ADDENDUM NO. 03

STAUNTON J&DR COURTS FACILITY

CITY OF STAUNTON, VIRGINIA

STAUNTON CITY BID REQUEST NO.: C00124

ARCHITECT'S PROJECT NO.: 630874

MOSELEYARCHITECTS

ARCHITECT/ENGINEER — RICHMOND, VIRGINIA

TIMMONS GROUP

CIVIL CONSULTANT — RICHMOND, VIRGINIA

SHEN MILSOM AND WILKE

AUDIO VISUAL CONSULTANT — ARLINGTON, VIRGINIA

March 26, 2024

QUESTION RESPONSES:

1. Drawing A3.1.2 indicates two different notes for roller shades. Note A under general notes indicates provide manual roller shades at all exterior windows UNO. Note 2 under Door, Frame and Glazing Type Keynotes indicates Provide roller shades as indicated by dashed lines. Please clarify which is correct.
   RESPONSE: A3.1.2 - Keynote 2 and dashed lines removed.
2. Hazardous Materials Abatement – Section 024100 indicates hazardous materials abatement will be performed as Part of this Project and there is also a Section 028000 in the Project Manual. (not listed in the table of contents) Please advise of who is performing the abatement of the hazardous, is it the Contractor or the Owner by separate contract?
   RESPONSE: Refer to revisions per ADD 01R. Contractor is responsible for abatement.
3. Steel fabricators are requesting the structural revit model for bidding purposes. Please advise if the CAD/Revit models for structural, civil, etc.. will be released for bidding purposes prior to award of the project.
   RESPONSE: We do not release these models during bidding - after bidding CAD release agreements must be signed with the contractor.
4. Section 000515, 1.9, Taxes - notes that the Owner is exempt from State sales tax; however it is our understanding that the Contractors still need to include sales tax in their bids. Please confirm sales tax associated with the Work is to be included in the Contractors bid.
   RESPONSE: The City is tax-exempt and shall not be charged taxes for the project. The contractor must include any taxes they pay in the bid price.
5. Section 010200 General Sitework Requirements is missing page 1. Please provide.
   RESPONSE: Refer to full section included in AD-03
6. Bonds – please advise if there will be any Erosion and Sediment Bonds and/or any other site bonds required for this project.
   RESPONSE: No E&S bond will be required for the project.
7. Section 014520 Testing, Adjusting, and Balancing – please confirm the Contractor/Subcontractors are only to assist the TAB agent/agency and also confirm the TAB agent/agency is engaged and paid for by the Owner
   RESPONSE: The TAB agent is NOT paid for by the owner. Refer to specification section 014520.
8. Commissioning - please confirm the Contractor/Subcontractors are only to assist the Commissioning agent/agency and also confirm the Commissioning agent/agency is engaged and paid for by the Owner.
   RESPONSE: Refer to Commissioning Specifications.
9. Section 018317 Exterior Building Enclosure Air Barrier Requirements, please confirm the Contractor/Subcontractors are only to assist the Third Party Testing agency for this section of work and also confirm the Third Party Testing agency for this work is engaged and paid for by the Owner.
   RESPONSE: There is no testing required by this section. The Contractor is, however, responsible for engaging ABAA to perform air barrier inspection/testing per Section 072736.
10. Floor Polishing & Waxing – please confirm the Owner is providing the floor polishing & waxing for the new floors or advise if the Contractor's are to include this in their pricing.
    RESPONSE: Refer to specification section 096513 for polishing. No waxing specified.
11. Section 024113 Selective Site Demolition – paragraph 1.9, Payment for Utility Removal/Relocations notes that "The Owner will pay for the relocation of"; please confirm the Owner will pay for the relocation of all the listed utilities, items A thru F as required.
    RESPONSE: Relocation of existing services and associated infrastructure identified in the contract documents is the responsibility of the contractor. Costs for reconnection of those services by third party utility purveyors to be paid for by the Owner.

12. Section 312000 Earth Moving – paragraph 1.5 notes the site is classified to subgrade paragraph and paragraph 1.5, E, 1 notes the additional excavation shall be counted toward the unit price allowances established in the Bid Form. However, the Bid Form does not provide any site related Unit Prices. Please provide the unit prices that are related to the Additional Work.
    RESPONSE: Site is unclassified to subgrade, refer to quantity allowances in section 012100 and the bid form.
13. Section 329200 Lawns and Grasses – paragraph 1.9, B notes "areas under existing modular buildings removed by the Owner"; please confirm this does not apply to this project or advise of these locations.
    RESPONSE: Confirmed. This note does not apply to this project.
14. The existing parking lots to remain appear to be in very rough condition with cracks, potholes, etc.. and there is a note on C4.0 noting "Damaged asphalt beyond the extents of mill & overlay to be replaced at the contractor's expense". Please confirm the contractors are not responsible for replacing the existing parking lots/paving that is already in very rough condition and/or already damaged.
    RESPONSE: Refer to drawings in AD-03. Contractors are not responsible for any remediation work outside of what is delineated on the plans, however, if areas outside of what is delineated are further damaged, it will need to be replaced at the contractors expense.
15. Section 042000, 2.01, 4, notes decorative concrete ground face block, however it does not provide a ground face manufacturer/basis of design selection. Please provide a basis of design if the project requires decorative ground face block. We are not currently finding any ground face block on the exterior elevations or on the finish schedule. Please advise of the intent.
    RESPONSE: Refer to revised specification section 042000 included in AD-03.
16. Section 042000, 2.02 does not provide a brick manufacturer/basis of design selection. Please provide a basis of design brick or provide a brick allowance to be used for bidding purposes.
    RESPONSE: Refer to revised specification section 042000 included in AD-03.
17. Precast and cast stone trim units – drawing A4.2 notes cast stone bands and architectural precast concrete coping, A5.2.2 provides APC shapes, and the project manual provides an architectural precast concrete scope, but not a cast stone specification. Please advise of the intent for precast versus cast stone trim units.
    RESPONSE: Refer to drawings A4.1, A4.2, A5.2.2 and specification section 047200 in AD-03. All units will be cast stone.
18. Can the AWI QCP requirement be removed and replaced with a specification requirement to provide millwork fabrication and installation that is commensurate with the AWI Standards?
    RESPONSE: AWI QCP is required.
19. Section 126723. Referencing the courtroom benches specified, please advise on what wood species the benches should be.
    RESPONSE: Refer to revised specification section 126723 in AD-03.
20. Drawing C4.0, A1.1.1. Referencing the flagpoles shown on the drawings referenced above, please provide the total height of the flagpoles, and provide a detail for the concrete foundation.
    RESPONSE: Refer to drawing A1.1.1 in AD-03.
21. Are Civil CAD Files available?
    RESPONSE: We do not release these models for bidding - after bidding CAD release agreements must be signed with the contractor.
22. Is there a REVIT model available to be issued to the contractors?
    RESPONSE: We do not release these models for bidding - after bidding CAD release agreements must be signed with the contractor.
23. Please confirm that the top railing molding and handrail for glass Guardrail (3/A6.1.3) is not wood/millwork.
    RESPONSE: Refer to specification section 057000 in AD-03
24. Please confirm that the wood hatch on 6/A6.1.5 ramp section is not required paneling.

RESPONSE: Refer to drawing A6.1.5 in AD-03. Paneling is not required on the ramp side of the wall.

25. Please confirm tags #2 and #8 on 6/A8.2.2 are all accurate as drawn. The inside of some areas are tagged to be painted (#8) while the far right is tagged to have a veneer finish (#2).
    RESPONSE: Refer to drawing A8.2.2 in AD-03.
26. Reference 5/A7.2.1. Please clarify the extent of wall paneling. Does it go above the crown as hatched? Is it above the chair rail as hatched in some areas? If so, does it go behind the acoustic panels?
    RESPONSE: Refer to drawing A7.2.1 in AD-03.
27. The site lighting layout on the C4.1 differs from the electrical site plan E1.0. Which is correct?
    RESPONSE: Refer to drawing E1.0 in AD-03.
28. DRAWING A3.3.1 SPECIFICATION 111900. Detention door and frame schedule calls for a shutter to be provided on doors D152, D154, D158, D255, D259, D260. Please provide a detail for the shutter, as well as any security hardware requirements.
    RESPONSE: Refer to Detail 12/A3.3.1 on revised Drawing A3.3.1.
29. SHEET C-2.0 calls out areas of the access road and asphalt parking lot to be "Milled and Overlaid". Sheet C-4.0 highlights those same areas as new heavy-duty asphalt which the detail on C-1.1 shows as 8" of stone base and 2" of surface asphalt.
    RESPONSE: Refer to revised drawings. Mill and overlay have been removed.
30. There are no grade changes in these areas except for the entrance where it has an exploded view showing specific regrading. There needs to be clarity as to whether the Mill and Overlay is to be utilized or full excavation, 8" of stone base and 2" of surface.
    RESPONSE: Refer to revised drawings. Mill and overlay have been removed.
31. In the entrance area near West Beverley, Sheet C5.0 calls for "Existing Asphalt to Remain" in the crosswalk and parking areas. This area is also left out of the areas to be milled and overlaid on sheet C-2.0, but on Sheet C-4.0 that same area is shaded as if it is new heavy-duty Asphalt. Which is correct?
    RESPONSE: Refer to revised drawings. Mill and overlay have been removed.
32. L2.0 On sheet L2.0 in the Notes, Note 2. Says the owner is responsible for maintaining shrubs and trees and also replacing any that die. Note 4-6 talks about maintenance but does not specify who is responsible. So, note 2 and 4-6 seem to contradict themselves. Plus, the landscaper should replace any shrubs or trees that die. Should the contractor assume warranting shrubs and trees for 1 yar and the Owner doing the maintenance? Also, can the contractor assume all the evergreens along the border would just have individual mulch rings around them?
    RESPONSE: Include a 1 year warrantee on shrubs & trees. Owner shall be responsible for maintenance of the trees, shrubs, landscape after it is accepted. Include a mulch ring on the evergreen screening trees individually.
33. Please state the anticipated award date and the anticipated project start date.
    RESPONSE: Award date tentatively week of 8 April, NTP week of 15 April.
34. A7.3.1 Should room 166, Hold Toilet, receive a detention equipment item D1 or D2 single or double detention mirror?
    RESPONSE: A detention mirror is not required in this space.
35. SE1.1 Please advise if pedestrian gates G6 & G7 are to be controlled and monitored by the security electronics system. If yes, are these tow gates to be equipped with hardware set SH12 per spec section 111960?
    RESPONSE: Refer to Drawing SE2.1 for gate control status. Provide Security Hardware Set SH12 at each gate, per Section 111960.
36. Addendum 1R detail 1 on Sheet 3.0.3 shows a resilient base which I believe is a special profile from Roppe. The specs do not indicate any special profile, just standard 4-inch cove base. Is the special profile desired and if so, can we get a product name?
    RESPONSE: Refer to revised specification section 096513 in AD-03

37. Spec 096513 Resilient base and accessories, regarding the stair covering a rubber stringer is listed in the products. The manufacturer of the specified tread does not make a matching stringer and stringer is not normally used where there is a mental stringer. Please let us know if a rubber stringer is desired and if so, what product.
    RESPONSE: Refer to revised specification section 096513 in AD-03
38. On the finish plan and finish schedule room 218 Elec calls for C-Tile (carpet tile). Is that correct?
    RESPONSE: Refer to updated drawing in AD-03.
39. 096519 Resilient Tile calls for moisture mitigation, but I believe this is part of a separate allowance and not part of the base bid. Am I correct?
    RESPONSE: Indicate as separate allowance.
40. Referencing the AIA General Conditions, subparagraph 15.1.7 and the supplementary general conditions revising this subparagraph, please reinstate the original AIA subparagraph 15.1.7 and remove the revision from the project documents.
    RESPONSE: The City will leave the supplementary language unchanged at 15.1.7.
41. Could Delta Controls be added to the list of manufacturers shown in 230900 2.1A?
    RESPONSE: Yes
42. Drawing A3.1.2 General Note A. states, " Provide Manual Roller Shades at all exterior windows UNO. Door, Frame and Glazing Type Keynote 2. stats, "Provide Roller Shades as indicated by Dashed Lines." 1. Are roller shades only required at Types notes with Keynote 2? 2. Are roller shades only required at the Glazing sections with dashed lines? 3. May we exclude Shades at: Doors, Vestibules, stairs, interior glazing? 4. May we exclude shades at: Vestibule 100? 5. Attached is our Shade Plan Takeoff Drawing. Please confirm accuracy.
    RESPONSE: Refer to drawing A3.1.2 in AD-03. Keynote 2 and dashed lines removed.
43. Spec section 122400 2.0.2 B. 6 a specifies, " Fascia". This is not detailed in the drawings. May we exclude?
    RESPONSE: Refer to revised specification section 122400 in AD-03. Refer to "Closure Clip" that houses the roller shade mechanism shown in detail 12/A5.2.3.
44. Spec section 122400 2.0.2 B. 6 c specifies, " Ceiling pockets." Detail 12/A5.2.3 articulates "Custom sided panel cover by Ceiling Perimeter System manufacturer," and " Ceiling Perimeter System Perimeter Pocket." The panel cover is not available by the Division 12 manufacturers. May be exclude? The pocket is available, however, for consistency, it is recommended that Division 09 provide both (Panel Cover and Pocket) for consistency/continuity. May we exclude Pocket? Are panel covers and pockets both color white?
    RESPONSE: Refer to revised specification section 122400 in AD-03. The "custom sided panel cover" is required due to ceiling heights and recessed pockets that have been noted as, "varies," therefore a specific size will not work for all applications. Panel covers are to be VIF for accuracy for each panel cover size throughout. A full range of standard colors are to be selected by the architect.
45. The project manual table of contents list Section 285220 Interview Room Recording System; however, it does not appear that we actually have that Section in the manual.
    RESPONSE: Delete specification section 285220.
46. Please confirm which A305 version should be used.
    RESPONSE: Refer to specifications in AD-03.
47. Addendum 1R, noted a revised Section 285000 Security Control System, however it was not included in the addendum.
    RESPONSE: Refer to specifications in AD-03.
48. Per the electrical service riser shown on Drawing E5.1 feeders 100Y and 225Y are to be installed between the generator and transfer switches. The detail for Duct bank B-B doesn't indicate either of the conduit sizes associated with 100Y or 225Y. Please provide clarification of required conduit sizes and the intent of each conduit shown in the B-B duck bank detail.
    RESPONSE: Refer to revised drawing E5.1 in AD-03.

49. Referencing the excavation scope, it does not clearly state in the bid documents to date what the intentions are of being an unclassified or classified site. There are currently no unit prices for rock or unsuitable materials on the bid form. There are no mention that I see of any allowances or units clearly stated in section 012100, 012100 or 012200. Earthwork section 312000 Definition 1.4 A mentions excavation (except for rock) but the Execution section 3 does not clearly spell out excavations or compensation. Excavation 312000 section part 1.5 Additional Work - part A refers to Paragraph 4.3.4 of the General Conditions for conditions of additional excavation work, yet there is no section 4.3.4 in the General Conditions or reference to excavations in the General Conditions. Can we clearly ask if units can be applied to the bid form? Can the site be fully classified or at least classified BELOW subgrade for rock or unsuitable materials.
    RESPONSE: Refer to question 12. Site is unclassified to subgrade, refer to quantity allowances in section 012100 and the bid form.
50. For the BAS Controls in DIV 23. Is it the intent that the UH's and CUH's are to be controlled and monitored on the BAS system? The control flow diagrams to mention it, the sequence of operations reference them, but the equipment specs call for integral thermostats.
    RESPONSE: UH and CUH to be controlled by BAS system. Equipment spec revised to include unit mounted thermostats rather than integral thermostats.
51. Spec 230993, section 2.17 calls for Fire Alarm Monitoring, but just leaves it to monitor dry contacts. Can you confirm the number of dry contacts? Does this system need to be integrated in to the BAS?
    RESPONSE: System is not integrated with control to the BAS - just monitored by the BAS. Dry contacts for simple status of fire alarm (alarm/normal)
52. Spec 230900 , section 2.1 allows for Scheider Electric, but then the following paragraphs refer to Niagra N4. Is a Scheider Electric Head end acceptable for this project or should it be a Tridium front end?
    RESPONSE: **Paragraph updated to remove the specific manufacturer framework/head ends and leave it open to multiple manufacturers set up**

MODIFICATIONS TO THE PROJECT MANUAL AND DRAWINGS:

DELETE the previously issued Documents indicated below in their entirety and SUBSTITUTE the revised Documents in their entirety, noted as Addendum 03, dated March 26, 2024.

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SECTION 122400 – WINDOW SHADES

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SECTION 220800 – PLUMBING SYSTEMS COMMISSIONING

SECTION 230800 – MECHANICAL SYSTEMS COMMISSIONING

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264313 Surge Protection for Low-Voltage Electrical Power Circuits
265119 LED Interior Lighting
265613 Lighting pole and standards
265619 LED Exterior Lighting

DIVISION 27 – COMMUNICATIONS

270500 Common Work Results for Communications
270528 Pathways for Communications Systems
271100 Communications Equipment Room Fittings
271300 Communications Backbone Cabling

271500 Communications Horizontal Cabling
275227 Elevator 2-way Intercom System
276410 RF BDA-Based Signal Booster System

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

280500 Common Work Results for Electronic Safety and Security
283111 Digital, Addressable Fire-Alarm System
285000 Security Control System (*AD-01R) (*AD-03)
285010 PLC, Network, and UPS Systems
285020 Video Graphical User Interface
285030 Cabinets and Enclosures
285100 Audio Communication Systems
285200 Video Surveillance
~~**285220 Interview Room Recording System(*AD-03)**~~
285260 Video Management System
285300 Access Control System (*AD-01R)
285400 Duress – Misc. Systems
285500 Auxiliary Control Systems
285900 Security Management Server

DIVISION 31 – EARTHWORK

312000 Earth Moving**(*AD-03)**

DIVISION 32 – EXTERIOR IMPROVEMENTS

321216 Asphalt Paving
321313 Site Concrete
321700 Pavement Markings, Signs, and Specialties
323114 Security Chain-Link Fences and Gates
329200 Lawns & Grasses
329300 Exterior Plants

DIVISION 33 – UTILITIES

331000 Exterior Water System
333000 Sanitary Sewerage
334100 Storm Utility Drainage Piping
334200 Foundation Drainage Systems

DIVISION 34 – TRANSPORTATION (not used)

APPENDIX A: Asbestos and Lead Paint Survey Report (*AD-01R)

APPENDIX B: Geotechnical Engineering Study (*AD-01R)

END OF TABLE OF CONTENTS

BID FORM - GENERAL CONSTRUCTION – Architect's Project No: 630874 (*AD-01R) (*AD-03)
City of Staunton IFB#C00124

DATED: _____
(Bidder to insert date bid submitted)

Bidder's Name and Address (Print or Type)

_____

_____

_____

City of Staunton, VA

116 W. Beverley St
Staunton, VA 24401

To Whom It May Concern:

This Bid is submitted in accordance with your Advertisement inviting Bids to be received for the General Construction Work for Staunton J&DR Courts Facility, City of Staunton, VA.

Having carefully examined the Contract Documents as defined in Article 1 of the Agreement, bound in the Specifications, and including the Addenda enumerated in the Bid, which are incorporated with these documents indicating various conditions affecting this Contract, the undersigned herein agrees to furnish all materials, perform all labor and do all else necessary to complete the Contract for the above-named Project in accordance with said Contract Documents for:

Total Base Bid Project Cost for All General Construction (INCLUDING ALLOWANCES)

_____ DOLLARS

($_____).

Accompanying this Bid is a certified check, bank cashier's check, bank treasurer's check or Bid Bond required by Paragraph 4.2 of the Instructions to Bidders which is deposited as a bid guarantee, and is to be retained by you and applied as provided in Paragraph 4.2.1 of the Instructions to Bidders, in case the undersigned shall default in executing the Contract or in furnishing the required Bonds and insurance certificates within the time specified by these Contract Documents.

The undersigned hereby certifies that this Bid is genuine, and is not a sham or collusive, or made in the interest of, or on behalf of any person, firm or corporation not herein named, and that the undersigned has not directly or indirectly induced or solicited any bidder to refrain from bidding and that the undersigned has not in any manner sought by collusion to secure for itself, any advantages over any other bidder.

The undersigned, intending to be legally bound, agrees that this Bid shall be irrevocable and shall remain subject to your acceptance for 60 days after the date set for bid opening.

It is hereby certified that the undersigned is the only person(s) or entity(ies) interested in this Bid as Principal, and that the Bid is made without collusion with any person, firm or corporation. The Bidder hereby agrees to furnish surety company bonds in the form incorporated in the Contract Documents, in the amount of one hundred percent (100%) of the Contract Price for the Performance Bond and the Payment Bond as surety against defects or inferior materials or workmanship which may develop during the period of one (1) year from the date of completion and acceptance of the Work performed under the Contract, within ten (10) days after notice by the Owner of the intention to award the Contract and execute the Agreement and furnish evidence of required insurance coverage, upon request, within ten (10) days after mailing by the Owner of Notice of Intent to Award, and to commence work within forty-eight (48) hours after receipt of Notice to Proceed.

The Bidder guarantees that, if awarded a Contract, it will furnish and deliver all materials, all specified temporary facilities and controls, tools, equipment, tests, and transportation, to secure all permits and licenses, to do and perform all labor, superintendence, and all means of construction, pay all fees (unless specifically noted otherwise), and do all incidental Work, and to execute, construct and finish, in an expeditious, substantial and workmanlike manner in accordance with the plans and specifications, to the complete satisfaction and acceptance of the Owner for the price herein stated.

It is understood that the City of Staunton reserves the right to reject any or all Bids or Proposals, or parts thereof, or items thereof, and to waive technicalities required for the best interests of the Owner.

The undersigned submits this Bid with the full knowledge of the Contract requirements and hereby agrees that Work of this Project, under this Contract, shall be **substantially completed by November 1st, 2025,** which period shall be the essence of the Contract. Each phase of construction will have its own substantial completion date. See Section 011000 Summary of Work.

The Bidder agrees that it will not assign its Bid or any of its rights or interests hereunder without written consent of the Owner.

The undersigned Contractor agrees to furnish all labor and materials for any additional work ordered by the Owner, and for which no pre-agreed price has been fixed, for the net cost of all labor and materials furnished plus the contracted markup noted in Article 6 of the Supplementary General Conditions.

THE BID FORM AND THE FOLLOWING ATTACHMENTS SHALL BE SUBMITTED IN DUPLICATE:

1. Two (2) Bid Security
2. Two (2) Contractor's Qualification Statement (AIA Document A305)
3. Two (2) Virginia SCC number
4. Two (2) Non-Collusion Affidavit

ALLOWANCES: The Instructions to Bidders and the Contract Documents comprising the plans and specifications, and all documents bound therewith, together with all Addenda thereto, shall apply to all Allowances and Unit Prices as listed in Division 1 Sections "Allowances", "Unit Prices", and as listed below:

Lump Sum Allowance #1: Interior and Exterior Panel Signage $50,000.

Quantity Allowance #1: Moisture Vapor Treatment (MVT):

Provide quantity of 20,000 square feet (sf) at $_____ per sf (in-place unit price/measurement);

for a total allowance amount of $_____ (figures only)

Quantity Allowance #2: Additional Excavation: **(*AD-03)**

Provide quantity of 200 cubic yards (cy) at $_____ per cy (in-place unit price/measurement);

for a total allowance amount of $_____ (figures only)

Quantity Allowance #3: Additional Excavation for Trenches and Footings: **(*AD-03)**

Provide quantity of 100 cubic yards (cy) at $_____ per cy (in-place unit price/measurement);

for a total allowance amount of $_____ (figures only)

Quantity Allowance #4: Mass Rock Excavation: **(*AD-03)**

Provide quantity of 25 cubic yards (cy) at $_____ per cy (in-place unit price/measurement);

for a total allowance amount of $_____ (figures only)

Quantity Allowance #5: Trench Rock Excavation: **(*AD-03)**

Provide quantity of 10 cubic yards (cy) at $_____ per sf (in-place unit price/measurement);

for a total allowance amount of $_____ (figures only)

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

ALTERNATE BID PRICE: (Reference Section 012300 – Alternates) **(*AD-01R)**

1. Alternate #1 Bid Price: Partial Building Demolition: Provide all work associated with Partial Building Demolition, the existing structure is a single-level steel-framed building consisting of steel roof deck. The demolition shall consist generally of roof structure, steel columns, and exterior and interior walls, in strict accordance with the Bid Documents; Lump Sum + Lump Sum Allowances + associated Quantity Allowances

$_____ (Figures only)

ADDENDA

The undersigned hereby acknowledge receipt of following Addenda and has prepared this bid accordingly:

ADDENDUM #_____	Dated_____	ADDENDUM #_____	Dated_____
ADDENDUM #_____	Dated_____	ADDENDUM #_____	Dated_____

Bids shall be officially signed in accordance with the Instructions to Bidders, using the applicable portion of the "Signature Pages".

SIGNATURES

IN WITNESS WHEREOF, the undersigned has caused this Bid to be executed as of the day and year indicated on the first page hereof.

For Individual Bidder

_____
Name of Bidder (Printed)

_____ By: _____
Witness (Signature of Individual)

Trading and doing business as *_____

Business Address_____

*If a fictitious or trade name is employed in the conduct of business, insert name here:

_____

Next, complete, by deletion as appropriate, the following statement:

Foregoing fictitious or trade name (has) (has not) been registered by the individual proprietorship under Virginia Law.

SIGNATURES

IN WITNESS WHEREOF, the undersigned has caused this Bid to be executed as of the day and year indicated on the first page hereof.

For Partnership Bidder

*_____
(Name of Partnership)

_____
Name of General Partner (Printed)

_____ By: _____
Witness (Signature of General Partner)

Business Address_____

The Partners constituting the Partnership herein named are:

Partner	Address
Partner	Address
Partner	Address
Partner	Address

[Add additional lines for the names and addresses of additional Partners, if there are more than four Partners in the Partnership, by attaching an additional page or pages to this Bid.]

*If a fictitious or trade name is employed by the Partnership in conduct of its business, insert name here:

_____

Next, complete, by deletion as appropriate, the following statement:

Foregoing fictitious or trade name (has) (has not) been registered by the partnership under Virginia Law.

SIGNATURES

IN WITNESS WHEREOF, the undersigned has caused this Bid to be executed as of the day and year indicated on the first page hereof.

For Corporate Bidder

_____

(Name of Corporation)

By:_____
Signature of President, Vice President, or other authorized representative *

Attest:_____
Signature of Secretary, Assistant Secretary, Treasurer, Assistant Treasurer or other authorized representative **

(CORPORATE SEAL)

Business Address_____

* If a representative other than the President or a Vice President of the Corporation signs this Bid on its behalf, then attach a valid corporate resolution or other appropriate proof, dated prior to or as of the date of the Bid, evidencing authority to execute this Bid on behalf of the Corporation.

** If a representative other than the Secretary, an Assistant Secretary, the Treasurer or an Assistant Treasurer attests to the signature of the corporate representative, then attach a valid corporate resolution or other appropriate proof, dated prior to or as of the date of the Bid, evidencing authority to attest to the execution of this Bid on behalf of the Corporation.

(1) Complete the following statement:

The Corporation has been organized and is existing under laws of the State/Commonwealth of

_____

(2) If the Corporation has been organized under laws of a State other than those of the Commonwealth of Virginia, complete, by deletion as appropriate, the following statement:

The Corporation (has) (has not) been granted a certificate of authority to do business in the Commonwealth of Virginia under applicable laws.

(3) If the Corporation has been organized under laws other than those of the Commonwealth of Virginia and has NOT been granted a certificate of authority, complete, by deletion as appropriate, the following statement:

The Corporation (has) (has not) applied for a certificate of authority to do business in the Commonwealth of Virginia and (has) (has not) attached a copy of the pending application to this Bid.

SIGNATURES

IN WITNESS WHEREOF, the undersigned has caused this Bid to be executed as of the day and year indicated on the first page hereof.

For Limited Liability Company (LLC) Bidder

[Name of Contractor]

_____
(Print Name of Limited Liability Company)

Attest:_____ By: _____
Signature of an authorized representative* Signature of an authorized representative**

* The individual attesting verifies and represents that the person whose signature is affixed to this Bid on behalf of the Limited Liability Company (LLC) is duly authorized in accordance with the representations hereafter set forth.

** Check the box which applies to this Bid:

□ The Certificate of Organization or operating agreement provide~~s~~ that the LLC is to be managed by managers, and this Bid has been executed by a Manager fully authorized by the Certificate, by the Operating Agreement and by Resolutions of the LLC. Copies of the relevant documents are provided with the Bid or can be provided upon request within three (3) working days.

□ The Certificate of Organization and operating agreement do~~es~~ not provide that LLC is to be managed by managers, and this Bid has been executed by a Member fully authorized by the Certificate, by the Operating Agreement and by Resolutions of the LLC. Copies of the relevant documents are provided with the Bid or can be provided upon request within three (3) working days.

□ This Bid has been executed by a representative of the LLC who is not a Manager or a Member of the LLC, and instead who holds the office of _____ (insert title), and the execution of this Bid is fully authorized by the Certificate, by the Operating Agreement and by Resolutions of the LLC. Copies of the relevant documents are provided with the Bid or can be provided upon request within three (3) working days.

The Bidder and the individuals signing and attesting to the execution of this document further represent that (1) execution of the Bid is carrying on business in the usual way; (2) the LLC authorizes the execution of this Bid even if execution and submission of this Bid is not carrying on business in the usual way for the LLC; and (3) to the best of the individuals' information and belief, the Owner has no knowledge of the Member's or the Manager's lack of actual authority, or of any applicable and relevant restriction on his or her authority.

Complete the following statement:

The LLC has been organized and is existing under laws of the State/Commonwealth of:

_____

If the LLC has been organized under laws of a State other than those of the Commonwealth of Virginia, complete, by deletion as appropriate, the following statement:

The LLC (has) (has not) been granted a certificate of authority to do business in the Commonwealth of Virginia under applicable laws.

If the LLC has been organized under laws other than those of the Commonwealth of Virginia and has NOT been granted a certificate of authority, complete, by deletion as appropriate, the following statement:

The LLC (has) (has not) applied for a certificate of authority to do business in the Commonwealth of Virginia and (has) (has not) attached a copy of the pending application to this Bid.

AIA® Document A305® – 2020

Contractor's Qualification Statement

THE PARTIES SHOULD EXECUTE A SEPARATE CONFIDENTIALITY AGREEMENT IF THEY INTEND FOR ANY OF THE INFORMATION IN THIS A305-2020 TO BE HELD CONFIDENTIAL.

SUBMITTED BY:
(Organization name and address.)

SUBMITTED TO:
(Organization name and address.)

TYPE OF WORK TYPICALLY PERFORMED
(Indicate the type of work your organization typically performs, such as general contracting, construction manager as constructor services, HVAC contracting, electrical contracting, plumbing contracting, or other.)

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

THIS CONTRACTOR'S QUALIFICATION STATEMENT INCLUDES THE FOLLOWING:
(Check all that apply.)

[ ] Exhibit A – General Information
[ ] Exhibit B – Financial and Performance Information
[ ] Exhibit C – Project-Specific Information
[ ] Exhibit D – Past Project Experience
[ ] Exhibit E – Past Project Experience (Continued)

CONTRACTOR CERTIFICATION
The undersigned certifies under oath that the information provided in this Contractor's Qualification Statement is true and sufficiently complete so as not to be misleading.

_____ _____
Organization's Authorized Representative Signature **Date**

_____
Printed Name and Title

NOTARY
State of:
County of:
Signed and sworn to before me this day of

_____
Notary Signature

My commission expires:

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Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with this certification at 15:17:16 ET on 03/20/2024 under Order No. 4104248195 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A305™ – 2020, Contractor's Qualification Statement,other than changes shown in the attached final document by underscoring added text and striking over deleted text.

_____

(Signed)

_____

(Title)

_____

(Dated)

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AIA® Document A305® – 2020 Exhibit A

General Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

§ A.1 ORGANIZATION
§ A.1.1 Name and Location
§ A.1.1.1 Identify the full legal name of your organization.

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

§ A.1.1.2 List all other names under which your organization currently does business and, for each name, identify jurisdictions in which it is registered to do business under that trade name.

§ A.1.1.3 List all prior names under which your organization has operated and, for each name, indicate the date range and jurisdiction in which it was used.

§ A.1.1.4 Identify the address of your organization's principal place of business and list all office locations out of which your organization conducts business. If your organization has multiple offices, you may attach an exhibit or refer to a website.

§ A.1.2 Legal Status
§ A.1.2.1 Identify the legal status under which your organization does business, such as sole proprietorship, partnership, corporation, limited liability corporation, joint venture, or other.

.1 If your organization is a corporation, identify the state in which it is incorporated, the date of incorporation, and its four highest-ranking corporate officers and their titles, as applicable.

.2 If your organization is a partnership, identify its partners and its date of organization.

.3 If your organization is individually owned, identify its owner and date of organization.

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User Notes: (1852728920)

.4 If the form of your organization is other than those listed above, describe it and identify its individual leaders:

§ A.1.2.2 Does your organization own, in whole or in part, any other construction-related businesses? If so, identify and describe those businesses and specify percentage of ownership.

§ A.1.3 Other Information

§ A.1.3.1 How many years has your organization been in business?

§ A.1.3.2 How many full-time employees work for your organization?

§ A.1.3.3 List your North American Industry Classification System (NAICS) codes and titles. Specify which is your primary NAICS code.

§ A.1.3.4 Indicate whether your organization is certified as a governmentally recognized special business class, such as a minority business enterprise, woman business enterprise, service disabled veteran owned small business, woman owned small business, small business in a HUBZone, or a small disadvantaged business in the 8(a) Business Development Program. For each, identify the certifying authority and indicate jurisdictions to which such certification applies.

§ A.2 EXPERIENCE

§ A.2.1 Complete Exhibit D to describe up to four projects, either completed or in progress, that are representative of your organization's experience and capabilities.

§ A.2.2 State your organization's total dollar value of work currently under contract.

§ A.2.3 Of the amount stated in Section A.2.2, state the dollar value of work that remains to be completed:

§ A.2.4 State your organization's average annual dollar value of construction work performed during the last five years.

§ A.3 CAPABILITIES

§ A.3.1 List the categories of work that your organization typically self-performs.

