FIXTURE SCHEDULE

TAG	DESCRIPTION	CW	HW	VENT	WASTE	VOLTAGE	EXTERNAL CHECK VALVE
P-1	LAVATORY - WALL HUNG W/ SINGLE LEVER FAUCET - ADA COMPLIANT : VITREOUS CHINA, 20"X18" WALL HUNG LAVATORY WITH 4" FAUCET CENTERS, CONCEALED ARMS AND 4" HIGH BACKSPLASH. PROVIDE WITH A 0.5 GPM SINGLE LEVER FAUCET, CHROME PLATED 3/8" SUPPLIES WITH STOPS, GRID DRAIN, P-TRAP. TAILPIECE AND ESCUTCHEONS. MOUNT LAVATORY AT A HEIGHT LEAVING A CLEARANCE OF AT LEAST 29" FROM THE FLOOR TO THE APRON AND THE RIM AT A MAXIMUM OF 34" AFF. PROVIDE ON THE EXPOSED WASTE PIPE AND WATER SUPPLY LINES A TRAP-WRAP INSULATION KIT WITH A VINYL AND PLASTIC COVERING.	1/2"	1/2"	2"	2"	Yes	Yes
P-2A	URINAL - ADA COMPLIANT : VITREOUS CHINA SIPHON JET URINAL WITH 3/4' TOP SPUD INLET, 2" I.P.S. OUTLET,AND 1.0 GPF MANUAL FLUSH VALVE. MOUNT WITH LIP OF URINAL AT 16" ABOVE FINISHED FLOOR. CONTROLS SHALL BE A MAXIMUM OF 39" ABOVE FINISHED FLOOR. PROVIDE FLOOR MOUNTED WALL CARRIER.	3/4"	-	2"	2"	Yes	Yes
P-3A	WATER CLOSET SLOAN WETS 8029.8013 OR SIMILAR - FLOOR MOUNTED - PRESSURE ASSISTED - ADA COMPLIANT : VITREOUS CHINA, 17" HIGH ELONGATED BOWL, SIPHON JET, 11/2" TOP SPUD INLET, CHINA BOLT CAPS AND WHITE OPEN FRONT PLASTIC SEAT WITH SELF-SUSTAINING CHECK HINGES. PROVIDE PRESSURE ASSISTED 1.6 GPF FLUSH VALVE WITH HANDLE AT A MAXIMUM OF 31" AFF.	1/2"	-	2"	4"	Yes	Yes
P-3B	WATER CLOSET SLOAN WETS 8029.8013 OR SIMILAR - FLOOR MOUNTED - PRESSURE ASSISTED : VITREOUS CHINA, 15" HIGH ELONGATED BOWL, SIPHON JET, 11/2" TOP SPUD INLET, CHINA BOLT CAPS AND WHITE OPEN FRONT PLASTIC SEAT WITH SELF-SUSTAINING CHECK HINGES. PROVIDE WITH PRESSURE ASSISTED 1.6 GPF FLUSH VALVE.	1/2"	-	2"	4"	Yes	Yes
P-4	SINGLE COMPARTMENT SINK : ELKAY LRAD1919CR SINGLE COMPARTMENT STAINLESS SINK 19-1/2" X 19" O.D., 19"X6" I.D., 6" DEEP, 10 GAUGE, WITH CHICAGO FAUCET 786-E35ABCP GOOSENECK SWING SPOUT FAUCET WITH 4" WRIST BLADE CONTROL HANDLES, REAR CENTERED CRUMB CUP STRAINER DRAIN, CHROME PLATED 3/8" ANGLE SUPPLIES WITH STOPS, P-TRAP, TAILPIECE AND ESCUTCHEONS.	1/2"	1/2"	2"	2"	Yes	Yes
P-5	ELECTRIC WATER COOLER – BI LEVEL – ADA COMPLIANT : OASIS PG8EBFSL BI-LEVEL BARRIER FREE WATER COOLER WITH SINGLE COMPRESSOR. WATER SUPPLY, DRAIN AND ELECTRICAL CONNECTION .8.0 GPH OF 50°F WATER AT 90°F AMBIENT AND 80°F INLET WATER, 18.8 GAUGE STAINLESS STEEL BASIN, 1/5 HP COMPRESSOR115V/1PH, SURFACE MOUNTED TO THE WALL WITH CHILLER BELOW BOWL AND SIDE AND FRONT PUSH BAR OPERATORS. PROVIDE WITH VERSA FILTER WATER FILTER. MOUNT UNIT SO THE BOTTOM OF THE LOWER COOLER IS AT 9" MINIMUM AFF WITH A CLEARANCE OF 27" MINIMUM FROM THE BOTTOM OF THE APRON OF THE BOWL TO THE FINISHED FLOOR. THE DIMENSION TO THE CENTERLINE OF THE LOWER COOLER BUBBLER SHALL BE 35". PROVIDE WITH STAINLESS STEEL CANE TOUCH APRON ATTACHED TO THE HI COOLER.	1/2"	-	2"	2"	Yes	Yes

Sheet List - Plumbing

SHEET #	SHEET NAME
P-001	PLUMBING LEGEND
P-100	UNDERGROUND PLUMBING PLAN
P-101	FIRST FLOOR PLUMBING PLAN
P-200	PLUMBING RISER

APPLICABLE BUILDING CODES

APPLICABLE BUILDING CODES	DOCUMENT	YEAR
ACCESSIBLE AND USEABLE BUILDINGS AND FACILITIES	ANSI A117.1	2009
FIRE SPRINKLER CODE	NFPA 13	2013
INTERNATIONAL BUILDING CODE (IBC)	STATE EDITION	2015
INTERNATIONAL ENERGY CONSERVATION CODE (IECC)	STATE EDITION	2015
INTERNATIONAL FIRE CODE (IFC)	STATE EDITION	2015
INTERNATIONAL FUEL GAS CODE (IFGC)	STATE EDITION	2015
INTERNATIONAL MECHANICAL CODE (IMC) / VIRGINIA MECHCANICAL CODE	STATE EDITION	2015
INTERNATIONAL PLUMBING CODE (IPC)	STATE EDITION	2015
INTERNATIONAL EXISTING BUILDING CODE (IEBC)	STATE EDITION	2009
NATIONAL ELECTRIC CODE (NEC)	NFPA 70	2014
NATIONAL FIRE ALARM & SIGNALING CODE	NFPA 72	2013
UNIFORM STATEWIDE BUILDING CODE		2018

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

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ADDITION AND RENOVATIONS
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FLUVANNA COUNTY
132 MAIN STREET
PALMYRA, VA 22963

COMMONWEALTH OF VIRGINIA
BRYAN LEE HARRISON
PROFESSIONAL ENGINEER

PLUMBING LEGEND

PLOT SCALE: N/A
FILENAME:
DATE: AUGUST 28, 2020

PROJECT
Fluvanna Co.

P-001

TAGGED NOTES

P1 DEMOLISH EXISTING SHOWER, SINK AND WATER CLOSET. SHOWER DRAIN TO BE CAPPED AND SEALED.

P2 REMOVE DOMESTIC HOT WATER PIPING BACK TO POINT INDICATED. SEE NEW WORK PLAN FOR NEW CONNECTION.

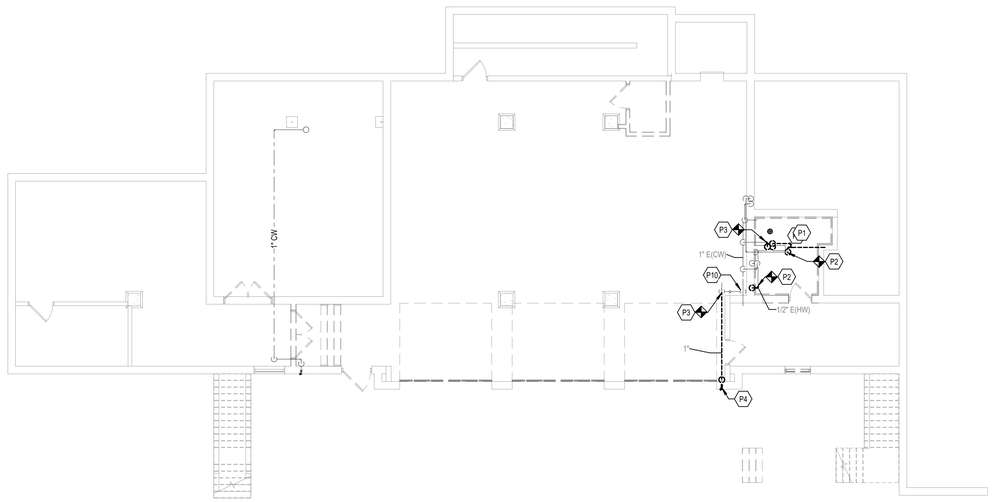
P3 REMOVE DOMESTIC COLD WATER PIPING BACK TO POINT INDICATED. SEE NEW WORK PLAN FOR NEW CONNECTION.

P4 REMOVE EXISTING WALL HYDRANT. SEAL EXTERIOR WALL TO MATCH EXISTING.

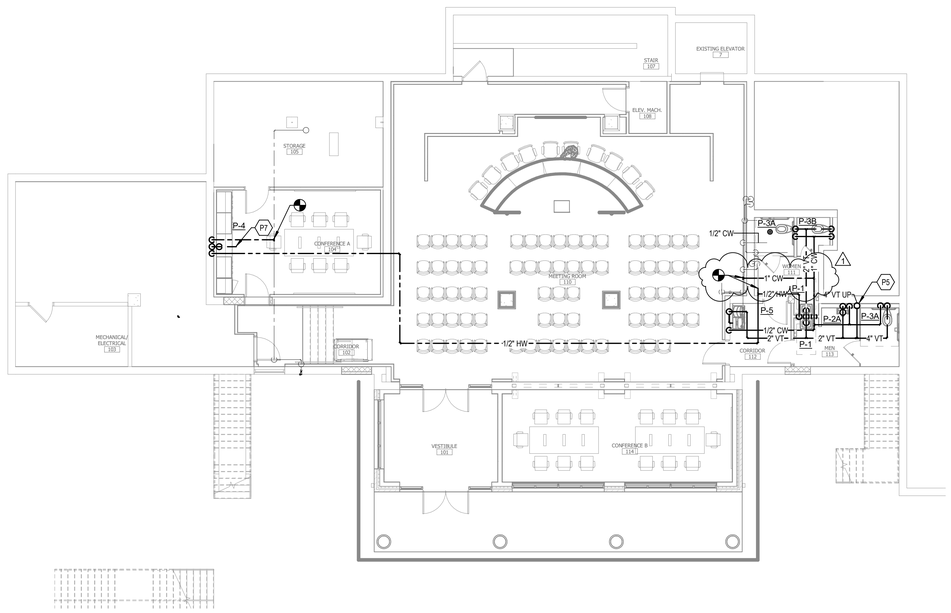
P5 4" VENT GOING UP TO THE LEVEL ABOVE. COORDINATE VENTING CONNECTION LOCATION WITH THE EXISTING VENTING ABOVE.

P7 COORDINATE VENT CONNECTION WITH EXISTING VENTS ON THE LEVEL ABOVE.

P10 DEMOLISH PIPE BACK TO ABOVE CEILING. CAP AND SEAL AIR TIGHT.



1 P-101 PLUMBING DEMOLITION PLAN
1/8" = 1'-0"



2 P-101 PLUMBING NEW WORK PLAN
1/8" = 1'-0"

REVISIONS

#	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

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CR

COMMONWEALTH OF VIRGINIA
BRYAN LEE HARRISON
PROFESSIONAL ENGINEER

FIRST FLOOR PLUMBING PLAN

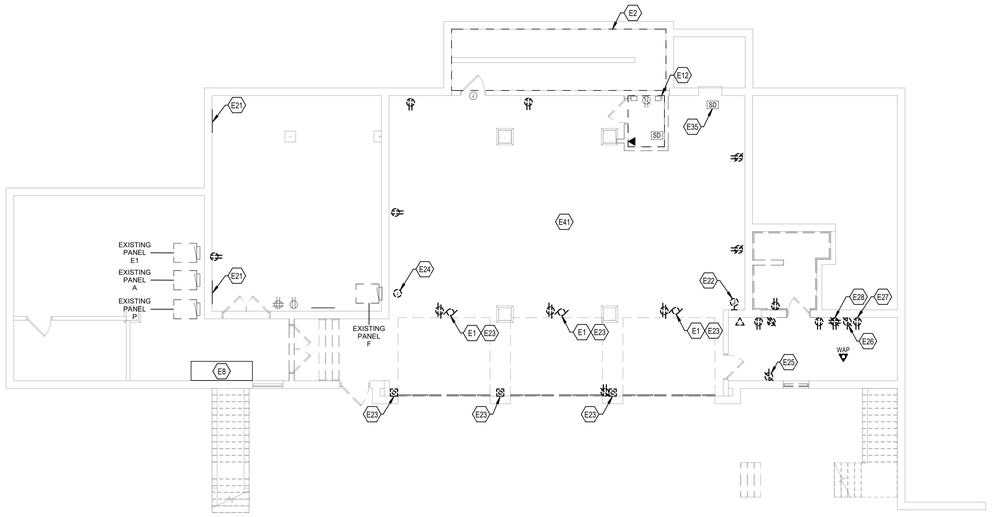
PLOT SCALE: 1/8" = 1'-0"

FILENAME:

DATE: AUGUST 28, 2020

PROJECT
Fluvanna Co.

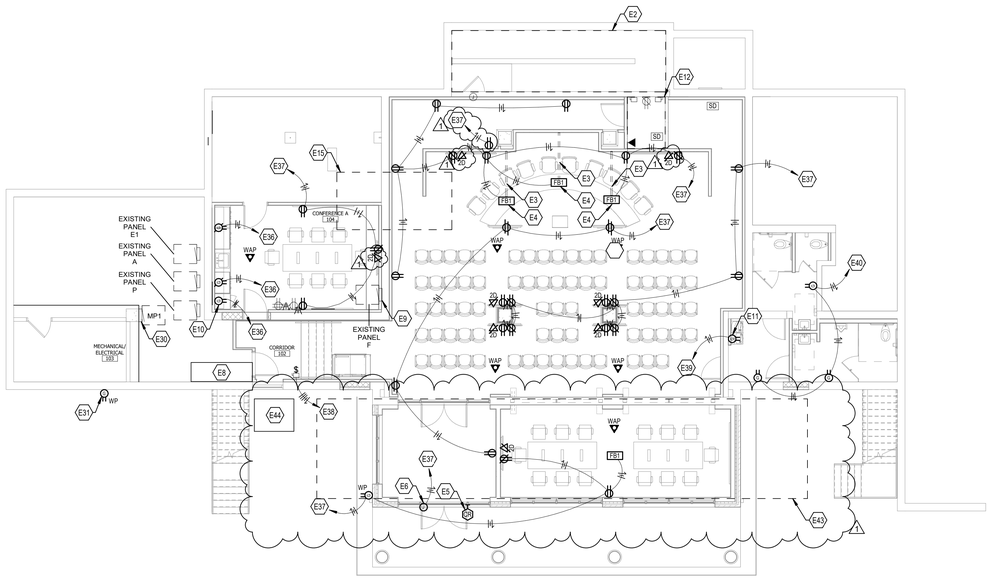
P-101



1 POWER/SYSTEMS DEMOLITION PLAN

SCALE: 1/8" = 1'-0"

0 2' 4' 8' 16' 24' 32'



2 POWER/SYSTEMS NEW WORK PLAN

SCALE: 1/8" = 1'-0"

0 2' 4' 8' 16' 24' 32'

ELECTRICAL POWER NOTES

A REFER TO THE ARCHITECT'S REFLECTED CEILING PLANS, ELEVATIONS, AND CASEWORK DETAILS FOR EXACT LOCATIONS OF ALL WALL AND CEILING MOUNTED ELECTRICAL DEVICES.

B CONTRACTOR SHALL FOLLOW BRANCH CIRCUITING LAY-OUT, AS INDICATED ON THE FLOOR PLANS, WITH A MAXIMUM OF THREE (3) BRANCH CIRCUITS PER HOMERUN. EACH BRANCH CIRCUIT SHALL BE PROVIDED WITH A DEDICATED NEUTRAL CONDUCTOR. DEDICATED NEUTRAL CONDUCTORS SHALL BE CONSIDERED CURRENT CARRYING. IF ADDITIONAL CONDUCTORS ARE RAN IN THE SAME CONDUIT WITH THOSE INDICATED, CONTRACTOR SHALL DERATE ALL CURRENT CARRYING CONDUCTORS PER NEC 310.15(B)(3), AND UPSIZE CONDUIT AS REQUIRED PER NEC 300.17 AND ANNEX C. MULTIWIRE BRANCH CIRCUITS AS DEFINED IN NEC 100 / 210.4 (CIRCUITS SHARING A COMMON NEUTRAL CONDUCTOR) SHALL NOT BE PERMITTED.

C IDENTIFY THE PANEL AND CIRCUIT NUMBER FOR ALL RECEPTACLES, SWITCHES, ETC. IN AREA OF CONSTRUCTION. PROVIDE CLEAR ADHESIVE LABELS WITH BLACK LETTERING. IN HEALTHCARE FACILITIES, ENGRAVE EMERGENCY DEVICE COVERPLATES IN PATIENT CARE AREAS. MARK INSIDES OF ALL DEVICE BOXES WITH PANEL AND CIRCUIT NUMBER.

D RECEPTACLES THAT ARE CONTROLLED BY AN AUTOMATIC MEANS SUCH AS OCCUPANCY SENSOR OR ENERGY MANAGEMENT SYSTEM SHALL BE MARKED IN ACCORDANCE WITH NEC 406.3(E).

E LOCATIONS OF ELECTRICAL CONNECTIONS AND LOCAL DISCONNECTS SHALL BE COORDINATED WITH MECHANICAL AND PLUMBING CONTRACTORS TO ENSURE ACCESS AND WORKING CLEARANCE IS MAINTAINED PER NEC. NOTIFY OTHER TRADES OF REQUIRED CLEARANCE AREAS TO AVOID ROUTING OF OTHER SYSTEMS IN THESE AREAS. DO NOT INSTALL ELECTRICAL EQUIPMENT OVER EQUIPMENT NAMEPLATES OR ACCESS PANELS OR THROUGH ACCESS/MAINTENANCE CLEARANCES OF EQUIPMENT BY OTHER TRADES.

F PANEL B2 LOCATED IN STORAGE ROOM ON FLOOR ABOVE.

G PROVIDE JUNCTION BOX COVERS FOR ALL EXISTING JUNCTION BOXES ABOVE CEILING WITHOUT COVERS. PROVIDE SUPPORTS FOR ALL EXISTING CONDUITS ABOVE CEILING.

ELECTRICAL SYSTEMS NOTES

A REFER TO THE ARCHITECT'S REFLECTED CEILING PLANS, ELEVATIONS, AND CASEWORK DETAILS FOR EXACT LOCATIONS OF ALL WALL AND CEILING MOUNTED ELECTRICAL DEVICES.

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D REFER TO "SYSTEM INSTALLATION MATRIX" (ON SYSTEMS LEGEND SHEET) AND SPECIFICATIONS FOR CONTRACTOR REQUIREMENTS OF EACH SYSTEM.

E THE CONTRACTOR SHALL ROUTE ALL "SYSTEM CONDUIT STUB-UPS" TO THE NEAREST CORRIDOR CABLING PATH (SEE "STUB-UP" DETAILS). REFER TO CABLING PATH INSTALLATION DETAIL FOR ADDITIONAL REQUIREMENTS.

F CONTRACTOR SHALL PAINT ALL SYSTEMS CONDUIT STUB-UPS LIGHT BLUE FOR SYSTEMS CABLING INTO THE CORRIDOR CABLING PATH. PROVIDE PULL STRINGS IN ALL NEW CONDUIT RUNS FOR SYSTEM CABLING INSTALLATION.

G ALL DATA DROPS ARE TO BE TERMINATED IN THE IT CLOSET ON THE SECOND FLOOR IN A NEW PATCH PANEL.

TAGGED NOTES

##

E1 DEMO EXISTING OVERHEAD DOOR CONTROLS AND POWER INFRASTRUCTURE BACK TO THE SOURCE.

E2 NO NEW ELECTRICAL WORK IN THIS AREA.

E3 TRENCH SLAB AND PROVIDE FLOORBOX FOR POWER, DATA AND AUDIOVISUAL CONNECTIONS.

E4 PROVIDE FLOORBOX (WIREMOLD EVOLUTION OR EQUAL) FLUSH WITH FLOOR WITH THE FOLLOWING CONNECTIONS: (2) DUPLEX RECTPACLES. (4) DATA DROPS IN 2" CONDUIT AND 1-1/2" CONDUIT TO AV RACK STUBED OUT ADJACENT TO RACK.

E5 MULLION MOUNT CARD READER BY OWNER, CABLING AND ROUGH IN BY CONTRACTOR.

E6 PROVIDE POWER AT DOOR FOR ACCESS CONTROL POWER SUPPLY.

E8 EXISTING ELECTRICAL EQUIPMENT TO REMAIN.

E9 PANELBOARD IS EXISTING TO REMAIN. FACE OF PANEL SHALL BE FLUSH WITH NEW WALL. PROVIDE ALL PANEL ACCESSORIES TO ACCOMODATE THIS WORK. INCLUDING CONDUIT SUPPORTS, FITTINGS, EXTENSIONS, ETC.

E10 PROVIDE GFI RECEPTACLE FOR UNDER-COUNTER REFRIGERATOR.

E11 PROVIDE GFI BREAKER FOR DRINKING FOUNTAIN/BOTTLE FILLER. COORDINATE EXACT LOCATION WITH APPROVED WATER COOLER SHOP DRAWINGS PRIOR TO ROUGHIN.

E12 EXISTING ELECTRICAL EQUIPMENT IN ELEVATOR MACHINE ROOM TO REMAIN.

E15 SERVER ROOM ON FLOOR ABOVE ROUTE ALL DATA CABLING TO THIS LOCATION ABOVE. PROVIDE 4" EZ PATH FIRE RATED SLEEVES AS NECESSARY.

E21 DEMOLISH ABANDONED TELEPHONE BOARD. REMOVE CABLES BACK TO SOURCE.

E22 DEMOLISH ABANDONED JUNCTION BOX AND COMMUNICATIONS CABLE.

E23 DEMOLISH GARAGE DOOR PUSH BUTTON AND CONNECTIONS TO MOTOR.

E24 DEMOLISH ABANDONED CONDUIT AND WIRE.

E25 DEMOLISH EXISTING CIRCUITS 31 & 33 IN PANEL A BACK TO SOURCE.

E26 DEMOLISH EXISTING CIRCUIT 10 IN PANEL B2 BACK TO SOURCE.

E27 DEMOLISH EXISTING RECEPTACLE, BUT REUSE EXISTING CIRCUIT B2-12 FOR NEW GENERAL PURPOSE RECEPTACLE IN AREA.

E28 DEMOLISH EXISTING RECEPTACLE, BUT REUSE EXISTING CIRCUIT F-27 FOR NEW DRINKING FOUNTAIN.

E30 PROVIDE NEW EATON/CUTLER-HAMMER 120/208/3 PHASE/4 WIRE 200A MAIN BREAKER PANEL MP1. UTILIZE FOR ALL NEW HVAC CONNECTIONS.

E31 PROVIDE NEW WEATHERPROOF GFI RECEPTACLE AND CONNECT TO RECEPTACLE CIRCUIT IN MECHANICAL ROOM. PROVIDE 2#12, 1#12 GROUND IN 3/4" CONDUIT.

E35 REINSTALL EXISTING TO REMAIN SMOKE DETECTOR IN NEW CEILING.

E36 UTILIZE SPACE IN EXISTING EATON/CUTLER-HAMMER PANELBOARD F FOR NEW CIRCUIT. PROVIDE 20A/1P BREAKER IN PANEL AND EXTEND 2#12, 1#12 GROUND IN 3/4" CONDUIT.

E37 UTILIZE SPACE IN EXISTING EATON/CUTLER-HAMMER PANELBOARD A FOR NEW CIRCUIT. PROVIDE 20A/1P BREAKER IN PANEL AND EXTEND 2#12, 1#12 GROUND IN 3/4" CONDUIT.

E38 REMOVE 3P BREAKER TURNED OFF IN PANEL F AND PROVIDE NEW 20A/2P BREAKER AND SPACE FILLER AS REQUIRED FOR CONNECTION TO NEW MOTORIZED LIFT. PROVIDE 3#12, 1#12 GROUND IN 3/4" CONDUIT FROM PANEL TO LIFT.

E39 UTILIZE EXISTING CIRCUIT F-27 FOR NEW DRINKING FOUNTAIN. PROVIDE 2#12, 1#12 GROUND IN 3/4" CONDUIT AS REQUIRED.

E40 UTILIZE EXISTING CIRCUIT B-12 FOR NEW CONNECTION IN SPACE. PROVIDE 2#12, 1#12 GROUND IN 3/4" CONDUIT AS REQUIRED.

E41 DEMOLISH ALL ELECTRICAL CONNECTIONS BACK TO SOURCE FROM REMOVED HVAC/PLUMBING EQUIPMENT. REFER TO HVAC AND PLUMBING DEMOLITION PLANS FOR DEMOLISHED EQUIPMENT LOCATIONS.

E43 EXISTING UNDERGROUND ELECTRICAL LINES ARE PRESENT IN THIS AREA, REFER TO SURVEY FOR ADDITIONAL INFORMATION.

E44 EXISTING PAD MOUNT TRANSFORMER TO REMAIN.

REVISIONS

#	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

CRABTREE ROHRBAUGH & ASSOCIATES - ARCHITECTS
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ADDITION AND RENOVATIONS
MULTIPURPOSE ROOM
FLUVANNA COUNTY
132 MAIN STREET
PALMYRA, VA 22963

COMMONWEALTH OF VIRGINIA
BRYAN LEE HARRISON
PROFESSIONAL ENGINEER

POWER/SYSTEMS PLANS

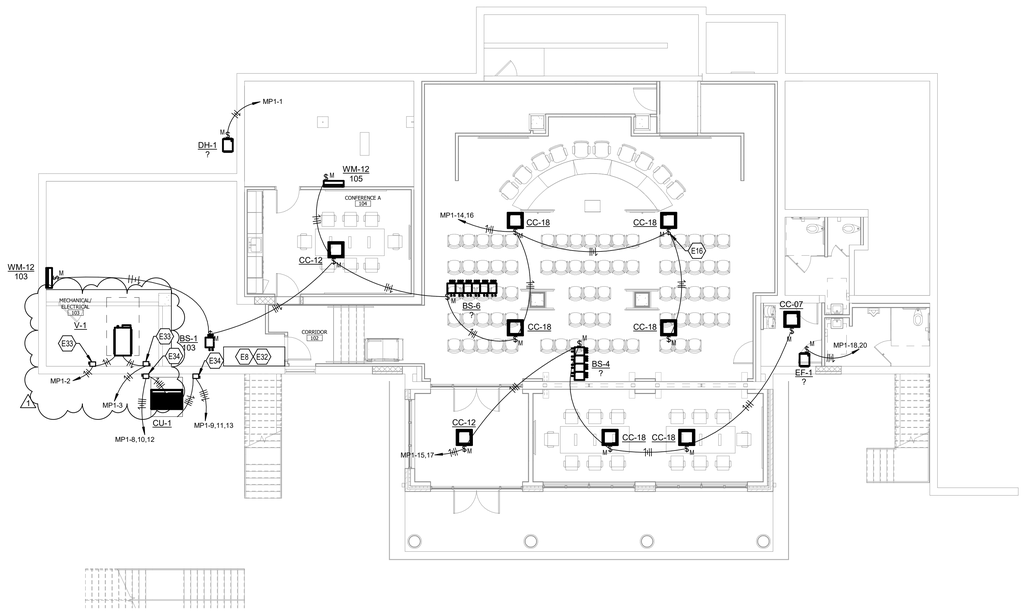
PLOT SCALE: 1/8" = 1'-0"

FILENAME:

DATE: AUGUST 28, 2020

PROJECT Fluvanna Co.

E-200



1 HVAC POWER NEW WORK PLAN

SCALE: 1/8" = 1'-0"

0 2' 4' 8' 16' 24' 32'

ELECTRICAL POWER NOTES

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F PANEL B2 LOCATED IN STORAGE ROOM ON FLOOR ABOVE.

G PROVIDE JUNCTION BOX COVERS FOR ALL EXISTING JUNCTION BOXES ABOVE CEILING WITHOUT COVERS. PROVIDE SUPPORTS FOR ALL EXISTING CONDUITS ABOVE CEILING.

TAGGED NOTES

E8 EXISTING ELECTRICAL EQUIPMENT TO REMAIN.

E16 TYPICAL: PROVIDE 2 POLE MOTORIZED SAFETY SWITCH MOUNTED ADJACENT TO HVAC EQUIPMENT TO SERVE AS DISCONNECTING MEANS. LABEL APPROPRIATELY.

E32 UTILIZE 200A FUSIBLE SWITCH TURNED OFF PREVIOUSLY SERVING CHILLER FOR NEW PANEL TO SERVE HVAC LOADS. PROVIDE (3) NEW 200A FUSES AND EXTEND #4/0, 1#6 GROUND IN 2.5" CONDUIT.

E33 PROVIDE 100A/3P NEMA 3R DISCONNECT.

E34 PROVIDE 60A/3P NEMA 3R DISCONNECT.

REVISIONS

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COMMONWEALTH OF VIRGINIA
BRYAN LEE HARRISON
PROFESSIONAL ENGINEER

HVAC POWER PLAN

PLOT SCALE: 1/8" = 1'-0"

FILENAME:

DATE: AUGUST 28, 2020

PROJECT
Fluvanna Co.

E-201

PROVIDE NEW TYPE WRITTEN PANEL SCHEDULES FOR ALL PANELS MODIFIED DURING CONSTRUCTION WHETHER SHOWN OR NOT

PANELBOARD AND WIRING SCHEDULE

PANEL: EXISTING PANEL A — **MAINS TYPE:** MCB — **PANEL INTERRUPTING RATING:** EXISTING
VOLTAGE: 208Y/120V,3P,4W — **SPD:** — **LOCATION:** MECHANICAL/ ELECTRICAL 103
AMPERES: 1 A — **MOUNTING:** SURFACE — **SUPPLY FROM:**

NOTES	CIRCUIT DESCRIPTION	HOT, NEUT, GND	OCP	P	CKT	A	B	C	CKT	P	OCP	HOT, NEUT, GND	CIRCUIT DESCRIPTION	NOTES
	LIGHTS	--	20	1	1	0.0	0.0		2	1	20	--	RECEPT	
	LIGHTS	--	20	1	3		0.0	0.0	4	1	20	--	RECEPT	
	LIGHTS	--	20	1	5			0.0	6	1	20	--	RECEPT	
	LIGHTS	--	20	1	7	0.0	0.0		8	1	20	--	FIRE HOUSE	
	CONTROL PANEL	--	20	1	9		0.0	0.0	10	1	20	--	FIRE HOUSE	
	DRYER	--	20	1	11			0.0	12	1	20	--	FIRE HOUSE	
	SPARE	--	20	1	13	0.0	0.0		14	1	20	--	BOILER ROOM RECEPT	
	TIME CLOCK	--	20	1	15		0.0	0.0	16	1	20	--	SPARE	
	PANEL 1A	--	20	1	17			0.0	18	1	20	--	SPARE	
	PANEL 1A	--	20	1	19	0.0	0.0		20	1	20	--	ELEVATOR PUMP	
	PANEL 1A	--	20	1	21		0.0	0.0	22	1	20	--	ELEVATOR PUMP	
	ELEVATOR LIGHTS	--	20	1	23			0.0	24	1	20	--	ELEVATOR PUMP	
	ELEVATOR LIGHTS	--	20	1	25	0.0	0.0		26	1	20	--	GENERATOR RECEPT	
	SMOKE DETECTOR	--	20	1	27		0.0	0.0	28	1	20	--	SPARE	
	SPARE	--	20	1	29			0.0	30	1	20	--	SPARE	
	SERVER ROOM	--	20	1	31	0.0	0.0		32	1	20	--	SPARE	
	CONDITIONER	--	20	1	33		0.0	0.0	34	1	20	--	SPARE	
	SPARE	--	20	1	35			0.0	36	1	20	--	NEW LOAD	
	NEW LOAD	--	20	1	37	0.0	0.0		38	1	20	--	NEW LOAD	
	NEW LOAD	--	20	1	39		0.0	0.0	40	1	20	--	NEW LOAD	
	NEW LOAD	--	20	1	41			0.0	42	1	20	--	NEW LOAD	
						0.0 kVA	0.0 kVA	0.0 kVA						
						0 A	0 A	0 A						

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
				TOTAL CONNECTED LOAD:	0 VA
				TOTAL ESTIMATED DEMAND:	0 VA
				TOTAL CONNECTED CURRENT:	0 A
				TOTAL ESTIMATED DEMAND CURRENT:	0 A
				25 % ADDITIONAL CAPACITY:	0 A
				TOTAL PANEL CURRENT:	0 A

NOTES: WHERE NOT LISTED, WIRE AND CONDUIT SHALL BE BE MINIMUM PER SPECIFICATIONS. SPARE BREAKERS TO BE 20A/1P.

PANELBOARD AND WIRING SCHEDULE

PANEL: MP1 — **MAINS TYPE:** MCB — **PANEL INTERRUPTING RATING:** <ENGINEER TO SPECIFY>
VOLTAGE: 208Y/120V,3P,4W — **SPD:** — **LOCATION:** MECHANICAL/ ELECTRICAL 103
AMPERES: 200 A — **MOUNTING:** SURFACE — **SUPPLY FROM:**

NOTES	CIRCUIT DESCRIPTION	HOT, NEUT, GND	OCP	P	CKT	A	B	C	CKT	P	OCP	HOT, NEUT, GND	CIRCUIT DESCRIPTION	NOTES
3/4" C	DH-1	1-#12, 1-#12, 1-#12	15	1	1	1.1	1.0		2	1	15	1-#12, 1-#12, 1-#12	V-1 CONNECTION #1	3/4" C
3/4" C	V-1 CONNECTION #2	1-#12, 1-#12, 1-#12	15	1	3		1.0		4					
					5				6					
					7		4.2		8					
1" C	CU-1 CONNECTION #2	3-#6, 1-#8, 1-#10	35	3	9		3.0	4.2	10	3	50	3-#6, 1-#6, 1-#10	CU-1 CONNECTION #1	1" C
					11			3.0	4.2	12				
3/4" C	VRF INDOOR	2-#12, 1-#12, 1-#12	15	2	13	3.0	1.3		14					
					15		1.0	1.3	16	2	15	2-#12, 1-#12, 1-#12	VRF INDOOR	3/4" C
					17			1.0	0.1	18	2	15	2-#12, 1-#12, 1-#12	EF-1 RM 112	3/4" C
					19	0.1			20					
					21				22					
					23				24					
					25				26					
					27				28					
					29				30					
					31				32					
					33				34					
					35				36					
					37				38					
					39				40					
					41				42					
						10.5 kVA	10.4 kVA	8.2 kVA						
						91 A	89 A	68 A						

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
EQUIP	29100 VA	100.00%	29100 VA	TOTAL CONNECTED LOAD:	29100 VA
				TOTAL ESTIMATED DEMAND:	29100 VA
				TOTAL CONNECTED CURRENT:	81 A
				TOTAL ESTIMATED DEMAND CURRENT:	81 A
				25 % ADDITIONAL CAPACITY:	20 A
				TOTAL PANEL CURRENT:	101 A

NOTES: WHERE NOT LISTED, WIRE AND CONDUIT SHALL BE BE MINIMUM PER SPECIFICATIONS. SPARE BREAKERS TO BE 20A/1P. DESCRIPTION IN NOTES DENOTES CONDUIT SIZE.

PANELBOARD AND WIRING SCHEDULE

PANEL: EXISTING PANEL E1 — **MAINS TYPE:** MCB — **PANEL INTERRUPTING RATING:** EXISTING
VOLTAGE: 208Y/120V,3P,4W — **SPD:** — **LOCATION:** MECHANICAL/ ELECTRICAL 103
AMPERES: 1 A — **MOUNTING:** SURFACE — **SUPPLY FROM:**

NOTES	CIRCUIT DESCRIPTION	HOT, NEUT, GND	OCP	P	CKT	A	B	C	CKT	P	OCP	HOT, NEUT, GND	CIRCUIT DESCRIPTION	NOTES
	MAIN	--	30	1	1	0.0	0.0		2	1	20	--	SUBPANEL E-2	
	MAIN	--	30	1	3		0.0	0.0	4	1	20	--	TELEPHONE BACKBOARD	
					5			0.0	6	1	20	--	NEW LOAD	
					7				8					
						0.0 kVA	0.0 kVA	0.0 kVA						
						0 A	0 A	0 A						

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
				TOTAL CONNECTED LOAD:	0 VA
				TOTAL ESTIMATED DEMAND:	0 VA
				TOTAL CONNECTED CURRENT:	0 A
				TOTAL ESTIMATED DEMAND CURRENT:	0 A
				25 % ADDITIONAL CAPACITY:	0 A
				TOTAL PANEL CURRENT:	0 A

NOTES: WHERE NOT LISTED, WIRE AND CONDUIT SHALL BE BE MINIMUM PER SPECIFICATIONS. SPARE BREAKERS TO BE 20A/1P.

PANELBOARD AND WIRING SCHEDULE

PANEL: EXISTING PANEL F — **MAINS TYPE:** MCB — **PANEL INTERRUPTING RATING:** EXISTING
VOLTAGE: None,Not ComputedP,Not ComputedW — **SPD:** — **LOCATION:** CONFERENCE A 104
AMPERES: 1 A — **MOUNTING:** SURFACE — **SUPPLY FROM:**

NOTES	CIRCUIT DESCRIPTION	HOT, NEUT, GND	OCP	P	CKT	A	B	C	CKT	P	OCP	HOT, NEUT, GND	CIRCUIT DESCRIPTION	NOTES
	2ND FLOOR AIR HANDLER	--	50	1	1	0.0	0.0		2	1	50	--	2ND FLOOR AIR HANDLER	
	2ND FLOOR AIR HANDLER	--	50	1	3		0.0	0.0	4	1	50	--	2ND FLOOR AIR HANDLER	
	2ND FLOOR HEAT PUMP	--	30	1	5			0.0	6	1	30	--	2ND FLOOR AIR HANDLER	
	2ND FLOOR HEAT PUMP	--	30	1	7	0.0	0.0		8	1	30	--	2ND FLOOR AIR HANDLER	
	SPARE	--	30	1	9		0.0	0.0	10	1	40	--	2ND FLOOR HEAT PUMP	
	SPARE	--	30	1	11			0.0	12	1	40	--	2ND FLOOR HEAT PUMP	
	INSPECTIONS OFFICE	--	20	1	13	0.0	0.0		14	1	20	--	SPARE	
	INDOOR UNIT	--	20	1	15		0.0	0.0	16	1	30	--	INSPECTIONS OFFICE	
	INSPECTIONS OFFICE	--	50	1	17			0.0	18	1	30	--	OUTDOOR UNIT	
	INDOOR UNIT	--	50	1	19	0.0	0.0		20	1	25	--	2 TON EXTEN	
	INSPECTIONS OFFICE	--	60	1	21		0.0	0.0	22	1	25	--	OFFICE	
	INDOOR UNIT	--	60	1	23			0.0	24	1	45	--	MORRISS ROOM	
	SPARE	--	30	1	25	0.0	0.0		26	1	45	--	4 TON	
	KACK SYSTEM	--	20	1	27		0.0	0.0	28	1	30	--	OUTDOOR UNIT	
	OUTDOOR	--	20	1	29			0.0	30	1	30	--	ADMIN	
	UNIT ADMIN	--	20	1	31	0.0	0.0		32	1	30	--	INSPECTIONS OFFICE	
	MORRIS ROOM	--	60	1	33		0.0	0.0	34	1	30	--	OUTDOOR UNIT	
	CKT B ATTIC	--	60	1	35			0.0	36	1	20	--	1 1/2 TON EXTEN	
	EXT AREA	--	30	1	37	0.0	0.0		38	1	20	--	AREA	
	ATTIC	--	30	1	39		0.0	0.0	40	1	20	--	NEW LOAD	
	NEW LOAD	--	20	1	41			0.0	42	1	20	--	NEW LOAD	
						0.0 kVA	0.0 kVA	0.0 kVA						

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
				TOTAL CONNECTED LOAD:	0 VA
				TOTAL ESTIMATED DEMAND:	0 VA
				TOTAL CONNECTED CURRENT:	Not Computed
				TOTAL ESTIMATED DEMAND CURRENT:	Not Computed
				25 % ADDITIONAL CAPACITY:	0 A
				TOTAL PANEL CURRENT:	0 A

NOTES: WHERE NOT LISTED, WIRE AND CONDUIT SHALL BE BE MINIMUM PER SPECIFICATIONS. SPARE BREAKERS TO BE 20A/1P.

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

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250 WEST MAIN STREET, SUITE 200
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TOWSON, MARYLAND
WHITE SULPHUR SPRINGS, WEST VIRGINIA

ADDITION AND RENOVATIONS
MULTIPURPOSE ROOM
FLUVANNA COUNTY
132 MAIN STREET
PALMYRA, VA 22963

CR

COMMONWEALTH OF VIRGINIA
BRYAN LEE HARRISON
PROFESSIONAL ENGINEER

PANEL SCHEDULES

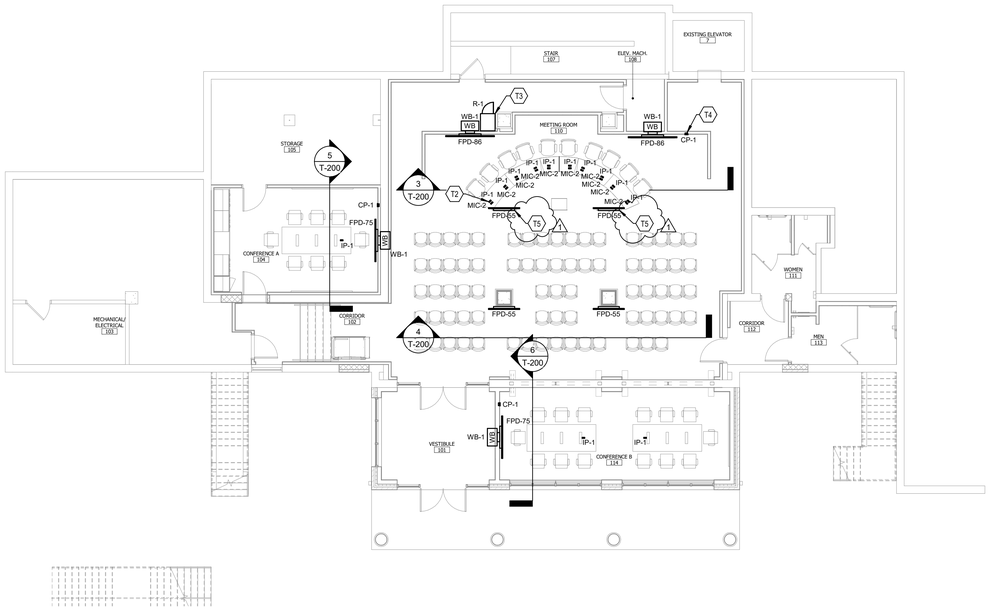
PLOT SCALE:

FILENAME:

DATE: AUGUST 28, 2020

PROJECT
Fluvanna Co.

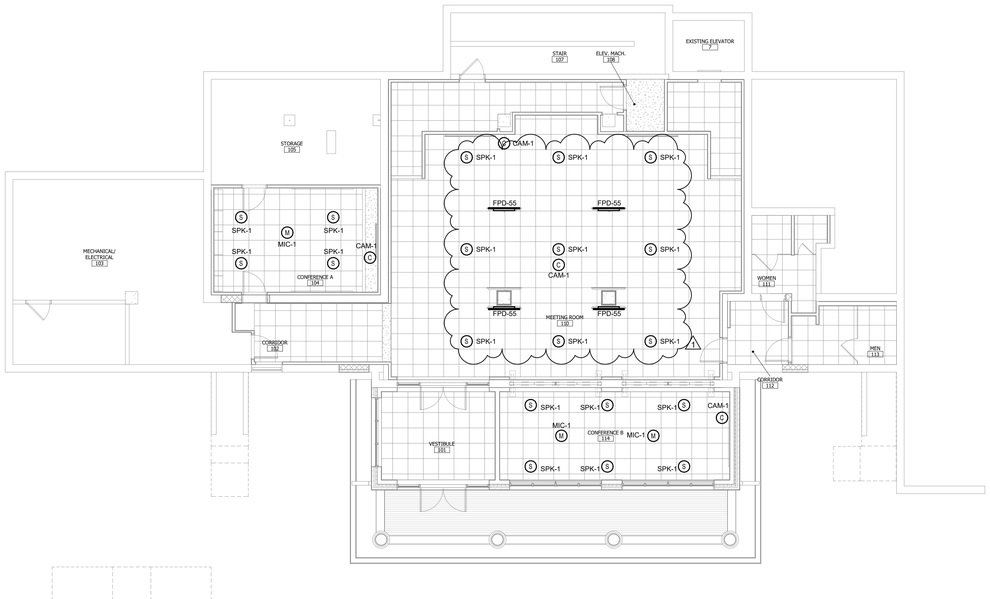
E-400



1 AUDIOVISUAL FLOOR PLAN

SCALE: 1/8" = 1'-0"

0 2' 4' 8' 16' 24' 32'



2 AUDIOVISUAL CEILING PLAN

SCALE: 1/8" = 1'-0"

0 2' 4' 8' 16' 24' 32'

AUDIOVISUAL SYSTEM STATEMENT OF FUNCTIONALITY

GENERAL: ALL FUNCTIONALITY BELOW SHALL BE PRESENT VIA THE INSTALLED AUDIOVISUAL SYSTEM. ALL PRODUCTS AND INTENDED FLOW DIAGRAMS ARE STANDARD OF QUALITY AND BASIS OF DESIGN. AUDIOVISUAL CONTRACTOR MAY SUB EQUIPMENT AS NECESSARY TO MEET STATEMENT OF FUNCTIONALITY BELOW. REFER TO SHEETS T-201 AND T-202 FOR (2) OPTIONS FOR AUDIOVISUAL SYSTEM. CONTRACTOR SHALL PICK (1) OF THE OPTIONS TO ACHIEVE FUNCTIONALITY LISTED BELOW. INTENT IS THE AV CONTRACTOR WILL PROVIDE ALL INFRASTRUCTURE REQUIRED TO ACCOMPLISH THIS FUNCTIONALITY. POWER AND DATA IS PROVIDED BEHIND EVERY DISPLAY AND PATHWAYS ARE PRESENT FROM OTHER DEVICE LOCATIONS.