§ A.3.2 Identify qualities, accreditations, services, skills, or personnel that you believe differentiate your organization from others.

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§ A.3.3 Does your organization provide design collaboration or pre-construction services? If so, describe those services.

§ A.3.4 Does your organization use building information modeling (BIM)? If so, describe how your organization uses BIM and identify BIM software that your organization regularly uses.

§ A.3.5 Does your organization use a project management information system? If so, identify that system.

§ A.4 REFERENCES

§ A.4.1 Identify three client references:
(Insert name, organization, and contact information)

§ A.4.2 Identify three architect references:
(Insert name, organization, and contact information)

§ A.4.3 Identify one bank reference:
(Insert name, organization, and contact information)

§ A.4.4 Identify three subcontractor or other trade references:
(Insert name, organization, and contact information)

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User Notes: (1852728920)

AIA® Document A305® – 2020 Exhibit B

Financial and Performance Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

§ B.1 FINANCIAL

§ B.1.1 Federal tax identification number:

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

§ B.1.2 Attach financial statements for the last three years prepared in accordance with Generally Accepted Accounting Principles, including your organization's latest balance sheet and income statement. Also, indicate the name and contact information of the firm that prepared each financial statement.

§ B.1.3 Has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, been the subject of any bankruptcy proceeding within the last ten years?

§ B.1.4 Identify your organization's preferred credit rating agency and identification information.
(Identify rating agency, such as Dun and Bradstreet or Equifax, and insert your organization's identification number or other method of searching your organization's credit rating with such agency.)

§ B.2 DISPUTES AND DISCIPLINARY ACTIONS

§ B.2.1 Are there any pending or outstanding judgments, arbitration proceedings, bond claims, or lawsuits against your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A, Section 1.2, in which the amount in dispute is more than $75,000?
(If the answer is yes, provide an explanation.)

§ B.2.2 In the last five years has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 failed to complete work awarded to it?

.2 been terminated for any reason except for an owners' convenience?

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User Notes: (1801083439)

.3 had any judgments, settlements, or awards pertaining to a construction project in which your organization was responsible for more than $75,000?

.4 filed any lawsuits or requested arbitration regarding a construction project?

§ B.2.3 In the last five years, has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management; or any of the individuals listed in Exhibit A Section 1.2:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 been convicted of, or indicted for, a business-related crime?

.2 had any business or professional license subjected to disciplinary action?

.3 been penalized or fined by a state or federal environmental agency?

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AIA® Document A305® – 2020 Exhibit C

Project Specific Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

PROJECT:
(Name and location or address.)

Staunton - J&DR Courts Facility

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

CONTRACTOR'S PROJECT OFFICE:
(Identify the office out of which the contractor proposes to perform the work for the Project.)

TYPE OF WORK SOUGHT
(Indicate the type of work you are seeking for this Project, such as general contracting, construction manager as constructor, design-build, HVAC subcontracting, electrical subcontracting, plumbing subcontracting, etc.)

CONFLICT OF INTEREST
Describe any conflict of interest your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A Section 1.2, may have regarding this Project.

§ C.1 PERFORMANCE OF THE WORK
§ C.1.1 When was the Contractor's Project Office established?

§ C.1.2 How many full-time field and office staff are respectively employed at the Contractor's Project Office?

§ C.1.3 List the business license and contractor license or registration numbers for the Contractor's Project Office that pertain to the Project.

§ C.1.4 Identify key personnel from your organization who will be meaningfully involved with work on this Project and indicate (1) their position on the Project team, (2) their office location, (3) their expertise and experience, and (4) projects similar to the Project on which they have worked.

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§ C.1.5 Identify portions of work that you intend to self-perform on this Project.

§ C.1.6 To the extent known, list the subcontractors you intend to use for major portions of work on the Project.

§ C.2 EXPERIENCE RELATED TO THE PROJECT

§ C.2.1 Complete Exhibit D to describe up to four projects performed by the Contractor's Project Office, either completed or in progress, that are relevant to this Project, such as projects in a similar geographic area or of similar project type. If you have already completed Exhibit D, but want to provide further examples of projects that are relevant to this Project, you may complete Exhibit E.

§ C.2.2 State the total dollar value of work currently under contract at the Contractor's Project Office:

§ C.2.3 Of the amount stated in Section C.2.2, state the dollar value of work that remains to be completed:

§ C.2.4 State the average annual dollar value of construction work performed by the Contractor's Project Office during the last five years.

§ C.2.5 List the total number of projects the Contractor's Project Office has completed in the last five years and state the dollar value of the largest contract the Contractor's Project Office has completed during that time.

§ C.3 SAFETY PROGRAM AND RECORD

§ C.3.1 Does the Contractor's Project Office have a written safety program?

§ C.3.2 List all safety-related citations and penalties the Contractor's Project Office has received in the last three years.

§ C.3.3 Attach the Contractor's Project Office's OSHA 300a Summary of Work-Related Injuries and Illnesses form for the last three years.

§ C.3.4 Attach a copy of your insurance agent's verification letter for your organization's current workers' compensation experience modification rate and rates for the last three years.

§ C.4 INSURANCE

§ C.4.1 Attach current certificates of insurance for your commercial general liability policy, umbrella insurance policy, and professional liability insurance policy, if any. Identify deductibles or self-insured retentions for your commercial general liability policy.

§ C.4.2 If requested, will your organization be able to provide property insurance for the Project written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis?

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§ C.4.3 Does your commercial general liability policy contain any exclusions or restrictions of coverage that are prohibited in AIA Document A101-2017, Exhibit A, Insurance A.3.2.2.2? If so, identify.

§ C.5 SURETY

§ C.5.1 If requested, will your organization be able to provide a performance and payment bond for this Project?

§ C.5.2 Surety company name:

§ C.5.3 Surety agent name and contact information:

§ C.5.4 Total bonding capacity:

§ C.5.5 Available bonding capacity as of the date of this qualification statement:

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AIA® Document A305® – 2020 Exhibit D

Contractor's Past Project Experience

	1	2	3	4
PROJECT NAME				
PROJECT LOCATION				
PROJECT TYPE				
OWNER				
ARCHITECT				
CONTRACTOR'S PROJECT EXECUTIVE				
KEY PERSONNEL (include titles)				
PROJECT DETAILS	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work
PROJECT DELIVERY METHOD	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:
SUSTAINABILITY CERTIFICATIONS				

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AIA® Document A305® – 2020 Exhibit E

Contractor's Past Project Experience, Continued

	1	2	3	4
PROJECT NAME				
PROJECT LOCATION				
PROJECT TYPE				
OWNER				
ARCHITECT				
CONTRACTOR'S PROJECT EXECUTIVE				
KEY PERSONNEL (include titles)				
PROJECT DETAILS	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work
PROJECT DELIVERY METHOD	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:
SUSTAINABILITY CERTIFICATIONS				

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User Notes: (3B9ADA37)

SECTION 01 02 00 – GENERAL SITEWORK REQUIREMENTS (*AD-03)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SITEWORK LAYOUT

A. Monuments and Benchmarks

1. Maintain all monuments, property corners, benchmarks 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 benchmarks and other reference points.
2. Protect these points throughout construction.
3. Layout work utilizing these reference points.

C. As-Built Drawings

1. Maintain a record of the as-built locations of all underground utilities and piping.
2. Maintain a record of any as-built variations of the work.
3. As-built Drawings shall be prepared and certified by a Land Surveyor registered in the Commonwealth of Virginia and in accordance with the City of Staunton's As-Built requirements and submitted to them for approval.
4. Submit these as-built drawings at Project Closeout.

1.3 EASEMENTS

A. 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 SUBMITTALS

A. For those submittals, close-out documents and O&M manuals requiring review by the engineer's consultants, contractor shall ship such documents to the engineer.

1.6 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.

1.7 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 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.

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 and fences 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

SECTION 012100
ALLOWANCES (*AD-03)

PART 1 GENERAL

1.01 SUBMITTALS

A. Allowance Proposal: Submit initial proposal for purchase of products and materials, on Change Order form.

B. Supporting Documentation:

1. Products and Material: Provide invoices and other documents as required, for products and materials indicating quantities, prices, taxes, delivery fees, and other costs.
2. Labor and Installation: Provide time sheets and other documents as required, indicating all on-site Subcontractor costs, including hours worked, quantity or amount of product/material installed, hourly wages, and Subcontractor overhead and profit.

1.02 LUMP-SUM AND QUANTITY ALLOWANCES

A. Costs Included in Lump-Sum and Quantity Allowances: All Subcontractor's costs: Cost of products and materials, taxes, freight, delivery, receiving and handling, labor and installation, Subcontractor overhead and profit.

B. Costs Not Included in Lump-Sum and Quantity Allowances: All General Contractor's costs: General coordination, GC's overhead and profit.

C. Contractor Responsibilities:

1. Assist Architect in selection of products.
2. Obtain proposals from suppliers and installers and offer recommendations.
3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.

D. Differences in costs will be adjusted by Change Order.

1.03 LUMP SUM ALLOWANCE SCHEDULE

A. Lump Sum Allowance No. 1: Include the stipulated sum of $50,000 for interior and exterior panel signage, as specified in Division 10 Section "Signage."

1.04 QUANTITY ALLOWANCE SCHEDULE

A. Quantity Allowance No. 1: Include 20,000 square feet of moisture vapor treatment (MVT). Coordinate with Division 1 "Unit Prices" for unit price requirements that will be used to determine allowance adjustments.

B. **Quantity Allowance No. 2: Include 200 cubic yards (cu yd) for excavation of material, where authorized or directed, below or in addition to the levels required for the Work. Backfill with imported structural fill material compacted per specifications. Include in the unit price the cost of quantity verification by a Surveyor Licensed in the Commonwealth of Virginia. Coordinate with Division 1 "Unit Prices" for unit price requirements that will be used to determine allowance adjustments. (*AD-03)**

C. **Quantity Allowance No. 3: Include 100 cubic yards (cu yd) for excavation of material in trenches and footings, where authorized or directed, below or in addition to the levels required for the Work. Backfill with imported structural fill material compacted per specifications. Include in the unit price the cost of quantity verification by a Surveyor**

Licensed in the Commonwealth of Virginia. Coordinate with Division 1 "Unit Prices" for unit price requirements that will be used to determine allowance adjustments. (*AD-03)

D. Quantity Allowance No. 4: Include 25 cubic yards (cu yd) for excavation of mass rock (not in trenches/footings), where authorized or directed, below or in addition to the levels required for the Work. Backfill with imported structural fill material compacted per specifications. Include in the unit price the cost of quantity verification by a Surveyor Licensed in the Commonwealth of Virginia. Coordinate with Division 1 "Unit Prices" for unit price requirements that will be used to determine allowance adjustments. (*AD-03)

E. Quantity Allowance No. 5: Include 10 cubic yards (cu yd) for excavation of rock in trenches/footings, where authorized or directed, below or in addition to the levels required for the Work. Backfill with imported structural fill material compacted per specifications. Include in the unit price the cost of quantity verification by a Surveyor Licensed in the Commonwealth of Virginia. Coordinate with Division 1 "Unit Prices" for unit price requirements that will be used to determine allowance adjustments. (*AD-03)

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 012100

SECTION 012200
UNIT PRICES (*AD-03)

PART 1 GENERAL

1.01 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.02 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.03 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated on the Drawings or in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the Drawings or individual specification section govern.

B. Take all measurements and compute quantities. Measurements and quantities will be verified via mutual agreement, and by personnel authorized by Owner, if required.

C. Assist by providing necessary equipment, workers, and survey personnel as required.

D. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.

E. Contractor's Engineer Responsibilities: Sign surveyor's field notes or keep duplicate field notes; calculate and certify quantities for payment purposes.

1.04 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.

B. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected Products.

1.05 SCHEDULE OF UNIT PRICES

A. Unit Price 1: Moisture Vapor Treatment (MVT):

1. Unit Price shall cover providing a surface-applied moisture vapor treatment, to be applied to concrete slabs prior to installation of floor finishes. Unit price shall be measured by the square foot (sq. ft.). This unit price shall be provided in coordination with Quantity Allowance; refer to Allowances section for more information.

B. **Unit Price 2: Additional Excavation: (*AD-03)**

1. **Unit Price shall cover excavation of material, disposal off-site, placement of properly compacted back-fill, and quantity verification by a licensed surveyor. Unit**

price shall be measured by the cubic yard (cu. yd.). This unit price shall be provided in coordination with Quantity Allowance; refer to Allowances section for more information.

C. Unit Price 3: Additional Excavation in Trenches and Footings: (*AD-03)
   1. Unit Price shall cover excavation of material from trenches and footings, disposal off-site, placement of properly compacted back-fill, and quantity verification by a licensed surveyor. Unit price shall be measured by the cubic yard (cu. yd.). This unit price shall be provided in coordination with Quantity Allowance; refer to Allowances section for more information.

D. Unit Price 4: Mass Rock Excavation: (*AD-03)
   1. Unit Price shall cover excavation of rock, disposal off-site, placement of properly compacted back-fill, and quantity verification by a licensed surveyor. Unit price shall be measured by the cubic yard (cu. yd.). This unit price shall be provided in coordination with Quantity Allowance; refer to Allowances section for more information.

E. Unit Price 5: Trench Rock Excavation: (*AD-03)
   1. Unit Price shall cover excavation of rock from trenches and footings, disposal off-site, placement of properly compacted back-fill, and quantity verification by a licensed surveyor. Unit price shall be measured by the cubic yard (cu. yd.). This unit price shall be provided in coordination with Quantity Allowance; refer to Allowances section for more information.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 012200

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS **(*AD-03)**

PART 1 – GENERAL

1.1 DESCRIPTION

A. Commissioning is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meet defined objectives and criteria. The commissioning process includes specific tasks to be conducted during construction to verify that construction is performed in accordance with contract requirements, equipment installations provide adequate service access, systems perform in accordance with design intent, and training meets the Owner's requirements.

B. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.

1.2 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.

B. Commissioning is further defined throughout Divisions 22, 23, and 26 particularly in Sections 220800, 230800, AND 260800.

1.3 COMMISSIONING TEAM

A. Commissioning Team: The members of the commissioning team consist of:

1. The Owner's representative (OR)
2. The commissioning authority (CxA)
3. The architect and design engineers (AE)
4. The Contractor aka general contractor (GC)
5. The mechanical/ plumbing contractor (MC)
6. The testing and balancing contractor (TAB)
7. The electrical contractor (EC)
10. The Automatic Temperature Controls contractor (ATC)
11. The Owner's facility operating and maintenance staff
12. Other installing subcontractors
13. Equipment suppliers and manufacturer's representatives

B. For this project, the CxA has been hired by the Owner. The CxA is DMV Engineering

DMV Engineering
833 Golden Arrow Street, Suite 100
Great Falls, VA 22066
Telephone (703) 731-1509

C. The CxA directs and coordinates the project commissioning activities and reports to the Owner. All team members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.

1.4 SCOPE

This section provides the general requirements that apply to the implementation of the commissioning process. Specific components, assemblies, and systems commissioning requirements are per Divisions 22, 23, and 26. In general, the following components, assemblies, and systems will be commissioned:

- Central heating system and distribution
- Air-handling units
- Terminal units, including heaters and VAV boxes
- Ventilation and exhaust systems
- HVAC controls
- Domestic hot water systems, pumps, and controls
- Lighting controls

1.5 COORDINATION

A. Project Commissioning Team: The members of the project commissioning team will consist of the commissioning authority and any support personnel, the Owner's facility staff, the Contractor, subcontractors and/or vendors as required, and the architect/ engineer.

B. Management: The CxA coordinates the commissioning activities through the construction manager. All members shall work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.

C. Scheduling: The CxA will provide sufficient information to the Contractor for required commissioning activities. The Contractor will integrate all commissioning activities into the overall project schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

1.6 PROCESS

A. The following is a brief overview of the typical commissioning tasks during and after construction and the general order in which they occur.

1. Commissioning during construction begins with an initial commissioning meeting conducted by the CxA where the commissioning process is reviewed with the project commissioning team members.

2. Additional meetings will be required throughout construction, scheduled by the CxA, through the Owner and GC, with necessary parties attending to plan, scope, coordinate, schedule future activities and resolve problems.

3. Equipment documentation is submitted to the CxA, through the Owner and GC, during normal submittals, including detailed startup procedures.

4. The pre-functional checklists are to be completed by the Contractor and its subcontractors throughout the construction installation and during the startup process.

5. Pre-functional checklists and equipment startup must be completed before systems performance verification. Additionally, testing and balancing and automation system trending must be completed before HVAC systems performance verification can occur.

6. The Contractor ensures that the subcontractors' construction checklists are executed and documented, and that startup and initial checkout are performed. The CxA verifies that the Testing and Balancing (TAB), construction checklists and startup were completed according to Contract requirements.
7. The CxA develops and implements equipment and system performance verification procedures. The performance verification tests are executed by the Contractor under the direction of the CxA with participation of the facility staff.
8. Issues discerned during construction, start-up, or performance verification will be documented by the CxA. Rectification of issues resides with the Contractor or AE.
9. The CxA reviews the O&M documentation for completeness and pertinence; and participates in Contractor's instructions and training of Owner's operating and maintenance personnel.

B. Other than deferred seasonal performance verification of HVAC systems, all equipment/systems commissioning, including all Owner training, shall be completed before Substantial Completion.

1.7 RESPONSIBILITIES

A. The general responsibilities of various parties in the commissioning process are provided herein; amplification of specific responsibilities is in Divisions 22, 23, and 26.

B. All Parties

1. Follow the Commissioning Plan (attachment to this specification section).
2. Attend initial commissioning meeting and additional meetings, as necessary.

C. Owner's Representative (OR)

1. Facilitate the coordination of the commissioning work by the CxA, and, with the GC and CxA, ensure that commissioning activities are being scheduled into the master schedule.
2. Attend a commissioning scoping meeting and other commissioning team meetings.
3. Furnish a copy of all construction documents, addenda, and Change documents.
4. At Owner's option, review any performance test procedures submitted by the CxA.
5. At Owner's option, observe and witness startup and performance testing of selected equipment.
6. Review commissioning progress and deficiency reports. Work to resolve CxA-cited non-compliance issues and deficiencies.
7 Assign operation and maintenance personnel and schedule them to participate in commissioning team activities and Contractor's instructions and training.
8. Assist the CxA as necessary in the seasonal or deferred performance verification and deficiency corrections required by the specifications.
9. Acknowledge completion of commissioning process.

D. Architect/Engineer (AE)

1. Architect: In addition to performing its contractual construction contract administration functions, architect shall:
   a. Attend initial commissioning meeting and selected commissioning team meetings.
   b. Coordinate CxA review and approval of Contractor-submitted submittals and shop drawings related to commissioned equipment. Architect will forward a set of relevant

documents at time of receipt A/E will coordinate receipt of CxA review documents within fourteen (14) days of receipt and shall incorporate any CxA comments into the submittals and shop drawings returned to the Contractor.

c. Provide any design documentation requested by the CxA.

d. Coordinate with OR to assure that the CxA is:

1) Provided copies of approved shop drawings as they are returned to the Contractor.

2) Notified of time, date, and place of all regularly scheduled progress meetings, and of any special meetings that may be called regarding commissioned systems.

3) Copied on all correspondence pertinent to the commissioned systems including but not limited to minutes of progress meetings, responses to Contractor requests for information and Change documentation.

e. Coordinate resolution of cited deficiencies (as appropriate).

2. Engineers: In addition to performing its contractual construction contract administration functions of submittals review, site visits, O&M manuals and As-Built documents review, engineers shall:

a. Attend initial commissioning meeting and other selected commissioning team meetings.

b. Provide any design narrative and sequences documentation requested by the CxA. Assist in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings, or equipment documentation is not sufficient for writing performance verification procedures.

c. Participate in the resolution of cited deficiencies (as appropriate).

d. Participate in training of Owner's operating and maintenance personnel, including providing systems design intent.

E. Contractors (GC)

General Contractor, subcontractors, and vendors shall assign representatives with expertise and authority to act on their behalf and schedule them to participate in and perform commissioning activities including, but not limited to, the following:

1. Provide the Commissioning Authority with a list of team members (including member's name, contract affiliation, title, responsibility, phone, email, and mailing address) who will represent the Installing Contractors in pre-functional checks and functional performance verification. Submit no later than at the Pre-Commissioning Meeting.

2. Assure that the Commissioning Authority is provided with all relevant correspondence, submittals, notifications, and assistance as may be required to satisfactorily complete the commissioning process using whatever personnel, time and resources that are required.

3. Facilitate the coordination of commissioning and incorporate commissioning milestones and activities into the project schedule. The Contractor shall coordinate with the Subcontractors to provide adequate time to accommodate all commissioning activities including the witnessing of milestone events, equipment start-ups, Owner training, Operating and Maintenance Manuals review and all other activities requiring scheduled participation of the Commissioning Authority as defined in the pre-functional checks and functional performance verification forms.

4. Provide detailed startup procedures for all commissioned equipment/systems.
5. Include in his Contract Sum the cost of furnishing the material requested and manpower necessary for the verification of proper system installation and operation as specified in this Section and Sections 220800, 230800, and 260800.
6. Attend initial commissioning meeting and other selected commissioning team meetings.
7. Provide notification of an impending event to the Commissioning Authority at least 72 hours in advance, notification may be by telephone or email. The 72-hour notice is acceptable if the event is accurately scheduled on the most current Construction Schedule. Events not accurately identified in the Construction Schedule shall require one-week notice.
8. Provide the training of Owner personnel prior to Substantial Completion. Training plan shall be submitted for approval at least four weeks prior to first training session. Approved O&M manuals must be employed in training.
9. Provide equipment/systems performance verification under CxA direction, including for seasonal or deferred verification. The contractors shall provide all tools or the use of tools to start, check-out and test equipment and systems. Evaluate performance deficiencies and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
11. Additional Information
    a. The Contractor may receive a written request from the Commissioning Authority requesting specific information needed about each piece of commissioned equipment or system.
    b. Typically, this request for specific information will include: detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures; full details of any Owner-contracted tests; fan and pump curves; full factory testing reports, if any; and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, copies of the installation and checkout materials shipped with the equipment and the actual field checkout sheet forms used by the factory or field technicians shall be submitted to the Commissioning Authority.
    c. The Commissioning Authority may request further documentation deemed necessary for the commissioning process. These data requests may be made prior to the normal submittal process.
12. Contractor's responsibility to have no deviations in submittals from requirements of the Contract Documents is not relieved by the Commissioning Authority's review.

F. Commissioning Authority (CxA)

1. Coordinates and directs the commissioning activities in a logical, sequential, and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.
2. Coordinate the commissioning work and, with the GC and OR, help integrate commissioning activities into the master schedule.
3. Revise the Construction Phase Commissioning Plan, as necessary.
4. Plan and conduct an initial commissioning meeting and other commissioning meetings as required.

5. Request and review additional information from the Contractor required to perform commissioning tasks, including O&M materials, Contractor startup and checkout procedures.
6. Review AE approved Contractor submittals applicable to systems being commissioned for compliance with commissioning needs.
7. Write and distribute construction pre-functional checklists. Monitor execution of checklists during construction and provide approval when warranted.
8. Perform site visits, as necessary, to observe component and system installations. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving discrepancies.
9. Witness and document milestone events as identified in Commissioning specification sections 220800, 230800, and 260800.
10. Recommend approval of systems startup by reviewing startup reports and by selected site observation.
11. With necessary assistance and review from AE, Contractor, installing contractors, and vendors; write the performance verification procedures for equipment and systems. Analyze any performance trend logs and monitoring data to verify performance. Direct, coordinate, and/or witness equipment/systems performance verification and recommend approval. Coordinate retesting as necessary until satisfactory performance is achieved.
12. Maintain a master Issues Log. Provide the Owner with written progress reports and test results with recommended actions.
13. Witness performance testing of systems listed in Commissioning specification sections 220800, 230800, and 260800.
14. Witness and participate in the Contractor's training of the Owner's operating personnel.
15. Review/approve the O&M manuals.
16. Provide a final commissioning report that includes an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope, a general description of testing and verification methods and all required commissioning task deliverables.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SEQUENCING AND SCHEDULING: Systems commissioning may be construed to be in three parts: installation verification, training and demonstrations, and performance verification.

A. Installation verification utilizes Pre-Functional Check Lists, documenting that equipment/systems are installed per Contract Documents, are serviceable, and are started in accordance with Contract requirements and/or manufacturers' recommendations.

B. Contractor's training of and demonstrations for Owner's operating and maintenance personnel occurs after Pre-Functional Checks are complete and all test and inspection reports and operation and maintenance manuals have been submitted and approved. Training and demonstrations usually precede Performance Verification; some training, such as use and operations of the automation

system, occurs during and after performance verifications.

C. Performance verification employs Functional Performance Verification forms and occurs only after all work required in related Sections has been successfully completed. HVAC systems require functional performance verification in distinct heating and cooling seasons, i.e. a minimum of two sessions of performance verification.

3.2 MEETINGS:

A. Initial Meeting. The CxA shall schedule an initial commissioning meeting. All commissioning parties are required to attend. CxA will issue an agenda and chair the meeting. General content of the meeting will be for the CxA to provide an overview of the commissioning process for the project and to establish lines of communications.

B. Miscellaneous Meetings. Other meetings may be planned and conducted by the CxA as construction progresses to address coordination, deficiency resolution, and planning issues.

3.3 SUBMITTALS

A. The CxA will review the Contractor's submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the commissioning process, to the performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of performance verification procedures and only secondarily to verify compliance with equipment specifications. The CxA will notify the Owner, and/ AE of items missing or areas that are not in conformance with Contract Documents.

B. The CxA may request additional submittal documentation to facilitate the commissioning work. These requests may entail manufacturer's printed installation and detailed startup procedures, full sequences of operation, O&M data, performance test procedures, control drawings and details of Owner contracted tests. All documentation requested by the CxA shall be included by the subcontractors in the O&M manuals.

3.4 CONSTRUCTION CHECKLISTS AND START-UP

A. Pre-Functional checklists are employed to verify that the equipment and systems are fully connected and operational. Installation elements of the checklists for a given system must be successfully completed and approved prior to startup. Contractors assert completion of installations. CxA verifies contractors' assertions.

B. Equipment startups are performed by responsible contractors and/or factory authorized technicians as required by pertinent specification sections. The primary role of the CxA in the start-up process is to ensure that there is written documentation that each of the specified start-up requirements or the manufacturer-recommended procedures has been completed. Successful start-ups shall be documented on the Pre-Functional Checklists.

C. Execution of Pre-Functional Checklists and Startup

1. The final pre-functional checklists will be provided by the CxA after all submittals are approved. Checklists are provided in Sections 220800, 230800, and 260800 and are indicative of required procedures to be executed as part of startup and initial checkout of the systems and the parties responsible for their execution. The pre-functional checklists may be revised in response to approved submittals.

2. The Contractor shall maintain on site the pre-functional checklists, organized by system and by subsystem. Entries shall be made on the checklists no less than weekly and/or as items are completed.

3. The execution and approval of the pre-functional checklist and startup shall be directed and performed by the Contractor, subcontractor, or vendor. Signatures are required of the applicable subcontractors for verification of completion of their work.

4. The Contractor/subcontractor responsible for the purchase of the equipment shall develop the full startup plan by combining the manufacturer's detailed startup and checkout procedures and the construction checklists and document the successful start-up. CxA shall witness startups and verify successful startup documentation.

5. The Contractor shall coordinate startup and checkout with the Owner, AE, and CxA. Startups requiring witnessing by the CxA are identified in Sections 220800, 230800, and 260800. In general, startup of major pieces of equipment shall be witnessed; a sampling strategy will be used for witnessing startup of multiple similar pieces of equipment.

D. Issues, Non-Conformance, and Approval in Checklists and Startup (Issues Log).

1. During the commissioning process, the Commissioning Authority may identify issues that require corrective action. The Commissioning Authority has no authority to dictate ways and means of issues resolution other than enforcing the dictates of Contract Drawings and Specifications. Resolution of issues that require interpretations or modifications to the Contract Documents shall be the responsibility of the Architect and Owner.

2. Written responses shall be made to issues reported by the Commissioning Authority. The Commissioning Authority shall provide status reports and issues logs as deemed appropriate during the commissioning process with original provided to Owner and copies to the General Contractor, and Architect. The General Contractor and/or Architect shall provide the Owner with a written response to each issue cited by the Commissioning Authority as to corrective actions implemented. The written response shall be provided to the Owner within a minimum of two (2) weeks of the date of the Commissioning Authority's issues citing correspondence (or earlier as required by the project schedule); copies shall be provided to the Commissioning Authority, General Contractor, and Architect. Issues that have not been fully resolved within the two-week period shall be noted as such with explanation of intended resolution; and subsequent status reports of the continued issue resolution shall be made in writing at two week intervals until such time as the issue has been fully rectified. The Owner reserves the right to withhold partial payment for construction contract or professional services until satisfactory resolution of commissioning issues have been documented and verified.

3.5 COMMISSIONING REPORTS

A. The Commissioning Authority shall document commissioning milestones with reports. The documents shall acknowledge acceptance at the milestone or separately list issues observed or discovered requiring correction. The document shall be distributed to Commissioning Team members.

3.6 OPERATIONS AND MAINTENANCE MANUALS

A. The commissioning process requires detailed O&M documentation as identified in this section, Section 017900, and technical specifications.

B. Operating and Maintenance Manuals shall be provided to the Architect/Engineer for review no later than the completion date of equipment placement or a minimum of eight (8) weeks before requesting inspection for substantial completion. AE shall provide the Operating and Maintenance Manuals to the Commissioning Authority after the AE's review. The Manuals with AE and Commissioning Authority's review comments will be returned to the Contractor for preparation for use in training of Owner's operating and maintenance personnel. Return of the reviewed Manuals

shall be approximately six weeks after Contractor submission.

C. Manuals format and content shall be as specified in Section 017900.

3.7 DEMONSTRATIONS AND TRAINING

A. The Contractor shall provide demonstrations and training in accordance with Section 017900, technical specification sections, and Sections 220800, 230800, and 260800.

B. Demonstration and training plan shall be submitted to the Commissioning Authority at the time of submission of the Operation and Maintenance Manuals. Plan shall fully detail all demonstrations and training that is to be provided by the Contractor to the Owner's operating and maintenance personnel and include a time allocation schedule. Actual dates and times, if used, shall be understood as tentative and subject to change based upon actual construction progress. However, at a minimum, the Demonstration and Training schedule shall include time allocations (i.e. hours) for each piece of equipment or system for which demonstration and training are specified. Commissioning Authority review comments will be provided when Operating and Maintenance Manuals are returned to the Contractor. The plan shall, as a minimum, cover the following elements:

1. Equipment/system
2. Intended audience
3. Location of training
4. Subjects covered (description, duration of discussion, special methods, etc.)
5. Methods of training (classroom lecture, manufacturer's quality video, site walk-through, actual operational demonstrations, written handouts, etc.).

C. The approved O&M manuals shall be incorporated into all training sessions.

1. Use the printed installation, operation and maintenance instruction material included in the O&M manuals.
2. Review the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include startup, operation in all modes possible, shutdown, seasonal change-over and any emergency procedures.
3. Discussion of relevant health and safety issues and concerns.
4. Discussion of warranties and guarantees.
5. Common troubleshooting problems and solutions.
6. Discussion of any peculiarities of equipment installation or operation.

D. The majority of training and demonstrations shall precede Performance Verification; some training, such as use and operations of the automation system, occurs during and after performance verifications. All training shall occur before Substantial Completion.

E. The CxA participation in demonstration and training is largely observational, verifying that training has given to the satisfaction of Owner's operating and maintenance personnel. The CxA may amplify the training sessions by explaining design concepts and systems interactions.

3.8 PERFORMANCE VERIFICATION

A. Requirements: Performance verification shall demonstrate that each system is operating according

to the design intent and Contract Documents. Performance verification facilitates bringing the systems from a state of individual substantial completion to full dynamic operation. All major systems, such as central HVAC plants, large air handling units, etc. shall have performances verified by the CxA. Systems involving multiple, repeated equipment, such as VAV terminals, room lighting control, shall be verified by sampling.

B. Coordination and Scheduling: The Contractor shall provide sufficient notice, regarding their completion schedule for the pre-functional checklists and startup of all equipment and systems to allow the performance verification to be scheduled and conducted before Substantial Completion. The commissioning team shall oversee, witness, and document the performance all equipment and systems. The CxA in association with the Contractor/subcontractors and facility staff shall execute the verifications.

1. Performance verification shall be conducted after the pre-functional checklists and startup has been satisfactorily completed.

2. Two weeks prior to scheduled start of functional performance verification, the Contractor shall provide the Commissioning Authority with a comprehensive report asserting that systems are ready for functional performance verification. The report shall include the following materials:

   a. Detailed descriptions of any deviations from the Contract Documents (including but not limited to change orders, addenda, and field changes) organized by system and by subsystem.

   b. Complete set of as-built drawings and documents, clearly identifying all deviations from the Contract Documents and organized by system and by subsystem.

   c. Complete set of all required manufacturer's equipment tests organized by system and by subsystem.

   d. Completed pre-functional checklists, organized by system and by subsystem.

   e. Results of any failed tests and detailed description of corrective actions taken, organized by system and by subsystem.

3. For HVAC systems, air balancing and water balancing shall be completed, and all systems shall be satisfactorily operating under automation system control programming (automatic control) prior to performance verification.

4. Performance verification proceeds from components to sub-systems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems shall be verified.

C. Procedures. CxA will provide detailed performance verification procedures and forms after all submittals, including controls, have been approved. Equipment performance shall be tested or verified per the parameters and requirements of the pertinent technical specifications and/or manufacturers' recommendations. Systems performances shall be verified per procedures of pertinent technical specifications, including Testing and Balancing of Division 23, and as further amplified by the CxA.

1. Performance testing and verification may be achieved by manual testing or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. The CxA may substitute specified methods or require an additional method to be executed other than what was specified, with the approval of the AE and Owner. The CxA will determine which method is most appropriate for tests that do not have a specified method.

2. Performance verification and testing shall be performed under design conditions as closely as is practically possible. Simulation of design conditions may be employed to verify performance. When simulation is used, the actual results may also require re-verification under design load conditions.
3. The Installing Contractor shall operate all equipment and systems in support of the commissioning work effort and shall provide all labor, equipment, and materials necessary to allow operational and performance verification of all commissioned equipment and systems.