MEETING ROOM 110

*USERS SHALL BE ABLE TO CONNECT TO ANY INPUT PANEL (IP-1) LOCATED AT THE DIAS VIA HDMI. WIRELESS PRESENTATION SHALL BE AVAILABLE IN THIS ROOM AS WELL. CONNECTIVITY IS VIA FLOOR BOXES WITH PATHWAYS BACK TO THE RACK (R-1). THIS CONNECTION WILL PASS AUDIO TO THE CEILING SPEAKERS IN THE ROOM AND VIDEO TO THE DISPLAYS. VIDEO ROUTING SHALL BE FLEXIBLE AND CAPABLE OF USING THE CEILING MOUNTED DISPLAYS LOCATED CEILING MOUNTED IN FRONT OF THE DIAS AS CONFIDENCE MONITORS WITH THE OTHER WALL MOUNTED WALL DISPLAYS SERVING AS CONTENT SHARING DISPLAYS. CONTROL WILL BE VIA TOUCH PANEL CONTROL INTERFACES (CP-1). A DISCUSSION TYPE MICROPHONE SYSTEM WILL BE TIED INTO THE SYSTEM FOR AUDIO SUPPORT. THE ROOM SHALL BE VIDEO TELECONFERENCE ENABLED USING A SOFT CODEC AND BUILT IN MICROPHONES AND CAMERAS.

CONFERENCE A 104

*STAND ALONE VIDEO TELECONFERENCING CAPABILITY VIA INPUT PANEL AT TABLE TOP (THROUGH FLOOR BOX). WIRELESS PRESENTATION FROM BYOD TO DISPLAY AND TO FAR END VIA VIDEO TELECONFERENCE. TOUCHPANEL CONTROL INTERFACE SHALL CONTROL THE ROOM.

CONFERENCE B 114

***MODE 1**: STAND ALONE VIDEO TELECONFERENCING CAPABILITY VIA INPUT PANEL AT TABLE TOP (THROUGH FLOOR BOX). WIRELESS PRESENTATION FROM BYOD TO DISPLAY AND TO FAR END VIA VIDEO TELECONFERENCE. TOUCHPANEL CONTROL INTERFACE SHALL CONTROL THE ROOM.

MODE 2: OVERFLOW FROM MEETING ROOM 110, INTEGRATE DISPLAY INTO THE SYSTEM AND PROGRAM TO CREATE MASTER/SLAVE RELATIONSHIP BETWEEN THE TOUCH PANELS. AUDIO SHALL BE INTEGRATED AS WELL TO OVERFLOW MODE.

TAGGED NOTES

T2 TYPICAL: PROVIDE HDMI INPUT AND MICRPHONE AT EACH CHAIR AT DESKS IN THE FRONT OF THE ROOM.

T3 PROVIDE AUDIOVISUAL RACK AT THIS LOCATION. SEE AUDIOVISUAL EQUIPMENT SCHEDULE AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

T4 TYPICAL: PROVIDE CONTROL PANEL AT THIS LOCATION. SEE AUDIOVISUAL EQUIPMENT SCHEDULE AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

T5 DISPLAY IS TO BE CEILING MOUNTED. PROVIDE ALL NECESSARY MOUNTING EQUIPMENT. REFER TO ARCHITECTURAL PLANS FOR MORE INFORMATION.

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

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MULTIPURPOSE ROOM
FLUVANNA COUNTY
132 MAIN STREET
PALMYRA, VA 22963

COMMONWEALTH OF VIRGINIA
BRYAN LEE HARRISON
PROFESSIONAL ENGINEER

AUDIOVISUAL PLANS

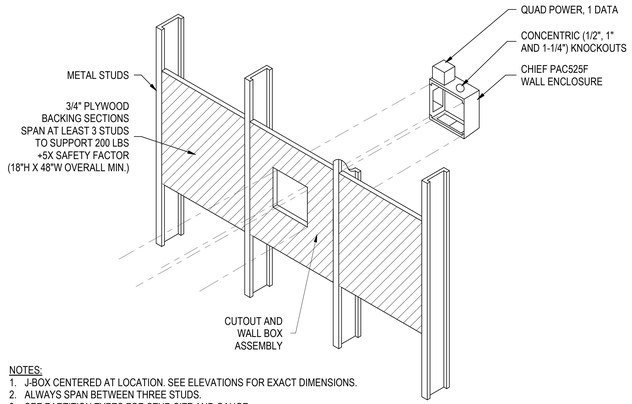
PLOT SCALE: 1/8" = 1'-0"

FILENAME:

DATE: AUGUST 28, 2020

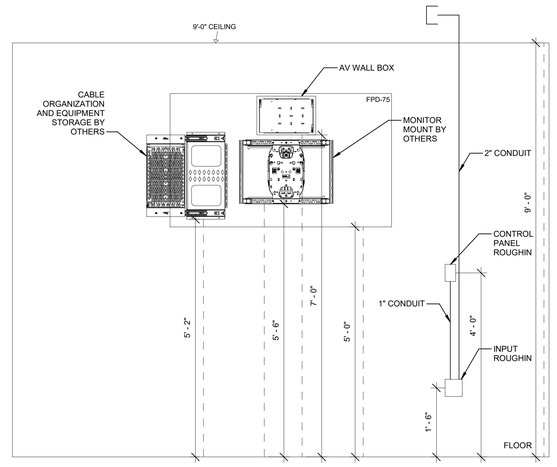
PROJECT
Fluvanna Co.

T-100

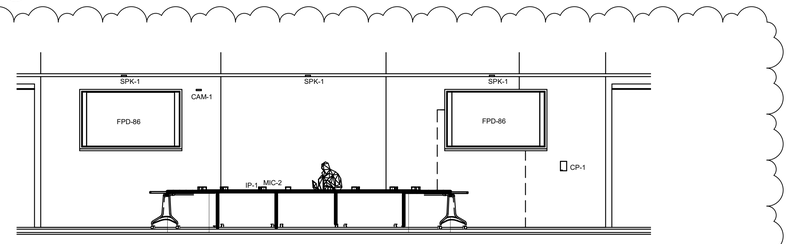


NOTES:
1. J-BOX CENTERED AT LOCATION. SEE ELEVATIONS FOR EXACT DIMENSIONS.
2. ALWAYS SPAN BETWEEN THREE STUDS.
3. SEE PARTITION TYPES FOR STUD SIZE AND GAUGE.
4. VERIFY LOCATIONS OF BACKING WITH PLANS & ROOM ELEVATIONS.
5. FASTEN BACKING FLUSH WITH FACE OF STUDS.
6. FLAT PANEL DISPLAYS AND MOUNTING BRACKETS BY AV CONTRACTOR.

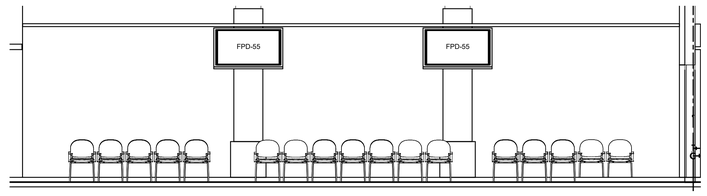
1 CHIEF PAC525F WALLBOX ROUGH-IN
SCALE: NONE



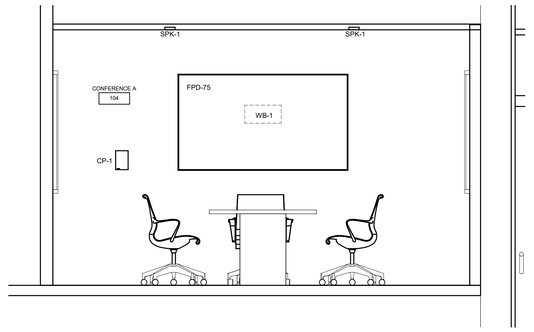
2 AV VISUAL DISPLAY ELEVATION FOR CONFERENCE ROOMS
SCALE: NONE



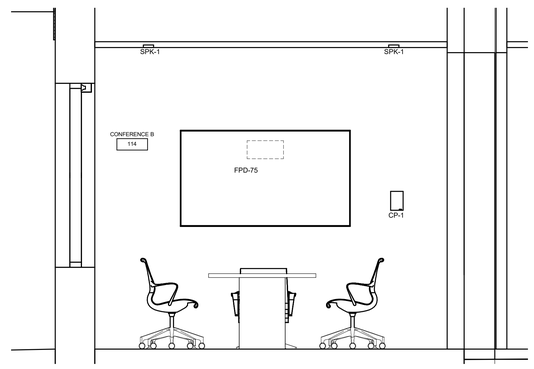
3 MEETING ROOM NORTH ELEVATION
SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8' 12' 16'



4 MEETING ROOM SOUTH ELEVATION
SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8' 12' 16'



5 CONFERENCE A RM 104 ELEVATION
SCALE: 1/2" = 1'-0"
0 1' 2' 4' 8' 12' 16'



6 CONFERENCE B RM 114 ELEVATION
SCALE: 1/2" = 1'-0"
0 1' 2' 4' 8' 12' 16'

REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

CRABTREE ROHRBAUGH & ASSOCIATES - ARCHITECTS
250 WEST MAIN STREET, SUITE 200
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FLUVANNA COUNTY
132 MAIN STREET
PALMYRA, VA 22963

CR

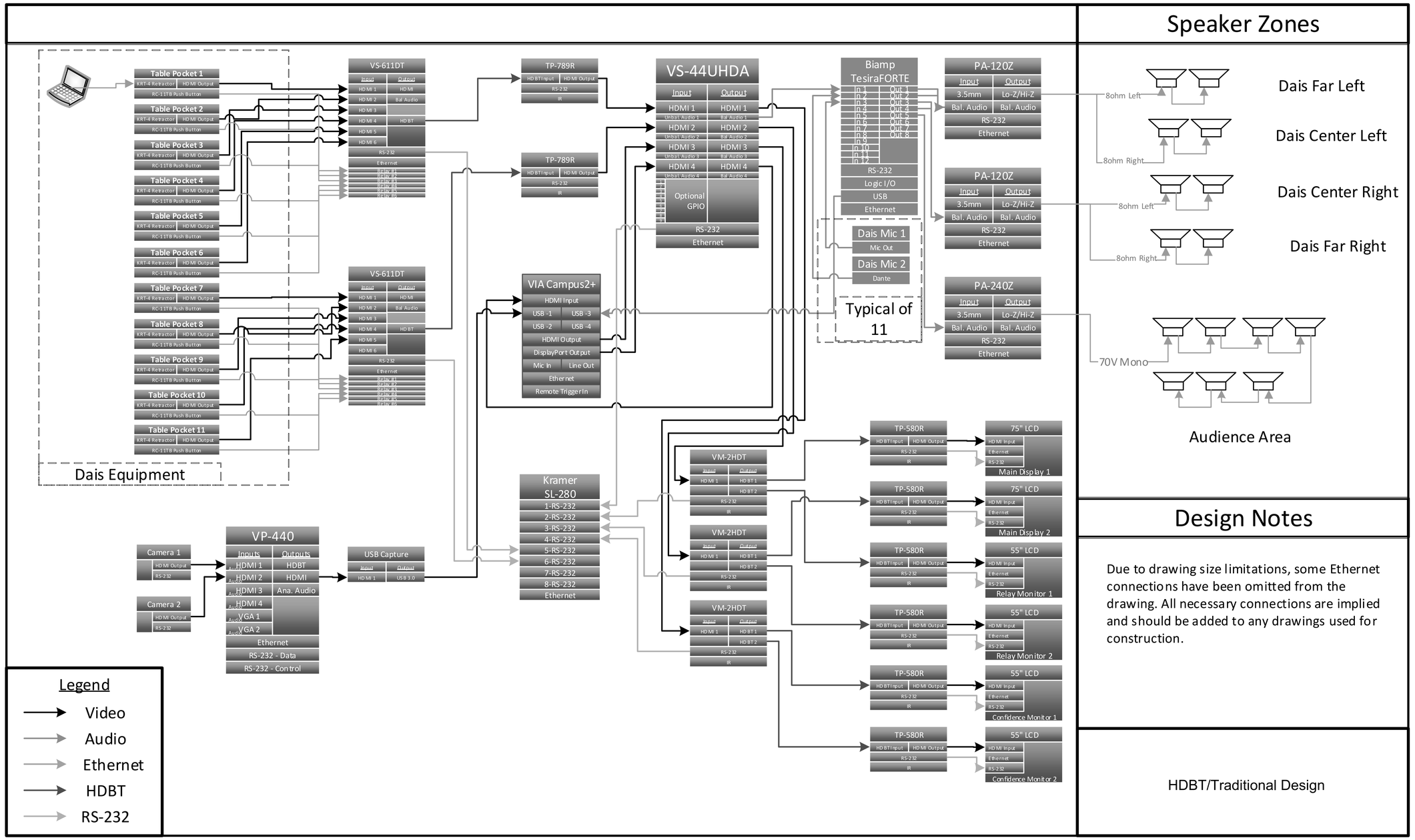
COMMONWEALTH OF VIRGINIA
BRYAN LEE HARRISON
PROFESSIONAL ENGINEER

AUDIOVISUAL DETAILS

PLOT SCALE: As indicated
FILENAME:
DATE: AUGUST 28, 2020

PROJECT
Fluvanna Co.

T-200



REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
1	9/14/20		Addendum 1

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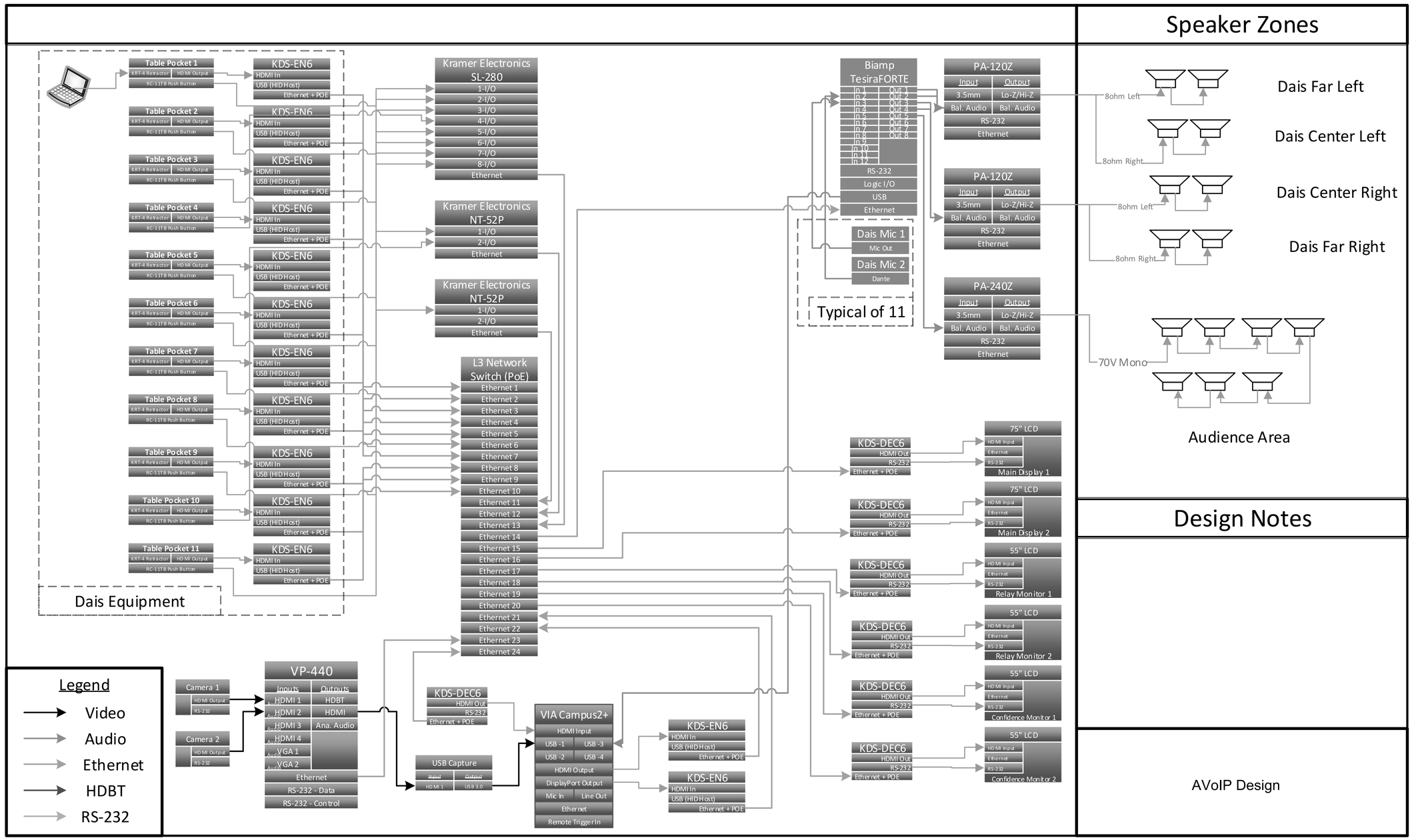
PALMYRA, VA 22963

BRYAN LEE HARRISON
LICENSED
PROFESSIONAL ENGINEER
COMMONWEALTH OF VIRGINIA

AUDIOVISUAL FLOW DIAGRAMS
PLOT SCALE:
FILENAME:
DATE: AUGUST 28, 2020

PROJECT
Fluvanna Co.

T-201



REVISIONS

	MM-DD-YR	NAME	DESCRIPTION OF CHANGES
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COMMONWEALTH OF VIRGINIA
BRYAN LEE HARRISON
PROFESSIONAL ENGINEER

AUDIOVISUAL FLOW DIAGRAMS

PLOT SCALE:

FILENAME:

DATE: AUGUST 28, 2020

PROJECT
Fluvanna Co.

T-202

THESE ARE NOT FINAL APPROVED PLANS FOR CONSTRUCTION. CONTRACTOR SHALL CONFIRM WITH OWNER THAT ALL REQUIRED REVIEWS, PERMITS, AND APPROVALS HAVE BEEN RECEIVED BEFORE BEGINNING CONSTRUCTION.

FLUVANNA COUNTY MULTIPURPOSE ROOM

SITE PLAN

PALMYRA DISTRICT

FLUVANNA COUNTY, VIRGINIA

09/14/2020

SITE DATA:

ENGINEER: TIMMONS GROUP
608 PRESTON AVENUE, SUITE 200
CHARLOTTESVILLE, VA 22903
TELEPHONE: 434-327-1681
CONTACT: JONATHAN SHOWALTER, P.E.
JONATHAN.SHOWALTER@TIMMONS.COM

TAX MAP PARCEL: 30A-A-36

SITE AREA: 6.28 ACRES

LIMITS OF DISTURBANCE: 0.16 ACRES

SETBACK: 125' FRONT
50' SIDE
75' REAR

ZONING: A-1 / CP

MAGISTERIAL DISTRICT: PALMYRA

SOURCE OF TOPOGRAPHY: TIMMONS GROUP.
28 IMPERIAL DRIVE
STAUNTON, VA 24401
(540)-885-0786

SOURCE TOPOGRAPHY: TIMMONS GROUP, AUG 28, 2020

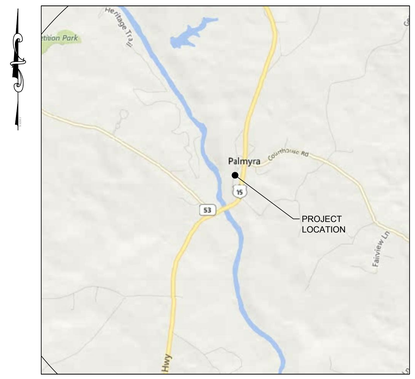
MISS UTILITY TICKET NO.: B023800377-00B

BENCHMARK: BENCHMARK: PUNCHED SPIKE NAIL 1.6' EAST OF EDGE OF PAVEMENT AND 36 FEET FROM NORTHERN END OF GUARD RAIL. TBM SPIKE ELEVATION= 272.93'

DATUM: HORIZONTAL: NAD83 VIRGINIA STATE GRID SOUTH ZONE
VERTICAL: NAVD88 ESTABLISHED THROUGH LEICA SMARTNET

PROPOSED USES: MULTIPURPOSE ROOM BUILDING ADDITION

FLOOD PLAIN: THIS PROPERTY IS IN FEMA DEFINED FLOOD ZONE "X" OF THE HUD DEFINED FLOOD HAZARD AREA AS SHOWN ON F.E.M.A. FLOOD INSURANCE RATE MAP PANEL #51109C0325B, DATED NOVEMBER 05, 1997.