D. Non-Conformance.

1. Corrections of minor deficiencies identified may be made during performance verification at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form or on an attached sheet.
2. As tests progress and a deficiency is identified that cannot be immediately rectified, the CxA shall discuss the issue with the commissioning team:
    a. When there is no dispute on the issue and the Contractor accepts responsibility to correct it, the CxA will document the issue in the Issues Log. After the Contractor acknowledges correction of the deficiency in writing in the Issues Log, the Contractor shall reschedule the test; and the test shall be repeated.
    b. If there is a dispute about an issue, regarding whether it is a Contractor issue or a design issue:
        1) The apparent issue shall be documented in the Issues Log.
        2) The Owner will determine the responsible party and the responsible party shall indicate the resolution on the Issues Log and the performance verification shall be repeated responsive to the resolution.
3. The Contractor shall acknowledge in writing the status of each outstanding issue identified in the Issues Log. A maximum two-week time interval will be allowed between the date of issuance of the Issues Log and the Contractor's resolution of deficiency and its response; however a faster Contractor correction and/or response will be required as necessary to maintain the project schedule and not delay project completion. When deficiencies have not been rectified within the allotted two weeks, Contractor's response shall provide explanations.
4. Failure Due to Manufacturer Defect: If 10% (or three, whichever is greater) of identical pieces of equipment fail to perform in accordance with the Contract Documents (mechanically or substantively) due to a manufacturing defect, not allowing it to meet its submitted performance specification, all identical units may be considered unacceptable by the Owner, AE or CxA. In such case, the Contractor shall provide the Owner with the following:
    a. The Contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be signed and dated, written explanation of the problem, cause of failures, etc., and all proposed solutions.
    b. The Owner will determine whether a repair is acceptable or whether a replacement of all identical units is required.
    c. Performance verification shall be repeated after all repairs/replacements have been completed.

E. Deferred Performance Verification

1. Unforeseen Deferred Tests. If any check or test cannot be completed due to the project completion level or required occupancy condition, execution of checklists and performance verification may be delayed upon approval of the CxA and Owner. These tests will be conducted in the same manner as originally required as soon as possible.
2. Seasonal Testing: During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The CxA shall coordinate this activity through the Owner. Tests will be executed, documented by the CxA and deficiencies should be corrected by the appropriate Contractor/ subcontractors with the CxA witnessing. Any final adjustments to the O&M manuals and as-builts due to the testing shall be made by the Contractor.

F. Costs for Re-Testing: Contractor is responsible for costs of performance verification. The cost of the work of the CxA is covered by the Owner. However, where re-testing of a system is required due to a deficiency having been cited and the re-test again fails due to un-rectified deficiencies, the costs of the CxA associated with all subsequent re-testing may be withheld from Owner's payment to the Contractor. Required retesting shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

3.9 RECOMMENDED ACCEPTANCE: The CxA notes each satisfactorily demonstrated function on the performance verification forms. CxA provides all forms in final commissioning manual delivered to the Owner with an executive summary recommending acceptance of the installation as complete and operating in accordance with contract requirements. Recommendation of acceptance may be conditional where:

A. The vast majority of the work was found to be installed and operating per Contract requirements, but some minor deficiencies remain. Final acceptance would be predicated upon the condition that all known issues have been corrected and accepted by the Owner.

B. The HVAC system may be conditionally accepted in the initial season of operation, with the condition that the operations in the opposite season must meet performance verification. Final acceptance of the HVAC system requires two-season (i.e. heating season and cooling season) performance verification.

END OF SECTION

Staunton J&DR Courts Facility

Commissioning Plan (*AD-03)

Last Update:
20 Mar 2024

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1. Overview

1.01 This commissioning plan outlines the commissioning process for the new Staunton Juvenile and Domestic Relations District Courts Facility in Staunton, Virginia. The Commissioning Authority for the project is DMV Engineering. Herein described are the responsibilities of the various parties involved in the design, construction, and commissioning process and the procedures by which all parties will endeavor to ensure the facility is designed, installed, evaluated, and operating per the Owners Project Requirements, and to ensure that the owner's maintenance personnel are fully trained.

1.02 Commissioning is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meet defined objectives and criteria. The commissioning process includes specific tasks to be conducted during construction to verify that construction is performed in accordance with contract requirements, equipment installations provide adequate service access, systems perform in accordance with design intent, and training meets the owner's requirements.

1.03 The project commissioning will be responsive to USGBC LEED Fundamental Commissioning requirements, although we understand that the project will not be registered with USGBC.

1.04 The commissioning process (Cx) involves parties involved in the design and construction process as well as the owner and the Commissioning Authority (CxA). It begins early in the design process when the facility is being programmed and the initial concepts and requirements for the building are being formulated. It continues throughout the design and construction process, past acceptance of the building and systems, into the early occupancy of the building, and through the warranty period. Primary elements of commissioning include:

- Identifying and documenting the owner's requirements for the facility.
- Ensuring that the designed systems meet the owner's program requirements.
- Ensuring that the systems installed are operating properly and maintainable.
- Testing systems to ensure that they are interacting and performing optimally.
- Ensuring that the design intent, installation, and O&M requirements are clearly and thoroughly documented.
- Training of the maintenance personnel to ensure they operate and maintain the facility per the design intent.
- Identifying, tracking, recording, and reporting all commissioning issues.
- Recommending to the Owner that all systems are complete and ready for acceptance.

2. Roles and Responsibilities

2.01 Owner's Representative (OR) – **City of Staunton**

A. Facilitate the coordination of the commissioning work by the CxA, and, with the GC and CxA, ensure that commissioning activities are being scheduled into the master schedule.
B. Review and approve the final Commissioning Plan.
C. Attend a commissioning scoping meeting and other commissioning team meetings.

D. Furnish a copy of all construction documents, addenda, and change orders documents and approved submittals and shop drawings related to commissioned equipment to the CxA or may delegate this duty to the AE.
E. At Owner's option, review and approve any performance test procedures submitted by the CxA.
F. At Owner's option, observe and witness startup and performance testing of selected equipment.
G. Review commissioning status reports and commissioning issues log. Coordinate and enforce the resolution of work to resolve CxA- cited issues.
H. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities and Contractor's instructions and training.
I. Assist the CxA as necessary in the seasonal or deferred performance verification and deficiency corrections required by the specifications.
J. Acknowledge completion of commissioning process and accept substantial completion.

2.02 Architect – **Moseley Architects**

A. Coordinate CxA review and approval of Contractor submittals and shop drawings related to commissioned equipment. Architect will forward a set of relevant documents at time of receipt. A/E will coordinate receipt of CxA review documents within fourteen (14) days of receipt and shall incorporate any CxA comments into the submittals and shop drawings returned to the Contractor.
B. Provide any design narrative documentation requested by the CxA.
C. Coordinate with OR to assure that the CxA is:
    - Provided copies of approved shop drawings as they are returned to the Contractor.
    - Notified of time, date, and place of all regularly scheduled progress meetings, and of any special meetings that may be called regarding commissioned systems.
    - Copied on all correspondence pertinent to the commissioned systems including but not limited to minutes of progress meetings, responses to contractor requests for information and, change order documentation.
D. Coordinate resolution of cited deficiencies (as appropriate).

2.03 Engineer – **Moseley Architects**

A. Provide any design narrative and sequences documentation requested by the CxA. Assist in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings, or equipment documentation is not sufficient for writing performance verification procedures.
B. Participate in the resolution of cited deficiencies (as appropriate).
C. Participate in training of Owner's operating and maintenance personnel, including providing systems design intent.

2.04 Contractor - **TBD**

Contractors retain all responsibility for the installations. CxA inspections and tests will determine the adequacy and completeness of the installations again to verify the contractor has provided the systems as specified. CxA testing does not alleviate contractor's responsibility for ensuring the systems are complete and functional. General Contractor, subcontractors, and vendors shall assign representatives with expertise and authority to act on their behalf and schedule them to participate in and perform commissioning activities including, but not limited to, the following:

A. Facilitate the coordination of commissioning and incorporate commissioning activities into the project schedule.
B. Provide detailed startup procedures for all commissioned equipment/ systems.
C. Include the cost of commissioning in the total Contract Sum.
D. Attend initial commissioning meeting and other selected commissioning team meetings.
E. The GC shall execute the commissioning responsibilities according to the Contract Documents and ensure that all subcontractors and vendors do likewise.
F. The GC shall provide notice to the CxA to witness construction milestones including HVAC equipment start-ups and training.
G. The GC shall be responsible for the completion of the pre-functional checklists as work progresses.
H. The GC shall ensure that written responses are provided to the issues log issued by the CxA.
I. The GC shall ensure that O&M manuals are submitted for review no later than the completion date of equipment placement, or a minimum of eight (8) weeks before Substantial Completion, whichever is earlier.
J. The GC shall coordinate and provide the training of Owner personnel prior to Substantial Completion. Approved O&M manuals shall be employed in training.
K. Contractors shall provide equipment/systems performance verification under CxA direction, including for seasonal or deferred verification. The contractors shall provide all tools or the use of tools to start, check-out and test equipment and systems. They shall also evaluate performance deficiencies and, in collaboration with the entity responsible for system and equipment installation, recommend corrective action.

2.05 Commissioning Authority (CxA) – **DMV Engineering**

The CxA directs and coordinates the project commissioning activities and reports to the Owner. All team members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents. All parties involved in the design and construction of the facility bear responsibility in the Cx process. The Cx process does not fundamentally change the responsibilities of the team members from conventional projects without a formal Cx process, it merely supplements and formalizes the responsibilities of all parties. The CxA's responsibilities shall include, but not be limited to the following:

A. Coordinate and direct commissioning activities in a logical, sequential, and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications with all necessary parties, frequently updated timelines and schedules, and technical expertise.
B. Coordinate the commissioning work and help integrate commissioning activities into the master schedule.
C. Plan and conduct an initial commissioning meeting and other commissioning meetings as required.
D. Request and review additional information from the Contractor required to perform commissioning tasks, including O&M manuals, and contractor startup and checkout procedures.
E. Review contractor submittals concurrently with the AE applicable to systems being commissioned for compliance with commissioning needs.
F. Create pre-functional checklists for the systems to be commissioned and provide them in a Commissioning Manual for the contractors to fill out. Monitor execution of checklists during construction and provide approval when warranted.

G. Perform site visits, as necessary, to observe component and system installations. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving discrepancies.
H. Witness and document milestone events and performance testing.
I. Recommend approval of systems startup by reviewing startup reports and by selected site observation.
J. With necessary assistance and review from A/E, contractors, and vendors; write the HVAC performance verification procedures for equipment and systems. Analyze any performance trend logs and monitoring data to verify performance.
K. Direct, coordinate, and/or witness equipment/systems performance verification and recommend approval. Coordinate retesting as necessary until satisfactory performance is achieved.
L. Maintain a master Issues Log. Provide the Owner with written progress reports and test results with recommended actions.
M. Witness and participate in the Contractor's training of the Owner's operating personnel.
N. Review/approve the O&M manuals.
O. Provide a final commissioning report (as described in this section).

3. Communication Protocols

3.01 Copies of mechanical, electrical, and plumbing system submittals, RFI responses, and approved change orders shall be provided to CxA.

3.02 Copies of progress meeting minutes and updated construction progress schedules shall be provided to CxA.

3.03 Copy of draft O&M Manuals shall be provided to CxA for review.

3.04 During construction, CxA shall be provided with a 72-hour advance notice for milestone monitoring.

3.05 CxA shall be furnished with copies of deficiency field reports provided to the mechanical contractor from the TAB and controls subcontractors.

3.06 CxA shall be furnished with a field draft copy of the Test & Balance report prior to functional performance testing.

3.07 Pre-functional checklists shall be maintained on site by the general contractor and shall be updated weekly. The CxA may request copies of completed pre-functional checklists prior to scheduling functional performance testing.

3.08 CxA shall be furnished Copy of As-Built documents for review.

3.09 Automatic Temperature Control / Building Automation System sub-contractor shall submit trend logs, as-built drawings, and other documentation per specification sections 019113, 230800, and 230900.

4. Systems/ Equipment to be Commissioned

4.01 HVAC Systems

- Natural Gas Condensing Boiler
- HVAC Pump (Heating Water)
- Variable Frequency Drive (VFD)
- Heating Water Piping System
- Packaged Rooftop Unit/ with Hydronic Heating Coil (RTU)
- Air Distribution System
- VAV Unit (Fan-Powered and Shut-off Type)
- Hydronic Unit Heater
- Electric Heater
- Ductless Split System AC Unit
- Fans
- Automatic Temperature Controls

4.02 Plumbing Systems

- Domestic Hot Water System

4.03 Electrical Systems

- Site and Building Lighting System Controls including Timeclock Control, and Occupancy/ Vacancy Sensors

5. Construction Phase Commissioning Process

5.01 Meetings: CxA shall schedule and conduct a commissioning kick-off meeting and miscellaneous Cx planning meetings as needed. The purpose of these meetings is to discuss the commissioning requirements.

5.02 Review of Submittals: CxA shall concurrently review submittals relating to key systems or equipment. Review is for Cx facilitation and does not replace the review of the A/E. CxA shall provide notice of any discerned issues related to submittals in a timely fashion (i.e. before equipment is ordered if possible, or when delivered on site if possible).

5.03 General Progress Commissioning Inspections: CxA will make unscheduled walks through the project to observe installation progress of Cx Systems. CxA will make scheduled site visits to observe milestone events including equipment start-ups, etc. CxA will issue a Cx Report for each site visit (scheduled or unscheduled) performed.

5.04 Issues Log

A. During the commissioning process, the Commissioning Agent may identify issues that require corrective action. The Commissioning Agent has no authority to dictate ways and means of issues resolution other than enforcing the dictates of Contract Drawings and Specifications. Resolution of issues that require interpretations or modifications to the Contract Documents shall be the responsibility of the Architect and Engineers. Project completion date shall not be delayed due to lack of timely issues resolution unless authorized contract extensions have been executed.

B. Written responses shall be made to issues reported by the Commissioning Agent. The Commissioning Agent shall provide status reports and issues logs as deemed appropriate

during the commissioning process with original provided to Owner and copies to the General Contractor, and Architect. The General Contractor and/or Architect shall provide the Owner with a written response to each issue cited by the Commissioning Agent as to corrective actions implemented. The written response shall be provided to the Owner within a minimum of two (2) weeks of the date of the Commissioning Agent's issues citing correspondence (or earlier as required by the project schedule); copies shall be provided to the Commissioning Agent, General Contractor, and Architect. Issues that have not been fully resolved within the two- week period shall be noted as such with explanation of intended resolution; and subsequent status reports of the continued issue resolution shall be made in writing at two-week intervals until such time as the issue has been fully rectified. The Owner reserves the right to withhold partial payment for construction contracts or professional services until satisfactory resolution of mechanical commissioning issues have been documented and verified.

5.05 Pre-Functional Checklists and Equipment Startup

A. The pre-functional checklists will be provided by the CxA. The checklists will be updated in response to approved submittals.

B. The execution and approval of the checklists and startup of the equipment shall be directed and performed by the Contractor, subcontractor, or vendor. Signatures are required of the applicable subcontractors for verification of completion of their work.

C. The Contractor/subcontractor responsible for the purchase of the equipment shall develop the full startup plan by combining the manufacturer's detailed startup and checkout procedures and the construction checklists and document the successful start-up. CxA shall sample witness startups and verify successful startup documentation.

D. The Contractor shall coordinate startup and checkout with the Owner, AE, and CxA. Startups requiring witnessing by the CxA are identified in the schedule below. In general, startup of all major pieces of equipment shall be witnessed; a sampling strategy will be used for witnessing startup of multiple similar pieces of equipment.

5.06 Functional Performance Testing (FPT)

A. The commissioning functional performance test forms (FPTs) will be delivered by the CxA to the contractor to use in conjunction with the start-up forms for that equipment which can be evaluated at start-up such as a Packaged RTU.

B. Pre-functional checklists, equipment startup, and testing and balancing (TAB) must first be submitted for equipment controlled by the building automation system before functional performance tests can be completed.

C. Participation: Participation of the appropriate subcontractors is typically required. The equipment factory representatives may also be required to participate as requested by the CxA.

D. Instrumentation

1. Standard instrumentation used across generic systems shall be provided by the GC with CxA input for spot-checking balancing, controls, and electrical power quality.

2. Proprietary instrumentation required to verify performance of specialty equipment shall be provided by Contractor and made available to CxA. Generally, no testing equipment will be required beyond that required to perform Contractors work under these Contract Documents.

E. Test Documentation: CxA will conduct, test, and/or witness tests as applicable. CxA will record test results on the forms developed for the testing. CxA will Pass or Fail the testing

and record the date and time of the test. Issues shall clearly be indicated when the test is failed. When all related testing is completed successfully, CxA shall recommend acceptance of the system or component.

F. Re-testing: When issues are identified during testing, depending on their extent or magnitude, they can be corrected during the test and the testing can continue to successful completion. More significant issues will require failure of the test and re-testing. Deficiencies of this magnitude will result in an action item on the Action List and the Commissioning Issues Log. The resolution of the issue will then subsequently be tracked by the CxA. All tests shall be repeated until successful completion.

I. Sampling: 100% of the terminal equipment will be reviewed/ evaluated through the BAS. 25% of the Lighting Controls will be reviewed on site.

J. Failure Limit on Sample Tests: The failure limit for multiple pieces of smaller equipment is 10%. Large critical systems have no failure limit allowed. This limit indicates the maximum percentage of the tested devices that may have any test that fails before an entirely new sample must be tested. This is based on the concept that if many failures occur it is a result of inadequate start up by the contractor. When the maximum number of failures is reached, testing on that sample will be terminated and retesting will be scheduled.

K. Opposite Season Testing: Testing procedures shall be repeated and/or conducted as necessary during appropriate seasons. "Opposite season" testing will be required where scheduling prohibits thorough testing in all modes of operation. Air Handler and Central heating system testing for heating related modes of operation and control loops shall be evaluated during outside air temperatures below 35°F.

L. Systems Acceptance Report: A final commissioning report with an executive summary recommending acceptance of the commissioned systems will be provided when all outstanding issues have been resolved. The final report shall contain, at a minimum, the list of participants and roles, a brief building description, the overview of the commissioning and testing scope, a general description of testing and verification methods, and all commissioning task deliverables identified in the construction documents.

M. Acceptance Criteria: The acceptance criteria will generally be as follows unless more specifically indicated with individual tests. CxA may exercise professional judgment to relax requirements and pass tests when appropriate.

1. Capacity and/or equipment performance will generally be as specified ±5%
2. Efficiency where specifically indicated in the documents will be ±5%. Where inferred from manufacturers catalogued data, criteria will be ±10%
3. Balancing related criteria will be ±5% for water and ±10% for air
4. Noise Levels: As indicated in the Owners Project Requirements (OPR). Otherwise as recommended in the most current version of the ASHRAE Handbooks for the applicable occupancy
5. HVAC Criteria (T, RH, CO2): Per the OPR.
6. Air Pressurization: As indicated in the Owners Project Requirements OPR. Otherwise as indicated in the most current version of the ASHRAE Handbooks for the applicable occupancy.
7. Lighting Controls: Operation per the OPR. Otherwise as recommended in the most current version of the IES Handbooks for the applicable occupancy.

5.07 Training Procedures

A. The Contractor shall provide demonstrations and training in accordance with Section 017900.

B. Demonstration and training plan shall be submitted to the CxA at the time of submission of the O&M Manuals. Plan shall fully detail all demonstrations and training that is to be provided by the Contractor to the Owner's operating and maintenance personnel and include a time allocation schedule. Actual dates and times, if used, shall be understood as tentative and subject to change based upon actual construction progress. However, at a minimum, the Demonstration and Training schedule shall include time allocations (i.e. hours) for each piece of equipment or system for which demonstration and training are specified. CxA review comments will be provided to when O&M Manuals are returned to the Contractor. The plan shall, as a minimum, cover the following elements:
   1. Equipment/system
   2. Intended audience
   3. Location of training
   4. Subjects covered (description, duration of discussion, special methods, etc.)
   5. Methods of training (classroom lecture, manufacturer's quality video, site walk-through, actual operational demonstrations, written handouts, etc.).

C. The approved O&M manuals shall be incorporated into all training sessions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare part inventory suggestions. The training shall include startup, operation in all modes possible, shutdown, seasonal changeover, emergency procedures, discussion of relevant health and safety issues, discussion of warranties and guarantees, common troubleshooting problems and solutions, and discussion of any peculiarities of equipment installation or operation.

D. All training shall occur before Substantial Completion.

E. The CxA participation in demonstration and training is largely observational, verifying that training has been given to the satisfaction of Owner's operating and maintenance personnel. The CxA may amplify the training sessions by explaining design concepts and systems interactions.

6. Commissioning Schedule

The following schedule provides the general sequence of events for the commissioning process. These milestones should be incorporated into the construction schedule for clarity, but are not on the critical construction path:

Task	Activities	Start	End	Duration/Interval
Meeting	Cx Kick-off			2 hours
Startups	Boilers/RTU			2-3 days
TAB	TAB of Water/Air systems			2-3 weeks
	Review of TAB Report by CxA			1 day
	Rectification of TAB Issues			14 days
	Final TAB Report Submitted			7 days
HVAC FPT	HVAC Performance Testing			1 week
Electrical Testing	Lighting Controls			1 day
Training	Lighting Controls			1 day
	HVAC / DHW			1 day
Final Report	Complete Documentation			2 days
Season 2 Testing	Resolve Issues and FPT			2-4 days

x

END

SECTION 02 41 13 - SELECTIVE SITE DEMOLITION (*AD-03)

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 any noted existing sanitary sewer pipe, water pipe, storm drainage pipe and appurtenances indicated.
4. Removal and replacement of site fencing.
5. Removal and replacement 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 Owner 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

Relocation of existing services and associated infrastructure identified in the contract documents is the responsibility of the contractor. Costs for reconnection of those services by third party utility purveyors to be paid for by the Owner.

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 Owner immediately for instructions. Provide a scale drawing with the location of the uncharted or incorrectly charted utilities for use by the Owner 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. Gas

1. Coordinate the removal and/or relocation of existing utilities with Gas Company.
2. Contact Gas Company Representative to arrange for required removal and/or relocation of existing service.

E. 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.

F. 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.

G. 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.

H. 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.

I. Light Poles

1. Remove and relocate light poles as indicated. If light poles are owned by a public utility, coordinate the relocation with them.

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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 042000
UNIT MASONRY (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ACI SP-66 - ACI Detailing Manual.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

C. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

E. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

F. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement.

G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

H. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.

I. ASTM C33/C33M - Standard Specification for Concrete Aggregates.

J. ASTM C55 - Standard Specification for Concrete Building Brick.

K. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale).

L. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.

M. ASTM C73 - Standard Specification for Calcium Silicate Brick (Sand-Lime Brick).

N. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.

O. ASTM C91/C91M - Standard Specification for Masonry Cement.

P. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

Q. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.

R. ASTM C151 - Standard Test Method for Autoclave Expansion of Hydraulic Cement.

S. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).

T. ASTM C270 - Standard Specification for Mortar for Unit Masonry.

U. ASTM C331/C331M - Standard Specification for Lightweight Aggregates for Concrete Masonry Units.

V. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.

W. ASTM C476 - Standard Specification for Grout for Masonry.

X. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.

Y. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

Z. ASTM C641 - Standard Test Method for Iron Staining Materials in Lightweight Concrete Aggregates.

AA. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

BB. ASTM C887 - Standard Specification for Packaged, Dry, Combined Materials for Surface Bonding Mortar.

CC. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry.

DD. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength.

EE. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.

FF. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.

GG. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

HH. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry.

II. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing.

JJ. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls.

KK. BIA Technical Notes No. 20 - Cleaning Brickwork.

LL. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls.

MM. BIA Technical Notes No. 46 - Maintenance of Brick Masonry.

NN. NCMA TEK 08-04A - Cleaning Concrete Masonry.

OO. NCMA TEK 10-04 - Crack Control for Concrete Brick and Other Concrete Masonry Veneers.

PP. NCMA TEK 12-01B - Anchors and Ties for Masonry.

QQ. NCMA TEK 12-02B - Joint Reinforcement for Concrete Masonry.

RR. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting at the Project site one week before starting work of this section; require attendance by all relevant installers.

1.03 SUBMITTALS

A. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

B. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories, for each type of masonry.

1. Provide elevations indicating steel reinforcing bar locations; provide details of reinforcing including bends and cross-sections, in accordance with ACI SP-66.
2. Indicate control and expansion joint locations.
3. Provide flashing details indicating corners, end dams, and other special conditions.
4. Calcium Silicate Masonry Units: For a substitute product meeting ASTM C90 to be considered, submit shop drawings of all elevations indicating locations of control, expansion, and other movement joints.

C. Samples: Face brick and mortar selections will be verified in mock-up panel. Provide samples of exposed accessories and trim requiring color selection.

D. Material Certificates and Test Reports: Provide manufacturer's certificates and test reports for the following:
   1. Masonry Units:
      a. Brick: Size data including fabrication tolerances.
      b. Brick: Efflorescence test, per ASTM C67/C67M.
      c. Masonry Units: Compressive strength test data.
      d. Concrete Masonry: Data indicating aggregates comply with ASTM C33/C33M (normal weight), ASTM C331/C331M (lightweight), and ASTM C618 (fly ash).
   2. Mortar and Grout Mixes: Provide description and proportion of materials for each type of mortar and grout.
   3. Provide material certificates for each type of metal accessory, including reinforcing bars, joint reinforcement, veneer ties and anchors, and other indicated accessories, indicating compliance with requirements.

E. Installer's Qualification Statement.

1.04 QUALITY ASSURANCE

A. Comply with provisions of ACI 530.1/ASCE 6/TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Fire Rated Assemblies: Provide products that comply with fire-resistance ratings indicated as determined by testing according to ASTM E119, by equivalent testing thickness, or by means acceptable to authorities having jurisdiction.

C. Source Limitations for Masonry: Provide each type of masonry unit from a single manufacturer's plant, sourced through a single supplier. Each type of masonry unit shall maintain consistency of color and texture for all product required on the entire project. The approved mockup/sample panel shall be used to determine acceptable color and texture range.
   1. Source Limitations for Decorative Concrete Masonry: Provide decorative concrete veneers from a manufacturer with a quality control agreement with water repellant manufacturer, certifying that units have been manufactured with integral water repellant to conform to performance requirements indicated. Provide current certificate from water repellant manufacturer confirming conformance.

D. Source Limitations for Mortar: Provide each mortar mix from a single manufacturer, sourced through a single supplier. Each required mortar mix shall maintain consistency of each component, including cementitious materials and aggregate, to provide consistent color and texture fr all product required on the entire project. The approved mockup/sample panel shall be used to determine acceptable color and texture range.

E. Aggregate for Concrete Masonry Units: If bottom ash is used as aggregate in the CMU, the Source for the bottom ash shall be a power station that has a minimum of ten (10) years continuous experience as a supplier of quality material as verified by independent certified laboratory testing and no defects in the marketplace.

F. Pre-Construction Testing: Owner shall engage an independent testing agency to perform field quality control tests, in accordance with Section 014000 - Quality Requirements.
   1. Clay Masonry Unit Tests: Testing agency shall test each variety of clay masonry in accordance with ASTM C67/C67M compressive strength requirements.
   2. Concrete Masonry Unit Tests: Testing agency shall test each variety of concrete unit masonry in accordance with ASTM C140/C140M compressive strength requirements.

1.05 MOCK-UPS

A. See Section 014000 - Quality Requirements for additional requirements.

B. Integrated Exterior Mockups: Attend preinstallation conference and provide masonry work for integrated exterior mockup as indicated on Drawings and as specified in Division 1 Section "Quality Requirements."

1.06 FIELD CONDITIONS

A. Wall Cavity Protection: Provide temporary waterproof sheet coverings over masonry walls at top of walls, sills, parapets, and other horizontal projections. Install coverings at end of each workday, when rain or precipitation is expected, and after masonry work is completed.
   1. Extend coverings down vertically at least 24 inches on each side of masonry wall. At multi-wythe walls where one wythe is more than 24 inches taller than other wythe(s), extend covering as required to fully cover all wythes and cavities.
      a. At roof parapets, extend covering on rear side of parapet full height down to roof deck/membrane, until vertical protection/roof membrane is installed.
   2. Secure all coverings in place with tape or adhesive that does not leave residue, or other securement method that does not penetrate or damage permanent construction.
   3. Provide protective coverings at sills and horizontal projections that can also serve as protection from mortar droppings.
   4. Provide protective coverings over tops of foundation walls containing insulation to protect from exposure to sun and from construction traffic damage.
   5. Do not remove or allow removal of temporary covers until permanent top of wall protection elements (coping, sill, roof surface, waterproof membrane, etc) are underway.

B. Cold- and Hot-Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
   2. Special Shapes: Provide nonstandard blocks configured for corners, lintels, headers, other detailed conditions, and as indicated below.
      a. Provide bullnose units for outside corners.
      b. Provide solid block with bullnosed top edges at free-standing CMU walls and where top of block is exposed at window sills and similar applications.
   3. Concrete Masonry Units: ASTM C90, lightweight.
      a. Exposed Faces: Manufacturer's standard color and texture.
      b. Aggregates:
         1) Lightweight Aggregates: Lightweight aggregate shall strictly comply with ASTM C331/C331M, ASTM C151, and ASTM C641. Drying shrinkage of aggregate shall not exceed 0.10% at 100 days.
         2) Waste concrete, scoria, and aglite shall not be permitted.
   4. ~~**Decorative Concrete Block: ASTM C90, normal weight.**~~ **(*AD-03)**
      a. ~~**Pattern: Manufacturer's standard ground-face pattern.**~~

b. ~~**Size: Match standard nominal dimensions per "Concrete Block" paragraph above.**~~
c. ~~**Color: To be selected by Architect from manufacturer's full range.**~~
d. ~~**Provide integral water repellent and companion mortar additive at all exterior decorative CMU.**~~
e. ~~**Topcoat: Where recommended by manufacturer of ground-face units, provide clear acrylic top-coat, minimum 20 percent solids content.**~~

5. ~~**Units with Integral Water Repellent: Concrete block units as specified in this section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.**~~ **(*AD-03)**
   a. ~~**Performance of Units with Integral Water Repellent:**~~
      1) ~~**Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours.**~~
         (a) ~~**No water visible on back of wall above flashing at the end of 24 hours.**~~
         (b) ~~**No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.**~~
         (c) ~~**No more than 25 percent of wall area above flashing visibly damp at end of test.**~~
      2) ~~**Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.**~~
      3) ~~**Compressive Strength: ASTM C1314; maximum 5 percent decrease.**~~
   b. ~~**Use only in combination with mortar that also has integral water repellent admixture.**~~
   c. ~~**Use water repellent admixtures for masonry units and mortar by a single manufacturer.**~~
   d. ~~**Available Products:**~~
      1) ~~**ACM Chemistries; RainBloc.**~~
      2) ~~**BASF Aktiengesellschaft; Rheopel Plus.**~~
      3) ~~**Grace Construction Products (W.R. Grace & Co.); Dry-Block.**~~

B. Concrete Brick:
   1. Actual Size: 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
   2. Concrete Building Brick: ASTM C55; lightweight, solid, for interior or concealed use.

2.02 BRICK UNITS

A. Facing Brick: ASTM C216, Type FBS or FBX, Grade SW.
   1. **Basis-of-Design Brick: U.S. Brick; “Cherry”; Smooth Finish.** **(*AD-03)**
   2. Actual Size: 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long (modular).
   3. Special Shapes: Molded units (plant-fabricated) as required by conditions indicated, unless standard units can be sawn to produce equivalent effect. Cut or sawn edges shall not be exposed in the finished work.
   4. Efflorescence: Provide brick that has been tested per ASTM C67/C67M and received a rating of "not effloresced."

B. Building (Common) Brick: ASTM C62, Grade SW, except MW may be used in locations indicated acceptable in reference standard; solid units.
   1. Actual size: Match face brick.
   2. Locations: May be used in concealed locations in lieu of face brick.

2.03 CALCIUM-SILICATE (SAND-LIME) MASONRY UNITS

A. Sand-Lime Brick: ASTM C73, Grade SW; solid units that have been pressure formed and autoclaved; 3-5/8-inch bed depth..
   1. Actual Size: 11-5/8 inches high; 3-5/8 inch depth; 23-5/8 inches long.
      a. Where multiple sizes are indicated, refer to Drawings for layout and location of each size of unit.
      b. Provide special shapes as indicated.
   2. Texture: Smooth finish on exposed faces and ends.
   3. Corners: Provide end return at corners; end finish shall match face texture indicated.
   4. Fabrication Tolerances:
      a. Unit Length and Height: Plus or minus 1/16 inch.
      b. Deviation from Square: Plus or minus 1/16 inch, with measurement taken using hte longest edge as the base.
      c. Bed Depth: Plus or minus 1/8 inch.
      d. Custom Unit Dimensions: Plus or minus 1/8 inch.
   5. Physical Characteristics:
      a. Average Compressive Strength, Brick Method: 8500 psi; per ASTM C67/C67M
      b. Average Compressive Strength, Dimension Stone Method: 6600 psi; per ASTM C170.
      c. Average Modulus of Rupture: 770 psi; per ASTM C99.
      d. Average Absorption Rate: 8.8 percent; per ASTM C97.
      e. Average Density: 129 lbs/ft^3; per ASTM C97.
   6. Products:
      a. Basis-of-Design Product: Arriscraft; Renaissance Stone.
         1) Color: 'Cafe'; Fort Valley, Georgia plant.
      b. Provide matching dolomitic limestone courses where calcium silicate is indicated at or below grade. Basis-of-Design: Arriscraft "Adair" Limestone.
      c. Subsitutions: Substitutions will be accepted if proper consideration is made by the bidder and contractor to accommodate for the different physical properties of the substitutes in comparison to the base bid material of Calcium Silicate Masonry Units. Any Unit considered for substitution must have tolerances that match Calcium Silicate Masonry Unit Tolerances to be accepted. Products below meet the ASTM C90 Concrete Block standard and shall be installed per NCMA TEK Bulletins and Notes, including horizontal joint reinforcement, control joints, and other installation criteria for movement and crack control. Available ASTM C90 products:
         1) General Shale Company; Regency Stone.
         2) Indiana Cast Stone; Cast Stone Masonry Units.
         3) Reading Rock, Inc; RockCast.