VICINITY MAP
SCALE: 1" = 2,000'

OWNER:

FLUVANNA COUNTY BOARD OF SUPERVISORS
P.O. BOX 299
PALMYRA, VA 22963

ENGINEER OF RECORD:

TIMMONS GROUP
608 PRESTON AVENUE, SUITE 200
CHARLOTTESVILLE, VA 22903
CONTACT: JONATHAN SHOWALTER, P.E.
TELEPHONE: 434-327-1681

Sheet List Table

Sheet Number	Sheet Title
C0.0	COVER
C1.0	NOTES AND DETAILS
C2.0	EXISTING CONDITIONS AND DEMO PLAN
C3.0	LAYOUT PLAN

OF SHEETS = 4

APPROVAL BLOCK

DIRECTOR OF PLANNING

COMMONWEALTH OF VIRGINIA
JONATHAN M. SHOWALTER
Lic. No. 0402057151
09/14/2020
PROFESSIONAL ENGINEER

KEY PLAN

REVISIONS

#	MM-DD-YR	NAME	DESCRIPTION OF CHANGES

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WHITE SULPHUR SPRINGS, WEST VIRGINIA

ADDITION AND RENOVATIONS
MULTIPURPOSE ROOM
FLUVANNA COUNTY
123 MAIN STREET
PALMYRA, VA 22963

COVER

PLOT SCALE: AS SHOWN
FILENAME: CRA PROJECT No. 3430
DATE: SEPTEMBER 10, 2020

PROJECT 46559.001

C0.0

GENERAL NOTES:

1. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT VIRGINIA DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS AND STANDARDS.
2. PRIOR TO ANY CONSTRUCTION, THE CONTRACTOR SHALL CONSULT THE OWNER AND VERIFY THE APPROVAL OF THE PLANS BY ALL FEDERAL, STATE AND LOCAL AGENCIES.
3. THE CONTRACTOR SHALL VERIFY THE ELEVATIONS OF ALL POINTS OF CONNECTION OR PROPOSED WORK TO EXISTING CURBS, SANITARY LINES, WATERLINES, ETC, PRIOR TO CONSTRUCTION.
4. UPON DISCOVERY OF SOILS THAT ARE UNSUITABLE FOR FOUNDATIONS, SUBGRADES, OR OTHER ROADWAY CONSTRUCTION PURPOSES, THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE OWNER. THESE AREAS SHALL BE EXCAVATED BELOW PLAN GRADE AS DIRECTED BY THE OWNER, BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED IN ACCORDANCE WIT1H CURRENT.
5. IF PRE-CAST UNITS ARE TO BE USED, THE MANUFACTURER SHALL SUBMIT DRAWING DETAILS FOR REVIEW. CERTIFICATION AND VDOT STAMP WILL BE REQUIRED ON ALL UNITS.
8. ALL CONCRETE SHALL BE A3-AE (AIR ENTRAINED 3,000 PSI), UNLESS OTHERWISE NOTED.
9. DESIGN CHANGES, SPECIFIED MATERIALS CHANGES AND/OR FIELD CHANGES FROM THE APPROVED PLANS NEED TO BE RESUBMITTED TO THE ENGINEER PRIOR TO PROCEEDING WITH THE WORK. A LETTER OF EXPLANATION SHALL ACCOMPANY THE REVISED PLANS AND/OR THE DRAINAGE CALCULATIONS, WHICH MUST BE SUBMITTED AND APPROVED BY THE ENGINEER.
11. THE INSTALLATION OF SEWER, WATER, AND GAS MAINS (INCLUDING SERVICE LATERALS AND SLEEVES) SHALL BE COMPLETED PRIOR TO THE PLACEMENT OF AGGREGATE BASE COURSE.
12. ROCKINGHAM COUNTY APPROVAL OF CONSTRUCTION PLANS DOES NOT PRECLUDE THE RIGHT TO REQUIRE ADDITIONAL FACILITIES AS DEEMED NECESSARY .
13. A PRIME COAT SEAL BETWEEN THE AGGREGATE BASE AND BITUMINOUS CONCRETE WILL BE REQUIRED AT THE RATE OF 0.30 GALLONS PER SQUARE YARD (REC-250 PRIME COAT) PER VDOT STANDARDS AND SPECIFICATIONS.
14. THE SCHEDULING OF AGGREGATE BASE INSTALLATION AND SUBSEQUENT PAVING ACTIVITIES SHALL ACCOMMODATE FORECAST WEATHER CONDITIONS PER SECTION 315 OF THE ROAD AND BRIDGE SPECIFICATIONS.
15. THE CONTRACTORS INSPECTOR SHALL HAVE APPROVED THE AGGREGATE BASE COURSE(S) FOR DEPTH, TEMPLATE AND PERFORMED THE REQUIRED FIELD INSPECTION (PROOF ROLL) PRIOR TO PLACEMENT OF ANY SURFACE COURSE(S). CONTACT THE OWNER FOR INSPECTION FOR THE AGGREGATE BASE COURSE(S) 48 HOURS PRIOR TO APPLICATION OF THE SURFACE COURSE(S).
16. ALL VEGETATION AND ORGANIC MATERIAL MATERIAL IS TO BE REMOVED FROM THE PROPOSED PAVEMENT LIMITS PRIOR TO CONDITIONING OF THE SUBGRADE.
17. CERTIFICATION AND SOURCE OF MATERIALS ARE TO BE SUBMITTED TO THE OWNER FOR ALL MATERIALS AND BE IN ACCORDANCE WITH THE ROAD AND BRIDGE SPECIFICATIONS, AND ROAD AND BRIDGE STANDARDS.
18. ALL NEW HANDICAP ACCESSIBLE REQUIREMENTS ON-SITE AND WITHIN ALL NEW STRUCTURES SHALL COMPLY WITH THE 2015 UNIFORM STATEWIDE BUILDING CODE, 2015 VIRGINIA CONSTRUCTION CODE, ICC/ANSI A117.1-03 AND 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN.

UTILITIES

1. ALL WORK SHALL COMPLY WITH FLUVANNA COUNTY AND THE VIRGINIA DEPARTMENT OF HEALTH WATER AND SEWER STANDARDS AND SPECIFICATIONS.
2. ANY DAMAGE TO EXISTING UTILITIES CAUSED BY CONTRACTOR OR ITS SUBCONTRACTORS SHALL BE CONTRACTOR'S SOLE RESPONSIBILITY AND REPAIRED AT CONTRACTOR'S EXPENSE.
3. THE CONTRACT DOCUMENTS DO NOT GUARANTEE THE EXISTENCE, NON-EXISTENCE OR LOCATION OF UTILITIES. CONTRACTOR SHALL VERIFY THE EXISTENCE AND LOCATION OR THE NON-EXISTENCE OF UTILITIES. AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION OR CONSTRUCTION, CONTRACTOR SHALL NOTIFY MISS UTILITY (1-800-552-7001) AND/OR THE RESPECTIVE UTILITY COMPANIES FOR GAS, WATER, SEWER, POWER, PHONE AND CABLE. CONTRACTOR SHALL TIMELY ARRANGE TO HAVE THE VARIOUS UTILITIES LOCATED, AND TO HAVE THEM REMOVED OR RELOCATED, OR TO DETERMINE THE METHOD OF PROTECTION ACCEPTABLE TO THE RESPECTIVE OWNER, IF THE METHOD OF PROTECTION IS NOT OTHERWISE SPECIFIED. CONTRACTOR SHALL CONDUCT ITS WORK IN THE VICINITY OF EXISTING UTILITIES IN ACCORDANCE WITH THE RESPECTIVE UTILITY'S RULES AND REGULATIONS. ANY COST INCURRED FOR REMOVING, RELOCATING OR PROTECTING UTILITIES SHALL BE BORNE BY CONTRACTOR UNLESS INDICATED OTHERWISE. CONTRACTOR SHALL EXCAVATE TO LOCATE BURIED UTILITIES FAR ENOUGH IN ADVANCE OF ITS WORK AND ORDERING MATERIALS TO ALLOW FOR HORIZONTAL AND /OR VERTICAL ADJUSTMENTS TO ITS WORK AND/OR THE UTILITIES. NO ADJUSTMENT IN COMPENSATION OR SCHEDULE WILL BE ALLOWED FOR DELAYS RESULTING FROM CONTRACTOR'S FAILURE TO CONTACT AND COORDINATE WITH UTILITIES.
4. WHEN THE WORK CROSSES EXISTING UTILITIES, THE EXISTING UTILITIES SHALL BE ADEQUATELY SUPPORTED AND PROTECTED FROM DAMAGE DUE TO THE WORK. ALL METHODS FOR SUPPORTING AND MAINTAINING THE EXISTING UTILITIES SHALL BE APPROVED BY THE RESPECTIVE UTILITY COMPANY AND/OR THE ENGINEER. CONTRACTOR SHALL EXERCISE CARE TO INSURE THAT THE GRADE AND ALIGNMENT OF EXISTING UTILITIES ARE MAINTAINED AND THAT NO JOINTS OR CONNECTIONS ARE DISPLACED. BACKFILL SHALL BE CAREFULLY PLACED AND COMPACTED TO PREVENT FUTURE DAMAGE OR SETTLEMENT TO EXISTING UTILITIES. ANY UTILITIES REMOVED AS PART OF THE WORK, AND NOT INDICATED TO BE REMOVED OR ABANDONED, SHALL BE RESTORED USING MATERIALS AND INSTALLATION EQUAL TO THE UTILITY'S STANDARDS.
5. CONTRACTOR SHALL NOTIFY LANDOWNERS, TENANTS AND THE ENGINEER PRIOR TO THE INTERRUPTION OF ANY SERVICES. SERVICE INTERRUPTIONS SHALL BE KEPT TO A MINIMUM.
6. THE ADJUSTMENT OF ALL MANHOLE TOPS, WATER VALVE BOXES, GAS VALVE BOXES AND WATER METER BOXES SHALL BE THE RESPONSIBILITY OF CONTRACTOR.
7. ALL WATER METER, VALVES AND FIRE HYDRANT ADJUSTMENTS/RELOCATIONS SHALL BE PERFORMED BY THE CONTRACTOR.

EROSION CONTROL & WORK AREA PROTECTION AND MAINTENANCE

1. CONTRACTOR SHALL, AT HIS EXPENSE, MAINTAIN THE WORK SITE IN A CLEAN AND ORDERLY APPEARANCE AT ALL TIMES. ALL DEBRIS AND SURPLUS MATERIAL COLLECTED SHALL BE DISPOSED OF OFF THE WORK SITE BY CONTRACTOR, AT HIS EXPENSE.
2. EXISTING LAWNS, TREES, SHRUBS, FENCES, UTILITIES, CULVERTS, WALLS, WALKS, DRIVEWAYS, POLES, SIGNS, RIGHT-OF-WAY MONUMENTS, MAILBOXES AND THE LIKE SHALL BE PROTECTED FROM DAMAGE DURING THE WORK. ANY DAMAGE CAUSED TO SUCH ITEMS SHALL BE REPAIRED OR REPLACED BY CONTRACTOR AT NO ADDITIONAL COST. PROPERTY PINS DISTURBED BY CONTRACTOR THAT ARE NOT SHOWN ON THE PLANS TO BE DISTURBED SHALL BE RESTORED BY A LICENSED SURVEYOR AT CONTRACTOR'S EXPENSE.
3. CONTRACTOR SHALL EMPLOY EROSION CONTROL DEVICES AND METHODS AS REQUIRED TO MEET THE REQUIREMENTS AND INTENT OF FLUVANNA COUNTY AND VESCH EROSION CONTROL ORDINANCE. CONTRACTOR SHALL PROVIDE THE NECESSARY DIVERSION DITCHES, DIKES OR TEMPORARY CULVERTS REQUIRED TO PREVENT MUD AND DEBRIS FROM BEING WASHED ONTO THE STREETS OR PROPERTY. CONTRACTOR'S VEHICLES SHALL BE KEPT CLEAN TO PREVENT MUD OR DUST FROM BEING DEPOSITED ON STREETS. NO AREA SHALL BE LEFT DENUDED FOR MORE THAN SEVEN (7) CALENDAR DAYS.
4. ALL DRAIN INLETS SHALL BE PROTECTED FROM SILTATION. INEFFECTIVE PROTECTION DEVICE SHALL BE IMMEDIATELY REPLACED AND INTEL CLEANED. FLUSHING IS NOT AN ACCEPTABLE METHOD OF CLEANING.
5. CONTRACTOR SHALL CLEAN UP, RESTORE, PERMANENTLY SEED AND MAINTAIN ALL DISTURBED AREAS IMMEDIATELY UPON COMPLETION OF WORK ON EACH SITE. TOPSOIL, SEED, FERTILIZER AND MULCH SHALL BE PLACED IN ACCORDANCE WITH TOWN OF BRIDGEWATER EROSION CONTROL ORDINANCE AND VESC STANDARDS ON ALL DISTURBED AREAS. A PERMANENT STAND OF GRASS ADEQUATE TO PREVENT EROSION SHALL BE ESTABLISHED PRIOR TO FINAL ACCEPTANCE.
6. AS DETERMINED BY THE ENGINEER, ANY DEFECTIVE, FAULTY, CRACKED, BROKEN OR GRAFFITIED SIDEWALKS, DRIVEWAYS, HANDICAP RAMPS OR CURB & GUTTER SHALL BE REMOVED AND REPLACED PRIOR TO FINAL ACCEPTANCE. NO ADDITIONAL PAYMENT WILL BE MADE FOR SUCH WORK.

CONCRETE AND ASPHALT

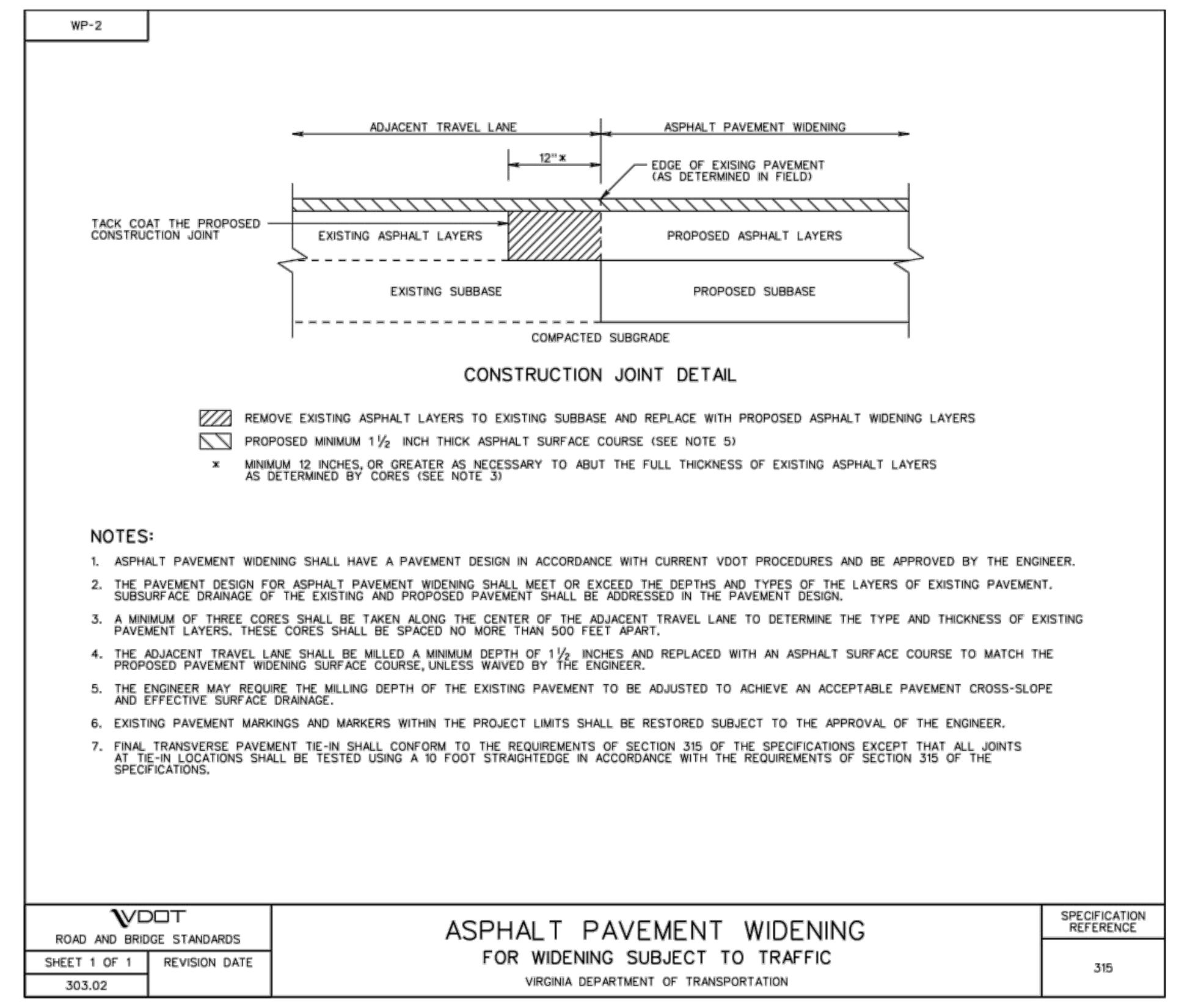
1. ALL FORMS SHALL BE INSPECTED BY THE CONTRACTORS INSPECTOR BEFORE ANY CONCRETE IS PLACED. THE INSPECTOR MAY REQUIRE CONTRACTOR, AT NO ADDITIONAL COST, TO REMOVE AND REPLACE CONCRETE PLACED PRIOR TO OR WITHOUT SUCH INSPECTION.
2. ALL MATERIAL INSIDE FORMS SHALL BE CLEAN AND FREE OF ALL ROCKS AND OTHER LOOSE DEBRIS. SUB-BASE MATERIAL SHALL BE COMPACTED BY MECHANICAL MEANS.
3. CONCRETE SHALL NOT BE PLACED UNLESS THE AIR TEMPERATURE IS AT LEAST 40 DEGREES FAHRENHEIT (F) IN THE SHADE AND RISING.
4. CONCRETE SHALL NOT BE PLACED UNTIL STEEL DOWELS HAVE BEEN INSTALLED IN EXISTING CONCRETE IN ACCORDANCE WITH VDOT STANDARDS.
5. 1/2" PREMOLDED EXPANSION JOINT MATERIAL SHALL BE PLACED AT A MAXIMUM OF 30' INTERVALS ON NEW SIDEWALK, CURB, CURB & GUTTER, AT EACH END OF DRIVEWAY ENTRANCES, AT EACH END OF HANDICAP RAMPS, SOME POINT ON ENTRANCE WALKS AND STEPS ADJUSTMENTS, AND ALONG BUILDINGS AND WALLS WHERE NEW CONCRETE SIDEWALKS ARE PLACED AGAINST THEM.
6. ALL EXISTING CURBS, CURB & GUTTER, SIDEWALK AND STEPS TO BE REMOVED SHALL BE TAKEN OUT TO THE NEAREST JOINT. DEMOLITION AND DISPOSAL COST TO BE INCLUDED IN OTHER UNIT BID ITEMS. NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK.
7. EXISTING ASPHALT PAVEMENT SHALL BE SAW CUT AND REMOVED AS PER THE SPECIFICATIONS. REMOVAL SHALL BE DONE IN SUCH A MANNER AS TO NOT TEAR, BULGE OR DISPLACE ADJACENT PAVEMENT. EDGES SHALL BE CLEAN AND VERTICAL, ALL CUTS SHALL BE PARALLEL OR PERPENDICULAR TO THE DIRECTION OF TRAFFIC.
8. DISPOSAL OF ALL EXCESS MATERIAL IS THE EXPENSE AND RESPONSIBILITY OF CONTRACTOR.

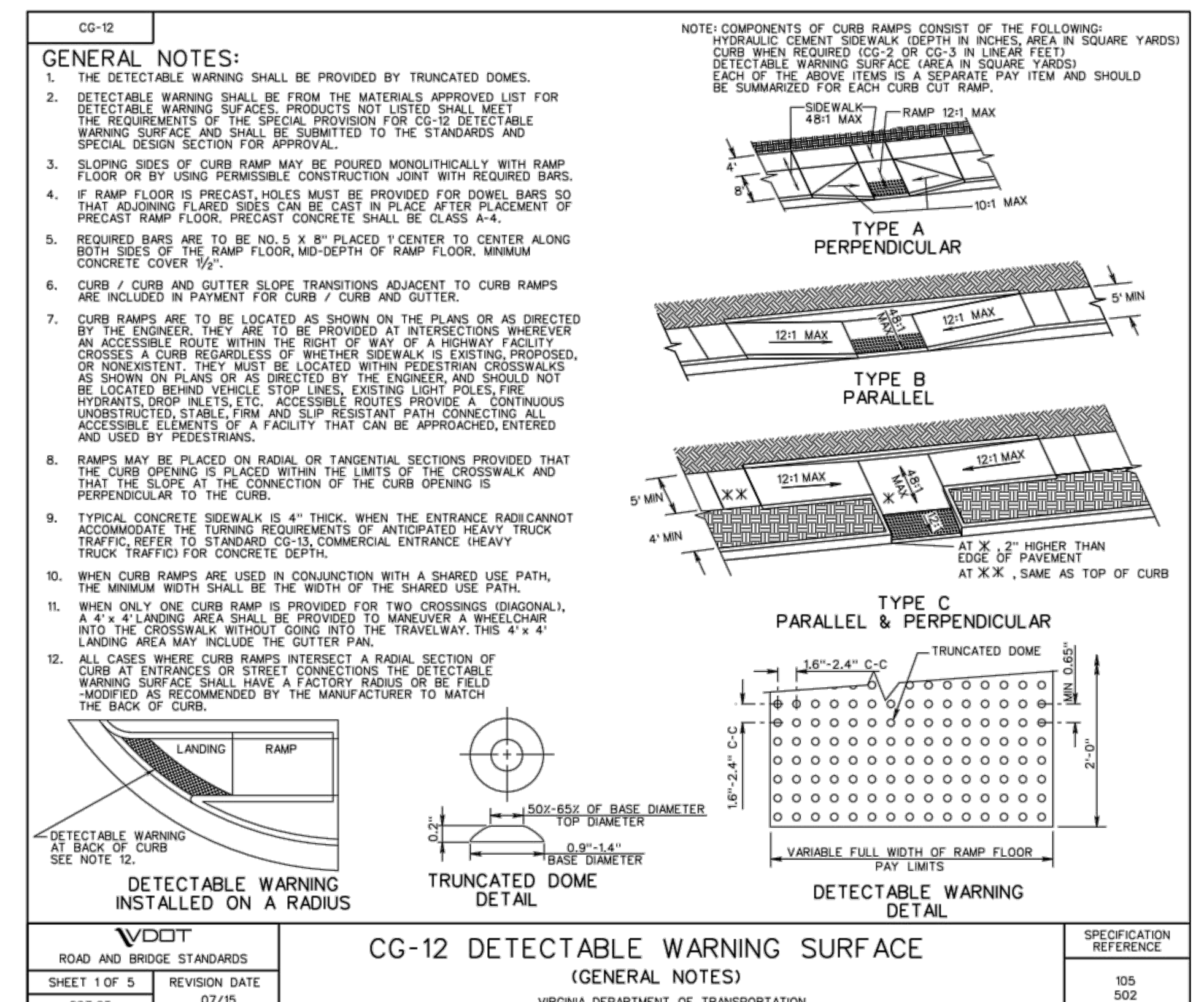
DRAINAGE

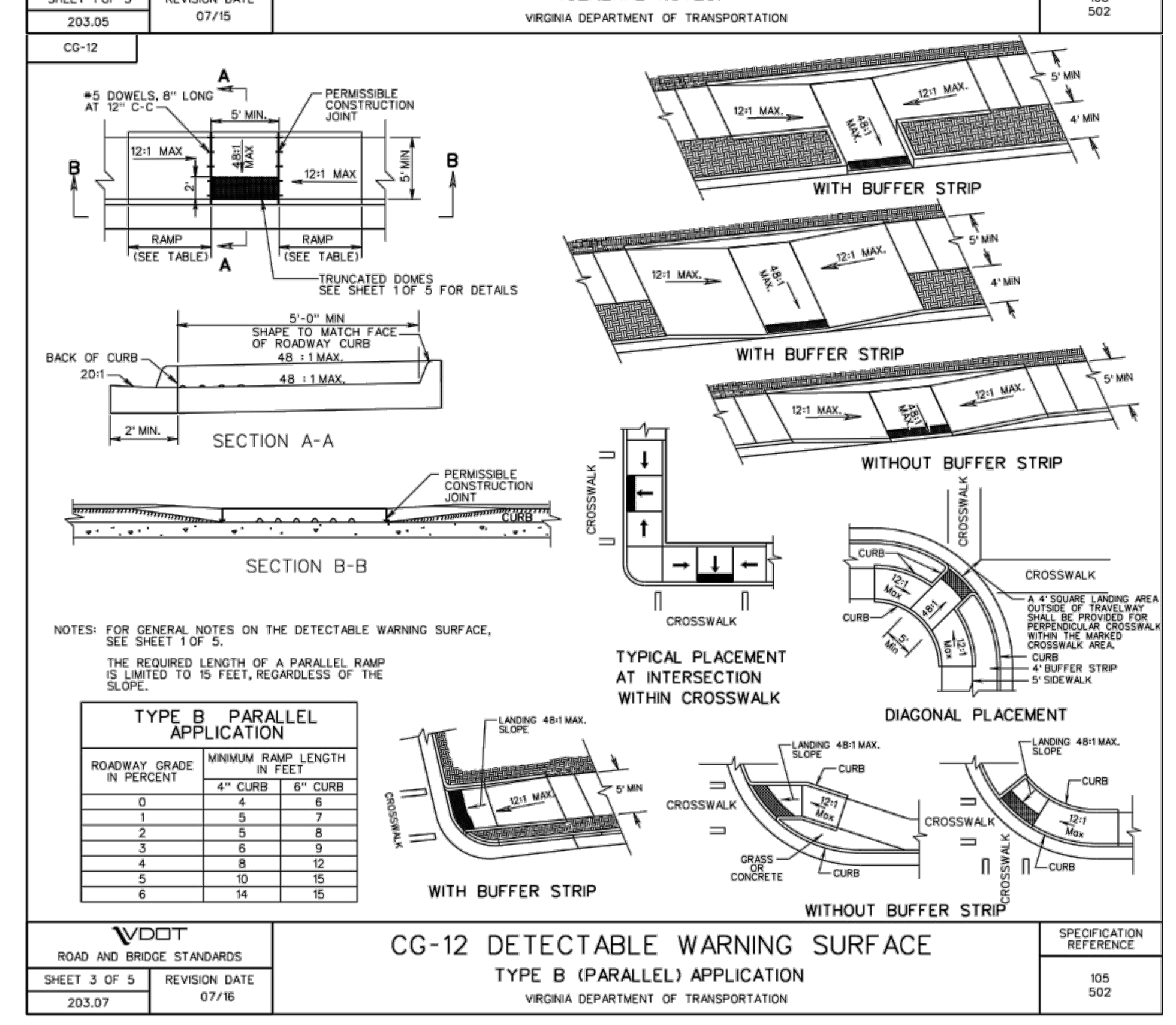
1. CONTRACTOR SHALL EXERCISE CARE, ESPECIALLY AT INTERSECTIONS AND GUTTER LINES, TO PROVIDE POSITIVE DRAINAGE. ANY AREAS WHERE WATER IS IMPOUNDED SHALL BE CORRECTED BY CONTRACTOR AT NO ADDITIONAL COST. POSITIVE DRAINAGE OF ALL ROADWAY AREAS TO THE STORM DRAIN INLETS OR OTHER ACCEPTABLE DRAINAGE CHANNELS AS NOTED ON THE PLANS IS REQUIRED.
2. CONTRACTOR SHALL MAINTAIN EXISTING STREAMS, DITCHES, DRAINAGE STRUCTURES, CULVERTS AND FLOWS AT ALL TIMES DURING THE WORK. CONTRACTOR SHALL PAY FOR ALL PERSONAL INJURY AND PROPERTY DAMAGE WHICH MAY OCCUR AS A RESULT OF FAILING TO MAINTAIN ADEQUATE DRAINAGE.
3. ALL PIPES, DI'S AND OTHER STRUCTURES SHALL BE INSPECTED BY THE CONTRACTORS INSPECTOR BEFORE BEING BACKFILLED OR BURIED. THE INSPECTOR MAY REQUIRE CONTRACTOR, AT NO ADDITIONAL COST, TO UNCOVER AND RE-COVER SUCH STRUCTURES IF THEY HAVE BEEN BACKFILLED OR BURIED WITHOUT SUCH INSPECTION.
4. ALL STORM SEWER PIPE AND DROP INLETS SHALL BE CLEARED OF DEBRIS AND ERODED MATERIAL PRIOR TO FINAL ACCEPTANCE.
5. ALL STORM SEWER PIPE JOINTS SHALL BE SEATED AND SEALED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
6. ALL EXISTING ROOF DRAINS AND OTHER DRAINAGE CONDUIT TIED INTO EXISTING PIPE SHALL BE TIED INTO NEW PIPE. ALL EXISTING ROOF DRAINS AND OTHER DRAINAGE CONDUIT BLOCKED OR DISRUPTED FROM THEIR PRE-CONSTRUCTION DRAINAGE PATTERNS SHALL BE SHORTENED, EXTENDED OR OTHERWISE CONNECTED TO THE NEW WORK USING MATERIALS APPROVED BY THE INSPECTOR, AND IN SUCH A WAY THAT THE NEW DRAINAGE PATTERNS ARE ACCEPTABLE TO ENGINEER.

TRAFFIC AND SIGNAGE

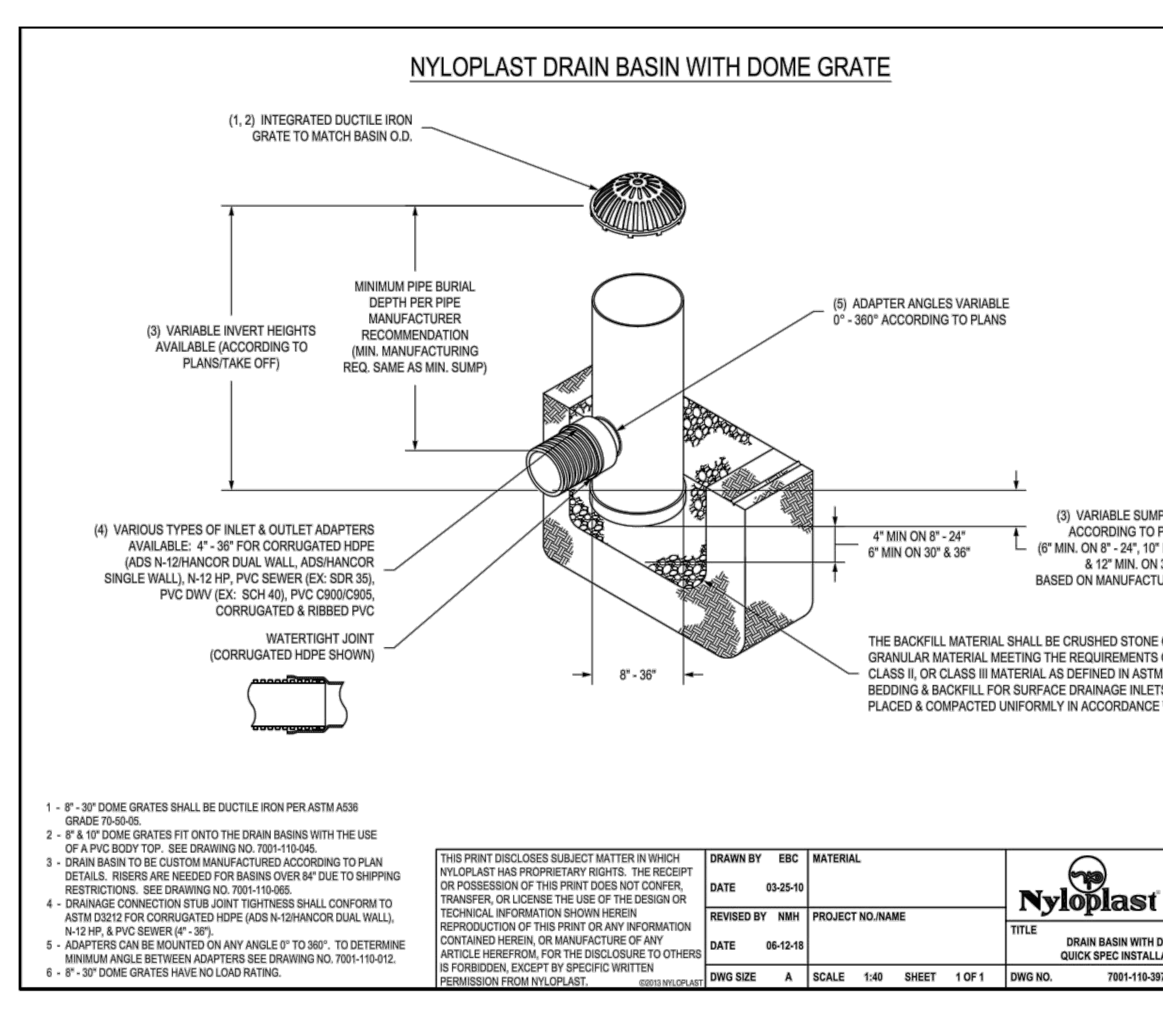
1. ALL TEMPORARY NO PARKING REQUIREMENTS SHALL BE PROVIDED BY CONTRACTOR WITH APPROVAL OF THE ARCHITECT AND OWNER.
2. CONTRACTOR SHALL PROVIDE NECESSARY REFLECTORS, BARRICADES, TRAFFIC CONTROL DEVICES AND/OR FLAG PERSONS TO INSURE THE SAFETY OF ITS WORKERS AND THE PUBLIC.
3. CONTRACTOR SHALL MAINTAIN SAFE AND PASSABLE PUBLIC ACCESS TO PROPERTIES AND THE PUBLIC RIGHT-OF-WAY DURING CONSTRUCTION. THE CONTRACTOR SHALL DEVELOP AND GET APPROVAL FROM VDOT FOR ANY MAINTENANCE OF TRAFFIC PLAN FOR WORK IN THE RIGHT OF WAY. ANY WORK IN THE ROW AND MAINTENANCE OF TRAFFIC PLAN SHALL BE IN ACCORDANCE WITH THE MUTCD MANUAL AND THE VIRGINIA WORK AREA PROTECTION MANUAL AND APPROVED BY VDOT. ACCESS FOR EMERGENCY VEHICLES SHALL BE MAINTAINED AT ALL TIMES.
4. EXCEPT AS OTHERWISE AUTHORIZED IN WRITING BY THE OWNER, THE WORK SHALL BE COORDINATED AND PERFORMED IN A MANNER SO THAT ALL EXISTING FIRE HYDRANTS SHALL BE ACCESSIBLE AT ALL TIMES DURING THE WORK.