2.04 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M.
   1. Colored Mortar: Premixed cement as required to match Architect's color sample.
   2. Available Products:
      a. Argos USA; Magnolia Masonry Cement.
      b. Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
      c. Lehigh Hanson; flamingo Colored Cement.

d. Roanoke Cement; a division of Titan America; Colored Masonry Cement.
e. York Building Products, a Stewart Company; Workrite Colored Masonry Cement.
f. Substitutions: See Section 016000 - Product Requirements.

B. Surface Bonding Mortar (Parge Coat): ASTM C887.

C. Mortar Aggregate: ASTM C144.

D. Grout Aggregate: ASTM C404.

E. Water: Clean and potable.

F. Accelerating Admixture: ASTM C494/C494M, Type C; nonchloride, noncorrosive type for use in cold weather; approved by manufacturer for use in masonry mortar.

G. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.
1. Use only in combination with masonry units manufactured with integral water repellent admixture.
2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
3. Meet or exceed performance specified for water repellent admixture used in masonry units.

2.05 DAMPPROOFING

A. General: Dampproofing may be provided as a Contractor option to parge coat, applied to exterior face of below grade CMU back up wall (prior to insulation or grouting).

B. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
1. Emulsified Asphalt Coating (Brush or Spray Applied): ASTM D1227/D1227M, Type II, Class 1 - Mineral colloid emulsifying agents with non-asbestos fibers or Type III, Class 1 - Mineral colloid emulsifying agents without fibrous reinforcement.
2. Accessory Materials: Provide asphaltic primer, glass fiber reinforcement, and compatible patching compounds as required and as recommended by manufacturer.
3. Manufacturers:
a. Henry Company.
b. Karnak Corporation.
c. Mar-Flex Systems, Inc.
d. W. R. Meadows, Inc.
e. Substitutions: See Section 016000 - Product Requirements.

2.06 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; uncoated.

B. Joint Reinforcement, Anchorage, and Ties, General: Comply with NCMA TEK 12-02B, NCMA TEK 12-01B, and requirements below.
1. Use ladder type joint reinforcement, unless otherwise indicated. Truss type reinforcement may be used only when approved by Architect, at walls indicated not to have vertical reinforcing steel and not to be grouted.
2. Provide prefabricated joint reinforcement sections for corners and for T-intersections.
3. Provide joint reinforcement in minimum 10 foot lengths.

4. At multi-wythe/cavity wall applications, size all anchors, ties, and reinforcement for depths of cavities indicated, including indicated insulation thickness as applicable. Ties shall maintain full adjustability at veneer wythe without affecting insulation.
5. At cavities with air space wider than 4-1/2 inches, provide high strength ties engineered for cavity depths indicated.

C. Single Wythe Joint Reinforcement: ASTM A951/A951M.
1. Material: Mill-galvanized steel for interior walls, hot-dip galvanized steel for exterior walls.
2. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

D. Multiple Wythe Joint Reinforcement: ASTM A951/A951M. Provide at composite walls and subgrade walls where all wythes are of the same material.
1. Material: Mill-galvanized steel for interior walls, hot-dip galvanized steel for exterior walls.
2. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.
   a. Provide two side rods for each wythe that is nominal 6-inch depth or greater, and one side rod for each wythe that is nominal 4-inch depth.

E. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M. Provide at cavity walls/masonry veneer walls.
1. Type: Ladder, with adjustable ties or tabs spaced at 16 in on center.
2. Material: Hot-dip galvanized steel.
3. Size: 0.1483 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire, width of components as required to extend at least halfway through veneer wythe, but provide not less than 5/8 inch of mortar coverage from each masonry face.
4. Vertical adjustment: Not more than 1 1/4 inches.

F. Strap Anchors: Bent steel shapes, 1-1/2 inch width, 0.105 inch thick, 24 inch length, with 2 inch long, 90 degree bend at each end to form a U or Z shape or with cross pins, hot dip galvanized to ASTM A153/A153M Class B.

G. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.
1. For Anchorage to Structural Steel Framing: Crimped wire anchors for welding to frame, 0.25 inch thick, with triangular/trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.

H. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B. Provide at masonry veneer walls with metal framing backup. At cavity walls with CMU backup and masonry veneer, masonry veneer anchors may be used in conjunction with standard horizontal joint reinforcing, at Contractor's option, in lieu of adjustable multiple wythe joint reinforcement.
1. Anchor Plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners.
2. Wire Ties: Manufacturer's standard shape, 0.1875 inch thick.
   a. Size wire ties to extend at least halfway through veneer wythe, but provide not less than 5/8 inch of mortar coverage from masonry face.
3. Vertical Adjustment: Not less than 3-1/2 inches.
4. Products:
   a. Construction Tie Products; CTP-16.
   b. Heckmann Building Products; 213 + 263.

c. Hohmann & Barnard; HB-213-2x.
d. Wire Bond; RJ-711.

I. Metal-to-Metal Fasteners (for Steel Studs): Self-drilling, self-tapping #10 hex screws; fabricated of either 304 stainless steel or of steel with corrosion resistant polymer coating tested to ASTM B117. Fasteners shall include integral neoprene or EPDM washer.
1. Products:
a. ELCO Construction Products; Dril-Flex with Stalgard Finish.
b. Heckmann Building Products; #668 TEK Self-Drilling Steel Stud Screw.
c. ITW Commercial Construction North America; Teks Maxiseal with Climaseal Finish, or Scots Long Life Teks (stainless steel).

2.07 FLASHINGS

A. Combination Non-Asphaltic Flashing Materials - Stainless Steel:
1. Stainless Steel/Polymer Fabric Flashing: ASTM A240/A240M; 2 mil type 304 stainless steel sheet bonded on one side to one sheet of polymer fabric.
a. Manufacturers:
1) Hohmann & Barnard, Inc; Mighty-Flash Stainless Flashing.
2) Prosoco; R-Guard SS ThruWall.
3) STS Coatings; Wall Guardian Stainless Steel TWF.
4) York Manufacturing, Inc; Multi-Flash SS.

B. Factory-Fabricated Flashing Corners and End Dams: Stainless steel.

C. Termination Bars: One-inch wide, fabricated of 0.125-inch PVC, 0.090-inch extruded aluminum, or 0.075-inch stainless steel; compatible with membrane and adhesives.

D. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.

E. Flashing Sealant/Adhesive/Liquid Seam Tape: Polyether-based, 100% solids, moisture-curing elastomeric products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates; and that are compatible with asphalt-free flashing materials and air barrier materials. Traditional mastic is not acceptable.
1. Available Products:
a. Master Builders Solutions; MasterSeal NP150.
b. STS Coatings; GreatSeal LT-100 Liquid Tape.
c. York; UniverSeal US-100 Liquid Tape.

2.08 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
1. Provide nominal 2.5-inch "standard" and "tee" configurations to suit application unless indicated otherwise.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.

C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.

1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations. Provide in depth matching cavity depth without gap at front or back of mesh. Fabricate approximately 10 inches high with minimum 6 inch high dovetail shape projections.
   a. Available Products:
      1) Advanced Building Products, Inc; Mortar Break DT.
      2) Heckmann Building Products; WallDefender.
      3) Hohmann & Barnard, Inc.; Mortar Trap.
      4) Mortar Net Solutions; MortarNet.
      5) Wire-Bond; Cavity Net DT (3611D).
   b. At cavities with depth greater than 2 inches, provide companion drainage product by one of the manufacturers above; nominal 1/2-inch thickness by 20 inches wide, to be field inserted into cavity in a "U" configuration. Basis-of-Design is "Mortar Catch 352" by Advanced Building Products, Inc.

D. Bond Break: ASTM D226/D226M, Type I ("No.15") asphalt felt or polyethylene tape.

E. Weeps/Cavity Vents:
   1. Cellular Type: Extruded propylene with honeycomb design.
      a. Color(s): To be selected by Architect from manufacturer's full range.
      b. Available Products:
         1) Advanced Building Products, Inc.; Mortar Break weep mesh.
         2) Blok-Lok Limited; Cell-Vent.
         3) CavClear/Archovations, Inc.; CavClear Weep Vent.
         4) Heckmann Building Products Inc.; No. 85 Cell Vent.
         5) Hohmann & Barnard, Inc.; Quadro-Vent.
         6) Mortar Net Solutions; WeepVent.
         7) Wire-Bond; Cell Vent.
   2. Bed Joint Weep System: Corrugated plastic drainage system incorporating continuous drainage strip within cavity portion of wall with integral weephole extensions at 9-1/2 inches on center located above flashing in the bed joint of the veneer masonry. Provide at masonry units over 32 inches long, and as indicated.
      a. Available Products:
         1) Heckmann Building Products; Core/Cavity Vent Weep System #367.
         2) Masonry Technology Incorporated (MTI); Cavity Weep CV 5010.

F. Reinforcing Positioners: Provide wire positioners in bed joints to keep steel reinforcing bars centered in cells, fabricated of 0.1483-inch hot-dip galvanized steel wire.
   1. Available Products:
      a. Heckmann Building Products, Inc.; No. 376 Rebar Positioner.
      b. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
      c. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.09 LINTELS

A. Masonry Lintels: Fabricated of bond beam CMUs, with texture matching adjacent standard CMU. Provide reinforcing bars and grout in accordance with structural requirements. Provide temporary supports until cured.

B. Precast Concrete Lintels: Comply with structural requirements for concrete strength and reinforcing. Precast U-lintels fabricated in accordance with performance standards of PCI MNL-116 with 3500 psi concrete for standard lintels and 6000 psi concrete for prestressed lintels as manufactured by Cast-Crete are acceptable in lieu of rectangular section lintels.

C. Steel Lintels: Refer to Section 055000 - Metal Fabrications.

2.10 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Masonry below grade and in contact with earth: Type S.
   2. Reinforced masonry: Type S.
   3. Mortar parge coats: Type S.
   4. Exterior, loadbearing and non-loadbearing, and interior, loadbearing and non-loadbearing: Type N, except as indicated above.
      a. Interior, non-loadbearing masonry may use Type O at Contractor's option.

B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
   1. Use colored mortar for all veneer masonry. Separate colors shall be required for each type and color of veneer.

C. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

D. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

E. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. For installation in cold or hot weather, comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.04 GENERAL INSTALLATION REQUIREMENTS

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
   1. CMU Coursing: One unit and one mortar joint equal 8 inches.

2. Brick Coursing: Either two or three units with accompanying mortar joints shall equal 8 inches, based on basis-of-design brick size(s) indicated above.

C. Provide running bond for all masonry units unless otherwise indicated.

D. Tool all mortar joints slightly concave where they will be exposed, unless otherwise indicated.
   1. Provide flush joints where they will be concealed by surface-applied treatments or finishes other than paint; including but not limited to tile, wall coverings, fluid-applied or SPF air barriers, or membranes.

E. Calcium Silicate Masonry Units: If substituting for the Basis-of-Design product with a concrete based product meeting ASTM C90, installation must meet the following requirements in addition to general installation requirements of this section:
   1. Provide additional control, expansion, and movement joints to comply with requirements of NCMA TEK 10-04.
   2. Horizontal joint reinforcement shall be spaced at no more than 16 inches O.C. vertically per NCMA TEK 10-04.
   3. Provide continuous bond breaker material between clay masonry and units meeting ASTM C90 standard.
   4. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.05 PLACING AND BONDING

A. Remove broken, cracked, chipped, or otherwise damaged masonry units from pallets and set aside. Do not use unless they may be field cut to remove damaged section, for installation where special shape is required to fit construction.

B. Create a consistent blend for each type of veneer masonry by mixing units from a minimum of three pallets.

C. Provide asphalt felt or polyethylene tape bond-breaker between clay masonry and concrete or other masonry types. Rake back joints for sealant.

D. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

E. Lay hollow masonry units with face shell bedding on head and bed joints.

F. Remove excess mortar and mortar smears as work progresses.

G. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

H. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

I. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
   1. Do not cut masonry unless it is required for certain shapes, such as rowlock sills, or unless it is unavoidable due to fitting around other construction, such as wall penetrations.
   2. Cut masonry edges shall not be visible in the final work. Where special shapes are required that would expose cut edges, they shall be plant-fabricated.

3.06 WEEPS/CAVITY VENTS

A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

3.07 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.08 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHE MASONRY, AND CAVITY WALL MASONRY

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. At parapets and below-grade/foundations, provide joint reinforcement at 8 inches o.c. vertically.

E. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.

F. Lap joint reinforcement ends minimum 6 inches.

G. Do not extend reinforcement across control, expansion, and other building movement joints.

H. Reinforce corners and intersections with prefabricated T- or L-shaped reinforcing.

I. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

J. Embed ties and anchors in mortar joint and extend at least halfway through masonry veneer unit; with at least 5/8 inch mortar cover to the outside face of the anchor.

3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Masonry and/or Metal Framing Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 24 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

3.10 REINFORCEMENT AND ANCHORAGES - COMPOSITE UNIT MASONRY

A. Install continuous horizontal joint reinforcement at 16 inches o.c. vertically, except at below grade foundation walls install at 8 inches o.c. vertically.

B. Where concrete foundations are indicated, tie below-grade masonry to concrete with rigid anchors spaced at maximum 8 inches o.c. vertically.

C. Coordinate with parging/dampproofing and with installation of insulation, where indicated.

3.11 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Remove or cover protrusions or sharp edges that could puncture flashings.
   2. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Terminate flashing up 16 inches minimum on vertical surface of backing:
   1. Anchor vertical leg of flashing into backing with a termination bar and sealant.

C. Extend metal flashings to within 1/2 inch of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.
   1. Notch and hem exterior corners of drip edges to eliminate sharp, exposed cut metal edges at locations below 6' - 0" above grade.

D. Support flexible flashings across gaps and openings.

E. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.12 LINTELS

A. Comply with requirements on Structural Drawings for type of lintel at each opening, additional lintel sizing, reinforcement, and installation requirements.

B. Install loose steel or precast lintels over openings, where indicated.

C. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
   1. Allow masonry lintels to attain specified strength before removing temporary supports.

D. Maintain minimum 8 inch bearing on each side of opening, unless otherwise indicated.

3.13 GROUTED COMPONENTS

A. Comply with requirements on Structural Drawings for locations of structural grouted components and accessories, including but not limited to, grouted bond beams, reinforced unit masonry walls, (including locations and sizing of vertical steel bar reinforcing), grouted solid CMU, and composite wall collar joints.

B. Lap splices minimum 24 bar diameters.

C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

D. Place and consolidate grout fill without displacing reinforcing.

3.14 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

C. Provide control and expansion joints at locations indicated on Drawings, and as follows:
   1. At changes in wall height.
   2. At changes in wall thickness
   3. At change in support (eg: transition from foundation support to floor slab support).
   4. Adjacent to corners of walls within a distance equal to no more than half the maximum control joint spacing.
   5. Wall intersections.
   6. Do not place control joints closer than 16 inches to edge of wall openings (doors, windows, louvers, ducts).
   7. Distance between joints shall not exceed a length to height ratio of 1.5:1.
   8. Distance between joints shall not exceed 25 feet where no openings occur between joints.
   9. Distance between joints shall not exceed 20 feet where openings occur between joints.

3.15 BUILT-IN WORK

A. As work progresses, install built-in metal door frames, anchor bolts, and plates and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Mix mortar (or grout) to a 4-inch maximum slump consistency and hand trowel into place in accordance with Steel Door Institute (SDI-100).
   2. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.16 TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.

B. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.17 CUTTING AND FITTING

A. Cut and fit for chases, pipes, conduit, and other penetrations. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.18 PARGING

A. Dampen masonry walls prior to parging.

B. Parge cavity side of CMU below grade back-up wythe with a single coat of surface-bonding mortar to a total thickness of 1/4 inch.
   1. In lieu of parging, Contractor may at its option apply bituminous dampproofing, at a minimum rate of 1.25 gal per 100 sq. ft. Apply primer if required by manufacturer and comply with manufacturer's installation requirements.

C. Steel trowel surface smooth and flat with a maximum surface variation of 1/8 inch per foot.

D. Strike top edge of parging at 45 degrees.

3.19 FIELD QUALITY CONTROL

A. Field Inspection: The Owner shall engage an independent inspection agency to perform field quality control inspections and prepare field reports.
   1. The Contractor shall permit full access to inspectors in order to perform inspections, including use of temporary facilities and equipment such as scaffolding or lifts.
   2. Do not enclose cavities or spaces to be grouted solid until inspections have approved grout and reinforcement for material properties, size, and installation locations.

B. Field Testing: The Owner shall engage an independent testing agency to perform field quality control tests, as specified in Section 014000 - Quality Requirements. For each type of masonry unit, 5 randomly chosen units shall be sampled for each 5,000 square feet of wall.
   1. Clay Masonry Unit Tests: Testing agency shall test each variety of clay masonry in accordance with ASTM C67/C67M requirements.
   2. Concrete Masonry Unit Tests: Testing agency shall test each variety of concrete unit masonry, of each load-bearing size indicated, in accordance with ASTM C140/C140M requirements.
   3. Mortar Tests: Testing agency shall test each type of mortar in accordance with ASTM C780. Mortar shall be tested on each of the first 3 days. Alert testing agency if mortar mix is altered during construction to allow for retesting.
   4. Grout Test: Testing agency shall test each type of grout in accordance with ASTM C1019. Grout shall be tested on each of the first 3 days. Alert testing agency if grout mix is altered during construction to allow for retesting.

3.20 REPAIR AND CLEANING

A. Remove masonry units that have become damaged or stained, or that do not display acceptable blend of color and texture matching mockup/sample panel. Remove as whole units, do not cut. Replace with new units with fresh mortar joints.

B. Remove excess mortar and mortar droppings.

C. Replace defective mortar and repoint. Enlarge holes or voids at defective mortar, and remove enough adjacent mortar to allow for repointing. Install fresh mortar joint and match to adjacent work.

D. Where expansion/control joints and sealant joints are indicated, clean joints and leave them clear and ready for installation of joint or sealant materials.

E. Clean concrete masonry in accordance with NCMA TEK 08-04A and clean clay masonry in accordance with BIA Technical Notes No. 20. Use hand cleaning/bucket-and-brush methods.

F. To prevent freezing of cleaners and rinse water, do not clean when masonry surface temperature will drop below 40 degrees F.

G. Test cleaning methods and materials on one half of mockup/sample panel; leave the other half uncleaned. Obtain approval of Architect before cleaning the finished work.

H. Protect adjacent non-masonry surfaces from cleaning materials and processes with temporary sheeting or masking.

I. Provide "in-progress" cleaning; clean masonry in each area as soon as possible after mortar has fully cured (approximately 7 to 28 days; coordinate with manufacturer's recommendations for each mortar type specified). Field test a small area to ensure mortar curing is complete prior to large-scale cleaning.

J. Pre-wet masonry surfaces and clean with specified cleaning solution. Rinse surfaces immediately after cleaning; do not allow cleaning solution to dry or set into the masonry.

K. Use non-metallic tools in cleaning operations.

L. Final Cleaning: As part of Project Closeout (prior to Substantial Completion), provide Final Cleaning of masonry veneer. Remove construction dust with a very low pressure rinse. Perform a visual inspection and spot clean to remove efflorescence, staining, or organic growth, in accordance with recommendations of BIA and NCMA technical notes.

3.21 PROTECTION

A. Provide temporary protective waterproof sheet coverings over tops of walls, parapets, sills, and other horizontal projections as the work progresses, in accordance with FIELD CONDITIONS article in Part 1 above.

B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

C. Provide protective vertical boards and horizontal sheeting at grade level base of walls to prevent staining or splashing from rain, mud, or mortar droppings.

3.22 MASONRY WASTE

A. Fill Material: Clean masonry waste may be used as fill material. Break up masonry waste into small pieces no greater than 4 inches any direction. Mix with Division 31 engineered fill material so that masonry waste is no more than 33% of the fill (1 part masonry waste, 2 parts engineered fill). Fill containing masonry waste shall be at least 18 inches below grade level.

1. Excess waste shall be removed and disposed of or recycled in accordance with Division 1 waste disposal requirements.

END OF SECTION 042000

SECTION 047200
CAST STONE MASONRY (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

D. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.

E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates.

G. ASTM C150/C150M - Standard Specification for Portland Cement.

H. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.

I. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.

J. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete.

K. ASTM C1364 - Standard Specification for Architectural Cast Stone.

1.02 SUBMITTALS

A. Product Data: Test results of cast stone components made previously by the manufacturer.

B. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.

C. Selection Samples: In the form of manufacturer's color charts, indicating full range of cast stone colors and textures, and mortar colors.

D. Verification Samples: Cast stone units and mortar will be verified in mock-up panel.

E. Source Quality Control Test Reports.

F. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Current producer member of the Cast Stone Institute or the Architectural Precast Association.
2. Manufacturer's production facility currently holds a Plant Certification from the Cast Stone Institute or the Architectural Precast Association.
3. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.

1.04 MOCK-UP

A. See Section 014000 - Quality Requirements for additional requirements.

B. Integrated Exterior Mockups: Attend preinstallation conference and provide cast stone masonry work for integrated exterior mockup as indicated on Drawings and as specified in Division 1 Section "Quality Requirements."

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

B. Number each piece individually to match shop drawings and schedule.

C. Store cast stone components and installation materials in accordance with manufacturer's instructions.

D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.

E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.

F. Store mortar materials where contamination can be avoided.

G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Architectural Cast Stone:

1. Arban Precast, Ltd.
2. Arriscraft; division of General Shale.
3. Cast Stone Systems, Inc.
4. Continental Cast Stone.
5. Premier Stoneworks, LLC.
6. Reading Rock, Inc.; RockCast.
7. Southern Castings, Inc.
8. Stafford Stone Works.

2.02 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C1364.

1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
4. Color: Color shall match basis-of-design color for calcium silicate masonry units specified in Section 042000 - Unit Masonry (Arriscraft Renaissance "Cafe").
5. Remove cement film from exposed surfaces before packaging for shipment.

B. Shapes: Provide shapes indicated on drawings.
   1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
   2. Unless otherwise indicated on drawings, provide:
      a. Wash or slope of 1:12 on exterior horizontal surfaces.
      b. Drips on projecting components, wherever possible.
      c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.

2.03 MATERIALS

A. Portland Cement: ASTM C150/C150M.
   1. For Mortar: Type I or II, except Type III may be used in cold weather.

B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.

C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.

D. Pigments: ASTM C979, inorganic iron oxides; do not use carbon black.

E. Admixtures: ASTM C494/C494M.

F. Water: Potable.

G. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi), deformed bars, galvanized.
   1. Galvanized in accordance with ASTM A767/A767M, Class I.

H. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.

I. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.

J. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.04 SOURCE QUALITY CONTROL

A. Test compressive strength and absorption of specimens selected at random from plant production.
   1. Test in accordance with ASTM C642.
   2. Select specimens at rate of 3 per 500 cubic feet, with a minimum of 3 per production week.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.

B. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

A. Install cast stone components in conjunction with masonry, complying with requirements of Section 042000.

B. Mechanically anchor cast stone units indicated; set remainder in mortar.

C. Setting:
   1. Drench cast stone components with clear, running water immediately before installation.
   2. Set units in a full bed of mortar unless otherwise indicated.
   3. Fill vertical joints with mortar.
   4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.03 TOLERANCES

A. Joints: Make all joints 3/8 inch, except as otherwise detailed.
   1. Rake mortar joints 3/4 inch for pointing.
   2. Remove excess mortar from face of stone before pointing joints.
   3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
   4. Leave the following joints open for sealant:
      a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
      b. Joints in projecting units.
      c. Joints between rigidly anchored units, including soffits, panels, and column covers.
      d. Joints below lugged sills and stair treads.
      e. Joints below ledge and relieving angles.
      f. Joints labeled "expansion joint".

B. Installation Tolerances:
   1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
   2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
   3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
   4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.04 REPAIR

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet.

B. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.

C. Repair methods and results subject to Architect 's approval.

3.05 CLEANING

A. Clean completed exposed cast stone after mortar is thoroughly set and cured.
   1. Wet surfaces with water before applying cleaner.
   2. Apply cleaner to cast stone in accordance with manufacturer's instructions.
   3. Remove cleaner promptly by rinsing thoroughly with clear water.
   4. Do not use acidic cleaners.

3.06 PROTECTION

A. Protect completed work from damage.

B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION 047200

SECTION 057000
DECORATIVE METAL RAILING (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

B. ADA Standards - 2010 ADA Standards for Accessible Design.

C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

D. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing.

E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

F. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

I. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

J. **ASTM C1172 – Standard Specification for Laminated Architectural Flat Glass. (*AD-03)**

K. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.

L. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.

M. AWS D1.1/D1.1M - Structural Welding Code - Steel.

N. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Schedule and conduct a preinstallation meeting at the Project Site.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, glass, anchors, and accessories.

B. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.

C. **Samples: Provide cherry wood rail samples with manufacturer's standard stain options to verify match to facility woodwork. (*AD-03)**

D. Test Reports: Submit test reports from an independent testing agency showing compliance with specified design and performance requirements.

E. Manufacturer's qualification statement.

F. **Installer's qualification statement. (*AD-03)**

G. Welders' qualification statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

1.04 QUALITY ASSURANCE

A. **Glass Manufacturer Qualifications: Provide glass products with ANSI accredited certifications through the Safety Glazing Certification Council (SGCC) that include plant audits and independent laboratory performance testing. (*AD-03)**

B. Installer Qualifications: Company specializing in installing decorative railing systems and acceptable to manufacturer.

C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.6/D1.6M no more than 12 months before start of scheduled welding work.

1.05 MOCK-UPS

A. **Provide mock-up of each type of railing system, approximately 10 feet long, illustrating each type of material, cladding, and finish. (*AD-03)**

B. See Section 014000 - Quality Requirements for additional requirements.

C. Locate where directed by Architect.

D. Approved mock-up may remain as part of the work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in factory-provided protective coverings and packaging.

B. Protect materials against damage during transit, delivery, storage, and installation at site.

C. Inspect materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.

D. Prior to installation, store materials and components under cover in a dry location.

1.07 FIELD CONDITIONS

A. Do not install railings until project is enclosed and ambient temperature of space is minimum 65 degrees F and maximum 95 degrees F.

B. Maintain ambient temperature of space at minimum 65 degrees F and maximum 95 degrees F for 24 hours before, during, and after railing installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. **Decorative Metal Railings - Aluminum with Stainless Steel Cable Infill, and Structural Glass with Aluminum Base Shoe: (*AD-03)**

1. Global Glass Railings.
2. Morse Industries.
3. Stainless Fabricators, Inc.
4. ViewRail.
5. Viva Railings, LLC.
6. Substitutions: See Section 016000 - Product Requirements.

2.02 RAILING SYSTEMS

A. Railing Systems - General: Factory- or shop-fabricated in design indicated, to suit specific project conditions, and for proper connection to building structure, and in largest practical sizes for delivery to site.

1. Performance Requirements: Design and fabricate railings and anchorages to resist the following loads without failure, damage, or permanent set; loads do not need to be applied simultaneously.
   a. Lateral Force: 75 lb minimum, at any point, when tested in accordance with ASTM E935.
   b. Distributed Load: 50 lb/ft minimum, applied in any direction at the top of the handrail, when tested in accordance with ASTM E935.
   c. Concentrated Loads on Intermediate Rails: 50 psf, minimum.
   d. Concentrated Load: 200 lbs minimum, applied in any direction at any point along the handrail system, when tested in accordance with ASTM E935.
2. Assembly: Join lengths, seal open ends, and conceal exposed mounting bolts and nuts using slip-on non-weld mechanical fittings, flanges, escutcheons, and wall brackets.
3. Joints: Tightly fitted and secured, machined smooth with hairline seams.
4. Field Connections: Provide sleeves to accommodate site assembly and installation.
5. Welded Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
   a. Ease exposed edges to a small uniform radius.
   b. Welded Joints:
      1) Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.
      2) Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.

B. Metal Railing: Engineered, post-supported railing system with cable infill.

1. Configuration: Guardrail with separate handrail.
   a. Height: 42 inch minimum height to top of guardrail.
2. **Posts: 2 inch by 2 inch square structural aluminum tube posts with minimum 0.150-inch wall thickness; high-performance organic finish. (*AD-03)**
3. **Top Guardrail: 2 inch by 1 inch rectangular aluminum tube; high-performance organic finish. (*AD-03)**
4. Handrail: Round, stainless steel, 1-1/2 inch diameter.
5. Decorative Flanges for Embedded Posts: Square, collared cover plate without screw holes.
6. Provide manufacturer's standard brackets for mounting handrail to vertical posts.
7. Fasteners: Manufacturer's standard; fasteners shall be concealed to greatest extend possible.
8. Infill at Cable Railings: Stainless steel cable.
   a. Material: ASTM A666, Type 304 or Type 316; 3/16-inch diameter.
   b. Mounting: Mechanically attached to frame.

C. **Structural Glass Railing: Engineered, base-shoe supported railing system with structural glass and with wood cap rail (guardrail). System shall not have vertical posts. (*AD-03)**

1. **Configuration: Guardrail (wood) only at upper floor level. At stairs, provide wood guardrail and separate aluminum handrail.**

2. **Top Rail (Guardrail): 2 inch diameter cherry. Fabricate with routed slot for mounting over top of 1/2-inch thick glass. Coordinate with facility woodwork to provide a stain matching other woodwork items.**
   a. **Woodwork shall comply with AWI Architectural Woodwork Standards (AWS) Section 7 – Stairwork and Rails; manufacturer's standard grade.**
3. **Hand Rail: Aluminum, 1-1/2 inch diameter, Schedule 40; clear anodized finish.**
   a. **Hand Rail Brackets: Aluminum, clear anodized, matching handrail; with manufacturer's standard attachment for fastening through glass panels. Provide factory cut outs in glass for handrail attachments.**
4. **Base Shoe: Aluminum, ASTM B221/B221M, 6063 alloy, T5 temper; rectangular profile, manufacturer's standard size approx. 2-1/2 to 2-3/4 inches wide by 4 to 4-1/4-inches high. Provide type compatible with 1/2-inch glass thickness. Clear anodized finish.**
5. **Glass: Laminated safety glass, complying with ASTM C1172.**
   a. **Interlayer: Manufacturer's standard, minimum 0.060-inch thick.**
   b. **Impact Strength: Category II, tested in accordance with 16 CFR 1201.**
   c. **Thickness: 1/2 inch.**
   d. **Edges: Ground smooth and polished.**
   e. **Color: Clear, no tint.**

2.03 MATERIALS

A. Aluminum Components: ASTM B221 or ASTM B221M.
   1. **Clear Anodized Finish: Class 1, AAMA 611 AA-M12C22A41, not less than 0.7 mils thick. (*AD-03)**
   2. High-Performance Organic Finish: AAMA 2604; multiple coats, thermally cured fluoropolymer system.

B. Stainless Steel Components:
   1. ASTM A666, Type 304.
   2. Stainless Steel Tubing: ASTM A554, Type 304, 16 gauge, 0.0625 inch minimum metal thickness, 1-1/2 inch diameter.
   3. Stainless Steel Finish: No. 4 Bright Polished finish.

2.04 ACCESSORIES

A. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground smooth.

B. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
   1. For anchorage to concrete, provide inserts to be cast into concrete for bolt anchors.
   2. For anchorage to masonry, provide brackets to be embedded in masonry for bolt anchors.
   3. For anchorage to stud walls, provide backing plates for bolt anchors.
   4. Exposed Fasteners: No exposed bolts or screws.

C. Carbon Steel Bolts and Nuts: ASTM A307.

D. Hydraulic Expansion Cement: ASTM C1107/C1107M.

E. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 0.015 inch dry film thickness per coat.

F. Finish Touch-Up Materials: As recommended by manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate and site conditions are acceptable and ready to receive work.

B. Verify field dimensions of locations and areas to receive work.

C. Notify Architect immediately of conditions that would prevent satisfactory installation.

D. Do not proceed with work until detrimental conditions have been corrected.

E. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates, and supports for attachment of anchors.

3.02 PREPARATION

A. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions, and directions for installation of anchorages and fasteners.

B. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

3.03 INSTALLATION

A. Comply with manufacturer's drawings and written instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, and with tight joints, except where necessary for expansion.

C. Anchor securely to structure.

D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

E. Weld connections that cannot be shop welded due to size limitations.

1. Weld in accordance with AWS D1.1/D1.1M.
2. Match shop welding and bolting.
3. Clean welds, bolted connections, and abraded areas.
4. Touch up shop primer and factory-applied finishes.
5. Repair galvanizing with galvanizing repair paint per ASTM A780/A780M.

F. Isolate dissimilar materials with bituminous coating, bushings, grommets, or washers to prevent electrolytic corrosion.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.05 FIELD QUALITY CONTROL

A. Field Services: Provide the services of the manufacturer for field observation of installation of railings.

3.06 CLEANING

A. Remove protective film from exposed metal surfaces.

B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents, or other substances that may damage the material or finish.

C. **Glass: Clean glazing surfaces; remove excess glazing sealant compounds, dirt, and other substances. (*AD-03)**

3.07 PROTECTION

A. Protect installed components and finishes from damage after installation.

B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.

1. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

END OF SECTION 057000

SECTION 081416
FLUSH WOOD DOORS (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition.

B. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

C. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

D. UL 10B - Standard for Fire Tests of Door Assemblies.

1.02 SUBMITTALS

A. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

B. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

C. Selection Samples: Submit manufacturer's color charts indicating full range of available colors, for each product requiring color selection.

D. Verification Samples: Submit three physical samples of door veneer, approximately 8 by 8 inches in size illustrating standard range of wood grain, stain color, and sheen.

E. Warranty, executed in Owner's name.

1.03 QUALITY ASSURANCE

A. Source Limitations: Provide all flush wood doors from a single manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging, and inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.05 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:

1. Eggers Industries.
2. Lambton Doors.
3. Masonite Architectural; Aspiro Select Wood Veneer Doors.
4. Oshkosh Door.
5. VT Industries, Inc.

2.02 DOORS

A. Doors: See drawings for locations and additional requirements.
   1. Doors shall be manufactured by the hot-press method, bonding faces, crossbands, and core together in a single operation with Type I glue. Doors manufactured by cold-pressing 2- or 3-ply pre-manufactured door skins to multiple cores in the same press will not be accepted.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at each location.
   2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled.
      a. Provide stile construction with concealed intumescent seals at pairs of doors, meeting required fire-ratings without the need of astragal or metal edge construction.

2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), particleboard Grade LD-2 per ANSI A 208.1; plies and faces as indicated.
   1. Provide structural-composite-lumber (SCLC) core for doors with glazing area cut out for 9-inch stile width doors.
   2. Provide structural-composite-lumber (SCLC) core for doors with exit devices.

B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

A. Veneer Facing for Transparent Finish: ~~Red oak~~ **Cherry (*AD-03)**, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. Vertical Edges: Any option allowed by quality standard for grade.
   2. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.

2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
   1. Provide solid blocks at lock edge for hardware reinforcement.

C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

D. For doors indicated to be factory-finished, factory install glazing in doors in compliance with quality standards specified, using manufacturer's standard elastomeric glazing sealant.

E. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

F. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

G. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

A. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 5, Varnish, Conversion or System 11, catalyzed polyurethane.
      b. Sheen: Satin.

B. Factory finish doors in accordance with approved sample.

C. Seal door top edge with color sealer to match door facing where doors will be exposed to view from above.

2.07 ACCESSORIES

A. Wood Louvers:
   1. Material and Finish: Match species of door panels.

B. Metal Louvers:
   1. Material and Finish: Roll formed steel; pre-painted finish to color as selected.
   2. Louver Blade: Inverted V blade, sight proof, light proof; fire rated to indicated rating, with fusible link designed to UL requirements.

C. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws. At fire-rated doors, provide noncombustible wood stops with concealed metal clips for indicated fire rating.

D. Door Hardware: Refer to Section 087100.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

A. Comply with specified quality standard for fit and clearance tolerances.

B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

END OF SECTION 081416

SECTION 081433
STILE AND RAIL WOOD DOORS (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. AWI (QCP) - Quality Certification Program.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition.

C. {RSTEMP#1686}ITS (DIR) - Directory of Listed Products{CH#49476}.

D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

E. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

F. UL (DIR) - Online Certifications Directory.

G. UL 10B - Standard for Fire Tests of Door Assemblies.

1.02 SUBMITTALS

A. Product Data: Indicate stile and rail core materials and construction; veneer species, type and characteristics.

B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, and cutouts for glazing.

C. Selection Samples: Manufacturer's color charts and swatches for hardwood species and stain finishes, indicating full range of materials and colors.

D. Verification Samples: Corner section of door, minimum 8- by 8-inch, indicating stile and rail construction, face and edge veneer, wood species and stain finish, to match that selected.

E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

F. Manufacturer's qualification statement.

G. Warranty, executed in Owner's name.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, FSC-accredited chain-of-custody manufacturer.

B. Quality Certification:

1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
2. Provide labels or certificates indicating that installed work complies with AWI/AWMAC/WI (AWS) requirements for grade or grades specified.
3. Provide designated labels on shop drawings as required by certification program.
4. Provide designated labels on installed products as required by certification program.
5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver, and store doors in accordance with quality standard specified.

B. Accept doors on site in manufacturer's packaging, and inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.05 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
   1. Provide warranty on glass vision panels for minimum 5 years.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Stile and Rail Wood Doors:
   1. Artistic Doors and Windows, Inc.
   2. Dimension Millworks.
   3. Masonite Architectural; Aspiro Authentic Stile & Rail Doors.
   4. VT Industries, Inc; Eggers Stile and Rail Doors.
   5. Substitutions: See Section 016000 - Product Requirements.

2.02 DOORS

A. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS), unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; solid lumber construction; mortise and tenon joints. Transparent finish.

2.03 DOOR AND PANEL FACINGS

A. Veneer Facing for Transparent Finish: ~~Red Oak~~ **Cherry, (*AD-03)** veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. Pairs: Pair match each pair; set match pairs within 10 feet of each other when doors are closed.

B. Adhesive: Type II - Water Resistant.

2.04 DOOR CONSTRUCTION

A. Vertical Exposed Edge of Stiles: Of same species as veneer facing.

B. Fit door edge trim to edge of stiles after applying veneer facing.

C. Bond edge banding to cores.

D. Panels: Raised, solid wood. Provide panel layouts as indicated on Drawings.
   1. Panel Trim/Sticking: Selected by Architect from manufacturer's standard range of sticking profiles.

E. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.

F. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

G. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

H. Factory install glazing in doors in compliance with quality standards specified, using manufacturer's standard elastomeric glazing sealant.

I. Fire Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

J. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with NFPA 252 or UL 10B - Negative (Neutral) Pressure; listed in UL (DIR) or ITS (DIR) and without any visible seals when door is open.

2.05 FINISHES

A. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 5, Varnish, Conversion or System - 11, Polyurethane, Catalyzed.
      b. Stain: As selected by Architect.
      c. Sheen: Satin.

B. Factory finish doors in accordance with approved sample.

2.06 ACCESSORIES

A. Glazing: See Section 088000.

B. Door Hardware: See Section 087100.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standards.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Machine cut for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

A. Comply with specified quality standard for fit, clearance, and joinery tolerances.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

END OF SECTION 081433

SECTION 093000
TILING (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar.

B. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar.

C. ANSI A108.1c - Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar.

D. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship.

E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive.

F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.

G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy.

H. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout.

I. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework.

J. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone.

K. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar.

L. ANSI A108.20 - American National Standard Specifications for Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs.

M. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.

N. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar.

O. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation.

P. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone.

Q. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.

R. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar.

S. ANSI A137.1 - American National Standard Specifications for Ceramic Tile.

T. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting at the Project Site one week before starting work of this section; require attendance by affected installers.
   1. Review substrate preparation requirements.
   2. Review each type of tile, mortar, grout, and TCNA installation methods.
   3. Review requirements for waterproofing and/or crack isolation membrane(s).

1.03 SUBMITTALS

A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
   1. Include waterproofing details at floor drains, shower pans, cove base, and thresholds.

C. Installer's Qualification Statement.
   1. Submit documentation of National Tile Contractors Association (NTCA) or Tile Contractors' Association of America (TCAA) accreditation.
   2. Submit documentation of completion of apprenticeship and certification programs.

D. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall have documented experience of work similar in scope, materials, and design to that indicated for this Project, with a record of successful in-service performance, with references upon request. Installer shall hold company-wide accreditation or employ individuals with one of the listed certifications (comply with at least one):
   1. Company-wide accreditation from one of the following:
      a. Accredited Five-Star member of the National Tile Contractors Association (NTCA) or Trowel of Excellence member of the Tile Contractors' Association of America (TCAA).
   2. Installer Certification:
      a. Ceramic Tile Education Foundation (CTEF): Certified Tile Installer (CTI).
      b. Apprenticeship Program: Installer has achieved Journeyworker status through an apprenticeship from the International Union of Bricklayers and Allied Craftworkers (IUBAC) or a U.S. Department of Labor (DOL)-recognized program.

1.05 MOCK-UPS

A. See Section 014000 - Quality Requirements for general requirements for mock-up.

B. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.
   1. Provide mock-up of minimum 5 square feet for each type of floor tile, unless otherwise indicated.
   2. Provide mock-up of minimum 5 square feet for each type of wall tile, unless otherwise indicated.
   3. Approved mock-up may remain as part of the Work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store tile, grout, and mortar off the ground, protected from weather and water infiltration.

B. Store products in unopened containers or packages until ready for use.

C. Protect materials from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature and humidity at levels required by referenced ANSI and TCNA tile standards, and per manufacturer's instructions.

PART 2 PRODUCTS

2.01 TILE (*AD-03)

A. Matte Porcelain Tile, Type **[P-TILE-A]**: ANSI A137.1 standard grade.
   1. Size: 12 by 24 inch, nominal.
   2. Thickness: 9 mm.
   3. Edges: Rectified.
   4. Color(s): To be selected by Architect from manufacturer's full range.
   5. Trim Units: Matching bullnose, cove base, and cove shapes in sizes coordinated with field tile.
   6. Products:
      a. Architessa; "Midas" Honed (Basis of Design)
      b. Daltile; "Society" Honed
      c. Mosaic Tile Co; Crossville "Moonstruck" Unpolished
      d. Best Tile; "Breton" Matte
      e. Stonepeak Ceramics; "Highland Collection" Honed
      f. Substitutions: See Section 016000 - Product Requirements.

B. Polished / Glazed Porcelain Tile, Type **[P-TILE-B]**: ANSI A137.1 standard grade.
   1. Size: 12x24in
   2. Thickness: 9 mm.
   3. Color(s): To be selected by Architect from manufacturer's full range.
   4. Products:
      a. Architessa; "Midas" Polished (Basis of Design)
      b. Daltile; "Society" Polished
      c. Mosaic Tile Co; Crossville "Moonstruck" Semi-Polished
      d. Best Tile; "Breton" Polished
      e. Stonepeak Ceramics; "Highland Collection" Polished
      f. Substitutions: See Section 016000 - Product Requirements.

C. Accent Pattern Wall Porcelain Tile, Type **[P-TILE-C]**: ANSI A137.1 standard grade.
   1. Size: *Varies, refer to Products Section below.*
   2. Surface Finish: Honed / Matte
   3. Color(s): To be selected by Architect from manufacturer's full range.
   4. Products:

a. Architessa; Davenport Patterns - Chain, Mosaic (Basis of Design)
b. Daltile, Starcastle Glass, Mosaic
c. Genrose Stone + Tile; "Materia Porcelain Tile - Deco" 2"x6"
d. BF Ceramics; "Elegance Squared Mosaic"
e. Crossville, Inc.
f. Ceramic Technics, LTD
g. Florida Tile, Inc.
h. Substitutions: See Section 016000 - Product Requirements.

2.02 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
   1. Applications:
      a. Open edges of wall tile.
      b. Open edges of floor tile.
      c. Wall corners, outside and inside.
      d. Transition between floor finishes of different heights.
      e. Thresholds at door openings.
      f. Expansion and control joints, floor and wall.
      g. Floor to wall joints.
      h. Borders and other trim as indicated on drawings.
   2. Manufacturers:
      a. Schluter-Systems.
      b. Genesis APS International.
      c. Blanke.
      d. Ceramic Tool Company (CTC).
      e. Substitutions: See Section 016000 - Product Requirements.

B. Thresholds: 2 inches wide by full width of wall or frame opening; beveled edge on both long edges; without holes, cracks, or open seams.
   1. Material: Marble, honed finish.
   2. Applications:
      a. At doorways where tile terminates.

2.03 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. Modified Dry-Set Mortar (Thinset): ANSI A118.4.
   1. Applications: Use this type at all locations where thinset mortar is indicated, unless otherwise indicated.
   2. Products:
      a. Custom Building Products; VersaBond Professional Thin-Set Mortar.
      b. H.B. Fuller Construction Products, Inc.; TEC Full Flex TA 390/391.
      c. LATICRETE International, Inc.; 252 Silver.
      d. MAPEI Corporation; Ultraflex 2.

e. Summitville Tiles, Inc.; S-1000 MP Thin-Set Latex Mortar.
f. Substitutions: See Section 016000 - Product Requirements.

C. Latex-Portland Cement LHT Mortar (Medium-Bed): ANSI A118.4.
1. Applications: Use this type of bond coat where Large and Heavy Tile (LHT) mortar is indicated, in a 1/4- to 3/8-inch thick medium-bed application.
2. Products:
a. Custom Building Products; ProLite Premium Rapid Setting Large Format Tile Mortar, with Multi-Surface Bonding Primer.
b. H.B. Fuller Construction Products, Inc; TEC Ultimate Large Tile Mortar.
c. LATICRETE International, Inc; 257 TITANIUM.
d. MAPEI Corporation; Ultraflex LFT.
e. Merkrete, by Parex USA, Inc; Merkrete 735 Premium Flex.
f. Summitville Tiles, Inc.; S-1200 MP Premium Medium Bed Mortar.
g. Substitutions: See Section 016000 - Product Requirements.

2.04 GROUTS

A. Provide setting and grout materials from same manufacturer.

B. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
3. Color(s): To be selected by Architect from manufacturer's full range.
4. Products:
a. Custom Building Products; Prism Color Consistent Grout.
b. H.B. Fuller Construction Products, Inc; TEC AccuColor Plus Grout.
c. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout.
d. MAPEI Corporation; Ultracolor Plus.
e. Merkrete, by Parex USA, Inc; Merkrete Pro Grout.
f. Substitutions: See Section 016000 - Product Requirements.

C. Water-Cleanable Epoxy Grout: ANSI A118.3 stain-resistant epoxy grout.
1. Applications: Where indicated.
2. Heat Resistance: Tested by manufacturer for continuous exposure up to 140 deg F, and intermittent exposure up to 212 deg F.
3. Color(s): To be selected by Architect from manufacturer's full range.
4. Products:
a. Custom Building Products; CEG-Lite 100% Solids Commercial Epoxy Grout.
b. H.B. Fuller Construction Products, Inc; TEC AccuColor EFX Epoxy Special Effects Grout.
c. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout.
d. MAPEI Corporation; Kerapoxy CQ.
e. Merkrete, by Parex USA, Inc; Merkrete Pro Epoxy.
f. Summitville Tiles, Inc; S-500 Ultra Max.

g. Substitutions: See Section 016000 - Product Requirements.

2.05 MAINTENANCE MATERIALS

A. Tile Sealants: Moisture- and mildew-resistant type sealants; one-part silicone for wall applications and multi-part urethane for floor applications. Sealants and accessories shall comply with requirements below and with requirements of Division 7 Section "Joint Sealants."
   1. Color(s): As selected by Architect from manufacturer's full line. Sealant colors shall match grout colors in adjacent joints unless otherwise indicated.
   2. Silicone Sealant (Walls): ASTM C 920, Type S, Grade NS, Class 25; Uses NT (non-traffic), G (glass), A (aluminum), O (other substrates indicated).
      a. Products:
         1) GE Silicones, a division of GE Specialty Materials; SCS1700 Sanitary.
         2) Pecora Corporation; Pecora 898 NST.
         3) Tremco Inc.; Tremsil 200.
         4) Substitutions: See Section 016000 - Product Requirements.
   3. Urethane Sealant (Floors): ASTM C 920, Type M, Grade P, Class 25; Uses T (traffic), M (mortar), A (aluminum), O (other substrates indicated).
      a. Products:
         1) Master Builders Solutions; MasterSeal SL 2.
         2) Pecora Corporation; NR-200 Urexpan.
         3) Sika Corporation; Sikaflex-2c SL.
         4) Tremco Inc.; THC-901.
         5) Substitutions: See Section 016000 - Product Requirements.
   4. Sealant Accessories: Provide backer rod, primer, and other sealant accessories as recommended by sealant manufacturer for applications required.

B. Grout Sealer: Liquid-applied, penetrating, moisture and stain protection for existing or new Portland cement grout.
   1. Composition: Water-based colorless silicone.
   2. Products:
      a. Custom Building Products; Aqua Mix Sealer's Choice Gold.
      b. Merkrete, by Parex USA, Inc; Merkrete Grout Sealer.
      c. SGM, Inc.; Grout Sealer.
      d. Summitville Tiles, Inc.; SL-99 Summitseal II.
      e. Substitutions: See Section 016000 - Product Requirements.

C. Tile Sealer: Stain protection for exposed surfaces of unglazed ceramic tile, other porous tile, and grout. Provide penetrating sealer with no sheen, preserving natural tile appearance.
   1. Products:
      a. Custom Building Products; Aqua Mix Sealer's Choice Gold.
      b. Rust-Oleum Corporation; Miracle Sealants 511 Impregnator Natural Looking Penetrating Sealer.
      c. STONETECH, a division of LATICRETE international, Inc; STONETECH Heavy Duty Sealer.
      d. Substitutions: See Section 016000 - Product Requirements.

D. Grout Release: Temporary, water-soluble pre-grout coating.

1. Products:
    a. Custom Building Products; Aqua Mix Grout Release.
    b. MAPEI Corporation; UltraCare Grout Release.
    c. Substitutions: See Section 016000 - Product Requirements.

2.06 ACCESSORY MATERIALS

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
    1. Crack Resistance: No failure at 1/8 inch gap, minimum.
    2. Peel-and-Stick Sheet Type:
        a. Material: Rubberized membrane laminated to reinforcing fabric.
        b. Thickness: 40 mils, nominal.
        c. Products:
            1) Boiardi Products Corp.; a QEP company; Elastiment 340 Sound Control Sheet Membrane Waterproofing and Anti-Fracture/Crack-Suppression System.
            2) Custom Building Products; Crack Buster Pro-Crack Prevention Mat Underlayment.
            3) MAPEI Corporation; Mapeguard 2.
            4) National Applied Construction Products, Inc.; ECB Anti-Fracture Membrane.
            5) Substitutions: See Section 016000 - Product Requirements.

B. Waterproofing Membrane: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
    1. Crack Resistance: No failure at 1/8 inch gap, minimum; comply with ANSI A118.12.
    2. Fluid or Trowel Applied Type with Embedded Reinforcing Fabric:
        a. Material: Synthetic rubber or Acrylic.
        b. Thickness: 30 mils, minimum, dry film thickness.
        c. Products:
            1) Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane.
            2) H.B. Fuller Construction Products, Inc; TEC HydraFlex Waterproofing Crack Isolation Membrane.
            3) LATICRETE International, Inc; 9235 Waterproofing Membrane.
            4) MAPEI Corporation; Mapelastic AquaDefense.
            5) Merkrete, by Parex USA, Inc; Merkrete Hydro Guard 2000.
            6) Summitville Tiles, Inc.; S-9000.
            7) Substitutions: See Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work, per ANSI A108.01, and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. For ease of cleaning and to prevent staining, precoat tile with temporary grout release. For unglazed ceramic and other porous tile types, provide either combination tile sealer/grout release, or a temporary grout release with final tile sealer applied after tile installation.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.20, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install non-ceramic trim in accordance with manufacturer's instructions.

G. Install thresholds where indicated.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control and expansion joints free of mortar, grout, and adhesive.

J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F122/F122A, over combination waterproofing/crack-isolation membrane, with latex-Portland cement grout.

1. Provide modified dry-set mortar in a standard thinset bed, except provide LHT mortar in a 1/4- to 3/8-inch medium bed at all large format tile (tile 12 inches or greater in any dimension).

3.05 INSTALLATION - WALL TILE

A. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.06 CLEANING

A. Clean tile and grout surfaces.

3.07 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION 093000

SECTION 096513
RESILIENT BASE AND ACCESSORIES (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

C. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile.

D. ASTM F1861 - Standard Specification for Resilient Wall Base.

E. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

F. ASTM F2169 - Standard Specification for Resilient Stair Treads.

G. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

H. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.02 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

B. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

C. Protect roll materials from damage by storing on end.

1.04 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

B. Maintain conditions at occupancy conditions for installation and until Substantial Completion.

PART 2 PRODUCTS

2.01 RESILIENT BASE (*AD-03)

A. Resilient Base: ASTM F1861, Type **[RB-A]**, Rubber base - Profile

1. Products:

a. Roppe, “Contours Profiled Wall Base – Intrigue #90 PV4090” (Basis of Design)

b. Mannington Commercial; “Sculptured Wall Base – Iconic EEICO”

c. Flexco (USA), Inc. “Base Sculptures Wall Base – Captivate”
d. Johnsonite, a Tarkett Company; “Millwork Wall Base System – “Delineate”
e. The Coveworks Inc; “Rubber Wall Base, Zest Collection – Elevated”
f. Substitutions: See Section 016000 - Product Requirements.

2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
3. Height: 4 inch.
4. Thickness: 0.125 inch minimum.
5. Finish: Satin.
6. Length: Roll; manufacturer's standard length.
7. Color: To be selected by Architect from manufacturer's full range.

B. Resilient Base: ASTM F1861, Type **[RB-B]**, Rubber base - No toe outside corner
1. Products:
a. Roppe,
b. Mannington Commercial
c. Flexco (USA), Inc.
d. Johnsonite, a Tarkett Company
e. Substitutions: See Section 016000 - Product Requirements.
2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
3. Height: 4 inch.
4. Thickness: 0.125 inch minimum.
5. Finish: Satin.
6. Length: Roll; manufacturer's standard length.
7. Color: To be selected by Architect from manufacturer's full range.

2.02 STAIR COVERING (*AD-03)

A. Stair Tread with Intergral Riser and Contrasting Nosing: Rubber; full width and depth of stair tread in one piece; tapered thickness.
1. Manufacturers:
a. C.I. Takiron; One Piece Treads/Risers - Pathways (Basis of Design)
b. Roppe
c. Flexco
d. Mannington Commercial
e. Johnsonite; Tarkett
f. Substitutions: See Section 016000 - Product Requirements.
2. Minimum Requirements: Comply with ASTM F2169, Type TV, Class 2.
3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
4. Nominal Thickness: 0.250 inch, tapered towards rear.
5. Nosing: Square, adjustable; 1-1/2 inch height.
6. Texture: Slip-Resistant surface, with pattern selected from manufacturer's full range.
7. Color: To be selected by Architect from manufacturer's full range.

B. ~~Stair Stringers: Full height in one piece and in maximum available lengths, matching treads in material and color.~~
   1. ~~Manufacturer: Provide stringers by same manufacturer as treads.~~
   2. ~~Nominal Thickness: 0.080 inch.~~

2.03 MOLDINGS, TRANSITIONS, AND EDGE STRIPS

A. Moldings, Transition and Edge Strips:
   1. Manufacturers:
      a. Flexco, Inc.
      b. Johnsonite.
      c. Mannington Commercial.
      d. R.C.A. Rubber Company (The).
      e. Roppe Corporation.
      f. VPI, LLC; Floor Products Division.
      g. Substitutions: See Section 016000 - Product Requirements.
   2. Molding/Transition Strip Profiles: Provide in sizes as required to suit flooring thicknesses and applications.
      a. Coved edge/cap for carpet.
      b. Joiner between carpet and resilient flooring or other materials with different heights.
      c. Transition strip between different types of materials that are the same height or between different styles/patterns of the same material.
      d. Slim transition strip with approximately 1/4-inch wide visible transition profile.
      e. Reducer strip at edges of flooring to reduce height to 0".
      f. Subfloor leveling accessory to transition between materials with height differences up to 1/2 inch.
   3. Material: Manufacturer's standard rubber or vinyl.
   4. Color: To be selected by Architect from manufacturer's full range.

2.04 ACCESSORIES

A. Leveling Compound: Blended cement mix, latex-modified, for use as trowelable underlayment, approved by resilient accessory manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

C. Moisture Vapor Treatment: Where resilient flooring and accessories are installed over concrete slabs, provide alkaline-resistant product designed to control excessive moisture vapor transmission through concrete slab, per the following:
   1. Products: Provide product approved by flooring manufacturer and complying with performance requirements below, equivalent to one of the following:
      a. Duraamen Engineered Products, Inc.; Perdure MVT.
      b. Maxxon Corporation; Maxxon MVP.
      c. Tnemec Company Inc.; Epoxoprime MVT, Series 208.
   2. Performance Requirements:
      a. Verify with flooring manufacturer that submitted product maintains compliance with all provisions of flooring manufacturer’s warranty.
      b. Low-VOC: Provide product with VOC content less than 15 g/L.

c. Bond Strength to Concrete: Minimum 400 psi per ASTM D 4541 (100% concrete failure).

d. Permeance: Maximum 0.1 perm per ASTM E 96, and 0.10 grains/hr/ft^2/in-Hg, per ASTM F3010.

e. Applications: Provide MVT for all concrete slabs on-grade and lightweight concrete elevated slabs.

D. Floor Polish: Fluid-applied polish recommended by resilient flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

1. Do not apply wall base until other finish items, including casework and painting, are complete.

C. Cementitious Subfloor Surfaces (Stair Treads/Landings): Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).

1. Test as Follows:

a. Alkalinity (pH): ASTM F710, when required by stair accessory manufacturer.

b. Internal Relative Humidity: ASTM F2170. One test per stair area.

c. Moisture Vapor Emission: ASTM F1869. One test per stair area.

2. If test results are not within limits recommended by stair accessory manufacturer, apply moisture vapor treatment (MVT) in accordance with manufacturer's requirements. MVT shall be provided per unit price and quantity allowance requirements.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with leveling compound to achieve smooth, flat, hard surface.

C. Prohibit traffic until leveling compound is fully cured.

D. Clean substrate.

3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Adhesive-Applied Installation:

1. Fit joints and butt seams tightly.

2. Set flooring in place, press with heavy roller to attain full adhesion.

D. Where type of floor finish, pattern, or color are different on opposite sides of door, install such that molding profiles or transition strips are centered under the door panel.

E. Install edge/reducer strips at unprotected or exposed edges, where flooring terminates, and where indicated.
   1. Resilient Strips: Attach to substrate using adhesive.

3.04 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Install base on solid backing. Bond tightly to wall and floor surfaces.

C. Job form internal and external corners in accordance with manufacturer's instructions. Form corners by "V" cutting or scribing; do not bend material in a manner that creates stress whitening.

D. In addition to walls, install base on other permanent construction with exposed vertical faces at floor level, including, but not limited to, columns, pilasters, and casework/cabinet knee and toe spaces.

E. Scribe and fit to door frames and other interruptions.

F. At uneven substrate surfaces (such as masonry mortar joints), provide manufacturer's recommended filler sealant or adhesive to fill voids along top of base.

3.05 INSTALLATION - STAIR COVERINGS

A. Install stair coverings in one piece for full width and depth of tread.

B. Install stringers configured tightly to stair profile.

C. Adhere over entire surface. Fit accurately and securely.

D. Clean stair tread and landing accessories and apply floor polish according to manufacturer's written instructions.

3.06 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.07 PROTECTION

A. Prohibit traffic on resilient accessories for 48 hours after installation.

B. Cover resilient accessories and protect from heavy construction traffic and equipment until Substantial Completion.

END OF SECTION 096513

SECTION 096519
RESILIENT TILE FLOORING (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.02 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

B. Shop Drawings: Indicate seaming plans, floor patterns, and dye lot.

C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

D. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 - Product Requirements, for additional provisions.
2. Extra Flooring Material: Quantity equivalent to 5 percent of each type and color.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

1.04 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.05 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer's Warranty: Provide a ten (10) year manufacturer warranty, covering defective material and installation.

C. Installer's Warranty: Installer shall warrant that the products have been installed in accordance with manufacturer's instructions.
   1. The installer shall provide a ten (10) year warranty against product failure due to excessive moisture vapor transmission through the slab.

PART 2 PRODUCTS

2.01 TILE FLOORING (*AD-03)

A. Vinyl Tile - LVT: Printed film type, with transparent or translucent wear layer; acoustic interlayer or backing.
   1. Manufacturers:
      a. J+J Flooring; "Classics II"; and "Tatami" (Basis of Design)
      b. Tarkett; "iD Lattitude" Series
      c. Shaw Contract; "Terrain II"; "Terrace"
      d. Six Degrees; "Compass"
   2. Minimum Requirements: Comply with ASTM F1700, Class III (Printed Film Vinyl Tile).
      a. Type: Type B; Embossed Surface.
   3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648.
   4. Plank Tile Size: 6"x48" / 9"x48" / 18"x36"
   5. Wear Layer Thickness: 20 mil, minimum.
   6. Color and Pattern: To be selected by Architect from manufacturer's full range.

2.02 ACCESSORIES

A. Subfloor Filler: Type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

C. Moisture Vapor Treatment: Where resilient flooring and accessories are installed over concrete slabs, and where field testing indicates high moisture vapor testing through concrete slabs, provide alkaline-resistant product designed to control excessive moisture vapor transmission through concrete slab in accordance with Division 01 MVT allowance and unit price, and per the following:
   1. Products: Provide product approved by flooring manufacturer and complying with performance requirements below, equivalent to one of the following:
      a. Duraamen Engineered Products, Inc.; Perdure MVT.
      b. Maxxon Corporation; Maxxon MVP.
      c. Tnemec Company Inc.; Epoxoprime MVT, Series 208.
   2. Performance Requirements:
      a. Verify with flooring manufacturer that submitted product maintains compliance with all provisions of flooring manufacturer’s warranty.
      b. Low-VOC: Provide product with VOC content less than 15 g/L.
      c. Bond Strength to Concrete: Minimum 400 psi per ASTM D 4541 (100% concrete failure).
      d. Permeance: Maximum 0.1 perm per ASTM E 96, and 0.10 grains/hr/ft^2/in-Hg, per ASTM F3010.

e. Applications: Provide MVT for all concrete slabs on-grade and lightweight concrete elevated slabs.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
   1. Test as Follows: Perform one of each test per 1,000 sf of installation area.
      a. Alkalinity (pH): ASTM F710.
      b. Internal Relative Humidity: ASTM F2170.
      c. Moisture Vapor Emission: ASTM F1869.
   2. If test results are not within limits recommended by flooring manufacturer, apply moisture vapor treatment (MVT) in accordance with manufacturer's requirements. MVT shall be provided per unit price and quantity allowance requirements.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is fully cured.

D. Clean substrate.

3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Adhesive-Applied Installation:
   1. Fit joints and butt seams tightly.
   2. Set flooring in place, press with heavy roller to attain full adhesion.

D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
   1. Resilient Strips: Attach to substrate using adhesive.

F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern, unless otherwise indicated.

C. Install plank tile with a random offset of at least 6 inches from adjacent rows.

3.05 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.06 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION 096519

SECTION 097200
WALL COVERINGS (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics.

D. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

E. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board.

F. SCAQMD 1168 - Adhesive and Sealant Applications.

1.02 SUBMITTALS

A. Product Data: Provide data on wall covering and adhesive.

B. Shop Drawings: Indicate wall elevations with seaming layout.

C. Selection Samples: Provide manufacturer's full range of color and pattern information.

D. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 - Product Requirements, for additional provisions.
2. Extra Wall Covering Materials: 25 linear feet of each color and pattern of wall covering; store where directed.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.04 MOCK-UPS

A. Provide panel, approximately 10 feet wide, full height, illustrating installed wall covering and joint seaming technique. Include inside and outside corner, as applicable.

B. Locate where directed by Architect.

C. Mock-up may remain as part of the Work.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inspect roll materials at arrival on site, to verify acceptability.

B. Protect packaged adhesive from temperature cycling and cold temperatures.

C. Do not store roll goods on end.

1.06 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.

B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surfaces.

PART 2 PRODUCTS

2.01 WALL COVERINGS (*AD-03)

A. General Requirements:

1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
2. Chemical and Stain Resistance: No visible staining or discoloration and no damage to surface texture when tested in accordance with ASTM D1308.
3. Low-Emitting Materials:
   a. Paints and Coatings: Paints and coatings field-applied inside the weatherproofing system shall be tested and determined compliant in accordance with CAL (CDPH SM) AND shall meet applicable VOC limits of CARB (SCM) or SCAQMD 1113.
   b. Adhesives and Sealants: Adhesives and sealants field-applied inside the weatherproofing system shall be tested and determined compliant in accordance with CAL (CDPH SM) AND shall meet the chemical content requirements of SCAQMD 1168.

B. Protective Wall Covering – Type III **[VWC-A]** *fabric-look* : Woven-backed vinyl roll stock with a protective coating.

1. Comply with ASTM F793/F793M, Category VI, Type III.
2. Roll Width: 52 inches.
3. Backing: Woven fabric.
4. Color: As selected by designer from manufacturer's full range.
5. Pattern Match: Random Match, Reverse Hang
6. Repeat: n/a
7. Abrasion Resistance; ASTM D-4977, Level 3
8. Impact Resistance; ASTM D-5420, Level 2
9. Manufacturers:
   a. Koroseal/RJF International; “Urbane” (Basis of Design)
   b. Wolf-Gordon; “Sparta”
   c. Momentum; “P3TEC, Stellar”
   d. MDC Wallcoverings; “Duratec”
   e. Substitutions: See Section 016000 - Product Requirements.
10. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
11. Trims: Corners and top edge - Metal.
12. Trim Color: As selected by designer from manufacturer's full range.
13. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.

14. Substrate Primer and Sealer: Alkyd enamel type.

C. Protective Wall Covering – Type III **[VWC-B]** *wood-look*: Woven-backed vinyl roll stock with a protective coating.
1. Comply with ASTM F793/F793M, Category VI, Type III.
2. Roll Width: 52 inches.
3. Backing: Woven fabric.
4. Color: As selected by designer from manufacturer's full range.
5. Pattern Match: Random Match, Reverse Hang
6. Repeat: n/a
7. Abrasion Resistance; ASTM D-4977, Level 3
8. Impact Resistance; ASTM D-5420, Level 2
9. Manufacturers:
   a. Koroseal/RJF International; “Nordic” (Basis of Design)
   b. Wolf-Gordon; “Spruce”
   c. Momentum; “P3TEC, Alpine”
   d. MDC Wallcoverings; “Duratec”
   e. Substitutions: See Section 016000 - Product Requirements.
10. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
11. Trims: Corners and top edge - Metal.
12. Trim Color: As selected by designer from manufacturer's full range.
13. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
14. Substrate Primer and Sealer: Alkyd enamel type.

D. Impact Resistant Wall Covering– **[IRWC]**: PVC-Free Rigid Sheet Product
1. Comply with ASTM F793/F793M, Category VI, Type III.
2. Sheet Width: 48”
3. Nominal Thickness: 0.40”
4. Color: As selected by designer from manufacturer's full range.
5. Pattern Match: Random Match, Reverse Hang
6. Repeat: n/a
7. Abrasion Resistance; ASTM D-4977, Level 3
8. Impact Resistance; Provide wall protection components that have been tested for impact using a ram-type impact test in accordance with the applicable provisions of ASTM F476 - 84.
9. Fire performance characteristics: Provide engineered PVC FREE wall protection system components identical to those tested in accordance with ASTM E84 for Class A/1 characteristics listed below:
   a. Flame spread: 25 or less
   b. Smoke developed: 450 or less
10. Manufacturers:
    a. Construction Specialties; “Acrovyn by Design – Textile Collection” (Basis of Design)
    b. Koroseal/RJF International

c. Wolf-Gordon
d. Momentum
e. MDC Wallcoverings, Duratec
f. Substitutions: See Section 016000 - Product Requirements.

11. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
12. Trims: Corners and top edge - Metal.
13. Trim Color: As selected by designer from manufacturer's full range.
14. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
15. Substrate Primer and Sealer: Alkyd enamel type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.