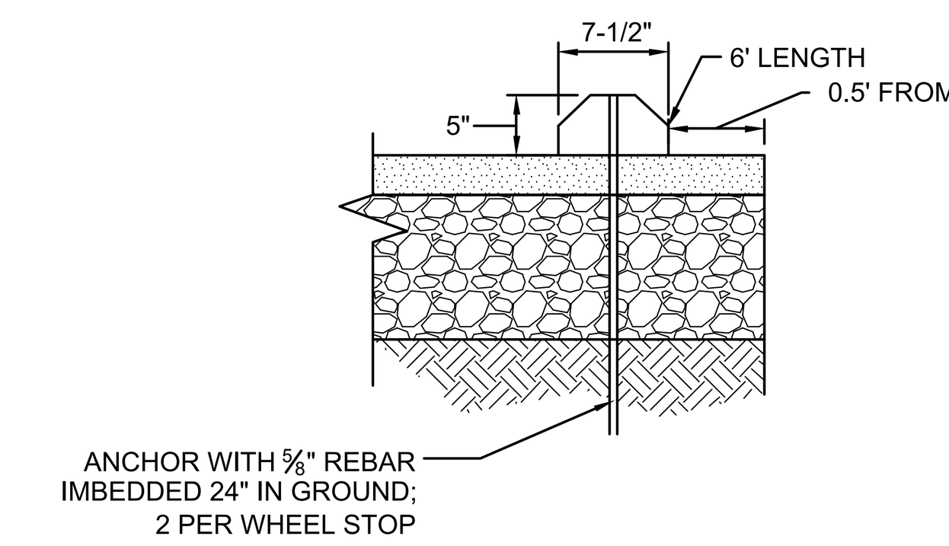




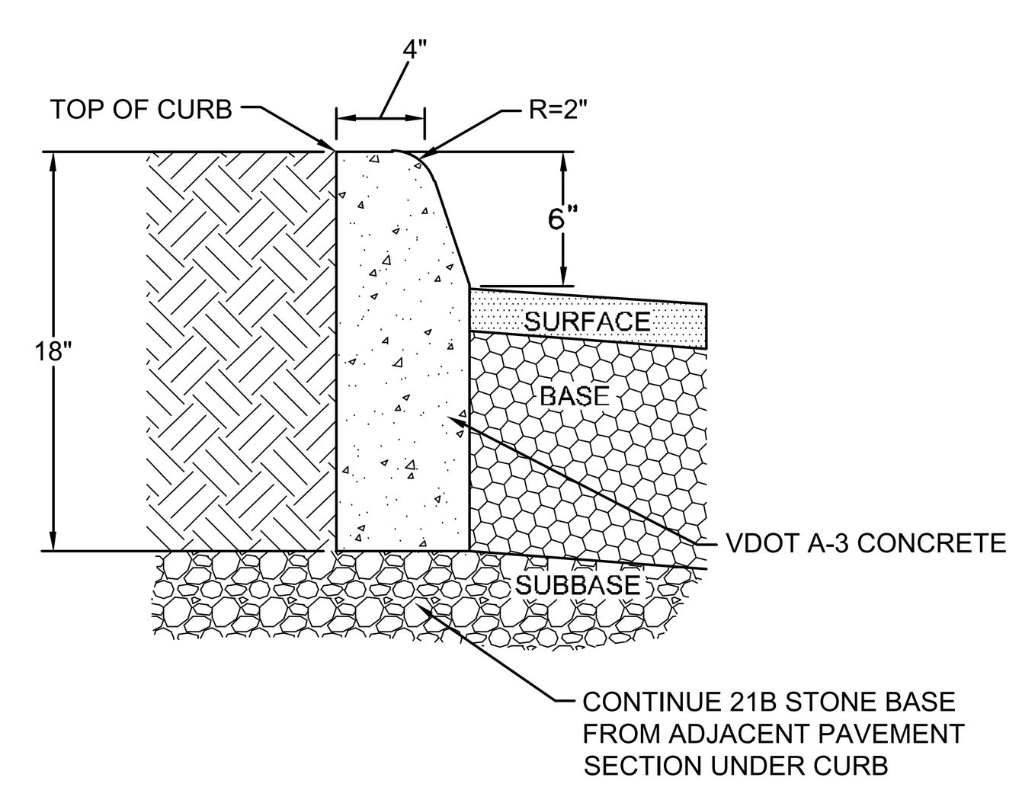


ROADWAY GRADE IN PERCENT	MINIMUM RAMP LENGTH IN FEET	
	4" CURB	6" CURB
0	4	6
1	5	7
2	5	8
3	6	9
4	8	12
5	10	15
6	14	15

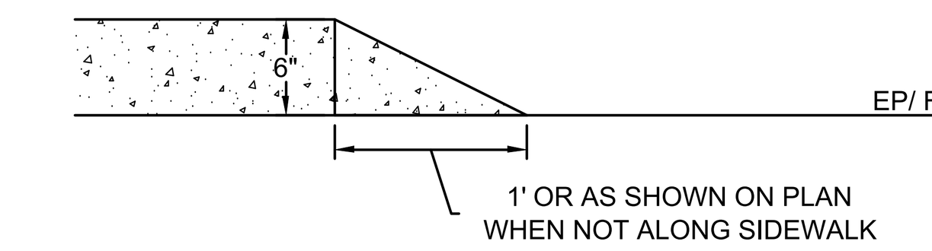




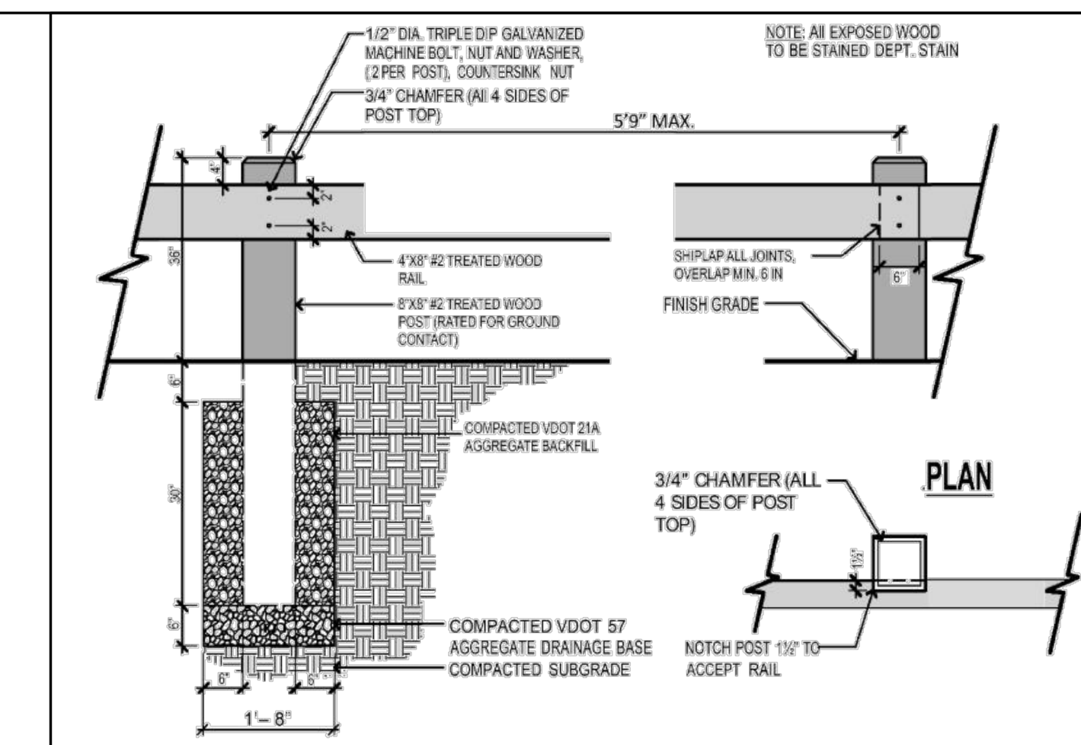
PRECAST CONCRETE WHEEL STOP
No Scale



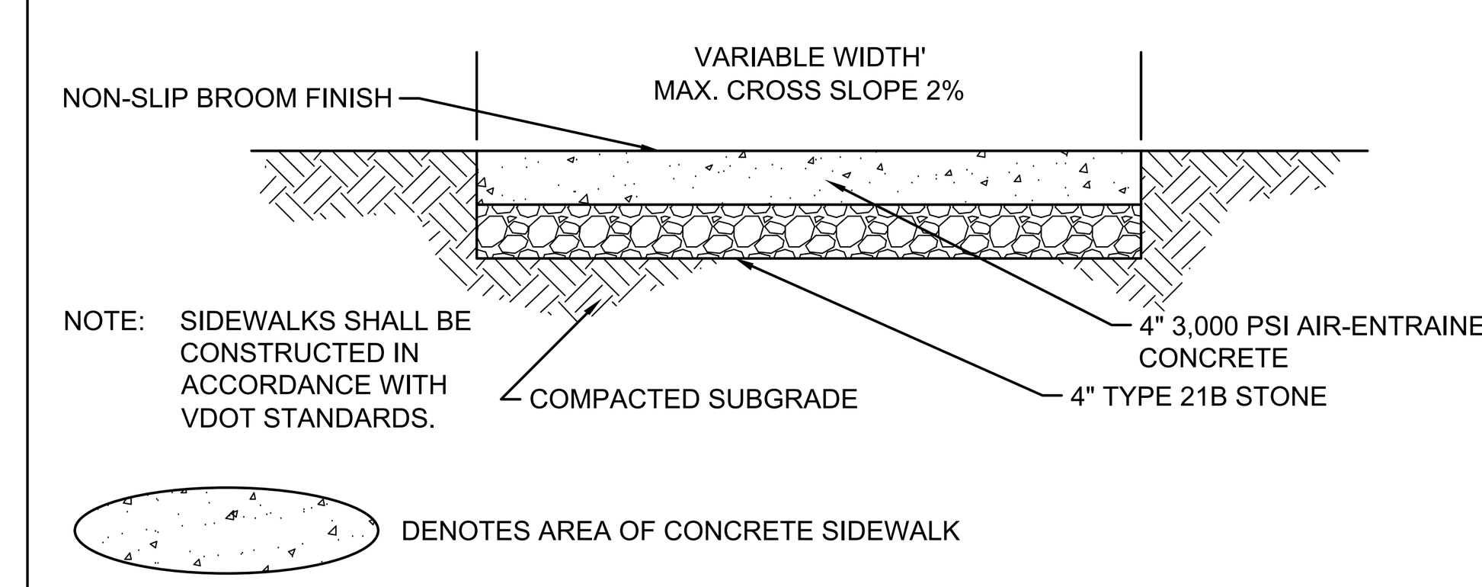
VDOT STANDARD CG-2 CURB
No Scale



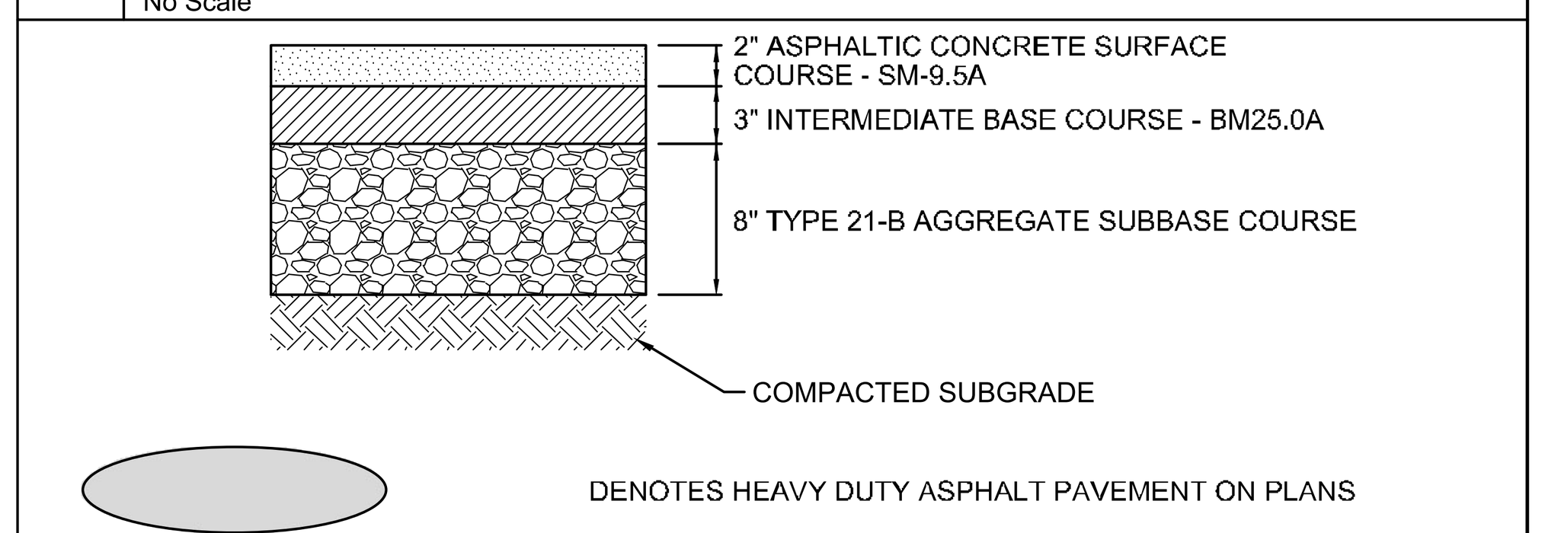
CURB WIPE DOWN DETAIL
No Scale



WOODEN GUARDRAIL
No Scale

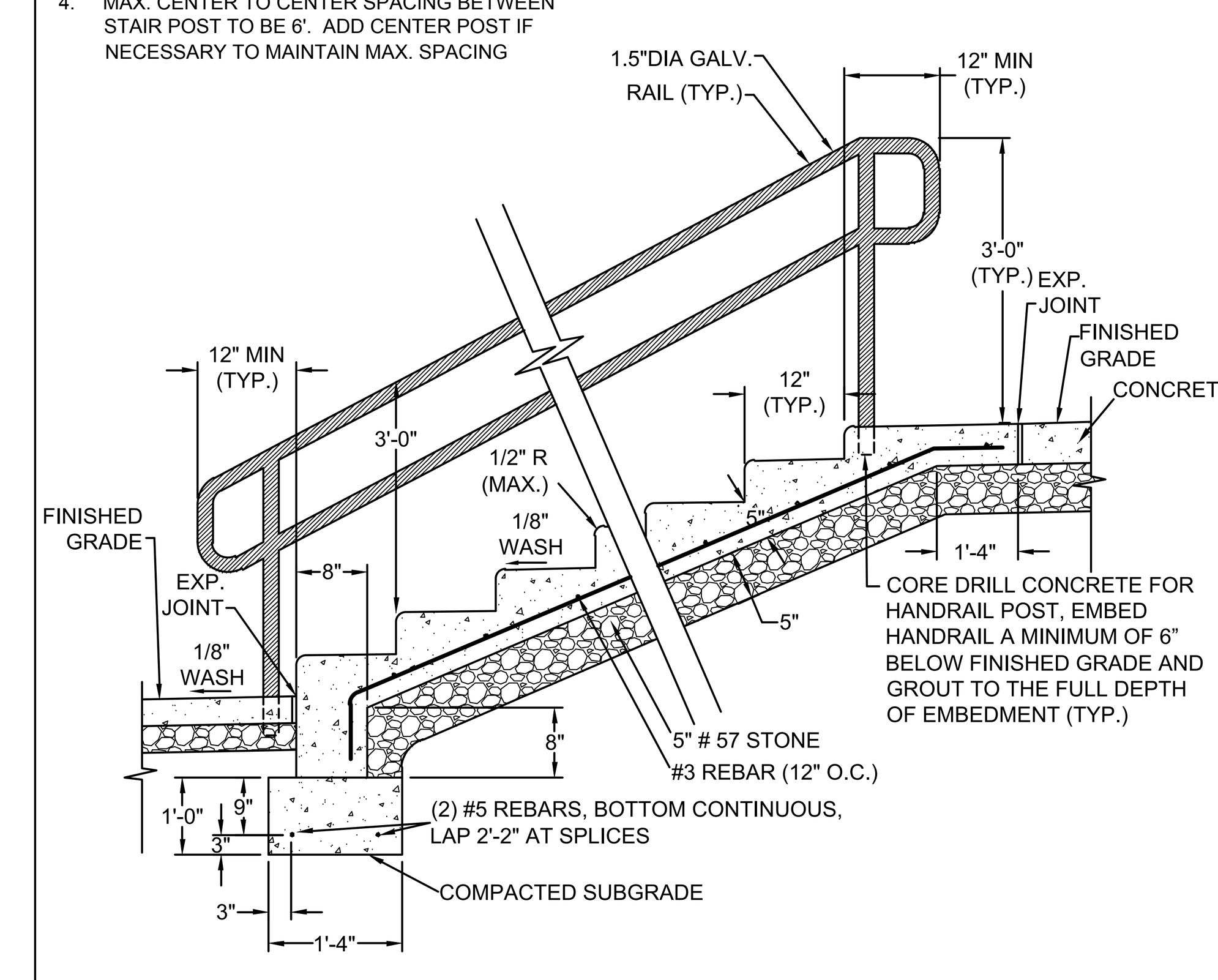


CONCRETE SIDEWALK PAVEMENT SECTION
No Scale

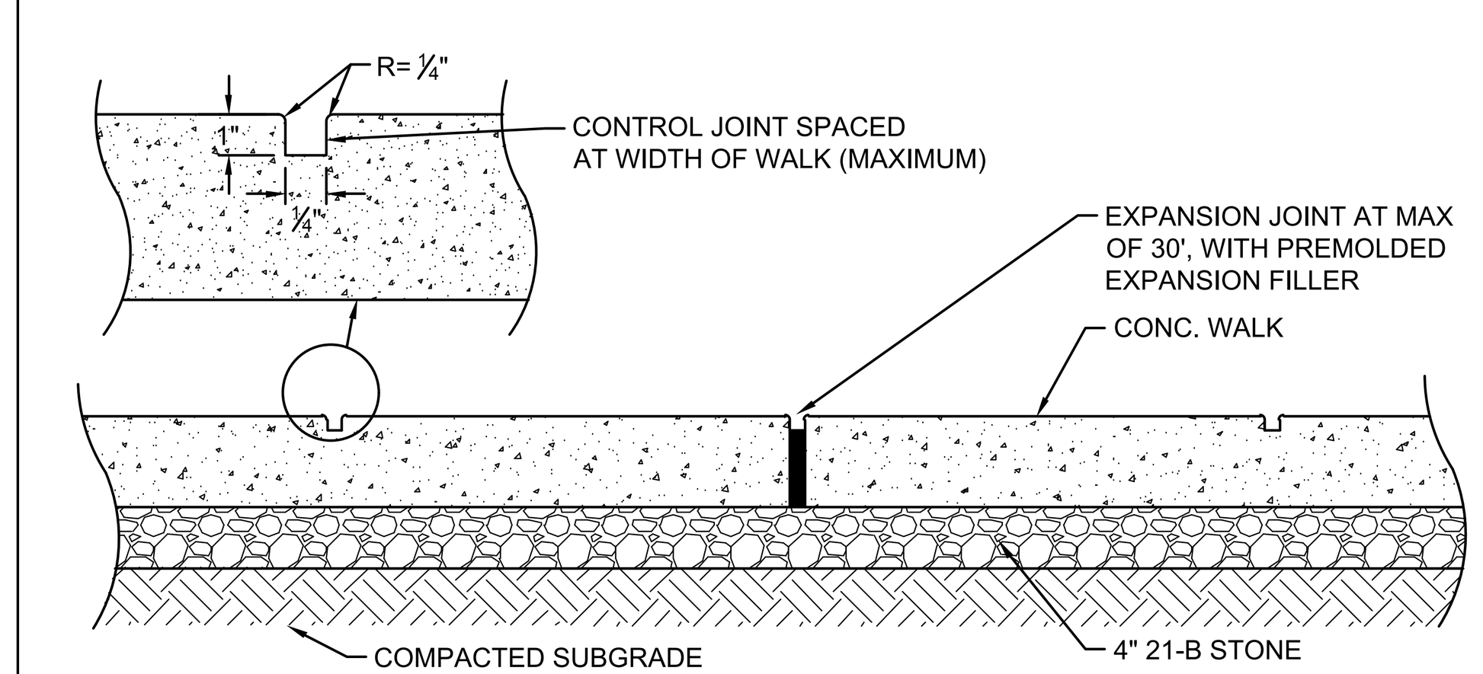


HEAVY DUTY ASPHALT PAVEMENT SECTION
No Scale

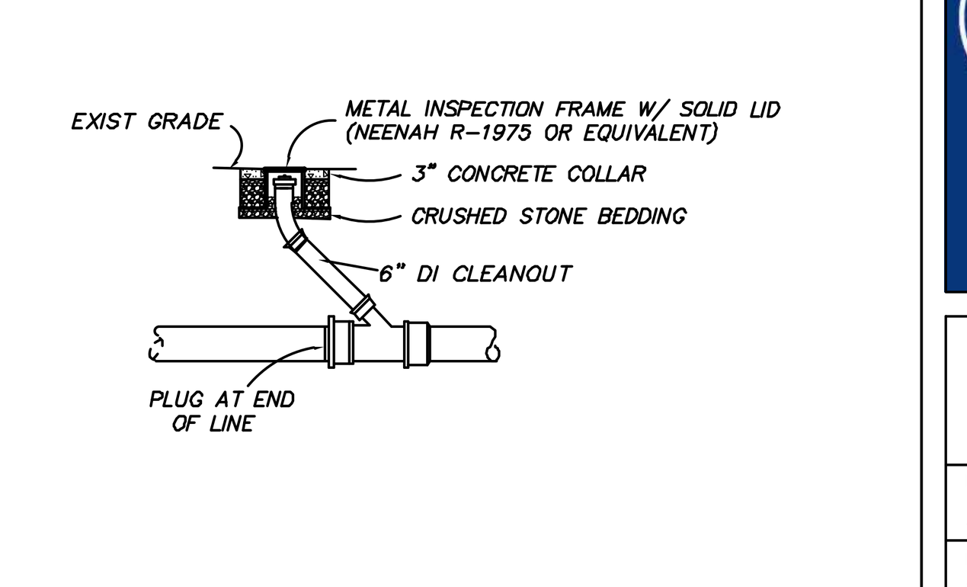
NOTES:
1. FINE BROOM FINISH ALL STAIRS.
2. RAIL ON BOTH SIDES OF STEPS (IF NOTED)
3. SEE PLAN FOR RISER HEIGHT
4. MAX. CENTER TO CENTER SPACING BETWEEN STAIR POST TO BE 6'. ADD CENTER POST IF NECESSARY TO MAINTAIN MAX. SPACING



EXTERIOR STAIRS
No Scale



CONCRETE SIDEWALK JOINT DETAIL
No Scale



CLEANOUT DETAIL
No Scale

COMMONWEALTH OF VIRGINIA
JONATHAN M. SHOWALTER
Lic. No. 0402057151
09/14/2020
PROFESSIONAL ENGINEER

KEY PLAN

REVISIONS

01	MM-DD-YR	NAME	DESCRIPTION OF CHANGES

CRABTREE ROHRBAUGH & ASSOCIATES - ARCHITECTS
www.cra-architects.com
MECHANICSBURG, PENNSYLVANIA
TOWSON, MARYLAND
WHITE SULPHUR SPRINGS, WEST VIRGINIA
250 WEST MAIN STREET, SUITE 200
CHARLOTTESVILLE VA 22902
434-975-7262

ADDITION AND RENOVATIONS
MULTIPURPOSE ROOM
FLUVANNA COUNTY
123 MAIN STREET
PALMYRA, VA 22963

CR

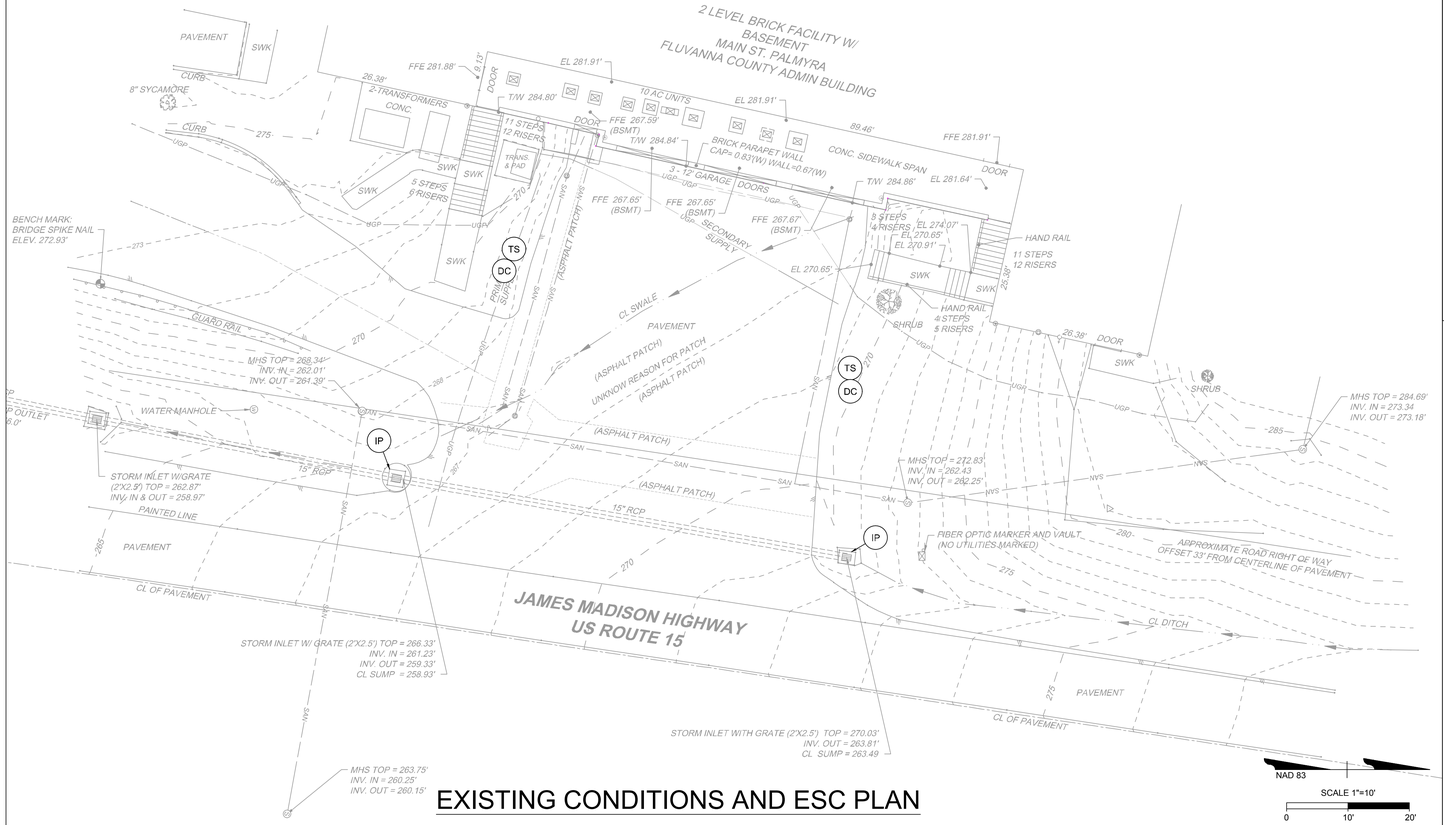
NOTES AND DETAILS

PLOT SCALE: AS SHOWN
FILENAME: CRA PROJECT No. 3430
DATE: SEPTEMBER 10, 2020

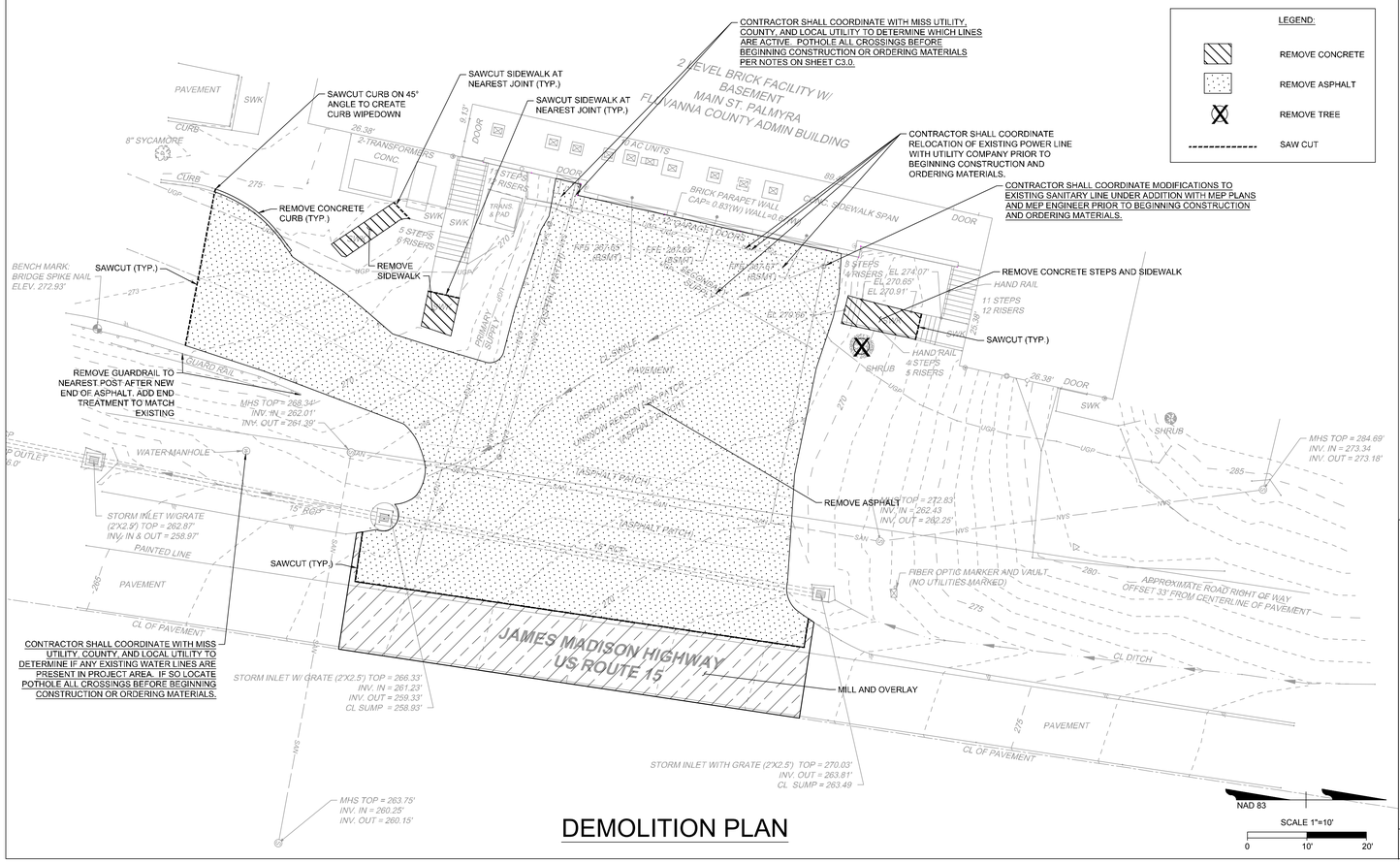
PROJECT
46559.001

C1.0

THESE ARE NOT FINAL APPROVED PLANS FOR CONSTRUCTION. CONTRACTOR SHALL CONFIRM WITH OWNER THAT ALL REQUIRED REVIEWS, PERMITS, AND APPROVALS HAVE BEEN RECEIVED BEFORE BEGINNING CONSTRUCTION.



EXISTING CONDITIONS AND ESC PLAN



DEMOLITION PLAN

SURVEY NOTES:

1. PROPERTY AND ZONING INFORMATION:
   - REFERENCE: FLUVANNA COUNTY BOARD OF SUPERVISORS
   - PARCEL NO.: DEED BOOK
   - ACREAGE: 83-6
   - ZONING: 6.284RES
   - A1
2. BASIS OF HORIZONTAL DATUM IS (NAD 83 NA 2011) VA SOUTH; BASIS OF VERTICAL DATUM IS NAVD 88. DATUM ESTABLISHED VIA (RTK) NETWORK. GPS OBSERVATIONS REFERENCING LEICA SMARTNET STATION 0601
3. THIS PLAT WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT AND MAY NOT SHOW ALL ENCUMBRANCES.
4. UNDERGROUND UTILITIES, AS SHOWN ON THIS PLAT, WERE DEFINED PER MISS UTILITY PAINT MARKINGS AND/OR LOCATED BY FIELD SURVEY. THERE MAY BE ADDITIONAL UNDERGROUND UTILITIES THAT WERE NOT LOCATED BY MISS UTILITY. SEE MISS UTILITY TICKET NO.
5. THIS SURVEY SHOWN HEREON IS BASED ON A FIELD SURVEY COMPLETED MARCH 9, 2020 BASED ON GRAPHIC DETERMINATION.
6. THIS PROPERTY IS IN FEMA DEFINED FLOOD ZONE "X" OF THE HUD DEFINED FLOOD HAZARD AREA AS SHOWN ON F.E.M.A. FLOOD INSURANCE RATE MAP PANEL # 51109C0325B, DATED NOVEMBER 05, 1997.
7. THIS IS NOT A BOUNDARY SURVEY; BOUNDARY DEPICTED HEREON IS COMPILED FROM FIELD EVIDENCE AND VDOT HIGHWAY PLAT

LEGEND:

- CP POWER POLE (PP)
- TP TELEPHONE PEDESTAL (TP)
- IRON FOUND IRON(F) IF NOTED
- SS SANITARY MANHOLE (MHS)
- SD STORM MANHOLE (MHD)
- EP EDGE OF PAVEMENT
- VT TELEPHONE VAULT (VT)
- SANITARY CLEANOUT
- ROOF DRAIN
- SPIGOT
- SWK SIDEWALK
- T/W TOP OF WALL

BOUNDARY
PROPERTY LINE
SAN SANITARY SEWER
STORM SEWER
EDGE OF PAVEMENT
UGP UNDERGROUND POWER

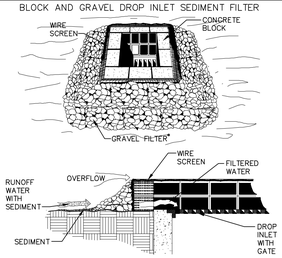
THIS TOPOGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF MICHAEL W. DORSEY LS FROM AN ACTUAL GROUND SURVEY MADE UNDER MY SUPERVISION; THAT THE ORIGINAL DATA WAS OBTAINED ON THE FOLLOWING DATE, AUGUST 28, 2020. THIS BASE- MAP AND DIGITAL GEOSPATIAL DATA INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

GENERAL CONSTRUCTION NOTES FOR EROSION AND SEDIMENT CONTROL

1. THE PLAN APPROVING AUTHORITY MUST BE NOTIFIED ONE WEEK PRIOR TO THE PRE-CONSTRUCTION CONFERENCE, ONE WEEK PRIOR TO THE COMMENCEMENT OF LAND DISTURBING ACTIVITY, AND ONE WEEK PRIOR TO THE FINAL INSPECTION.
2. ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND VIRGINIA REGULATIONS VR 625-02-00 EROSION AND SEDIMENT CONTROL REGULATIONS.
3. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING.
4. A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.
5. PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF-SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE OWNER FOR REVIEW AND APPROVAL BY THE PLAN APPROVING AUTHORITY.
6. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE PLAN APPROVING AUTHORITY.
7. ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.
8. DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED FILTERING DEVICE.
9. THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.
10. ALL FILL MATERIAL TO BE TAKEN FROM AN APPROVED, DESIGNATED BORROW AREA.
11. ALL WASTE MATERIALS SHALL BE TAKEN TO AN APPROVED WASTE AREA. EARTH FILL SHALL BE INERT MATERIALS ONLY, FREE OF ROOTS, STUMPS, WOOD, RUBBISH, AND OTHER DEBRIS.
12. ALL INERT MATERIALS SHALL BE TRANSPORTED IN COMPLIANCE WITH OF THE CODE OF FLUVANNA.
13. BORROW, FILL OR WASTE ACTIVITY INVOLVING INDUSTRIAL-TYPE POWER EQUIPMENT SHALL BE LIMITED TO THE HOURS OF 7:00AM TO 9:00PM.
14. BORROW, FILL OR WASTE ACTIVITY SHALL BE CONDUCTED IN A SAFE MANNER THAT MAINTAINS LATERAL SUPPORT, OR ORDER TO MINIMIZE ANY HAZARD TO PERSONS, PHYSICAL DAMAGE TO ADJACENT LAND AND STRUCTURES/IMPROVEMENTS, AND DAMAGE TO ANY PUBLIC STREET BECAUSE OF SLIDES, SINKING, OR COLLAPSE.
15. THE DEVELOPER SHALL RESERVE THE RIGHT TO INSTALL, MAINTAIN, REMOVE OR CONVERT TO PERMANENT STORMWATER MANAGEMENT FACILITIES WHERE APPLICABLE ALL EROSION CONTROL MEASURES REQUIRED BY THIS PLAN REGARDLESS OF THE SALE OF ANY LOT, UNIT, BUILDING OR OTHER PORTION OF THE PROPERTY.
16. TEMPORARY STABILIZATION SHALL BE TEMPORARY SEEDING AND MULCHING. SEEDING IS TO BE AT 75 LBS/ACRE, AND IN THE MONTHS OF SEPTEMBER TO FEBRUARY TO CONSIST A 50/50 MIX OF ANNUAL RYEGRASS AND CEREAL WINTER RYE, OR IN MARCH AND APRIL TO CONSIST OF ANNUAL RYE, OR MAY THROUGH AUGUST TO CONSIST OF GERMAN MILLET. STRAW MULCH IS TO BE APPLIED AT 80LBS/100SF. ALTERNATIVES ARE SUBJECT TO APPROVAL BY THE COUNTY EROSION CONTROL INSPECTOR.
17. PERMANENT STABILIZATION SHALL BE LIME AND FERTILIZER, PERMANENT SEEDING, AND MULCH. AGRICULTURAL GRADE LIMESTONE SHALL BE APPLIED AT 90LBS/1000SF, INCORPORATED INTO THE TOP 4-6 INCHES OF SOIL. FERTILIZER SHALL BE APPLIED AT 1000LBS/ACRE AND CONSIST OF A 10-20-10 NUTRIENT MIX. PERMANENT SEEDING SHALL BE APPLIED AT 240LBS/ACRE AND CONSIST OF 90% KENTUCKY 31 OR TALL FESCUE AND 10% KENTUCKY BLUEGRASS. STRAW MULCH IS TO BE APPLIED AT 80LBS/100SF. ALTERNATIVES ARE SUBJECT TO APPROVAL BY THE COUNTY EROSION CONTROL INSPECTOR.
18. MAINTENANCE: ALL MEASURES SHALL BE INSPECTED WEEKLY AND AFTER EACH RAINFALL EVENT. ANY DAMAGE OR CLOGGING TO STRUCTURAL MEASURES SHALL BE REPAIRED IMMEDIATELY. SILT TRAPS SHALL BE CLEANED WHEN 50% OF THE WET STORAGE VOLUME IS FILLED WITH SEDIMENT. ALL SEEDED AREAS SHALL BE RESEEDED WHEN NECESSARY TO ACHIEVE A GOOD STAND OF GRASS. SILT FENCE AND DIVERSION DYKES WHICH COLLECT SEDIMENT TO HALF THEIR HEIGHT MUST BE CLEANED AND REPAIRED IMMEDIATELY.
19. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS OF FINAL SITE STABILIZATION, WHEN MEASURES ARE NO LONGER NEEDED, SUBJECT TO APPROVAL BY THE COUNTY EROSION CONTROL INSPECTOR.