B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.

C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.

3.02 PREPARATION

A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.

B. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.

C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

D. Surfaces: Correct defects and clean surfaces that affect work of this section. Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions. Minimum Level 3 wall finish is required; for surfaces with Level 5 finish, ensure the surface and any surface coatings are fully dry and cured.

E. Marks: Seal with shellac those that may bleed through surface finishes.

F. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.

G. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION

A. Apply adhesive and wall covering in accordance with manufacturer's instructions.

B. Apply adhesive to wall surface immediately prior to application of wall covering.

C. Use wall covering in ~~roll~~ number sequence.

D. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.

E. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.

F. Butt edges tightly.

G. Do not seam within 2 inches of internal corners or within 6 inches of external corners.

H. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.

I. Do not install wall covering more than 1/4 inch below top of resilient base.

J. Apply wall covering to electrical wall plates prior to replacing.

K. Install termination trim.

L. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.04 CLEANING

A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.

B. Reinstall wall plates and accessories removed prior to work of this section.

3.05 PROTECTION

A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION 097200

SECTION 098414
ACOUSTIC STRETCHED-FABRIC WALL AND CEILING SYSTEMS (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications.

B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests.

E. ASTM E2573 - Standard Practice for Specimen Preparation and Mounting of Site-Fabricated Stretch Systems to Assess Surface Burning Characteristics.

1.02 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Specimen warranty.

B. Shop Drawings: Details indicating typical transitions to other finish surfaces and elevations indicating proposed locations of fabric seams.
   1. Include mounting and attachment details, and details at edges, corners and other special conditions.

C. Selection Samples: Fabric swatches representing manufacturer's full range of available colors, textures, and patterns.

D. Test Reports: Certified test data from an independent test agency verifying that wall systems meet specified requirements for acoustical and fire performance.

E. Installer's Qualification Statement.

F. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

B. Installer Qualifications: Company specializing in performing work of the type specified; trained or certified by manufacturer for installation of specified products.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect fabric, acoustical backing, and track from excessive moisture in shipment, storage, and handling.

B. Do not deliver materials to project until wet work such as concrete and plaster has been completed.

C. Store products in manufacturer's unopened packaging until ready for installation.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.05 FIELD CONDITIONS

A. Do not begin installation until interior conditions have reached temperature and humidity that will be maintained during occupancy.

B. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Stretched-Fabric Wall Systems:
   1. Accutrack Systems.
   2. Conwed.
   3. Fabric Wall.
   4. Fabricmate Systems.
   5. FabriTRAK Systems, Inc.
   6. Novawall Systems, Inc.
   7. Substitutions: See Section 016000 - Product Requirements.

2.02 ACOUSTIC STRETCHED-FABRIC SYSTEM

A. Acoustic Stretched-Fabric System: Field installed, fabric is stretched and set into framework and laid over acoustic material anchored to substrate. Framework consists of continuous perimeter and intermediate mounting frames anchored to substrate, and designed to permit removal and replacement of fabric within framed areas without affecting adjacent areas.
   1. Surface Burning Characteristics: Flame Spread Index of 25, maximum; Smoke Developed Index of 450, maximum; when whole system is tested in accordance with ASTM E84 using mounting specified in ASTM E2573 for stretched systems.
      a. Surface Burning Characteristics tested by ASTM E 2573 shall be for the complete assembly, including framing extrusions, core material, and fabric covering.
   2. Noise Reduction Coefficient (NRC): 0.80, minimum, when tested in accordance with ASTM C423, Type A mounting per ASTM E795.
   3. Prefabricated, fabric covered and individually framed panels are not permitted.
   4. Install fabric over acoustic material and into framework without use of adhesives, tapes, or fasteners.
   5. Seams in fabric are not permitted; adjust frame layouts to accommodate width of fabric; obtain written approval of frame layouts from Architect.

2.03 MATERIALS

A. Frame: Extruded polymer framing system with serrated jaws of sufficient strength to hold fabric in place after repeated applications.

1. Wall Frame Size: 1 inch height from wall substrate to match core thickness; with minimum 1 inch wide base.
   a. Wall Frame Shape: Bevel at perimeter, and square at intermediate abutting joints.
   b. Reveal: 1/2-inch.

B. Acoustic Material:
1. Provide type of acoustic material in thickness required to achieve Noise Reduction Coefficient (NRC) indicated.
2. Ensure that thickness of acoustic material fills depth of frame as necessary for application without use of support blocking.
3. Compressed Fiberglass Board: Class A fire rated in accordance with ASTM E84.
   a. Overall Thickness: 1 inch.

C. Rigid Blocking: Fire-retardant treated medium density fiberboard complying with ANSI A208.2, in thickness to meet project requirements.
1. Panel Fabric: **(*AD-03)**
   Acceptable Manufacturers:
   a. Carnegie; "Xorel" (Basis of Design)
   b. Architex
   c. CF Stinson
   d. Wolf Gordon
   e. Momentum Textiles
   f. Maharam, "Tek Wall Volta"
2. Wall Color: Selected from full range available from basis-of-design style.
3. Width: 54 inch minimum.

D. Fasteners: As recommended by manufacturer of acoustic stretched-fabric system in accordance with project requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Begin installation only after substrates have been properly prepared.

B. Verify that casework, markerboards, door and window jambs, finished ceiling, and other finished items adjacent or abutting the acoustic stretched-fabric system have been properly installed.

C. When preparation of substrate is the responsibility of another installer, notify Architect of unsatisfactory preparation prior to proceeding with this work.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation of this work.

B. Prepare substrate surfaces using methods as recommended by the manufacturer for achieving acceptable result as required for this work.

C. Remove wall plates and other obstacles, and properly prepare substrates to receive frames and acoustic material in accordance with manufacturer's instructions.

3.03 INSTALLATION

A. Install acoustic stretched-fabric system at locations indicated in accordance with approved shop drawings and manufacturer's instructions.

B. Frames: Install perimeter and intermediate frames using appropriate fasteners for prepared substrate, firmly secured to ensure frames do not separate from substrate.
   1. For tile or masonry substrates, apply continuous bead of adhesive along base of framing in addition to spacing of conical anchors and/or fasteners at 6 to 8 inches on center.
   2. Follow contours of wall and scribe to adjoining work at borders, penetrations, and imperfections.
   3. Install framing around openings and penetrations.
   4. Allow for spacing of framework to accommodate insertion of installation tool.

C. Acoustic Material: Cut and trim acoustic material to fit snugly within perimeter and intermediate framework.
   1. Apply adhesive and press acoustic material into place, maintaining constant plane.
   2. At fixtures mounted within areas of acoustic stretched-fabric system, install rigid blocking for backing and maintain plane of fixture surface flush with face of acoustic stretched-fabric system.

D. Fabric: Stretch fabric over acoustic material, locking edges of fabric into frame's serrated jaws using manufacturer's recommended tool. Maintain fabric weave plumb, level and true, in proper relation to building lines, without ripples, waviness, hourglass, or other deleterious effects.
   1. Upon fabric installation, do not employ adhesives or mechanical fasteners of any type, and ensure fabric is free-floating and in contact with acoustic material as necessary.
   2. Stapling or gluing of fabric to cores or channel framework is not permitted.
   3. Provide tension in fabric sufficient to prevent sagging under anticipated changes in temperature and humidity.
   4. At outside corners, wrap as single piece of fabric without joints, seams, or visible framing; unless otherwise indicated.

3.04 CLEANING

A. Clean exposed surfaces of acoustic stretched-fabric system in compliance with manufacturers instructions for cleaning and repair of minor damage to exposed surfaces.

B. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage to system.

3.05 PROTECTION

A. Protect installed materials upon completion of this work, using methods that will ensure that the finished work is without damage or deterioration upon Date of Substantial Completion.

END OF SECTION 098414

SECTION 122400
WINDOW SHADES (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work related to products of this section; require attendance of affected installers.

B. Sequencing:

1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
2. Do not install shades until final surface finishes and painting are complete.

1.03 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.

B. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.

C. Source Quality Control Submittals: Provide test reports indicating compliance with specified fabric properties.

D. Selection Samples: Include fabric samples in full range of available colors and patterns.

E. Verification Samples: Minimum size 6 inches square, representing actual materials, color and pattern.

F. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.

G. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Authorized installation representative of fabricator/manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

B. Handle and store shades in accordance with manufacturer's recommendations.

1.06 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's warranty from Date of Substantial Completion, covering the following minimum terms:

1. Manual Operating Mechanism / Clutch: 10 years, minimum (excludes bead chain).
2. Fabric: 10 years, minimum.
3. Balance of Shade Hardware and Non-Operating Materials and Components: 25 years, minimum.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Interior Manually Operated Roller Shades:

1. Draper, Inc; Clutch Operated FlexShade.
2. Hunter Douglas Architectural; RB500 Manual Roller Shades.
3. Lutron Electronics Co., Inc; Contract Roller Manual Roller Shades.
4. MechoShade Systems LLC; Mecho/5 System.
5. WT Shade; HeliaRise.
6. Substitutions: See Section 016000 - Product Requirements.

B. Source Limitations: Provide products produced by a single manufacturer and obtained from a single supplier.

2.02 ROLLER SHADES

A. General:

1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
2. Provide shade system that operates smoothly when shades are raised or lowered.

B. Roller Shades: **(*AD-03)**

1. Description - Interior Roller Shades: Single roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
   a. Drop Position: Regular roll.
   b. Roll Direction: Roll down, closed position is at window sill.
   c. Mounting: Window jamb inside-mounted to vertical or horizontal gypsum surfaces only. Mounting to aluminum window mullions is prohibited.
   d. Size: As indicated on drawings for rough opening sizes; field verify rough openings prior to fabrication.
2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
3. Roller Tubes: As required for type of shade operation.

a. Material: Extruded aluminum, clear anodized finish or electrogalvanized/epoxy primed steel, as standard with manufacturer.
b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
c. Fabric Attachment: Utilize manufacturer's standard method for attaching shade fabric material to rollers.

4. Hembars: Designed to maintain bottom of shade straight and flat.
   a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
5. Manual Operation for Interior Shades:
   a. Clutch Operator: Manufacturer's standard material and design, permanently lubricated.
   b. Drive Chain: Continuous loop beaded ball chain, 95 pounds minimum breaking strength. Provide upper and lower limit stops.
6. Accessories: **(*AD-03)**
   a. ~~Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; clear anodized finish.~~ Closure Clip: Aluminum clip to conceal installed roller shade. Contractor's recommendation either 2 or 3 inch clip.
   b. End Caps: Provide manufacturer's standard end caps to cover exposed ends of brackets.
   c. Ceiling Pockets with Prewired Raceway: UL 325 listed, extruded aluminum shade pocket with removable closure panel and ceiling tile support, for recess mounting in acoustical tile or drywall ceilings; size and configuration as indicated on drawings.
      1) Products:
         (a) Armstrong Celings; Axiom Building Perimeter System (Basis of Design)
         (b) USG; COMPÄSSO Elite Curtain Pockets
         (c) MechoShade Systems LLC
   d. Fasteners: Noncorrosive, and as recommended by shade manufacturer.

2.03 SHADE FABRIC

A. Fabric: Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
   1. Manufacturers:
      a. Lutron Electronics Co., Inc; Basketweave 27 - 1% .
      b. Mermet Corporation; E-Screen - 1%.
      c. Phifer, Inc; Style 2500 1%.
      d. Substitutions: See Section 016000 - Product Requirements.
   2. Material: Vinyl coated fiberglass.
   3. Performance Requirements:
      a. Flammability: Pass NFPA 701 large and small tests.
      b. Fungal Resistance: No growth when tested according to ASTM G21.
   4. Color: To be selected by Architect from manufacturer's full range.
   5. Fabrication:
      a. Fabric Orientation: Railroaded, fabric is turned 90 degrees off the roll.

b. If height of opening requires multiple panels of railroaded fabric, use manufacturer's standard sewn seams.

2.04 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.

1. Vertical Dimensions: Fill openings from head to sill with 1/4 inch maximum space between bottom bar and window stool.
2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb, with maximum 1/4 inch gap at each edge of jamb.

C. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine finished openings for deficiencies that may preclude satisfactory installation.

B. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.

B. Replace shades that cannot be cleaned to "like new" condition.

3.05 PROTECTION

A. Protect installed products from subsequent construction operations.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION 122400

SECTION 126723
COURTROOM BENCH SEATING (*AD-03)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

C. ASTM A48/A48M - Standard Specification for Gray Iron Castings.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Manufacturers seeking consideration as an acceptable alternative to the named manufacturers for specified courtroom seating and wood benches must submit samples, details, technical materials, fabrication specifications, and performance criteria to the Architect a minimum of 30 days after award of Contract in accordance with the General Conditions and Division 1 Sections "Substitution Procedures" and "Product Requirements". Materials not meeting all product, technical, and performance criteria will not be considered.

1.03 SUBMITTALS

A. Product Data: Manufacturer's printed data sheets for products specified.

B. Shop Drawings: Fabrication and installation details including seating and end panel styles, layouts and dimensions, aisle widths and row spacing.

C. Selection Samples: Manufacturer's color charts and swatches for hardwood and finishes, indicating full range of materials, colors, and patterns available.

D. Verification Samples: Provide material samples for each wood type, including all accessories and end panel finishes, illustrating all finishes and workmanship to be expected in the finished Work.

1. For each solid wood or wood veneered product indicated to receive transparent finish, provide at least three samples illustrating standard range of wood grain, stain color, and sheen, for selected color.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Installer's Qualification Statement.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced, locally-based installer with regular experience in the installation of courtroom, church, and theater style seating.

B. Seating Layout: Design and fabricate seating such that intermediate seating supports are equally spaced, and intermediate supports and end panels are aligned from first row to last row.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver seats to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.

B. Store seating units in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.06 FIELD CONDITIONS

A. Verify seating unit dimensions through the use of field measurements prior to fabrication.

B. Do not install seating until HVAC is operating at occupancy conditions and interior floor finishes are complete.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Bench Spectator Seating:
   1. Sauder Manufacturing Company (Basis-of-Design Manufacturer).
   2. New Holland Custom Woodwork Ltd. (subject to specified requirements)
   3. Ratigan-Schottler Mfg. Co. (subject to specified requirements)

B. Source Limitations: Provide all spectator bench seating by one manufacturer.

2.02 MATERIALS (*AD-03)

A. Cast Iron: ASTM A48/A48M, Class 25A minimum, free of air holes and casting imperfections, all edges ground smooth.

B. Sheet Steel: ASTM A879/A879M, Commercial Steel (CS) or Drawing Steel (DS) electrogalvanized sheet, 04Z (12G) coating class on both surfaces; chemically treated for baked enamel finish.

C. Steel Plates, Bars, and Tubes: ASTM A36/A36M.

D. Exposed Hardwood: Solid lumber selected for absence of visible defects; species as indicated.

E. Species: Rift White Oak Veneer

F. Concealed Plywood: Veneer-core plywood; particleboard-core plywood is not acceptable. Provide hardwood plywood in compliance with ANSI/HPMA HP or softwood plywood in compliance with ANSI PS 1, as standard with seating manufacturer.

G. Expansion Anchors: Expansion anchors complying with GSA A-A-1923 A, Type 4, or comparable, as required by seating manufacturer for specified concrete substrate and installation conditions.

H. Wood Screws: Flat head carbon steel; length and type as required by seating manufacturer for substrates and fabrication/installation requirements.

2.03 COURTROOM BENCH SEATING (*AD-03)

A. Fixed seating system designed using aligned intermediate supports in each row and with aligned end panels. Fabricate seating with ergonomic contoured forms for maximum comfort, with materials selected to be free from defects, projections, or irregularities. Smoothly round corners and edges, and use concealed, rounded, or countersunk fasteners to prevent snagging or pinching hazards due to projections.

B. Courtroom Bench Seating: Veneered construction, with high pressure laminated core construction, hardwood veneer, and lumber moldings. Provide formed veneer-core plywood construction panel material for seat and back construction. Solid lumber or particleboard seat and back construction will not be considered.
   1. Basis-of-Design Bench: Sauder Manufacturing Co.; Model #302-2315.
   2. End Panel: One piece panels fastened securely to aisle standards with concealed fasteners.

a. Basis-of-Design: For bid purposes provide equivalent to Sauder Manufacturing Co.; Model #302-2315.rectangular end with raised panel. Provide full range of options to Architect for verification, including manufacturer's "endless" option without end panel.
b. Edge molding profiles shall be selected by Architect from manufacturer's full range.

3. New Holland Custom Woodwork Ltd. bench body model 50-LS is acceptable subject to provision of "apron" trim piece at rear underside of caprail, and provision of a like-design end panel to match basis-of-design specified.

C. Hardwood Veneer and Stained Finish: Selected by Architect from manufacturer's full range.

2.04 FINISHES

A. Ferrous Metals: Manufacturer's standard two-coat baked enamel finish, applied over conversion coating appropriate to base metal.

B. Hardwood: Manufacturer's standard clear low-gloss finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates for conditions detrimental to installation of bench seating. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with manufacturer's installation instructions and approved shop drawings.

B. Locate bench seating in locations as indicated on approved shop drawings, with required clearances, elevations, and sight lines.

C. Install bench seating directly over carpet or other finish flooring as indicated.

1. Do not install bench seating until finish flooring installation is complete and approved.
2. Protect flooring and other adjacent finishes during seating installation.
3. Provide installation methods that will not damage finish flooring. Do not drag or slide seating over flooring.
4. Provide for repair or replacement of flooring that is damaged by the work of this section.

3.03 CLEANING AND PROTECTION

A. Repair minor abrasions and imperfections in finishes with a coating that matches factory-applied finish; replace units that cannot be repaired to unblemished appearance.

B. Protect installed seating for the duration of construction.

END OF SECTION 126723

SECTION 220800 - PLUMBING SYSTEMS COMMISSIONING **(*AD-03)**

PART 1 GENERAL

1.01 INTENT

The intended result of the Plumbing Commissioning process is to assure the Owner that the domestic hot water system is installed, operates, and performs in accordance with contract drawings and specifications prior to the Owner's acceptance of the building and that Owner's personnel are properly trained to operate and maintain the system.

1.02 SCOPE

A. Work Included: This project will have selected building systems commissioned. The equipment and systems to be commissioned are specified in Part 3 of this section. That portion of the commissioning effort that the Installing Contractor is responsible to execute is defined herein. The commissioning process will be directed by a Commissioning Agent. The plumbing commissioning shall provide substantial verification that systems and equipment are installed and performing in accordance with the contract documents and design intent. This independent commissioning shall be complementary to the construction period services performed by the Architect and Mechanical Consulting Engineer.

B. Work Not Included: It shall not be incumbent upon the Commissioning Agent to evaluate design. Systems installed and performing in accordance with plans and specifications that do not achieve and/or maintain conditions in accordance with design intent will be so noted when observed.

1.03 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.

B. This section complements and forms an integral part of Division 22 and all other sections of Division 22 shall have the same force and effect as if printed herewith in full.

C. The specification Section 019113 GENERAL COMMISSIONING REQUIREMENTS forms a part of this section and shall have the same force and effect as if printed herewith in full.

1.04 RELATED WORK

A. Installing Contractor: The contractor responsible for the installation of the equipment and/or systems to be commissioned (Installing Contractor) shall be responsible for all pre-commissioning work as defined within this specification section, in addition to all associated work in the individual commissioned equipment and/or systems related to Division 22 specification sections.

B. Plumbing Contractor: All Division 22 Plumbing specification sections form a part of this section and shall have the same force and effect as if printed herewith in full.

1.05 SUPPLEMENTAL CONDITIONS

A. All work of Division 22 must be complete prior to functional performance verification, unless approved in writing by the Owner's Project Manager. This includes completion and acceptance of the following tasks for all systems, including but not limited to:

1. Submission of all data requested by the Commissioning Agent
2. Correction of all identified deficiencies or written approval by the Owner for exception from this milestone
3. Completed and signed start-up and pre-functional checklist documentation

4. Required training of Owner personnel completed and approved
5. Submission of the approved O&M manuals

B. Remedial Work: Completion of remedial work required as a result of failed functional performance verification shall be the responsibility of the Installing Contractor. The time period for completion of remedial work required as a result of failed functional performance verification shall be fourteen (14) calendar days prior to the date of Owner's acceptance of Substantial Completion.

1.06 COMMISSIONING AGENT AUTHORITY

Throughout the commissioning process, the commissioning agent's role is primarily one of an observer/witness; monitoring the installation, start-up, operation, and performance of select plumbing systems, electrical systems, and mechanical systems. The commissioning agent shall have no authority to alter design or installation procedures. If acceptable performance cannot be achieved, it will be the commissioning agent's responsibility to apprise the Owner, design engineer, and/or contractor of the issue. Corrective actions shall be the responsibility of the Owner, design engineer, and/or contractor; and not that of the commissioning agent. The commissioning agent shall have the authority to require tests and demonstrations to verify proper performance.

PART 2 PRODUCTS

NOT APPLICABLE TO THIS SPECIFICATION

PART 3 EXECUTION

3.01 COMMISSIONING TEAM AND CHECKLISTS

A. The General contractor shall designate team members to participate in the pre-functional checks and functional performance verification specified herein. In addition, the project manager, the architect/engineer, and the manufacturer will represent the Owner. The team members shall be designated as follows:

Designation	Function
CxA	Commissioning Agent
GC	General Contractor
MC	Mechanical Contractor
PC	Plumbing Contractor
ATC	Controls Contractor
TAB	Testing and Balancing Contractor
OR	Owner's Representative
A/E	Architect/Engineer
EC	Electrical Contractor
MFR	Manufacturer

B. The Pre-Functional Checklists attached in Appendix A and Functional Performance Verifications attached in Appendix B assign responsibility for specific commissioning activity tasks. The Contractor and responsible Installing subcontractor(s) and any additional commissioning team members identified on the checklist shall initial and date the appropriate forms for each task indicated in these Checklists. One form shall be completed for each piece of commissioned equipment or system. By initialing and dating the entry, the responsible Installing Contractor shall indicate completion and verification of proper installation in accordance with Contract requirements and acceptance of responsibility for the installation of the equipment and/or systems.

1. Forms are to be initialed and dated at the time of completion of the specific checklist task item.
2. Where additional forms are required, the responsible Installing Contractor shall be responsible for photocopying or replicating the appropriate form(s).

3.02 RESPONSIBILITIES

Each member of the commissioning team has responsibilities to the successful completion of the commissioning process as follows:

A. The Owner's Representatives shall perform their normal construction contract administration functions.

B. The Architect shall provide adequate support to the Consulting Mechanical Engineer as related to his duties in the commissioning process. It shall also be the Architect's responsibility, either directly or through his assignee, to assure that the commissioning agent is:

1. Provided copies of approved shop drawings as they are returned to the Contractor
2. Notified of time, date, and place of all regularly scheduled progress meetings, and of any special meetings that may be called regarding Plumbing systems.
3. Copied on all correspondence pertinent to the plumbing systems including but not limited to minutes of progress meetings, responses to contractor requests for information, change order documentation.

C. The General Contractor shall, in addition to his normal responsibilities for construction of the project, assure that his subcontractors recognize the authority of the commissioning agent and perform responsive to the requirements of the commissioning process. He shall assure that proper notification, at least 48 hours in advance, is provided to the commissioning agent of the milestones of the Plumbing systems installation, at a minimum as follows:

1. Start-up of equipment specified to be performed by factory authorized personnel
2. Piping cleaning and sterilization
3. Date of punch-out inspections
4. Date of training and instructions to Owner's operating personnel regarding operations of the plumbing system

D. The Mechanical/ Plumbing Subcontractor shall, in addition to his normal responsibilities for construction of the project, assure that proper notification of the milestones of the plumbing systems installation as cited in Paragraph D. are provided to the General Contractor. The Plumbing Subcontractor shall assure that his subcontractors recognize the authority of the commissioning agent and perform responsive to the requirements of the commissioning process.

E. The Commissioning Agent will follow the procedures as set forth in the paragraph titled Commissioning Agent Procedures to execute his responsibility for:

1. Verifying that the required plumbing systems are installed and operating in accordance with contract documents and specifications.
2. Assuring that Owner's Operating and Maintenance personnel are fully trained on systems operation and maintenance.
3. Assuring that Close Out documentation is properly provided to the Owner.

3.03 TESTS: The pre-functional checks and functional performance verification shall be performed in a manner that essentially duplicates the checking, testing, and inspection methods established in the

related Sections. Where checking, testing and inspection methods are not specified in other Sections, methods shall be established that will provide the information required. Testing and verification required by this Section shall be performed throughout the commissioning process. Requirements of this Section do not supplant those in related Sections but may expand upon them. The Contractor shall provide all materials, services, and labor required performing the pre-functional checks and functional performance verification. A pre-functional check or functional performance verification shall be aborted if any system deficiency prevents the successful completion of the test or if any non-Owner commissioning team member is not present for the test. The Contractor shall reimburse the Owner for all costs associated with effort lost due to tests that are aborted. These costs shall include direct personnel expenses, plus overhead and profit, and travel costs for Owner commissioning team members.

A. Pre-Functional Checks: Pre-functional checks shall be performed for the items indicated on the checklists in Appendix A. Deficiencies discovered during these checks shall be corrected and re-tested in accordance with the applicable contract requirements.

B. Functional Performance Verification: Functional performance verification shall be performed for the item indicated on the checklists in Appendix B. Functional performance verification shall begin only after all pre-functional checks have been successfully completed. Verifications shall prove all modes of the sequences of operation and shall verify all other relevant contract requirements. Verifications shall begin with equipment or components and shall progress through subsystems to complete systems. Upon failure of any functional performance verification checklist item, the Contractor shall correct all deficiencies in accordance with the applicable contract requirements. The checklist shall then be repeated until it has been completed with no errors.

3.04 COMMISSIONING AGENT PROCEDURES: The Commissioning Agent will perform systems commissioning following the procedures listed herein, and all members of the Commissioning Team shall cooperate fully with the execution of these procedures. To achieve plumbing systems commissioning, the Commissioning Agent shall:

A. Perform unscheduled walks through the building to observe and keep abreast of plumbing systems installation progress, means, and methods. Commissioning agent's presence in the building will be for his benefit in preparing to commission the building and shall in no way be construed as superseding the authority of the project architect/engineers.

B. Review Plumbing Shop Drawings and Submittals concurrently with the Project Consulting Mechanical Engineer. The purpose of this review is primarily one of familiarization with equipment to be furnished on the project for on-site verification by the commissioning agent and in no way relieves the Consulting Mechanical Engineer of his duties or supersedes his authority for shop drawing review.

C. Issue Pre-Functional Check Lists relevant to the project for Contractor monitoring and verification of installation progress (See Appendix A). Establish milestones in the plumbing system installation at which time interim commissioning status reports will be prepared and issued by the Commissioning Agent.

D. Review Contractor prepared Operating and Maintenance Manuals and be present during Plumbing Contractor instructions to the Owner's operating personnel regarding operations and maintenance of the plumbing system.

E. Review Contractor prepared As-Built drawings and all certifications and warranties required for submission by project specifications.

F. Furnish a written report and recommend acceptance of the plumbing system upon satisfactorily completing the commissioning process. Recommendations for approval, when appropriate,

will be forwarded to the project Architect/Engineer for inclusion in their final submission of project close out documentation to the Owner.

3.05 CONTRACTOR COMMISSIONING PROCEDURES: The General Contractor and all relevant Sub-Contractors shall, in addition to being responsive to the procedures cited for execution by the Commissioning Agent in paragraph titled Commissioning Agent Procedures, perform as follows to achieve satisfactory plumbing systems commissioning. The Contractor shall:

A. Demonstrate the performance of the domestic hot water system to the Commissioning Agent and Owner's Representative after completion of construction.

B. Evaluations

1. The Owner's Commissioning Agent shall observe the calibrations and measurements associated with the functional performance verification of the equipment, systems and control systems identified herein; set the time schedule of functional performance verification; and make any necessary corrective or remedial work recommendations to ensure that the commissioned equipment and systems function as described in the control sequence of operation and perform in accordance with design intent.

2. The Installing Contractor shall operate all equipment and systems in support of the commissioning work effort and shall provide all labor, equipment, and materials necessary to allow operational and performance verification of all commissioned equipment and systems.

C. At a minimum, the performance and operation demonstrations of the following equipment and/or systems will be required:

1. Domestic Hot Water System

D. Should any performance verification reveal operation or performance not in accordance contract documents, the Contractor shall rectify the deficiency, and re-inspection shall be performed. Should operation or performance still not be as specified on the re-inspection due to Contractor's work, the time and expenses of the Commissioning Agent to make further re-inspections shall be considered as additional cost to the Owner.

3.06 SATISFACTORY COMPLETION: The Contractor's personnel shall be made available to execute all aspects of the commissioning process until the Owner accepts final results. Commissioning tasks and meetings may be repeated until the Owner is satisfied and will not be fixed as one-time, one-chance events for the Contractor.

3.07 CLOSE OUT SUBMITTALS

A. Close out documents, consisting of but not limited to As-Built Drawings, Certificates of Inspections, Warranties, Final Testing and Balancing Reports, Operating and Maintenance Manuals, transmittals documenting delivery of spare parts as submitted to the Architect/Engineer shall be copied to the commissioning agent for concurrent review.

COMMISSIONING APPENDICIES

Appendix A: Pre-Functional Checklists System / Equipment
Domestic Hot Water Heater and Circulation Pump

Appendix B: Functional Performance Verification System / Equipment
Domestic Hot Water Pump

APPENDIX A

Domestic Hot Water System (Gas)

Checked By_____

Date_____

Checklist Item	YES	NO	REMARKS
Installation			
Housekeeping pad installed			
Service clearances provided			
Heater installed and leveled			
Casing undamaged			
Piping and valves installed per detail			
Thermometers installed			
Temp/pressure relief installed, piped to floor drain			
Expansion tank installed			
Vacuum relief installed			
Gas piping installed & tested			
Type B flue installed			
Burner powered			
Tempering Valve installed per detail			
HW setpoint entered per CDs			
Tempering Valve temperature setpoint per CDs			
Circ pump installed per detail			
Aquastat installed per detail			
Electrical			
Disconnect(s) installed			
System powered			
Controls			
BAS connections complete (DHW temps and recirc pump S/S and status)			
Safeties function			

Comments:

APPENDIX B

PERFORMANCE VERIFICATION PROCEDURE

Domestic Hot Water Circulating Pump

1. Automation system starts/stops pumps on time schedule.

	Owner's Rep. Initials:	Date	
Control Sequence Functional Test		Pass	Fail
When pumps are running there is no excessive noise or vibration and there are no water leaks.			
P –			
Pump starts/stops in response to Aquastat			

Comments/Notes:

SECTION 230800 - MECHANICAL SYSTEMS COMMISSIONING

PART 1 – GENERAL

1.1 INTENT: The intended result of the Mechanical Commissioning process is to assure the Owner that the mechanical systems are installed, operate, and perform in accordance with Contract documents and that Owner's personnel are properly trained to operate and maintain the systems – all prior to the Owner's acceptance of the building.

1.2 SCOPE:

A. Work Included: This project will have selected building systems commissioned. The equipment and systems to be commissioned are specified in Part 3 of this section. That portion of the commissioning effort that the Contractor is responsible to execute is defined herein. The commissioning process will be directed by a Commissioning Authority. The mechanical commissioning shall provide substantial verification that systems and equipment are installed and performing in accordance with the Contract Documents and design intent. This independent commissioning shall be complementary to the construction administration services performed by the Architect and/or Mechanical Consulting Engineer.

B. Work Not Included: It shall not be incumbent upon the Commissioning Authority to verify adequacy of mechanical systems to accommodate the heating, cooling, ventilating, or domestic hot water loads imposed upon them, i.e. to evaluate design. Systems installed and performing in accordance with Contract Documents that do not achieve and/or maintain conditions in accordance with design intent will be so noted when observed. Commissioning of fire protection sprinkler and electrical systems are excluded from the mechanical commissioning process except as may be incidental to the operations of the mechanical system; i.e. note would be made if sprinkler piping blocked access to mechanical equipment, if a fan turned backwards due to improper power connections, etc.

1.3 INFORMATIONAL SUBMITTALS

A. Contractor Submittals and Shop Drawings: Concurrent with AE review, the Contractor will send submittals relating to systems to be commissioned to the CxA for review of compliance with the Contract Documents. Comments will be returned directly to the AE with a copy to the Owner for coordination of a final submittal review response from the AE to the Contractor.

B. Commissioning Documentation: Submit the following information to the CxA:

1. Schedule: Schedule for completing construction checklists, pre-functional and start-up for HVAC systems, assemblies, equipment, and components to be commissioned.

2. Checklists: Completed construction checklists, pre-functional checklists, point-to-point checklists, and start-up forms for each piece of equipment or component.

3. TAB Reports: Submit initial draft version as soon as available and follow with final version when complete.

4. Documentation of corrective actions for logged deficiencies.

1.4 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 1 Specifications Sections, apply to this Section.

B. This section complements and forms an integral part of Division 23 and all other sections of Division 23 shall have the same force and effect as if printed herewith in full.

C. The specification Section 019113 GENERAL COMMISSIONING REQUIREMENTS forms a part of this section and shall have the same force and effect as if printed herewith in full.

1.5 RELATED WORK:

A. Contractor: The contractor responsible for the installation of the equipment and/or systems to be commissioned shall be responsible for all pre-commissioning work as defined within this specification section, in addition to all associated work in the individual commissioned equipment and/or systems related Division 23 and Divisions 22 and 26 specification sections.

B. Mechanical: All Division 23 Mechanical specification sections form a part of this section and shall have the same force and effect as if printed herewith in full.

C. Electrical: All Division 26 Electrical specification sections form a part of this section and shall have the same force and effect as if printed herewith in full.

D. Plumbing: All Division 22 Plumbing specification sections form a part of this section and shall have the same force and effect as if printed herewith in full.

1.6 SUPPLEMENTAL CONDITIONS:

A. All work of Division 23 and related Division 22 and 26 must be complete prior to functional performance verification, unless approved in writing by the Owner's Project Manager. An exception to this is any required seasonal or approved deferred performance verification. Required work includes completion and acceptance of the following tasks for all systems, including but not limited to:

1. Submission of all data requested by the Commissioning Authority
2. Correction of all identified issues or written approval by the Owner for exception from this milestone
3. Completed and signed start-up and pre-functional checklist documentation
4. Required training of Owner personnel completed and approved
5. Submission of acceptable and complete O&M manuals approved by the A/E.