DEMOLITION NOTES

1. CONTRACTOR SHALL VERIFY ALL FIELD CONDITIONS PRIOR TO CONSTRUCTION INCLUDING UNDERGROUND UTILITY CONNECTION POINTS, RECEIVING PIPES SIZES, INVERTS, AND PIPE MATERIAL FOR UNDERGROUND STRUCTURES. CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY UPON FINDING A DIFFERENCE IN FIELD CONDITIONS AND WHAT IS DEPICTED ON THE PLANS.
2. ALL UTILITIES OR STRUCTURES NOT INDICATED FOR REMOVAL OR MODIFICATION ARE TO REMAIN, BE PROTECTED FROM DAMAGE AND MINIMUM COVER SHALL BE MAINTAINED. CONTRACTOR RESPONSIBLE FOR ANY DAMAGE TO EXISTING STRUCTURES DURING PROPOSED MODIFICATIONS.
3. ALL WASTE MATERIAL GENERATED FROM CLEARING AND DEMOLITION ACTIVITIES SHALL BE DISPOSED OF OFF-SITE IN ACCORDANCE WITH ALL APPLICABLE RULES AND REGULATIONS.
4. CONTACT "MISS UTILITY" (811) OR 1-800-552-7001 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION.
5. REMOVE/ DEMOLISH/ ABANDON AFTER EROSION CONTROL MEASURES ARE IN PLACE AND APPROVAL OF THE INSPECTOR. REFER TO EROSION CONTROL PLAN.
6. ALL PAVEMENT OR CONCRETE TO BE REMOVED SHALL BE SAW CUT TO PROVIDE A STRAIGHT AND UNIFORM JOINT WITH NEW CONSTRUCTION. ANY EXISTING PAVEMENT, SIDEWALK, CURB & GUTTER, ETC. THAT MUST BE REMOVED TO ALLOW NEW CONSTRUCTION SHALL BE REMOVED AND REPAIRED PER THE SPECIFICATIONS AND DETAILS OR TO MATCH EXISTING CONDITIONS (WHETHER OR NOT SHOWN ON THE DRAWINGS TO BE REMOVED). UTILITY INSTALLATIONS MAY UTILIZE OPEN CUT OF PAVEMENTS UNLESS INDICATED OTHERWISE. TRENCH IN EXISTING ASPHALT SHALL BE PATCHED PER PAVEMENT REPAIR DETAIL.
7. CONTRACTOR TO COORDINATE ANY NECESSARY UTILITY RELOCATIONS DIRECTLY WITH APPLICABLE UTILITY PROVIDER.
8. EXISTING MANHOLES, VALVE BOXES, VAULTS, CLEANOUTS, UTILITY POLES ETC. TO REMAIN WITHIN THE GRADING LIMITS SHALL BE ADJUSTED AS NEEDED TO FUNCTION PROPERLY WITH THE PROPOSED FINISHED GRADES (WHETHER OR NOT INDICATED TO BE MODIFIED).



SPECIFIC APPLICATION: THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE AN OVERFLOW CAPACITY IS NECESSARY TO PREVENT EXCESSIVE PONDING AROUND THE STRUCTURE.

* GRAVEL SHALL BE VDOT #3, #357 OR #5 COARSE AGGREGATE.

IP 3.07-3

STORM DRAIN INLET PROTECTION
No Scale

EROSION CONTROL LEGEND

			*
SAF	SAF	SAFETY FENCE	3.01
IP		INLET PROTECTION	3.07
TS		TEMPORARY SEEDING	3.31
PS		PERMANENT SEEDING	3.32
MU		MULCHING	3.35
TP	TP	TREE PROTECTION	3.38
DC		DUST CONTROL	3.39

* "VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK" SPECIFICATION NUMBER

TABLE 3.31-B
ACCEPTABLE TEMPORARY SEEDING PLANT MATERIALS
"QUICK REFERENCE FOR ALL REGIONS"

PLANTING DATES	SPECIES	RATE (LBS./ACRE)
SEPT. 1 - FEB. 15	50/50 MIX OF ANNUAL RYEGRASS (LOLIUM MULTI-FLORUM) & CEREAL (WINTER) RYE (SECALE CEREALE)	50-100
FEB. 16 - APR. 30	ANNUAL RYEGRASS (LOLIUM MULTI-FLORUM)	60-100
MAY 1 - AUG. 31	GERMAN MILLET (SETARIA ITALICA)	50

TS 3.31

TEMPORARY SEEDING PLANT MATERIALS
No Scale

TABLE 3.32-D
SITE SPECIFIC SEEDING MIXTURES FOR PIEDMONT AREA

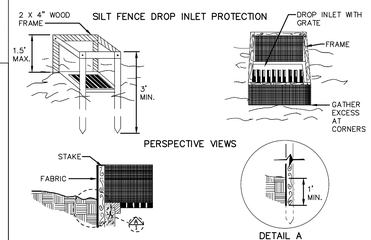
	TOTAL LBS. PER ACRE
MINIMUM CARE LAWN	
COMMERCIAL OR RESIDENTIAL	175-200 LBS.
KENTUCKY 31 OR TURF-TYPE TALL FESCUE	90-100%
IMPROVED PERENNIAL RYEGRASS	0-5%
KENTUCKY BLUEGRASS	0-5%
GENERAL SLOPE (3:1 OR LESS)	
KENTUCKY 31 FESCUE	128 LBS.
RED TOP GRASS	2 LBS.
SEASONAL NURSE CROP *	20 LBS.
	150 LBS.
LOW-MAINTENANCE SLOPE (STEEPER THAN 3:1)	
KENTUCKY 31 FESCUE	108 LBS.
RED TOP GRASS	2 LBS.
SEASONAL NURSE CROP *	20 LBS.
CROWNVETCH **	20 LBS.
	150 LBS.

* USE SEASONAL NURSE CROP IN ACCORDANCE WITH SEEDING DATES AS STATED BELOW:
- FEBRUARY 16TH THROUGH APRIL ..... ANNUAL RYE
- MAY 1ST THROUGH AUGUST 15TH ..... FOXTAIL MILLET
- AUGUST 16TH THROUGH OCTOBER ..... ANNUAL RYE
- NOVEMBER THROUGH FEBRUARY 15TH ..... WINTER RYE

** SUBSTITUTE SERICEA LESPEDEZA FOR CROWNVETCH EAST OF FARMVILLE, VA (MAY THROUGH SEPTEMBER USE HULLED SERICEA, ALL OTHER PERIODS, USE UNHULLED SERICEA). IF FLATPEA IS USED IN LIEU OF CROWNVETCH, INCREASE RATE TO 30 LBS./ACRE. ALL LEGUME SEED MUST BE PROPERLY INOCULATED. WEEPING LOVEGRASS MAY BE ADDED TO ANY SLOPE OR LOW-MAINTENANCE MIX DURING WARMER SEEDING PERIODS; ADD 10-20 LBS./ACRE IN MIXES.

PS 3.32

PERMANENT SEEDING MIX FOR PIEDMONT AREA
No Scale



SPECIFIC APPLICATION
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER THAN 5%) WHERE THE INLET SHEET OR OVERLAND FLOWS (NOT EXCEEDING 1 C.F.S.) ARE TYPICAL. THE METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS, SUCH AS IN STREET OR HIGHWAY MEDIANS.

IP 3.07-1

STORM DRAIN INLET PROTECTION
No Scale

COMMONWEALTH OF VIRGINIA
JONATHAN M. SHOWALTER
Lic. No. 0402057151
09/14/2020
PROFESSIONAL ENGINEER

KEY PLAN

REVISIONS

NO	MM-DD-YR	NAME	DESCRIPTION OF CHANGES

CRABTREE ROHRBAUGH & ASSOCIATES - ARCHITECTS
250 WEST MAIN STREET, SUITE 200
CHARLOTTESVILLE VA 22902
434-975-7262
www.cra-architects.com
MECHANICSBURG, PENNSYLVANIA
TOWSON, MARYLAND
WHITE SULPHUR SPRINGS, WEST VIRGINIA

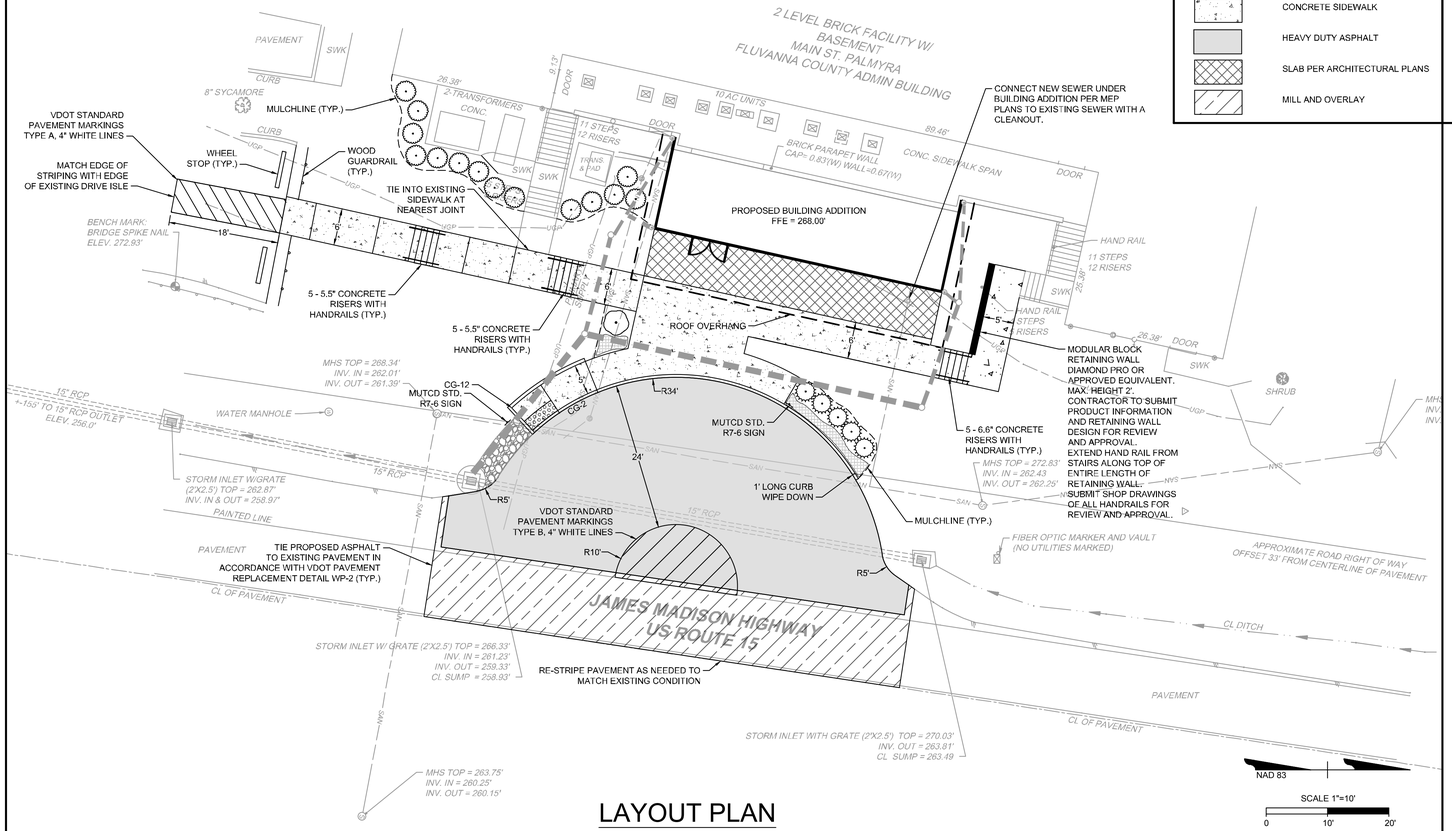
ADDITION AND RENOVATIONS
MULTIPURPOSE ROOM
FLUVANNA COUNTY
123 MAIN STREET
PALMYRA, VA 22963

EXISTING CONDITIONS & DEMOLITION PLAN
PLOT SCALE: 1" = 10'
FILENAME: CRA PROJECT No. 3430
DATE: SEPTEMBER 10, 2020

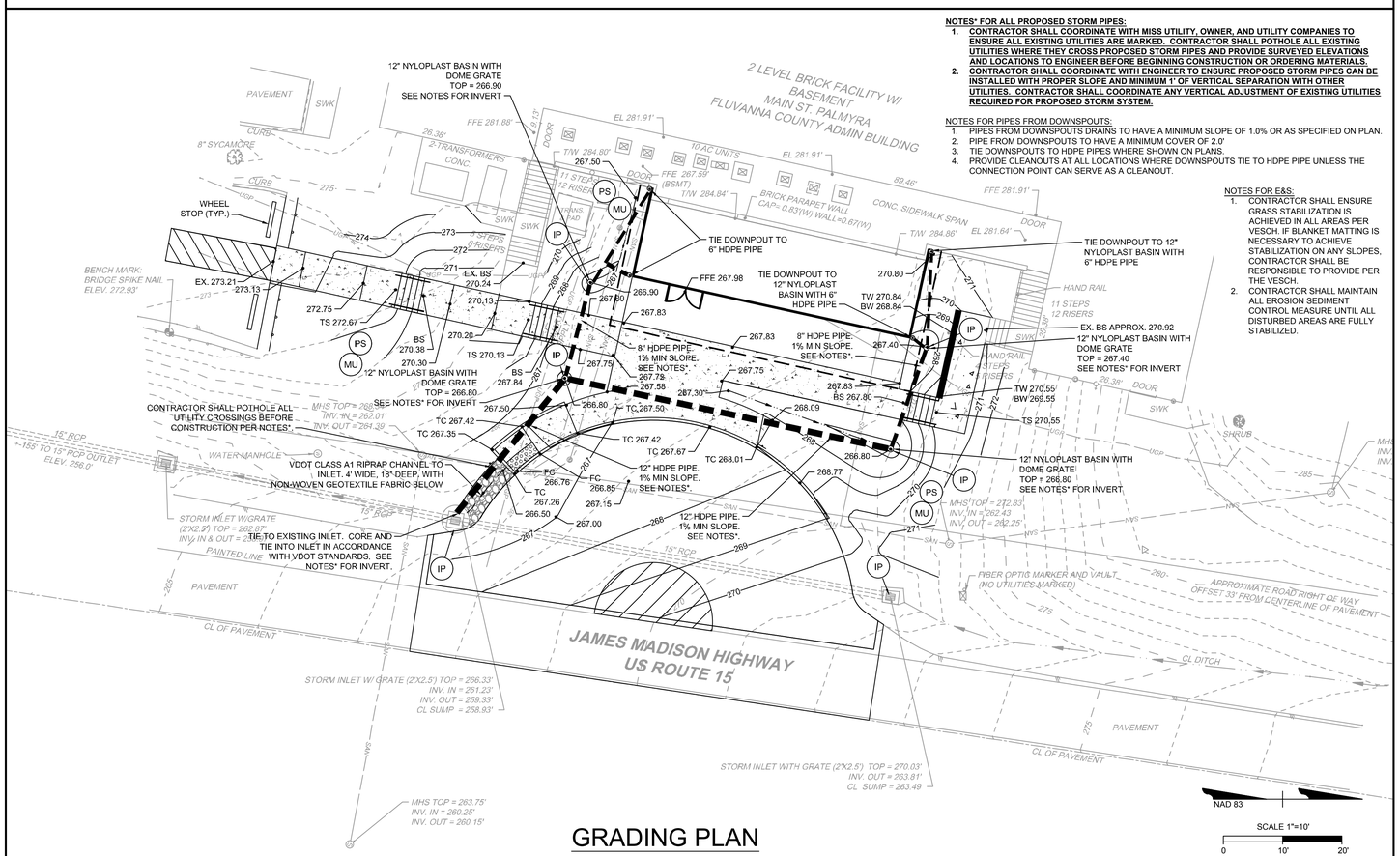
PROJECT 46559.001

C2.0

THESE ARE NOT FINAL APPROVED PLANS FOR CONSTRUCTION. CONTRACTOR SHALL CONFIRM WITH OWNER THAT ALL REQUIRED REVIEWS, PERMITS, AND APPROVALS HAVE BEEN RECEIVED BEFORE BEGINNING CONSTRUCTION.



LAYOUT PLAN



GRADING PLAN

NOTES* FOR ALL PROPOSED STORM PIPES:

1. **CONTRACTOR SHALL COORDINATE WITH MISS UTILITY, OWNER, AND UTILITY COMPANIES TO ENSURE ALL EXISTING UTILITIES ARE MARKED. CONTRACTOR SHALL POTHOLE ALL EXISTING UTILITIES WHERE THEY CROSS PROPOSED STORM PIPES AND PROVIDE SURVEYED ELEVATIONS AND LOCATIONS TO ENGINEER BEFORE BEGINNING CONSTRUCTION OR ORDERING MATERIALS.**
2. **CONTRACTOR SHALL COORDINATE WITH ENGINEER TO ENSURE PROPOSED STORM PIPES CAN BE INSTALLED WITH PROPER SLOPE AND MINIMUM 1' OF VERTICAL SEPARATION WITH OTHER UTILITIES. CONTRACTOR SHALL COORDINATE ANY VERTICAL ADJUSTMENT OF EXISTING UTILITIES REQUIRED FOR PROPOSED STORM SYSTEM.**

NOTES FOR PIPES FROM DOWNSPOUTS:

1. PIPES FROM DOWNSPOUTS DRAINS TO HAVE A MINIMUM SLOPE OF 1.0% OR AS SPECIFIED ON PLAN.
2. PIPE FROM DOWNSPOUTS TO HAVE A MINIMUM COVER OF 2.0'
3. TIE DOWNSPOUTS TO HDPE PIPES WHERE SHOWN ON PLANS.
4. PROVIDE CLEANOUTS AT ALL LOCATIONS WHERE DOWNSPOUTS TIE TO HDPE PIPE UNLESS THE CONNECTION POINT CAN SERVE AS A CLEANOUT.

NOTES FOR E&S:

1. CONTRACTOR SHALL ENSURE GRASS STABILIZATION IS ACHIEVED IN ALL AREAS PER VESCH. IF BLANKET MATTING IS NECESSARY TO ACHIEVE STABILIZATION ON ANY SLOPES, CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE PER THE VESCH.
2. CONTRACTOR SHALL MAINTAIN ALL EROSION SEDIMENT CONTROL MEASURE UNTIL ALL DISTURBED AREAS ARE FULLY STABILIZED.

LEGEND:

- CONCRETE SIDEWALK
- HEAVY DUTY ASPHALT
- SLAB PER ARCHITECTURAL PLANS
- MILL AND OVERLAY

PLANTING LEGEND:

- (15) ILEX GLABRA "COPMACTA" - INKBERRY HOLLY - 30" MIN. INSTALLED SIZE
- (5) ILEX CRENTATA "HOOGENDORN" - HOOGENDORN HOLLY - 24" MIN. INSTALLED SIZE
- (1) ABELIA x GRANDIFLORA - GLOSSY ABELIA - 30" MIN. INSTALLED SIZE
- (23) HYPERICUM CALYCINUM - AARONSBEARD - 18" ON CENTER

GRADING

TC = TOP OF CURB
TW = TOP OF WALL
BW = BOTTOM OF WALL
TS = TOP OF STAIRS
BS = BOTTOM OF STAIRS
FC = FACE OF CURB
EP = EDGE OF PAVEMENT
EX. = EXISTING
PROP. = PROPOSED
APPROX. = APPROXIMATELY

LANDSCAPE GENERAL NOTES

PRE-CONSTRUCTION

- CONTRACTOR IS RESPONSIBLE FOR CONTACTING "MISS UTILITY" AT 1.800.552.7001 FOR LOCATION OF ALL UTILITY LINES.TREES SHALL BE LOCATED A MINIMUM OF 5 FEET FROM SEWER/WATER CONNECTIONS. NOTIFY LANDSCAPE ARCHITECT OF CONFLICTS.
- VERIFY ALL PLANT MATERIAL QUANTITIES ON THE PLAN PRIOR TO BIDDING, PLANT LIST TOTALS ARE FOR CONVENIENCE ONLY AND SHALL BE VERIFIED PRIOR TO BIDDING.
- PROVIDE PLANT MATERIALS OF QUANTITY, SIZE, GENUS, SPECIES, AND VARIETY INDICATED ON PLANS. ALL PLANT MATERIALS AND INSTALLATION SHALL COMPLY WITH RECOMMENDATIONS AND REQUIREMENTS OF ANSI Z60.1 "AMERICAN STANDARD FOR NURSERY STOCK". IF SPECIFIED PLANT MATERIAL IS NOT OBTAINABLE, SUBMIT PROOF OF NON AVAILABILITY TO THE ARCHITECTS, TOGETHER WITH PROPOSAL FOR USE OF EQUIVALENT MATERIAL.
- PROVIDE AND INSTALL ALL PLANTS AS IN ACCORDANCE WITH DETAILS AND CONTRACT SPECIFICATIONS.

CONSTRUCTION/INSTALLATION

- LANDSCAPE ARCHITECT RESERVES THE RIGHT TO REJECT ANY PLANTS AND MATERIALS THAT ARE IN AN UNHEALTHY OR UNSIGHTLY CONDITION, AS WELL AS PLANTS AND MATERIALS THAT DO NOT CONFORM TO ANSI Z60.1 "AMERICAN STANDARD FOR NURSERY STOCK"
- LABEL AT LEAST ONE TREE AND ONE SHRUB OF EACH VARIETY AND CALIPER WITH A SECURELY ATTACHED, WATERPROOF TAG BEARING THE DESIGNATION OF BOTANICAL AND COMMON NAME.
- INSTALL LANDSCAPE PLANTINGS AT ENTRANCES/EXITS AND PARKING AREAS ACCORDING TO PLANS SO THAT MATERIALS WILL NOT INTERFERE WITH SIGHT DISTANCES.
- CONTRACTOR IS RESPONSIBLE FOR WATERING ALL PLANT MATERIAL DURING INSTALLATION AND UNTIL FINAL INSPECTION AND ACCEPTANCE BY OWNER. CONTRACTOR SHALL NOTIFY OWNER OF CONDITIONS WHICH AFFECTS THE GUARANTEE.

INSPECTIONS/GUARANTEE

- UPON COMPLETION OF LANDSCAPE INSTALLATION, THE LANDSCAPE CONTRACTOR SHALL NOTIFY THE GENERAL CONTRACTOR WHO WILL VERIFY COMPLETENESS, INCLUDING THE REPLACEMENT OF ALL DEAD PLANT MATERIAL. CONTRACTOR IS RESPONSIBLE FOR SCHEDULING A FINAL INSPECTION BY THE LANDSCAPE ARCHITECT.
- ALL EXTERIOR PLANT MATERIALS SHALL BE GUARANTEED FOR ONE FULL YEAR AFTER DATE OF FINAL INSPECTION AGAINST DEFECTS INCLUDING DEATH AND UNSATISFACTORY GROWTH. DEFECTS RESULTING FROM NEGLECT BY THE OWNER, ABUSE OR DAMAGE BY OTHERS, OR UNUSUAL PHENOMENA OR INCIDENTS WHICH ARE BEYOND THE CONTRACTORS CONTROL ARE NOT THE RESPONSIBILITY OF THE CONTRACTOR
- PLANT MATERIAL QUANTITIES AND SIZES WILL BE INSPECTED FOR COMPLIANCE WITH APPROVED PLANS BY A SITE PLAN REVIEW AGENT OF THE PLANNING DEPARTMENT PRIOR TO THE RELEASE OF THE CERTIFICATE OF OCCUPANCY.
- REMOVE ALL GUY WIRES AND STAKES 12 MONTHS AFTER INSTALLATION.

COMMONWEALTH OF VIRGINIA
JONATHAN M. SHOWALTER
Lic. No. 0402057151
09/14/2020
PROFESSIONAL ENGINEER

KEY PLAN

REVISIONS

#	MM-DD-YR	NAME	DESCRIPTION OF CHANGES

CRABTREE ROHRBAUGH & ASSOCIATES - ARCHITECTS
250 WEST MAIN STREET, SUITE 200
CHARLOTTESVILLE VA 22902
434-975-7262
www.cra-architects.com
MECHANICSBURG, PENNSYLVANIA
TOWSON, MARYLAND
WHITE SULPHUR SPRINGS, WEST VIRGINIA

ADDITION AND RENOVATIONS
MULTIPURPOSE ROOM
FLUVANNA COUNTY
123 MAIN STREET
PALMYRA, VA 22963

LAYOUT AND GRADING PLAN

PLOT SCALE: 1" = 10'
FILENAME: CRA PROJECT No. 3430
DATE: SEPTEMBER 10, 2020

PROJECT 46559.001

C3.0

TJL Environmental Health Consultants, Inc.
2304 Jefferson Park Avenue
Charlottesville, VA 22903
434-977-1409
tjloving@comcast.net

ASBESTOS-CONTAINING MATERIALS INSPECTION

The Fluvanna County Administration Building
132 Main Street
Palmyra, Virginia 22963

Basement Level Garage, Storage and Mechanical Spaces

August 23, 2020

TJL Environmental Health Consultants, Inc.
2304 Jefferson Park Avenue
Charlottesville, VA 22903
434-977-1409
tjloving@comcast.net

August 23, 2020

Ms. Shannon Race
Administrative Program Specialist
Fluvanna County Public Works
197 Main St.
Palmyra, VA 22963

RE: Asbestos-Containing Materials (ACM) Inspection Report for Basement Garage, Storage and Mechanical Spaces at the Fluvanna County Administration Building in Palmyra, Virginia

Dear Ms. Race:

On August 17, 2020, TJL Environmental Health Consultants, Inc. (TJL) inspected the interior spaces of the Fluvanna County Administration Building basement, as referenced above, for the presence of asbestos-containing materials (ACM). In accordance with Virginia Statewide Building Code and EPA NESHAP pre-renovation requirements, all suspect ACM* within these spaces were sampled and later tested for asbestos content by a Virginia State-licensed laboratory using polarized light microscopy (PLM).

As indicated in the attached laboratory PLM reports, no asbestos was detected within samples of any of the suspect materials tested, which included the following:

1. 2'x4' Cross-grain and random pattern lay-in ceiling tiles
2. Drywall and related joint compound around equipment closet
3. Surface filler on concrete block walls
4. Pipe fitting insulation cement and related canvas wrap and sealant

***NOTE: Since there was no actual demolition performed by TJL to allow access behind, beneath, above, etc. exposed building materials, certain inaccessible ACM may not have been identified. TJL has made every possible effort to locate all suspect ACM that were reasonably accessible to the inspector during the survey. Future maintenance, renovations or demolition contractors should be informed that enclosed ACM may not have been identified during this inspection and that if encountered, to cease work until a positive identification of the suspect materials has been made. Also, since only building materials were tested, any equipment, appliances, fixtures or supplies within this building that were not part of its construction, were not examined.**

TJL Environmental Health Consultants, Inc.
2304 Jefferson Park Avenue
Charlottesville, VA 22903
434-977-1409
tjloving@comcast.net

Feel free to contact me if you have questions regarding this report, or should you need assistance with future ACM, lead-based paints, molds, or indoor air quality inspections or assessments.

Sincerely,

T. Joel Loving, M.S., C.E.I.
President
Virginia Asbestos Inspector License #3303-000057

AmeriSci Richmond
13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: 8047631200 FAX: 8047631800

August 18, 2020

Environmental Health Consultants
Attn: T. Joel Loving
2304 Jefferson Park Avenue
Charlottesville, VA 22903

RE: Environmental Health Consultants
Job Number 120081589
P.O. #Loving
Fluvanna Co Admin Office Bldg Basement

Dear T. Joel Loving:

Enclosed are the results for PLM asbestos analysis of the following Environmental Health Consultants samples received at AmeriSci on Monday, August 17, 2020, for a 24 hour turnaround:

F 8-17-20-1, F 8-17-20-2, F 8-17-20-3, F 8-17-20-4, F 8-17-20-5, F 8-17-20-6, F 8-17-20-7, F 8-17-20-8, F 8-17-20-9, F 8-17-20-10, F 8-17-20-11, F 8-17-20-12, F 8-17-20-13

The 13 samples contained in zip lock bag were shipped to AmeriSci via Hand Delivered (Drop Box). These samples were prepared and analyzed according to EPA PLM Method (EPA 600/R-93/116 Section 2.2). The required analytical information, analysis results, analyst signature and laboratory identification are contained in the PLM Bulk Asbestos Report. If TEM analysis was requested for selected samples the gravimetric reduction data (by Sec 2.3) and TEM Asbestos % (by Sec 2.5) are included in Table 1 along with a summary of Asbestos % by PLM for all samples analyzed.

This report relates ONLY to the sample analysis expressed as % asbestos. AmeriSci assumes no responsibility for customer supplied data such as “sample type”, "location", or “area sampled”. This report must not be used to claim product endorsement by AmeriSci, NVLAP or any agency of the U. S. Government. The National Institute of Standards and Technology accreditation requirements mandate that this report must not be reproduced, except in full, without the written approval of the laboratory. This report may contain specific data not covered by NVLAP or ELAP accreditations, if so identified in relevant footnotes.

AmeriSci appreciates this opportunity to serve your organization. Please contact us for any further assistance or with any questions.

Sincerely,

T. Brian Keith
Laboratory Director | Authorized Signatory

AmeriSci Richmond
13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: (804) 763-1200 • FAX: (804) 763-1800

PLM Bulk Asbestos Report

Environmental Health Consultants
Attn: T. Joel Loving
2304 Jefferson Park Avenue

Charlottesville, VA 22903

Date Received 08/17/20
Date Examined 08/18/20

AmeriSci Job # 120081589
P.O. #
Page 1 **of** 4

RE: Fluvanna Co Admin Office Bldg Basement

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
F 8-17-20-1 1	120081589-01 **Location:** 2'x4' Crossgrain & Dot Lay-In Ceiling Tile	***No***	NAD (by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: White/Gray, Heterogeneous, Non-Fibrous, Ceiling Tile **Asbestos Types:** **Other Material:** Fibrous glass 95 %, Non-fibrous 5 %			
F 8-17-20-2 1	120081589-02 **Location:** 2'x4' Crossgrain & Dot Lay-In Ceiling Tile	***No***	NAD (by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: White/Gray, Heterogeneous, Non-Fibrous, Ceiling Tile **Asbestos Types:** **Other Material:** Fibrous glass 95 %, Non-fibrous 5 %			
F 8-17-20-3 2	120081589-03 **Location:** 2'x4' Random Pattern Lay-In Ceiling Tiles	***No***	NAD (by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: White/Gray, Heterogeneous, Non-Fibrous, Ceiling Tile **Asbestos Types:** **Other Material:** Cellulose 45 %, Fibrous glass 25 %, Non-fibrous 15 %, Perlite 15 %			
F 8-17-20-4 2	120081589-04 **Location:** 2'x4' Random Pattern Lay-In Ceiling Tiles	***No***	NAD (by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: White/Gray, Heterogeneous, Non-Fibrous, Ceiling Tile **Asbestos Types:** **Other Material:** Cellulose 45 %, Fibrous glass 25 %, Non-fibrous 15 %, Perlite 15 %			
F 8-17-20-5 3	120081589-05.1 **Location:** Drywall And Related Joint Compound	***No***	NAD (by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Drywall **Asbestos Types:** **Other Material:** Fibrous glass 2 %, Non-fibrous 98 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

Fluvanna Co Admin Office Bldg Basement

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
F 8-17-20-5	120081589-05.2	***No***	NAD
3	**Location:** Drywall And Related Joint Compound		(by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: White, Heterogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
F 8-17-20-6	120081589-06.1	***No***	NAD
3	**Location:** Drywall And Related Joint Compound		(by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Drywall **Asbestos Types:** **Other Material:** Cellulose 4 %, Fibrous glass 2 %, Non-fibrous 94 %			
F 8-17-20-6	120081589-06.2	***No***	NAD
3	**Location:** Drywall And Related Joint Compound		(by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: White, Heterogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
F 8-17-20-7	120081589-07.1	***No***	NAD
3	**Location:** Drywall And Related Joint Compound Electrical Room		(by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Drywall **Asbestos Types:** **Other Material:** Cellulose 4 %, Fibrous glass 2 %, Non-fibrous 94 %			
F 8-17-20-7	120081589-07.2	***No***	NAD
3	**Location:** Drywall And Related Joint Compound Electrical Room		(by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: White, Heterogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
F 8-17-20-8	120081589-08	***No***	NAD
4	**Location:** Surface Block Filler		(by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: Green, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous Talc 5 %, Non-fibrous 95 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

Fluvanna Co Admin Office Bldg Basement

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
F 8-17-20-9	120081589-09	***No***	NAD
4	**Location:** Surface Block Filler		(by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: Green, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous Talc 5 %, Non-fibrous 95 %			
F 8-17-20-10	120081589-10	***No***	NAD
4	**Location:** Surface Block Filler		(by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: Green, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
F 8-17-20-11	120081589-11	***No***	NAD
5	**Location:** Pipe Fitting Insulation Cement And Canvas Wrap Sealant		(by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: White, Heterogeneous, Non-Fibrous, Wrap/Insulation **Asbestos Types:** **Other Material:** Cellulose 25 %, Fibrous glass 50 %, Non-fibrous 25 %			
F 8-17-20-12	120081589-12	***No***	NAD
5	**Location:** Pipe Fitting Insulation Cement And Canvas Wrap Sealant		(by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: White, Heterogeneous, Non-Fibrous, Wrap/Insulation **Asbestos Types:** **Other Material:** Cellulose 30 %, Fibrous glass 50 %, Non-fibrous 20 %			
F 8-17-20-13	120081589-13	***No***	NAD
5	**Location:** Pipe Fitting Insulation Cement And Canvas Wrap Sealant		(by CVES) by J. Samuel Baird on 08/18/20
Analyst Description: White/Yellow, Heterogeneous, Non-Fibrous, Wrap/Insulation **Asbestos Types:** **Other Material:** Cellulose 25 %, Fibrous glass 50 %, Non-fibrous 25 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

Fluvanna Co Admin Office Bldg Basement

Reporting Notes:

Analyzed by: J. Samuel Baird
Date: 8/18/2020

Reviewed by: J. Samuel Baird

*NAD = no asbestos detected, Detection Limit <1%, Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; "Present" or NVA = "No Visible Asbestos" are observations made during a qualitative analysis; NA = not analyzed; NA/PS = not analyzed / positive stop; PLM Bulk Asbestos Analysis using Meiji, Model MT 6130 microscope, Serial #1410298, by EPA 600/R-93/116 per 40 CFR 763 (NVLAP Lab Code 101904-0) and ELAP PLM Analysis Protocol 198.1 for New York friable samples which includes quantitation of any vermiculite observed (198.6 for NOB samples) or EPA 400 pt ct by EPA 600/M4-82-020 (NYSDOH ELAP Lab # 10984); CA ELAP Lab # 2508; Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the laboratory. This PLM report relates ONLY to the items tested.

Environmental Health Consultants, Inc.
2304 Jefferson Park Avenue
Charlottesville, VA 22903
Phone & Fax: (434) 977-1409 • Email: tjloving@comcast.net

120081589

Laboratory Sample Analysis Request

Analysis and Turnaround Time Requested: PLM (3 24hrs)

Project Description: Fluvanna Co. Admin. Office Bldg Basement

Instructions: Please email results as soon as analyses completed. Repeat all sample information shown below on final lab report. Please sign and return this form with written report. Other special requests: SP= Stop Positive

Sample #	Special Notes	Person/Area Sampled	Activity Occurring	Pump #	Pump Flow Rate (LPM)	Start Time	Stop Time
F8-17-20-1		2'x4' Crossgrain+dot lay-in ceiling tiles					
-2	SP	"		"			
-3		2'x4' Random pattern lay-in ceiling tiles					
-4	SP	"					
-5		Drywall and related joint compound					
-6	SP	Drywall and related joint compound					
-7	SP	Drywall and related joint compound (electrical room					
-8		Surface block filler					
-9	SP	"					
-10	SP	"					
-11		Pipe fitting insulation cement and canvas wrap Sealant					
-12	SP	"					
-13	SP	"					
					RECEIVED		
					AUG 17 2020		
					By RPR		

Samples submitted by: _____ **Date:** 8-17-20

Samples received by: _____ **Date:** _____

IFB#2021-01

FLUVANNA COUNTY – BASEMENT RENOVATION

Company Name	Representative Name	Email Address	Phone No.	Signature
Montgomery Consulting	John Fields	John@montgomeryConsulting.net	804-615-4336	John Fields
Jamerson-Lewis	Shawn Penn	SPENN@jamersonlawis.com	434-845-3468	
ATHENA CONSTRUCTION	ALAN MILLER	alan.miller@athena construction group.com	703 870 3721	
THE TRENT CORPORATION	BILL STOUT	bill.stout@trentcorp.net	804-201-6290	
Talon Veteran Services, Inc.	Mason Kosco	mkosco@talonvet.com	804-878-5054	Mason Kosco

FLUVANNA

COLOR SCHEME A

WALL

PAINT MANUFACTURER: SHERWIN WILLIAMS PAINTS

SW 9165 GOSSAMER VEIL	SW7604 SMOKY BLUE	SW 7069 IRON ORE
FIELD	ACCENT	TRIM

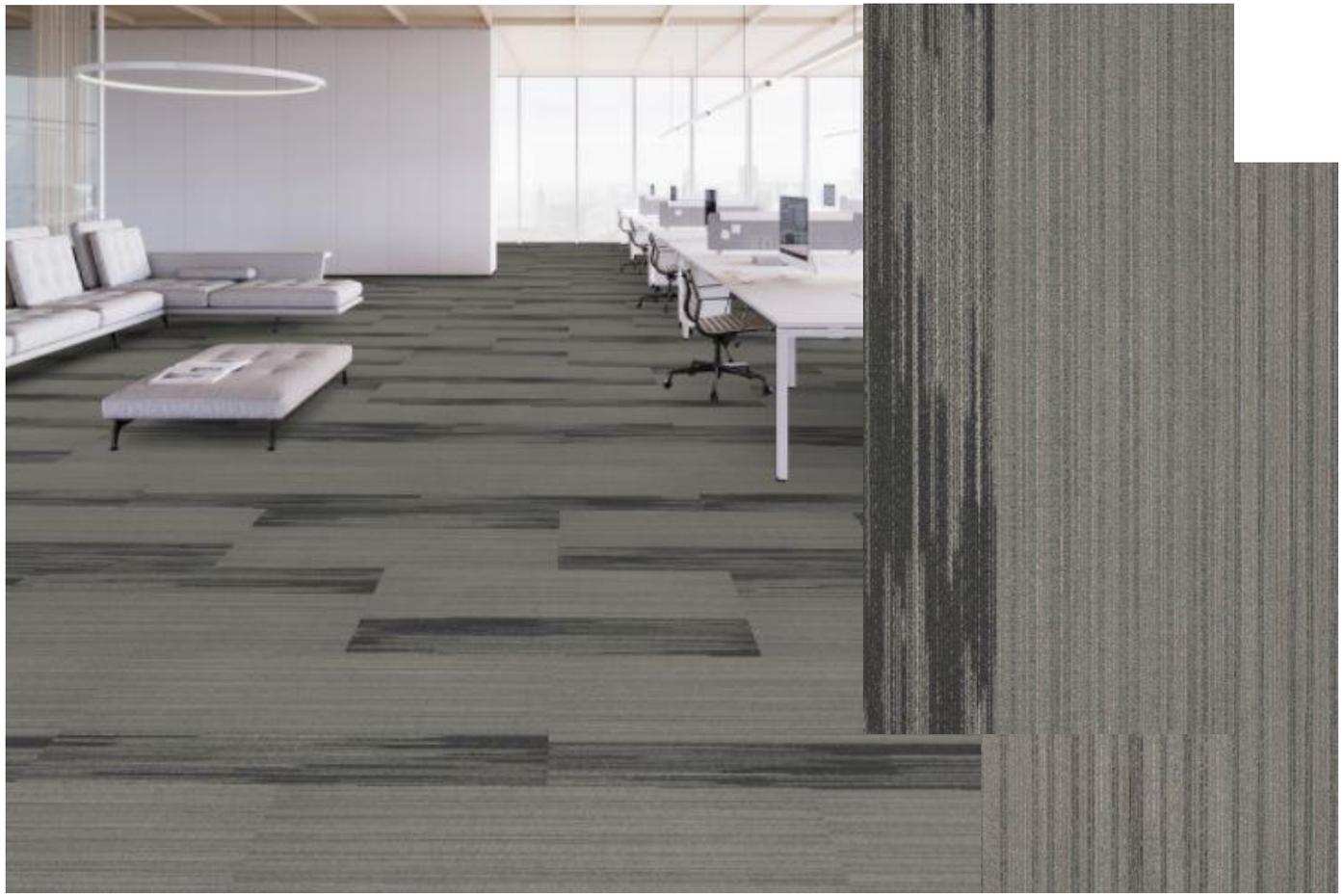
MISC.

WOOD PANELING ACCENT
@ MULTIPURPOSE ROOM

JOHNSONITE, RUBBER BASE

FLOOR

CARPET TILE, MANUFACTURER: SHAW CONTRACT



MULTIPURPOSE ROOM AND CONFERENCE ROOMS

**PHOTOS MAY NOT ACCURATELY DEPICT COLOR AND PATTERN. PLEASE ORDER SAMPLES PRIOR TO ORDERING.*

CR CELEBRATING 35 YEARS 1984 - 2019
Crabtree, Rohrbaugh & Associates Architects
401 East Winding Hill Road
Mechanicsburg, PA 17055
www.cra-architects.com
Pennsylvania | Maryland | Virginia | West Virginia

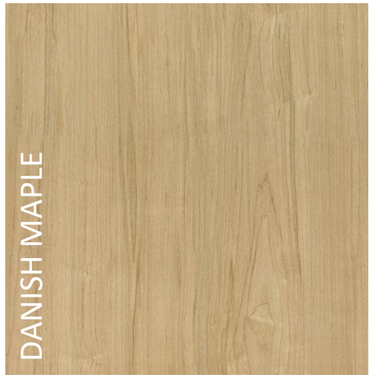
FLUVANNA COUNTY ADDITION AND RENOVATION

FINISH STANDARDS 2020

FLUVANNA

COLOR SCHEME A

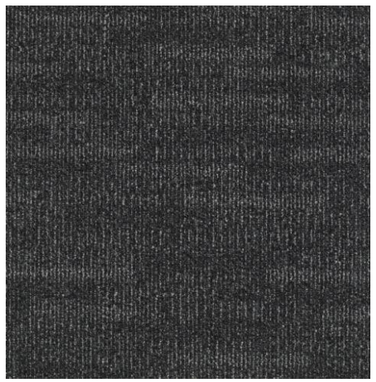
MISC.



FORMICA, PLASTIC LAMINATE, CASEWORK @ CONF. A

WILSONART, PLASTIC LAMINATE, CTOP @ CONF A

GRAHAM, WOOD DOORS



CARPET TILE, MANUFACTURER: SHAW CONTRACT, ENTRANCE MAT @ VESTIBULE

FLOOR & WALL TILE

PROCELAIN TILE, MANUFACTURER: GARDEN STATE TILE

TIVOLI, 12”x24” WHITE MATTE, WALL TILE @ RESTOOMS

TIVOLI, 12”x24” SILVER MATTE, FLOOR & WALL TILE @ RESTOOMS

*PHOTO DOES NOT REPRESNET ACTUAL TILE. PHOTO SHOWN IS FOR TWO TONE TILE IN RESTROOMS.

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