B. Remedial Work: Completion of remedial work required as a result of failed functional performance verification shall be the responsibility of the Contractor. The time period for completion of remedial work required as a result of failed functional performance verification shall be a minimum of fourteen (14) calendar days prior to the date of Owner's acceptance of Substantial Completion; the time period shall be greater as required to meet the contractual Substantial Completion date.

C. The Contractor shall reimburse the Owner for liquidated damages for costs incurred due to delays in Substantial Completion of the project. These damages shall include costs for Owner's commissioning team members.

1.7 AUTHORITY OF THE COMMISSIONING AUTHORITY: Throughout the commissioning process, the Commissioning Authority's role is primarily one of an observer/witness; monitoring the installation, start-up, operation, and performance of the mechanical heating, ventilating, and air conditioning (HVAC) systems, electrical systems, and domestic hot water systems. The Commissioning Authority shall have no authority to alter design or installation procedures. If acceptable performance cannot be achieved, it will be the Commissioning Authority's responsibility to apprise the Owner, design engineer, and/or contractor of the deficiency. Corrective actions shall be the responsibility of the Owner, design engineer, and/or contractor; and not that of the Commissioning Authority. The Commissioning Authority shall have the authority to require and review tests and demonstrations to verify proper performance.

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

A. General: Provide test equipment, instrumentation, and tools necessary to perform functional performance testing. Use test equipment and instrumentation that has been calibrated, certified, and properly maintained.

1. Test equipment and instrumentation required to perform the commissioning shall remain the property of the Contractor unless otherwise indicated.

2. Proprietary test equipment, instrumentation, and tools shall become the property of the Owner at Substantial Completion. Proprietary test equipment, instrumentation, and tools are those manufactured or prescribed by tested equipment manufacturer and required for work on its equipment as a condition of equipment warranty, or as otherwise required to service, repair, adjust, calibrate or perform work on its equipment.

PART 3 – EXECUTION

3.1 COMMISSIONING TEAM AND CHECKLISTS

A. The general contractor shall designate team members to participate in the pre-functional checks and functional performance verification specified herein. In addition, the project manager, the architect/ engineer, and the manufacturer will represent the Owner. The team members shall be designated as follows:

Designation	Function
CxA	Commissioning Authority

GC	General Contractor
MC	Mechanical Contractor
ATC	Automatic Temperature Control Contractor
TAB	Testing and Balancing Contractor
O	Owner
A/E	Architect/Engineer
EC	Electrical Contractor
MFR	Manufacturer

B. The Pre-Functional Checklists attached in Appendix A and Functional Performance Verifications attached in Appendix B assign responsibility for specific commissioning activity tasks. The Contractor and responsible Installing subcontractor(s) and any additional commissioning team members identified on the checklist shall initial and date the appropriate forms for each task indicated in these Checklists. One form shall be completed for each piece of commissioned equipment or system. By initialing and dating the entry, the responsible Installing Contractor shall indicate completion and verification of proper installation in accordance with Contract requirements and acceptance of responsibility for the installation of the equipment and/or systems.

1. Forms are to be initialed and dated at the time of completion of the specific checklist task item.
2. Where additional forms are required, the Contractor shall be responsible for photocopying or replicating the appropriate form(s).

3.2 RESPONSIBILITIES: Each member of the commissioning team has responsibilities to the successful completion of the commissioning process as follows:

A. The Owner's Representatives shall perform their normal construction contract administration functions.

B. The Architect shall provide adequate support to the Consulting Mechanical Engineer as related to his duties in the commissioning process. It shall also be the Architect's responsibility, either directly or through his assignee, to assure that the commissioning Authority is:

1. Provided copies of approved shop drawings as they are returned to the Contractor.
2. Notified of time, date, and place of all regularly scheduled progress meetings, and of any special meetings that may be called regarding mechanical systems.
3. Copied on all correspondence pertinent to the mechanical systems including but not limited to minutes of progress meetings, responses to contractor requests for information, change order documentation.

C. The Consulting Mechanical Engineer shall perform his normal construction contract administration functions including resolution of Contractor Requests for Information on mechanical documents and installation.

D. The Contractor shall, in addition to his normal responsibilities for construction of the project, assure that his subcontractors recognize the authority of the commissioning Authority and perform in accordance with the requirements of the commissioning process. The Contractor shall assure that proper notification, at least 72 hours in advance, is provided to the commissioning Authority of the milestones of the mechanical systems installation, at a minimum as follows:

1. Start-up of equipment specified to be performed by factory authorized personnel.
2. Piping cleaning and flushing
3. Start date of Air/Water Balancing
4. Date of punch-out inspections
5. Date of training and instructions to Owner's operating personnel regarding operations of the mechanical system

E. The Electrical Subcontractor shall perform his normal contract obligations and be responsive to the authority of the commissioning Authority.

F. The Mechanical Subcontractor shall, in addition to his normal responsibilities for construction of the project, assure that proper notification of the milestones of the mechanical systems installation as cited in Paragraph D. are provided to the General Contractor. The Mechanical Subcontractor shall assure that his subcontractors recognize the authority of the commissioning Authority and perform in accordance with the requirements of the commissioning process, including the Testing, Adjusting and Balancing (TAB) and Temperature Controls / Automation System subcontractors.

G. The Commissioning Authority will follow the procedures as set forth in the paragraph titled Commissioning Authority Procedures to execute his responsibility for:

1. Verifying that the required mechanical systems are installed and operating in accordance with Contract Documents.

2. Assuring that Owner's Operating and Maintenance personnel are fully trained on systems operation and maintenance.

3. Assuring that Close Out documentation is properly provided to the Owner.

3.3 TESTS

A. The pre-functional checks and functional performance verification shall be performed in a manner that essentially duplicates the checking, testing, and inspection methods established in the related Sections. Where checking, testing and inspection methods are not specified in other Sections, methods shall be established that will provide the information required. Testing and verification required by this Section shall be performed throughout the commissioning process. Requirements of this Section do not supplant those in related Sections but may expand upon them. The Contractor shall provide all materials, services, and labor required performing the pre-functional checks and functional performance verification. A pre-functional check or functional performance verification shall be aborted if any system deficiency prevents the successful completion of the test or if any non-Owner commissioning team member is not present for the test. After two failed tests, the Contractor shall reimburse the Owner for all Owner costs associated with additional testing. These costs shall include costs for Owner commissioning team members.

1. Pre-Functional Checks: Pre-functional checks shall be performed for the items listed on the checklists in Appendix A. Deficiencies discovered during these checks shall be corrected and re-tested in accordance with the applicable Contract requirements.

2. Functional Performance Verification: Functional performance verification shall be performed for the items listed on the checklists in Appendix B. Functional performance verification shall begin only after all pre-functional checks have been successfully completed. Verifications shall prove all modes of the sequences of

operation and shall verify all other relevant Contract requirements. Verifications shall begin with equipment or components and shall progress through subsystems to complete systems. Upon failure of any functional performance verification checklist item, the Contractor shall correct all deficiencies in accordance with the applicable contract requirements. The checklist shall then be repeated until it has been completed with no errors.

3.4 COMMISSIONING AUTHORITY PROCEDURES: The Commissioning Authority will perform systems commissioning following the procedures listed herein, and all members of the Commissioning Team shall cooperate fully with the execution of these procedures. Ideally. initial mechanical systems performance verification shall be performed when outdoor air temperatures, for any portion of the day of testing, are either above 80ºF (cooling mode) or below 40ºF (heating mode). If initial performance verification occurs during the cooling mode, subsequent performance verification shall occur during the next heating season; and similarly, if performance verification occurs in the heating season, subsequent performance verification shall be performed during the next cooling season. To achieve mechanical systems commissioning, the Commissioning Authority shall:

A. Attend periodic construction progress meetings and perform unscheduled walks through the building to observe and keep abreast of mechanical systems installation progress, means, and methods. Commissioning Authority's presence at meetings and in the building will be for his benefit in preparing to commission the building and shall in no way be construed as superseding the authority of the project architect/engineers.

B. Review mechanical Shop Drawings and Submittals concurrently with the Project Consulting Mechanical Engineer. The purpose of this review is primarily one of familiarization with equipment to be furnished on the project for on site verification by the commissioning Authority and in no way relieves the Consulting Mechanical Engineer of his duties or supersedes his authority for shop drawing review. Note: The Contractor may proceed with equipment procurement after receipt of Architect/Engineer approval of mechanical Shop Drawings and/or Submittals.

C. Issue Pre-Functional Check Lists relevant to the project for Contractor monitoring and verification of installation progress (See Appendix A). Establish milestones in the mechanical system installation at which time interim commissioning status reports will be prepared and issued by the Commissioning Authority.

D. Be present to observe the start-up of equipment that is supervised and certified by the equipment manufacturer's authorized representative.

E. Visit the project periodically during testing, adjusting, and balancing of the air and water systems to observe the actual work being performed, and review the certified reports submitted by the TAB agency.

F. Periodically observe the installation of the automatic temperature controls system: verify calibration of a representative sampling of sensing devices.

G. Observe the operation of all central plant equipment, air handling units, and exhaust fans and a representative sampling of VAV terminals, unit heaters. Observations shall include exercising equipment/systems their respective control sequences including safeties.

H. Verify the commissioning of the Automatic Temperature and Direct Digital Controls System by reviewing point histories. The operational and monitoring capabilities of the DDC system will be employed in the commissioning of the mechanical systems.

J. Review Contractor prepared Operating and Maintenance Manuals and be present during Mechanical Contractor instructions to the Owner's operating personnel regarding operations and maintenance of the mechanical system.

K. Review Contractor prepared As-Built drawings and all certifications required for submission by project specifications.

L. Furnish a written report and recommend acceptance of the mechanical system upon satisfactorily completing the commissioning process. Commissioning Authority's recommendation to accept mechanical systems shall occur prior to Substantial Completion (i.e. Owner acceptance).

M. Recommendations for approval, when appropriate, will be forwarded to the project Architect/Engineer for inclusion in their final submission of project close out documentation to the Owner.

3.5 CONTRACTOR COMMISSIONING PROCEDURES: The Contractor and all relevant Sub-Contractors shall, in addition to being responsive to the procedures cited for execution by the Commissioning Authority in paragraph titled Commissioning Authority Procedures, perform as follows to achieve satisfactory mechanical systems commissioning.

A. Demonstrate the performance of each piece of equipment to the Commissioning Authority and Owner's Representative when ready. Schedule the TAB, HVAC controls/energy management and other sub-Trade Representatives as may apply to demonstrate the performance of the equipment and systems.

B. Evaluations

1. The Owner's Commissioning Authority shall observe the calibrations and measurements associated with the functional performance verification of the equipment, systems and control systems identified herein; set the time schedule of functional performance verification; and make any necessary corrective or remedial work recommendations to ensure that the commissioned equipment and systems function as described in the control sequence of operation and perform in accordance with design intent.

2. The relevant subcontractor shall operate all equipment and systems in support of the commissioning work effort and shall provide all labor, equipment, and materials necessary to allow operational and performance verification of all commissioned equipment and systems.

C. Weather-Dependent Verification Procedures: Weather-dependent performance verification that cannot be adequately achieved by simulation shall be performed in the appropriate climatic season. When simulation is used, the actual results may also require re-verification in the appropriate season.

D. At a minimum, the performance and operation demonstrations of the following equipment and/or systems will be required:

1. Natural Gas Condensing Boiler
2. HVAC Pump (Heating Water)
3. Variable Frequency Drive (VFD)
4. Heating Water Piping System
5. Packaged Rooftop Unit/ with Hydronic Heating Coil (RTU)
6. Air Distribution System

7. VAV Unit (Fan-Powered and Shut-off Type)
8. Hydronic Unit Heater
9. Electric Heater
10. Ductless Split System AC Unit
11. Fans
12. Automatic Temperature Controls

E. Sampling techniques shall be employed for performance verification of multiple identical pieces of equipment/systems such as incremental units, VAVs, etc. and as cited above. Performances of all such equipment/systems shall be verified via review of TAB report and automation system data, field verification shall be performed for 10-20% of each type of identical pieces of equipment/systems. Commissioning Authority's selection of sample equipment/systems to be field verified shall be guided by performances demonstrated in TAB report and EMS data. Note that sampling technique does not apply to pre-functional verification.

F. The Contractor shall repeat any measurement contained in the TAB report where required by the Commissioning Authority for verification or diagnostic purposes.

G. Should any performance verification reveal operation or performance not in accordance Contract Documents, the Contractor shall rectify the deficiency, and re-inspection shall be performed. Should operation or performance still not be as specified on the re-inspection due to Contractor's work, the time and expenses of the Commissioning Authority to make further re-inspections shall be considered as additional cost to the Owner. The total sum of such costs shall be deducted from the final payment to the Contractor.

3.6 SATISFACTORY COMPLETION: The Contractor's personnel shall be made available to execute all aspects of the commissioning process until the Owner accepts final results. Commissioning tasks and meetings may be repeated until the Owner is satisfied and will not be fixed as one-time, one-chance events for the Contractor.

3.7 CLOSE OUT SUBMITTALS:

A. Close out documents, consisting of but not limited to As-Built Drawings, Certificates of Inspections, and transmittals documenting delivery of spare parts, submitted to the Architect/Engineer shall be copied to the commissioning Authority for concurrent review.

B. Operating and Maintenance Manuals shall be submitted for Architect/Engineer review and approval well before any equipment/systems demonstrations or training occurs. The approved O&M Manuals shall be employed during demonstrations and training.

COMMISSIONING APPENDICIES

Appendix A: Pre-Functional Checklists

System / Equipment

1. Natural Gas Condensing Boiler
2. HVAC Pump (Heating Water)
3. Variable Frequency Drive (VFD)
4. Heating Water Piping System
5. Packaged Rooftop Unit/ with Hydronic Heating Coil (RTU)
6. Air Distribution System
7. VAV Unit (Fan-Powered and Shut-off Type)
8. Hydronic Unit Heater
9. Electric Heater
10. Ductless Split System AC Unit
11. Fans
12. Automatic Temperature Controls

Natural Gas Condensing Boiler **Unit No._____**

Design MFR and Model No._____ **Checked By_____**

Installed MFR and Model No._____ **Date_____**

Checklist Item	YES	NO	N/A or COMMENT
Documentation			
Submittal Approved			
O&M Info			
Boiler Start-Up Report			
Mfr start-up services complete			
Installation – General			
Housekeeping pad installed			
Piping installed per diagrams & details			
Maintenance access & clearances provided			
Relief valve set & piped to drain			
Condensate kit installed and piped per mfr literature			
Temp/pressure gauges installed			
Wells installed for BAS sensors			
Installation – Control			
Low water cut-off properly adjusted			
Hi-Limit alarm properly adjusted			
OA sensor installed and calibrated			
Heating water setpoints entered per design intent			
BAS interfaced			
HW reset capability set per design intent			
Required safety alarms tested and received at BAS			
Electrical			
Power to unit			
Emergency shut-off switch installed			
Fuel System			
Gas piping pressure tested and leak free			
Gas train install & vented per specs			
Adequate gas pressure at gas train inlet verified by mfr's rep.			
Combustion Venting			
Vent provided per contract			
Inlet provided per contract			

Comments:

HVAC Pump **Unit No._____**

Design MFR and Model No._____ **Checked By_____**

Installed MFR and Model No._____ **Date_____**

Checklist Item	YES	NO	N/A or COMMENT
Documentation			
Submittal Approved			
O&M Info			
Installation – General			
Vibration isolation provided			
Verify pump/motor alignment			
Installed per detail			
Strainer clean			
Maintenance access provided			
Pump insulation removable w/o damage			
Pump labeled			
Electrical			
Disconnect installed & powered			
VFD installed & powered (where applicable)			
Starter installed & powered (where applicable)			
Verify proper rotation of motor			
Installation - Controls			
Pump capable of automatic operation			
Pump status signal to BAS			

Comments:

Variable Frequency Drive **Unit No._____**

Design MFR and Model No._____ **Checked By_____**

Installed MFR and Model No._____ **Date_____**

Checklist Item	**YES**	**NO**	**N/A or COMMENT**
Documentation			
Submittals Approved			
O&M Info submitted			
Mfr start-up complete			
Test reports			
Installation			
VFD installed per contract			
Wiring connections installed per mfr's req.			
Service access & clearances provided			
Permanent label affixed			
Verify rotation of controlled device			
VFD enclosure free from damage			
The drive is mounted securely			
The drive is properly grounded			
Input voltage matches nominal input voltage			
Verify no hydronic piping over / near VFD			
Conventional or E-Bypass provided			
Phase-Loss Monitor			
Controls			
Control wiring installed and connected			
Drive minimum speed programmed			

Comments:

Heating Water System Piping
Checked By_____

Date_____

Checklist Item	YES	NO	REMARKS
Documentation			
Submittals Approved			
Valve charts provided			
As-Built Drawings submitted			
Installation			
Pipe installation complete			
Expansion compensation provided			
Hangers/supports/saddles complete			
Vibration isolation provided			
Manual Isolation valves provided per plans & diagrams			
Valve chain operators provided			
Automatic control valves installed			
Air Separator installed			
Make-up water piping installed & press. reg. valve setting per diagrams			
Pressure relief setting per diagrams			
Expansion tank installed & charge pressure coordinated w/ make-up water press. reg. valve setting			
Auto air vents installed at high points			
Drain valves installed at low points			
Balancing valves installed & accessible			
Flow measuring devices provided & installed per mfr. guidelines			
Wells installed for BAS sensors			
Piping pressure tested			
Cleaned & flushed			
System strainers clean			
Insulation installation complete			
Pipe labeling complete			
Fire stopping complete			
Sleeves provide at floor, wall & roof penetrations			

Comments:

Packaged Rooftop Unit (RTU) **Unit No._____**

Design MFR and Model No._____ **Checked By_____**

Installed MFR and Model No._____ **Date_____**

Checklist Item	YES	NO	N/A or COMMENT
Documentation			
Submittals approved			
O&M Info submitted			
Factory start-up complete			
Training complete			
Installation – General			
Roof curb or housekeeping pad installed			
Service clearances provided			
Casing undamaged			
Access doors installed and operational			
Casing interior liner per specs			
Dirt and debris removed			
Internal vibration isolation operational			
Ductwork completed			
Flexible duct connections installed			
Clean filters installed			
Filter gauge installed			
Installation – DX Cooling Coil			
Coil elements free of dust & debris			
Condensate drain piped			
Expansion valve installed			
Refrigerant piping complete			
Hot Gas Reheat installed			
Installation – Heating Coil			
Piping configured per detail			
Valves installed per detail			
Coil free from dirt			
Coil installed to permit drainage			
Air purged from system			
Verify direction of water flow			
Strainers clean			
Installation - Supply Fan			
Verify fan wheel rotation correct			
Verify drive alignment			
Verify bearing lubrication accessible			
Fan wheel free from vibration			

Packaged Rooftop Unit **Unit No._____** **Page 2 of 2**

Checklist Item	YES	NO	N/A or COMMENT
Installation - Exhaust Fan			
Verify fan wheel rotation correct			
Verify drive alignment			
Verify bearing lubrication accessible			
Fan wheel free from vibration			
Electrical			
Interior lights installed & operational			
Receptacles installed & operational			
Installation - Controls			
Control valves/actuators installed			
Control dampers/actuators installed			
Verify location of all sensors			
Spare Parts			
Post-construction filters provided			
Spare sets of filters to owner			

Comments:

Air Distribution System

Checked By_____

Date_____

Checklist Item	YES	NO	REMARKS
Documentation			
Submittals Approved			
Leakage Test Reports submitted			
Shop Drawings submitted			
Installation			
Scheduled Seal Class provided			
Elbows compliant w/ contract			
Transitions compliant w/ contract			
Branch take-offs compliant w/ contract			
Fittings compliant w/contract			
Ducts properly supported			
Manual balancing dampers installed per contract			
Motor operated dampers installed per contract			
Fire and smoke dampers installed per contract			
Ductwork clean			
Access doors installed			
Ductwork lined per contract			
Sound attenuators installed per contract			
Air device connections/installation per contract			
Leakage tests successfully completed			
Duct insulated in accordance with contract			
Insulation vapor barrier complete/undamaged			

Comments:

VAV Unit (Fan-powered and Shut-off Type) **Unit No.**_____

Design MFR and Model No._____ **Checked By**_____

Installed MFR and Model No._____ **Date**_____

Checklist Item	YES	NO	N/A or COMMENT
Documentation			
Submittal Approved			
O&M Info			
Installation			
Straight duct at inlet per detail			
Control panel accessible (36" or 42" clear)			
Acoustic lining provided per detail			
Control valve actuator accessible			
RHC Piping installed per detail			
Air purged for reheat coil			
No piping above control panel			
Controls			
Room temperature sensor installed			
Room temperature sensor calibrated			
Room CO2 sensor installed			
Room CO2 sensor calibrated			
Power to controller/ fan motor			
Control devices connected to controller			
Testing, Adjusting, and Balancing (TAB)			
Balancer inlet correction coefficients backed up to host BAS system (defaults)			

Comments:

Hydronic Unit Heater **Unit No._____**

Design MFR and Model No._____ **Checked By_____**

Installed MFR and Model No._____ **Date_____**

Checklist Item	YES	NO	N/A or COMMENT
Documentation			
Submittals approved			
O&M Info submitted			
Installation - General			
Installed per detail			
Air purged from coil			
Verify direction of water flow			
Unit free from damage			
Maintenance access provided			
Verify proper rotation of fan/motors			
Installation - Controls			
Room temperature sensor installed and calibrated			
HW control valve installed & connected to BAS			
UH capable of automatic operation			
Electrical			
Unit disconnect installed & powered			

Comments:

Electric Heater **Unit No._____**

Design MFR and Model No._____ **Checked By_____**

Installed MFR and Model No._____ **Date_____**

Checklist Item	YES	NO	N/A or COMMENT
Documentation			
Submittals approved			
O&M Info submitted			
Installation - General			
Installed per detail			
Unit free from damage			
Verify proper rotation of fan/motors			
Installation - Controls			
Integral thermostat functional			
Electrical			
Unit powered			

Comments:

Ductless Split System AC Unit **Unit No._____**

Design MFR and Model No._____ **Checked By_____**

Installed MFR and Model No._____ **Date_____**

Checklist Item	YES	NO	N/A or COMMENT
Documentation			
Submittals approved			
O&M Info submitted			
Installation			
Indoor unit installed per MFR guidelines			
Indoor unit free from damage			
Clean filters installed in indoor unit			
Condensate pump installed and operational			
Condensate drain piped per contract documents			
Refrigerant piping leak tested			
Piping insulated			
Air cooled condenser free from damage			
Air cooled condenser service & airflow clearances provided			
Condenser weather-guard provided (if specified)			
Controls			
Factory controls installed & wired			
Local thermostat per contract documents (wall mounted or remote control).			
BAS room temperature sensor installed and monitoring			
Electrical			
Disconnect installed			
System powered			

Comments:

Fan (Inline or PRV) **Unit No.__**

Design MFR and Model No._____ **Checked By_____**

Installed MFR and Model No._____ **Date_____**

Checklist Item	YES	NO	N/A or COMMENT
Installation			
Proper curb installed (PRV)			
Backdraft/ motorized damper installed/functioning			
Installed per detail			
Ductwork connected			
Flexible connections provided			
Maintenance access provided			
Verify fan wheel/motor rotation correct			
Fan wheel free from vibration			
Controls			
Control damper actuator installed & operational (where applicable)			
Control interlocks operational			
Fan capable of operation via control source (BAS, switch, sensor)			
Electrical			
Unit disconnect installed & powered			

Comments:

Automatic Temperature Controls **Unit No.**_____

Design MFR and Model No._____ **Checked By**_____

Installed MFR and Model No._____ **Date**_____

Checklist Item	YES	NO	REMARKS
Installation			
Certification of completion submitted			
Layout of control panels per design			
Framed instructions mounted near panels			
As-built shop drawing submitted			
Components properly label			
Components wired to panels			
EMS connections made to panels			
Control wiring labeled			
Listing of EMS point submitted			
Power available to panels			
Maintenance access provided			
Manufacturer start-up services complete			
Installation – Controls			
Control valves/actuators installed			
Control dampers/actuators installed			
Verify location of each control sensor			
Verify control sensors operational			
Verify control graphics complete			
Verify CPU system, peripherals, and accessories operational			
Verify network and remote connection capabilities functional			
Verify input / output device and sensor expansion capability			
ATCS capable of automatic operation			

Comments:

Appendix B: Functional Performance Verification

System / Equipment

1. Heating Water System
2. Packaged Rooftop Unit/ with Hydronic Heating Coil (RTU)
3. VAV Unit (Fan-Powered and Shut-off Type)
4. Hydronic Unit Heater
5. Electric Heater
6. Ductless Split System AC Unit
7. Fans

NOTE: Samples of Functional Performance Verification Checklists are provided herein and are subject to change. Checklists for the complete project will be provided during Construction Period.

PERFORMANCE VERIFICATION PROCEDURE

Split System AC Unit/ Heat Pump

Performance verification shall start with the thermostat set above the actual space temperature; AC Unit should be off. Adjust space thermostat so set point is below actual space temperature; AC Unit should turn on.

	Owner's Rep. Initials:	Date
Split System AC Unit		
AC-		
Thermostat set above actual space temperature; unit is off		Pass Fail
Thermostat set below actual space temperature; unit is on		Pass Fail
Discharge Air Temperature		°F
AC-		
Thermostat set above actual space temperature; unit is off		Pass Fail
Thermostat set below actual space temperature; unit is on		Pass Fail
Discharge Air Temperature		°F

Comments/Notes:

SECTION 230900 – BUILDING AUTOMATION SYSTEM - *AD-03

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 control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

B. Related Sections include the following:

1. Division 23 Section "Meters and Gages for HVAC Piping" for measuring equipment that relates to this Section.
2. Division 23 Section "Sequences of Control" for requirements that relate to this Section.
3. Division 28 Sections for additional conduit requirements for all electronic safety and security systems specified under Division 28.

C. Work Under Other Sections:

1. All wells, valves, taps, dampers, flow stations, etc. furnished by the BAS manufacturer shall be installed under Section "Hydronic Piping."
2. The following shall be provided under Division 23 specifications sections:
   a. 120V power to BAS panels and devices with circuits indicated on the drawings. Refer to "Coordination" paragraph below.
   b. Wiring of power feeds to disconnect switches and starters.
   c. Wiring from disconnect switches and starters to electric motors.
   d. Wiring of any remote start/stop switches and manual or automatic motor speed control devices not furnished under this section of the specifications.

1.3 DEFINITIONS

A. BAS: Building Automation System.

B. DDC: Direct digital control.

C. I/O: Input/output.

D. IT: Information Technology.

E. IS: Information Systems.

F. LAN: Local Area Network.

G. MS/TP: Master-slave/token-passing

H. NAC: Network area controllers.

I. PC: Personal computer.

J. PID: Proportional plus integral plus derivative.

K. PPM: Parts per million.

L. RTD: Resistance temperature detector.

M. WAN: Wide-Area Network

1.4 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:

1. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.
2. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.
3. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.
4. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.
5. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.
6. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.
7. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
8. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:

    a. Water Temperature: Plus or minus 1 deg F.
    b. Water Flow: Plus or minus 5 percent of full scale.
    c. Water Pressure: Plus or minus 2 percent of full scale.
    d. Space Temperature: Plus or minus 1 deg F.
    e. Ducted Air Temperature: Plus or minus 1 deg F.
    f. Outside Air Temperature: Plus or minus 2 deg F.
    g. Dew Point Temperature: Plus or minus 3 deg F.
    h. Temperature Differential: Plus or minus 0.25 deg F.
    i. Relative Humidity: Plus or minus 5 percent.
    j. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
    k. Airflow (Terminal): Plus or minus 10 percent of full scale.
    l. Air Pressure (Space): Plus or minus 0.01-inch wg.

m. Air Pressure (Ducts): Plus or minus 0.1-inch wg.
n. Carbon Dioxide: Plus or minus 50 ppm.
o. Electrical: Plus or minus 5 percent of reading.

1.5 SYSTEM DESCRIPTION

A. Control system consists of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.

B. Control system includes interface to the following:
1. Division 28 sections on Electronic Safety and Security Systems. Provide interface outputs for selective annunciation and monitoring (i.e. alarm status).
2. Building clock control system specified in Division 27 Section "GPS Wireless Clock System."
3. Building lighting control system specified in Division 26 Section "Lighting Control Devices."
4. Fire alarm system specified in Division 28 Section "Digital Addressable Fire Alarm."

1.6 WARRANTY

A. Provide all services, materials and equipment necessary for the successful operation of the entire BAS system for a period of one year beginning on the date of Substantial Completion.

B. Services, materials, and equipment shall include but not be limited to:
1. The adjustment, required testing, and repair of the system including all computer equipment, transmission lines, transmission equipment, sensors and control devices.
2. On-line support services shall be provided as follows:
a. The local BAS representative shall have the capability to monitor and control the facility's building automation system via a dialup connection.
b. If the problem is not resolved by local support, the national office of the building automation system manufacturer, having the same dialup capability, shall also provide online support.

1.7 SUBMITTALS

A. Pre-submittal meeting: The Contractor performing work under this Section of the specifications shall attend a meeting for coordinating the control system with major pieces of equipment including air handling units, VAV boxes, existing VFD's and chillers. The meeting shall be held on the project site in the contractor's trailer or other location acceptable to the Contractor. The Contractor shall be responsible for arranging the meeting. Submittals shall be essentially complete at the time of the meeting so detailed coordination items can be discussed.

B. Submit ten (10) complete sets of documentation in the following phased delivery schedule:
1. Schedule of dampers including size, leakage, and flow characteristics.
2. Schedule of valves including leakage and flow characteristics.
3. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics,

finishes for materials, and installation and startup instructions for each type of product indicated. Include each control device labeled with setting or adjustable range of control.

4. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. Include the following:
   a. System schematics, including:
      1) Written sequences of operation
      2) Listing of connected data points, including connected control unit and input device.
         a) point names
         b) point addresses
      3) Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
      4) Details of control panel faces, including controls, instruments, and labeling.
      5) Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
      6) Trunk cable schematic showing programmable control unit locations and trunk data conductors.
      7) System graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.
      8) System configuration showing peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.

C. Maintenance Data: For systems to include in maintenance manuals specified in Division 1. Include the following:
   1. Maintenance instructions and lists of spare parts for each type of control device.
   2. Interconnection wiring diagrams with identified and numbered system components and devices.
   3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
   4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
   5. Calibration records and list of set points.

D. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors. Revise Shop Drawings to reflect actual installation and operating sequences.

E. Upon project completion, submit operation and maintenance manuals, consisting of the following:
   1. Index sheet listing contents in alphabetical order.
   2. Manufacturer's equipment parts list of all functional components of the system.
   3. CD-ROM of system schematics including wiring diagrams.
   4. Sequence of operations
   5. As-built interconnection wiring diagrams.
   6. Operator's manual.
   7. Trunk cable schematic showing remote electronic panel locations and all trunk data.
   8. List of connected data points, including panels to which they are connected and input device (sensors, thermostat, etc.)
   9. Software and firmware operational documentation. Include the following:
      a. Software operating and upgrade manuals.

b. Program software backup: On a magnetic media or compact disc, complete with data files.
c. Device address list.
d. Printout of software application and graphic screens.
e. Software license required by and installed for DDC workstations and control systems.

10. Software Upgrade Kit: For Owner to use in modifying software to suit future power system revisions or monitoring and control revisions.
11. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

F. Submit product data sheets for airflow measuring devices indicating minimum placement requirements, sensor density, sensor distribution, and installed accuracy to the host control system. Submit a schedule of airflow measuring devices indicating compliance with specified accuracy at minimum and maximum airflow rates. Submit installation, operation and maintenance documentation.

1.8 QUALITY ASSURANCE

A. The BAS system shall be designed and installed, commissioned, and serviced by a manufacturer's authorized installer.

B. Manufacturer Qualifications: A firm experienced in manufacturing automatic temperature-control systems similar to those indicated for this Project and with a record of successful in-service performance.

C. All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and not custom designed specially for this project.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Section 15, governing radio frequency electromagnetic interference and shall be so labeled.

F. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilation Systems."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory-mounted on equipment, arrange for shipping of control devices to equipment manufacturer.

B. System Software: Update to latest version of software at Project completion.

1.10 COORDINATION

A. Control Wiring: The BAS manufacturer shall be responsible for all BAS and temperature control wiring for a complete and operable system. All wire and cable shall be plenum-rated and shall be in accordance with Division 26 specification sections and all local, state and national codes and ordinances.

B. Where plenum-rated BAS cable is routed in concealed, accessible spaces, the cable may be run in the cable trays or in J-Hooks provided under this section of the specifications. Where plenum-rated BAS cable is routed in exposed or inaccessible areas, it shall be run conduit provided under this section of the specifications.

C. Power Wiring:
   1. Power wiring indicated (device and circuit designation indicated) on the drawings shall be provided under Division 26.
   2. The BAS manufacturer shall be responsible for power wiring not indicated (device or circuit designation not indicated) on the Drawings. It shall be the BAS manufacturer's responsibility to review the Contract Documents to determine the extent of power wiring included in Division 26 and to provide additional power wiring as required. Work shall be in accordance with Division 26 specifications and all local, state and national codes and ordinances.
   3. Where the contractor performing work under this section requires an additional circuit for power wiring to a device or panel under paragraph 2 above, an RFI shall be issued requesting approval to use an available circuit in the nearest panel. Once approval is granted, all wiring and conduit from the breaker to the device or panel shall be provided under this section of the specifications.

D. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation. All conduits shall be concealed within walls and above ceilings unless indicated otherwise.

E. Coordinate installation of conduit to avoid cutting of finished surfaces.

F. Coordinate equipment with Division 28 Section "Common Work Results for Electronic Safety and Security" for building security control detection system and selective annunciation and monitoring only (i.e. 'status alarms').

G. Coordinate equipment with Division 27 Section "GPS Wireless Clock System" to achieve compatibility with equipment that interfaces with that system.

H. Coordinate equipment with Division 26 Section "Lighting Control Devices" to achieve compatibility with equipment that interfaces with that system.

I. Coordinate equipment with Division 28 Section "Digital Addressable Fire Alarm" to achieve compatibility with equipment that interfaces with that system.

J. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.

K. Coordinate equipment with Division 26 Section "Panelboards" to achieve compatibility with starter coils and annunciation devices.

L. Coordinate equipment with Division 26 Section "Switchboards" to achieve compatibility with power monitoring and metering devices in that equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
1. Alerton
2. Automated Logic
3. Delta Controls ***AD-03**
4. Honeywell
5. Johnson Controls Inc.
6. Trane
7. Schneider Electric
8. Siemens

B. This project requires the installation of a new building automation system. The building automation system shall be standardized on owner's preferences. ***AD-03**

C. The design of the BAS shall network any existing operator workstations located off-site, the new operator worksatation, the district supervisory server, network area controllers, and stand-alone DDC controllers. The network architecture shall consist of two levels: a high performance peer-to-peer network and DDC controller-specific local area networks. Access to the controller-specific LAN shall be totally transparent to the user when accessing data or developing control programs. The BAS shall be comprised of Network Area Controller(s) within each facility. The NAC shall connect to the owner's wide area network. Access to the system, either locally in each building, or remotely from a central site or sites, shall be accomplished through standard web browsers, via the VPN access to the system's WAN. Each NAC shall communicate to LonMark/LonTalk (IDC) and/or BACnet (IBC) controllers provided under this Section.

D. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

E. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via

dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

F. Peer-to-Peer Network Level: All operator devices either network resident or connected via dial-up modems shall have the ability to access all point status and application report data, and to execute control functions for any and all other devices via the peer-to-peer network. No hardware or software limits shall be imposed on the number of devices with global access to the network data at any time.
   1. Telecommunication Capability:
      a. Auto-dial/auto-answer communications shall be provided to allow DDC Controllers to communicate with remote operator stations and/or remote terminals via telephone lines, as indicated in the sequence of operations. Existing modems and existing remote host software shall be utilized to meet existing connection system.
      b. Auto-dial DDC Controllers shall automatically place calls to workstations to report alarms or other significant events. The auto-dial program shall include provisions for handling busy signals, "no answers" and incomplete data transfers.
   2. Operators at dial-up workstations shall be able to perform all control functions, all report functions and all database generation and modification functions as described for workstations connected via the network. Routines shall be provided to automatically answer calls from remote DDC Controllers. The fact that communications are taking place with remote DDC Controllers over telephone lines shall be completely transparent to an operator.
   3. Main DDC panels shall be connected via fiber. All fiber, connection hardware, and work required for connection of main panels shall be included.
   4. An Ethernet connection shall be made to the exiting central maintenance host workstation. The contractor performing work under this section of the specifications shall meet with the Owner's IT or IS department and shall be responsible for providing a complete Ethernet connection over the Owner's existing network. All software, hardware, wiring, fiber, and components necessary shall be provided.

2.2 DDC EQUIPMENT

A. Operator Workstations: A new workstation should be provided in the existing building. All BAS interface software should be installed on the new workstation. Provide at least two hard copies on CD or DVD of all software required for interface. Provide 2 copies of software tools required to modify programming and sequences of operation.
   1. Application Software:
      a. I/O capability from operator station.
      b. System security for each operator via software password and access levels.
      c. Automatic system diagnostics; monitor system and report failures.
      d. Database creation and support.
      e. Automatic and manual database save and restore.
      f. Dynamic color graphic displays with up to 10 screen displays at once.
      g. Custom graphics generation and graphics library of HVAC equipment and symbols.
      h. Alarm processing, messages, and reactions.
      i. Trend logs retrievable in spreadsheets and database programs.

j. Alarm and event processing.
k. Object and property status and control.
l. Automatic restart of field equipment on restoration of power.
m. Data collection, reports, and logs. Include standard reports for the following:
   1) Current values of all objects.
   2) Current alarm summary.
   3) Disabled objects.
   4) Alarm lockout objects.
   5) Logs.
n. Custom report development.
o. Workstation application editors for controllers and schedules.
p. Maintenance management.

B. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.

1. Binary Inputs: Allow monitoring of on-off signals without external power.
2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
3. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.
4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with three-position (on-off-auto) override switches and status lights.
5. Analog Outputs: Provide either modulating signal, low voltage (0- to 10-V dc) or current (4 to 20 mA) with status lights, two-position (auto-manual) switch, and manually adjustable potentiometer.
6. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
7. Universal I/Os: Provide software selectable binary or analog outputs.

C. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:

1. Output ripple of 5.0 mV maximum peak to peak.
2. Combined 1 percent line and load regulation with 100-mic.sec. response time for 50 percent load changes.
3. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.

2.3 DDC CONTROLLERS

A. No controller shall be loaded to more than 80%. IE: A controller with 20 available points shall be loaded with 16 points or less.

B. DDC controllers shall be stand-alone, multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies and input/output point modules. Controller size shall be sufficient

to fully meet the requirements of the contract documents. Each controller shall support a minimum of two (2) LAN Device Networks.

C. Each DDC controller shall have sufficient memory to support its own operating system and databases, including:
   1. Control processes
   2. Energy management applications
   3. Alarm management applications including custom alarm messages for each level alarm for each point in the system.
   4. Historical/trend data for points specified.
   5. Maintenance support applications.
   6. Custom processes.
   7. Operator I/O.
   8. Dial-up communications.
   9. Manual override monitoring.

D. Each DDC controller shall support any combination of industry standard inputs and outputs.

E. Provide all processors, power supplies and communication controllers so that the implementation of a point only requires the addition of the appropriate point input/output termination module and wiring.

F. DDC controllers shall provide a minimum two RS-232C serial data communication ports for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop operator's terminals. DDC controllers shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems, Ethernet connections, printers, or terminals.

G. Each DDC controller shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all panel components. The DDC controller shall provide both local and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication.

H. Isolation shall be provided at all peer-to-peer network terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standards 587-1980.

I. In the event of the loss of normal power, there shall be an orderly shutdown of all DDC controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 100 days.
   1. Upon restoration of normal power, the DDC controller shall automatically resume full operation without manual intervention.
   2. Should DDC controller memory be lost for any reason, the system shall automatically reload the DDC controller via the local RS-232C port, via telephone line dial-in or Ethernet from the existing network workstation PC.

J. Provide a separate DDC controller for each RTU or other HVAC system. It is intended that each unique system be provided with its own point resident DDC controller.

2.4 DDC CONTROLLER RESIDENT SOFTWARE FEATURES

A. General:
1. The software programs specified in this Section shall be provided as an integral part of DDC Controllers and shall not be dependent upon any higher-level computer for execution.

B. Control Software Description:
1. The DDC Controllers shall have the ability to perform the following pre-tested control algorithms:
a. Two-position control
b. Proportional control
c. Proportional plus integral control
d. Proportional, integral, plus derivative control
e. Automatic tuning of control loops

C. DDC Controllers shall have the ability to perform any or all the following energy management routines:
1. Time-of-day scheduling
2. Calendar-based scheduling
3. Holiday scheduling
4. Temporary schedule overrides
5. Start-Stop Time Optimization
6. Automatic Daylight Savings Time Switchover
7. Night setback control
8. Enthalpy switchover (economizer)
9. Peak demand limiting
10. Temperature-compensated duty cycling
11. Trending

D. DDC Controllers shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.

E. Alarm management shall be provided to monitor and direct alarm information to operator devices. Each DDC Controller shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost. At no time shall the DDC Controllers ability to report alarms be affected by either operator or activity at a PC workstation, local I/O device or communications with other panels on the network.

F. A variety of historical data collection utilities shall be provided to manually or automatically sample, store and display system data for points as specified.

2.5 APPLICATION SPECIFIC CONTROLLERS (ASC)

A. Each DDC Controller shall be able to extend its performance and capacity using remote application specific controllers (ASCs) through LAN Device Networks.

B. Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor. Provide the following types of ASCs as a minimum:
   1. Terminal Equipment Controllers
      a. Terminal Box (VAV box controllers) should have a differential pressure transmitter (transducer) accuracy of 0.015-inches w.g. or less.

C. Each ASC shall be capable of control of the terminal device independent of the manufacturer of the terminal device.

D. Terminal Equipment Controllers:
   1. Provide for control of each piece of equipment , including, but not limited to, the following:
      a. Terminal Boxes
      b. Exhaust fans
      c. Terminal Units

2.6 ELECTRONIC SENSORS

A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.

B. Thermistor Temperature Sensors and Transmitters and Resistance Temperature Detectors and Transmitters:
   1. Accuracy: Plus or minus 0.5 deg F at calibration point.
   2. Wire: Twisted, shielded-pair cable.
   3. Insertion Elements in Ducts: Single point, 8 inches long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft.
   4. Averaging Elements in Ducts: 36 inches long, flexible; use where prone to temperature stratification or where ducts are larger than 10 sq. ft.
   5. Insertion Elements for Liquids: Brass or stainless steel socket with minimum insertion length of 2-1/2 inches.
   6. Room Sensor Cover Construction: Manufacturer's standard locking covers.
      a. Set-Point Adjustment (classrooms, offices, work/ resource rooms and conference rooms): Exposed warmer/cooler slider. Range of adjustment capable at zone sensor shall be programmable through the BAS.
      b. Set-Point Adjustment (other spaces/ common areas): Concealed.
      c. Set-Point Indication: Concealed.
      d. Thermometer: Concealed.
      e. Color: Manufacturer's standard.
      f. Orientation: Vertical.
   7. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
   8. Space Sensor Guards: Provide heavy-duty, cast aluminum, hinged guards with security screws and lock for sensors located in the Gymnasium, Cafeteria/ Dining, Auditorium.
   9. Specific Sensor Type Locations: In corridors, restrooms/ toilets, stairs, and lobbies provide blank stainless-steel cover plate sensors with insulated back and security screws.

C. Humidity Sensors: Capacitance or bulk polymer resistance type.

1. Accuracy: 5 percent full range with linear output.
2. Room Sensor Range: 20 to 80 percent relative humidity.
3. Room Sensor Cover Construction: Manufacturer's standard locking covers.
   a. Color: Manufacturer's standard.
   b. Orientation: Vertical.
4. Outside-Air Sensor: 20 to 80 percent relative humidity range with mounting enclosure, suitable for operation at outdoor temperatures of 0 to 185 deg F.
5. Duct-Mounted: Electric insertion, 2-position type with adjustable, 2 percent throttling range, 20 to 80 percent operating range, and single- or double-pole contacts.

D. Pressure Transmitters/Transducers:
1. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input and temperature-compensated.
   a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
   b. Output: 4 to 20 mA.
   c. Building Static-Pressure Range: 0- to 0.25-inch wg.
   d. Duct Static-Pressure Range: 0- to 5-inch wg.
2. Water Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure; linear output 4 to 20 mA.
3. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure and tested to 300-psig; linear output 4 to 20 mA.
4. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential. Accuracy shall be +/- 5% of range.
5. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system; linear output 4 to 20 mA.
6. Building Pressure Sensor: Manufacturers standard located above the ceiling with sensing tubes and cover plate in corridor ceiling in centralized/ average reading location for the unit it serves.

E. Current Sensing Switch:
1. Sensor supply voltage and supply current shall be induced from monitored conductor. Contact rating shall be 0.2 amperes at 30 volts DC/AC. Trip set point shall be adjustable to +/-1% of range. Current sensing switch wiring shall not be polarity sensitive.

F. Liquid Level Sensors:
1. Liquid level sensors shall have ½" accuracy calibrated to detect water in temperature range from 60°F to 80°F. Output signal shall be 4 to 20 mA. Sensor material shall be stainless steel or other non-corrosive material.

G. Freezer and Cooler Temperature Sensors:
1. Specifically manufactured to be moisture/water proof. Sensors shall be provided with 25' rugged cable to allow termination away from areas of condensation. Sensor shall be Kele part #ST-RS3-C, ST-R91S-C or approved equal.

2.7 STATUS SENSORS

A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg.

B. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig, piped across pump.

C. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.

D. Voltage Transmitter (100- to 600-V ac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy.

E. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4- to 20-mA kW output, with maximum 2 percent error at 1.0 power factor and 2.5 percent error at 0.5 power factor.

F. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.

G. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.

2.8 CARBON DIOXIDE SENSORS AND TRANSMITTERS

A. Carbon Dioxide Sensor and Transmitter: Single detectors using solid-state infrared sensors; suitable over a temperature range of 23 to 130 deg F and calibrated for 0 to 2 percent, with continuous or averaged reading, 4- to 20-mA output, for wall mounting. LCD, digital display indicating CO2 concentrations in PPM. Measurement range of 0-2000 PPM with lifetime self-calibration or automatic background calibration. AirTest Series EE80 or approved equal.
   1. Space Sensor Guards: Provide heavy-duty, cast aluminum, hinged guards with security screws and lock for sensors located in the Gymnasium, Cafeteria/ Dining, Auditorium.

2.9 FLOW MEASURING STATIONS

A. Duct Airflow Station:

   1. Qualifications: The manufacturer shall have a minimum of ten years experience producing products of this type.
   2. Acceptable Manufacturers: Subject to compliance with requirements, provide products by Ebtron Inc. Unless otherwise noted model numbers shall be as follows:

      a. Model GTx116-PC for ducts and plenums.
      b. Model GTx116-F for fan inlet applications.

   3. Alternative Manufacturers: Alternative manufacturers may be submitted as a substitution in accordance with Division 1 specification requirements. Superior performance or lower cost to the owner must be provided. Acceptance shall be at the sole discretion of the Architect.

4. Special Warranty: In addition to other required warranties, provide 3 years on parts from the date of unit shipment.
5. Delivery, Storage and Handling: All handling and storage procedures shall be per manufacturer's recommendations. Airflow measuring devices shall be kept clean and dry, protected from weather and construction traffic.
6. Provide airflow/temperature measurement devices where indicated on the plans. Fan inlet measurement devices shall not be substituted for duct or plenum measurement devices indicated on the plans.
7. The measurement device shall consist of one or more sensor probe assemblies and a single, remotely mounted, microprocessor-based transmitter. Each sensor probe assembly shall contain one or more independently wired sensor housings. The airflow and temperature readings, calculated for each sensor housing, shall be equally weighted and averaged by the transmitter prior to output. Pitot tubes and arrays are not acceptable. Vortex shedding flow meters are not acceptable.
8. Sensor Probe Assemblies:

    a. Sensor housings shall be manufactured of a U.L. listed engineered thermoplastic.
    b. Sensor housings shall utilize two hermetically sealed, bead-in-glass thermistor probes to determine airflow rate and ambient temperature. Devices that use "chip" or diode case type thermistors are unacceptable. Devices that do not have two thermistors in each sensor housing are not acceptable.
    c. Sensor housings shall be calibrated at a minimum of 16 airflow rates and have an accuracy of +/-2% of reading over the entire operating airflow range.
    d. Each sensor housing shall be calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).
    e. Devices whose accuracy is the combined accuracy of the transmitter and sensor probes must demonstrate that the total accuracy meets the performance requirements of this specification throughout the measurement range.
    f. Operating temperature range for the sensor probe assembly shall be -20° F to 160° F. The operating humidity range for the sensor probe assembly shall be 0-99% RH (non-condensing).
    g. Each temperature sensor shall be calibrated at a minimum of three temperatures and have an accuracy of +/-0.15° F over the entire operating temperature range. Each temperature sensor shall be calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).
    h. Each sensor probe assembly shall have an integral, U.L. listed, plenum rated cable and terminal plug for connection to the remotely mounted transmitter. All terminal plug interconnecting pins shall be gold plated.
    i. Each sensor assembly shall not require matching to the transmitter in the field.
    j. A single manufacturer shall provide both the airflow/temperature measuring probe(s) and transmitter at a given measurement location.
9. Duct and Plenum Sensor Probe Assemblies:
    a. Sensor housings shall be mounted in an extruded, 6063 aluminum tube probe assembly.
    b. Thermistor probes shall be mounted in sensor housings using an epoxy resin.
    c. All thermister probe wires shall be contained within the aluminum tube probe assembly.
    d. The number of sensor housings provided for each location shall be as follows:
        1) Area (sq.ft.) Sensors
        2) <2 4

3)	2 to <4	6
4)	4 to <8	8
5)	8 to <16	12
6)	>=16	16

e. Probe assembly mounting brackets shall be constructed of 304 stainless steel. Probe assemblies shall be mounted using one of the following options:
   1) Insertion mounted through the side or top of the duct
   2) Internally mounted inside the duct or plenum
   3) Standoff mounted inside the plenum

f. The operating airflow range shall be 0 to 5,000 FPM unless otherwise indicated.

10. Fan Inlet Sensor Probe Assemblies:
   a. Sensor housings shall be mounted on 304 stainless steel blocks.
   b. Mounting rods shall be field adjustable to fit the fan inlet and constructed of nickel-plated steel.
   c. Mounting feet shall be constructed of 304 stainless steel.
   d. The operating airflow range shall be 0 to 10,000 FPM unless otherwise indicated.

11. Transmitters:
   a. The transmitter shall have a 16-character alphanumeric display capable of displaying airflow, temperature, system status, configuration settings and diagnostics. Configuration settings and diagnostics shall be accessed through a pushbutton interface on the main circuit board. Airflow shall be field configurable to be displayed as a velocity or a volumetric rate.
   b. The transmitter shall be capable of:
      1) Independently monitoring and averaging up to 16 individual airflow and temperature readings.
      2) Displaying the airflow and temperature readings of individual sensors on the LCD display.
   c. The transmitter shall have a power switch and operate on 24 VAC (isolation not required). The transmitter shall use a switching power supply fused and protected from transients and power surges.
   d. All interconnecting pins, headers and connections on the main circuit board, option cards and cable receptacles shall be gold plated.
   e. The operating temperature range for the transmitter shall be -20° F to 120° F. The transmitter shall be protected from weather and water.
   f. The transmitter shall be capable of communicating with the BAS using one of the following interface options:
      1) Linear analog output signal: Field selectable, fuse protected and isolated, 0-10VDC and 4-20mA (4-wire)
      2) RS-485: Field selectable BACnet-MS/TP
      3) Base-T Ethernet: Field selectable BACnet Ethernet, BACnet-IP
   g. The transmitter shall have an infrared interface capable of downloading individual sensor airflow and temperature data or uploading transmitter configuration data to a handheld PDA (Palm or Microsoft Pocket PC operating systems).
   h. The measuring device shall be UL listed as an entire assembly.
   i. The manufacturer's authorized representative shall review and approve placement and operating airflow rates for each measurement location indicated. A written report shall be submitted to the architect should any measurement location not meet the manufacturer's placement requirements.

12. Installation: Install in accordance with manufacturer's instructions at locations indicated. A written report shall be submitted to the architect if any discrepancies are found.
13. Adjusting: Duct and plenum devices shall not be adjusted without the Architect's approval.

2.10 THERMOSTATS

A. Available Manufacturers:
1. Danfoss Inc.; Air-Conditioning and Refrigeration Div.
2. Heat-Timer Corporation.
3. Tekmar Control Systems, Inc.

B. Combination Thermostat and Fan Switches: Line-voltage thermostat with push-button or lever-operated fan switch.

1. Label switches "FAN ON-OFF" or "FAN HIGH-LOW-OFF" or "FAN HIGH-MED-LOW-OFF."
2. Mount on single electric switch box.

C. Electric, solid-state, microcomputer-based room thermostat with remote sensor.
1. Automatic switching from heating to cooling.
2. Preferential rate control to minimize overshoot and deviation from set point.
3. Set up for four separate temperatures per day.
4. Instant override of set point for continuous or timed period from 1 hour to 31 days.
5. Short-cycle protection.
6. Programming based on every day of week.
7. Selection features include degree F or degree C display, 12- or 24-hour clock, keyboard disable, remote sensor, and fan on-auto.
8. Battery replacement without program loss.
9. Thermostat display features include the following:
   a. Time of day.
   b. Actual room temperature.
   c. Programmed temperature.
   d. Programmed time.
   e. Duration of timed override.
   f. Day of week.
   g. System mode indications include "heating," "off," "fan auto," and "fan on."

D. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24-V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed set-point adjustment, 55 to 85 deg F set-point range, and 2 deg F maximum differential.

E. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch or equivalent solid-state type, with heat anticipator; listed for electrical rating; with concealed set-point adjustment, 55 to 85 deg F set-point range, and 2 deg F maximum differential.

1. Electric Heating Thermostats: Equip with off position on dial wired to break ungrounded conductors.

2. Selector Switch: Integral, manual on-off-auto.

F. Remote-Bulb Thermostats: On-off or modulating type, liquid filled to compensate for changes in ambient temperature; with copper capillary and bulb, unless otherwise indicated.

1. Bulbs in water lines with separate wells of same material as bulb.
2. Bulbs in air ducts with flanges and shields.
3. Averaging Elements: Copper tubing with either single- or multiple-unit elements, extended to cover full width of duct or unit; adequately supported.
4. Scale settings and differential settings are clearly visible and adjustable from front of instrument.
5. On-Off Thermostat: With precision snap switches and with electrical ratings required by application.
6. Modulating Thermostats: Construct so complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.

G. Immersion Thermostat: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range and adjustable set point.

H. Airstream Thermostats: Two-pipe, fully proportional, single-temperature type; with adjustable set point in middle of range, adjustable throttling range, plug-in test fitting or permanent pressure gage, remote bulb, bimetal rod and tube, or averaging element.

I. Electric, Low-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic- reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or below set point.

1. Bulb Length: Minimum 20 feet.
2. Quantity: One thermostat for every 20 sq. ft. of coil surface.

J. Electric, High-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic- reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or above set point.

1. Bulb Length: Minimum 20 feet.
2. Quantity: One thermostat for every 20 sq. ft. of coil surface.

K. Heating/Cooling Valve-Top Thermostats: Proportional acting for proportional flow, with molded-rubber diaphragm, remote-bulb liquid-filled element, direct and reverse acting at minimum shutoff pressure of 25 psig, and cast housing with position indicator and adjusting knob.

2.11 ACTUATORS

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.

1. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

2. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
3. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
4. Spring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running and breakaway torque of 150 in. x lbf.
5. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
6. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running and breakaway torque of 150 in. x lbf.

B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.

1. Valves: Size for torque required for valve close off at maximum pump differential pressure.
2. Dampers: Size for running torque calculated as follows:
   a. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft. of damper.
   b. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. of damper.
   c. Parallel-Blade Damper without Edge Seals: 4 inch-lb/sq. ft of damper.
   d. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. of damper.
   e. Dampers with 2- to 3-Inch wg of Pressure Drop or Face Velocities of 1000 to 2500 fpm: Increase running torque by 1.5.
   f. Dampers with 3- to 4-Inch wg of Pressure Drop or Face Velocities of 2500 to 3000 fpm: Increase running torque by 2.0.
3. Coupling: V-bolt and V-shaped, toothed cradle.
4. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
5. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
6. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
7. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
8. Temperature Rating: Minus 22 to plus 122 deg F.
9. Temperature Rating (Smoke Dampers): Minus 22 to plus 250 deg F.

2.12 CONTROL VALVES

A. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.

B. Bronze body, bronze trim, two or three ports as indicated, replaceable plugs and seats, and union and threaded ends.

1. Rating: Class 125 for service at 125 psig and 250 deg F operating conditions.
2. Sizing: 3-psig maximum pressure drop at design flow rate, to close against pump shutoff head.

3. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.

2.13 DAMPERS

A. Dampers: AMCA-rated, parallel or opposed-blade design; 0.108-inch- minimum thick, galvanized-steel or 0.125-inch- minimum thick, extruded-aluminum frames with holes for duct mounting; damper blades shall not be less than 0.064-inch- thick galvanized steel with maximum blade width of 8 inches and length of 48 inches.

1. Secure blades to 1/2-inch- diameter, zinc-plated axles using zinc-plated hardware, with oil-impregnated sintered bronze blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F.
3. Edge Seals, Standard Pressure Applications: Closed-cell neoprene.
4. Edge Seals, Low-Leakage Applications: Use inflatable blade edging or replaceable rubber blade seals and spring-loaded stainless-steel side seals, rated for leakage at less than 10 cfm per sq. ft. of damper area, at differential pressure of 4-inch wg when damper is held by torque of 50 in. x lbf; when tested according to AMCA 500D.

2.14 SMOKE DETECTORS

A. Smoke detectors shall be furnished under Division 28 and installed under this Section.

B. Wiring from smoke detectors to fire alarm system shall be under Division 28.

C. Wiring from smoke detectors to mechanical equipment shall be under this Section.

2.15 LOW TEMPERATURE DETECTION STAT: By BAS manufacturer, adjustable freeze stats from 32-40°F set point.

2.16 CURRENT SENSING RELAYS: By controls contractor for all equipment.

2.17 MISCELLANEOUS RELAYS AND SWITCHES:

A. General: Where required by the sequence of operation switches, relays, and miscellaneous devices necessary to accomplish the sequence shall be provided under this section.

PART 3 - EXECUTION

3.1 PROJECT MANAGEMENT

A. Provide a designated project manager who will be responsible for the following:

1. Construct and maintain project schedule
2. On-site coordination with all applicable trades and subcontractors
3. Authorized to accept and execute orders or instructions from owner/architect
4. Attend project meetings as necessary to avoid conflicts and delays
5. Make necessary field decisions relating to this scope of work
6. Coordination/Single point of contact.

3.2 EXAMINATION

A. Verify that power supply is available to control units and operator workstation.

B. Verify that duct-, pipe-, and equipment-mounted devices are installed before proceeding with installation.

3.3 INSTALLATION

A. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.

B. Connect and configure equipment and software to achieve sequence of operation specified in Section 23 section "Sequences of Control."

C. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices next to light switch(es) when space is available with top of device at 48 inches above finished floor. Where space next to light switch(es) is not available, align device vertically with light switch and locate device with top at 40 inches above the finished floor.

1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

D. Install guards on thermostats where indicated on Drawings. Provide cast aluminum hinged guards on sensors serving the gymnasium/cafeteria.

E. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.

F. Install labels and nameplates to identify control components according to Division 23 Section "Identification for HVAC Piping and Equipment."

G. Install hydronic instrument wells, valves, and other accessories according to Division 23 Section "Hydronic Piping."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
2. Test and adjust controls and safeties.
3. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
4. Test each point through its full operating range to verify that safety and operating control set points are as required.
5. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
6. Test each system for compliance with sequence of operation.
7. Test software and hardware interlocks.

C. DDC Verification:

1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
2. Check instruments for proper location and accessibility.
3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
4. Check instrument tubing for proper fittings, slope, material, and support.
5. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
6. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
7. Check temperature instruments and material and length of sensing elements.
8. Check control valves. Verify that they are in correct direction.
9. Check DDC system as follows:

    a. Verify that DDC controller power supply is from emergency power supply.
    b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
    c. Verify that spare I/O capacity has been provided.
    d. Verify that DDC controllers are protected from power supply surges.

D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.5 ADJUSTING

A. Calibrating and Adjusting:

1. Calibrate instruments.
2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
4. Control System Inputs and Outputs:

a. Check analog inputs at 0, 50, and 100 percent of span.
b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
c. Check digital inputs using jumper wire.
d. Check digital outputs using ohmmeter to test for contact making or breaking.
e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.

5. Flow:

a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
b. Manually operate flow switches to verify that they make or break contact.

6. Pressure:

a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.

7. Temperature:

a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
b. Calibrate temperature switches to make or break contacts.

8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
10. Provide diagnostic and test instruments for calibration and adjustment of system.
11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

B. Adjust initial temperature and humidity set points.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose.

3.6 TRAINING

A. Provide 8 hours of training for Owner's designated operating personnel. Training shall include:
1. Explanation of drawings and operation & maintenance manuals
2. Walk-through of the job to locate control components
3. Operator workstation and peripherals
4. Operation of Portable computer
5. DDC controller and ASC operation/function
6. Operator control functions including graphic generation and field panel programming

7. Explanation of adjustment, calibration and replacement procedures

B. Since the Owner may require personnel to have more comprehensive understanding of the hardware and software, additional training must be available form the Manufacturer. If necessary additional training will be contracted by the Owner at a later date.

C. Coordinate with Owner if video recording documentation of training is required.

3.7 COMMISSIONING

A. Provide up to 16 hours for commissioning/ engineer testing and verification of the controls. This may include providing trends, modified programming, on-site testing, and similar testing and verification methods to ensure the controls are functioning as intended by the sequence of controls.

B. Provide the AE with read-only remote access to the BAS network 1 month prior to substantial completion date. All programming and graphics shall be in place 1 month prior to substantial completion date to allow for engineer testing and verification. A login in and server access must be identified and provided five weeks prior to substantial completion.

END OF SECTION 230900

SECTION 238239 - UNIT HEATERS *AD-03

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general provisions of the Contract Documents apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cabinet unit heaters with centrifugal fans and electric-resistance heating coils.
2. Propeller unit heaters with electric-resistance heating coils.
3. Wall heaters with propeller fans and electric-resistance heating coils.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. PTFE: Polytetrafluoroethylene plastic.

C. TFE: Tetrafluoroethylene plastic.

1.4 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each product indicated.

B. Samples for Initial Selection: Finish colors for units with factory-applied color finishes.

C. Samples for Verification: Finish colors for each type of cabinet unit heater and wall and ceiling heaters indicated with factory-applied color finishes.

D. Operation and Maintenance Data: For cabinet unit heaters to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2007, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IESNA 90.1-2007 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2007, Section 6 - "Heating, Ventilating, and Air-Conditioning."

PART 2 - PRODUCTS

2.1 PROPELLER UNIT HEATERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Airtherm; a Mestek Company.
2. Carrier Corp.
3. Daikin Applied (McQuay International)
4. Dunham-Bush, Inc.
5. Engineered Air.
6. International Environmental Corp.
7. Ruffneck Heaters, Starozik Industries Ltd.
8. Trane.
9. USA Coil & Air Inc.

B. Description: An assembly including casing, coil, fan, and motor in horizontal discharge configuration with adjustable discharge louvers.

C. Comply with UL 2021.

D. Cabinet: Removable panels for maintenance access to controls.

E. Cabinet Finish: Manufacturer's standard baked enamel applied to factory-assembled and -tested propeller unit heater before shipping.

F. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2007.

G. Discharge Louver: Adjustable fin diffuser for horizontal units and conical diffuser for vertical units.

H. Hot-Water Coil: Copper tube, 0.031-inch wall thickness, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and rated for a minimum working pressure of 200 psig and a maximum entering water temperature of 325 deg F , with manual air vent. Test for leaks to 375 psig underwater.

I. Fan: Propeller type with aluminum wheel directly mounted on motor shaft in the fan venturi.

J. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

1. Motor Type: Permanently lubricated, multispeed.

K. Control Devices:

1. Unit-mounted, fan-speed switch.
2. Unit-mounted or remote thermostat as indicated in schedule on drawings. ***AD-03**

2.2 WALL HEATERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Berko; Marley Engineered Products.
2. Chromalox, Inc.; a division of Emerson Electric Company.
3. Indeeco.
4. Markel Products; a division of TPI Corporation.
5. Marley Electric Heating; a division of Marley Engineered Products.
6. QMark Electric Heating; a division of Marley Engineered Products.
7. Trane.

B. Description: An assembly including chassis, electric heating coil, fan, motor, and controls. Comply with UL 2021.

C. Cabinet:

1. Front Panel: Stamped-steel louver, with removable panels fastened with tamperproof fasteners.
2. Finish: Baked enamel over baked-on primer with manufacturer's standard color selected by Architect, applied to factory-assembled and -tested wall and ceiling heaters before shipping.
3. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2007.

D. Surface-Mounting Cabinet Enclosure: Steel with finish to match cabinet.

E. Hot-Water Coil: Copper tube, 0.031-inch wall thickness, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and rated for a minimum working pressure of 200 psig and a maximum entering water temperature of 325 deg F , with manual air vent. Test for leaks to 375 psig underwater.

F. Fan: Aluminum propeller directly connected to motor.

1. Motor: Permanently lubricated. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

G. Controls: Unit-mounted thermostat. Low-voltage relay with transformer kit.

H. Electrical Connection: Factory wire motors and controls for a single field connection with disconnect switch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in for electrical connections to verify actual locations before unit heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install cabinet unit heaters to comply with NFPA 90A.

B. Install propeller unit heaters level and plumb.

C. Suspend propeller unit heaters from structure with all-thread hanger rods and elastomeric hangers. Hanger rods and attachments to structure are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment." Vibration hangers are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

3.3 CONNECTIONS

A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

3.5 ADJUSTING

A. Adjust initial temperature set points.

END OF SECTION 238239

SECTION 260800 - ELECTRICAL SYSTEMS COMMISSIONING (*AD-03)

PART 1 – GENERAL

1.1 INTENT: The intended result of the Electrical Commissioning process is to assure the Owner that the electrical systems are installed, operate, and perform in accordance with Contract Documents and that Owner's personnel are properly trained to operate and maintain the systems – all prior to the Owner's acceptance of the building.

1.2 SCOPE:

A. Work Included: This project will have selected building electrical systems commissioned. The equipment and systems to be commissioned are specified in Part 3 of this specification section. That portion of the commissioning effort that the Contractor is responsible to execute is defined herein. The commissioning process will be directed by a Commissioning Authority. The electrical commissioning shall provide substantial verification that systems and equipment are installed and performing in accordance with the Contract Documents and design intent. This independent commissioning shall be complementary to the construction administration services performed by the Architect and/or Electrical Consulting Engineer.

B. Work Not Included: It shall not be incumbent upon the Commissioning Authority to evaluate design. Systems installed and performing in accordance with Contract Documents that do not achieve performance in accordance with design intent will be so noted when observed.

1.3 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 1 Specifications Sections, apply to this Section.

B. This section complements and forms an integral part of Divisions 26 and all other sections of Divisions 26 shall have the same force and effect as if printed herewith in full.

C. The specification Section 019113 GENERAL COMMISSIONING REQUIREMENTS forms a part of this section and shall have the same force and effect as if printed herewith in full.

1.4 RELATED WORK:

A. Contractor: The contractor responsible for the installation of the equipment and/or systems to be commissioned shall be responsible for all pre-commissioning work as defined within this specification section, in addition to all associated work in the individual commissioned equipment and/or systems related Divisions 26 specification sections.

B. Electrical: All Division 26 specification sections form a part of this section and shall have the same force and effect as if printed herewith in full.

1.5 SUPPLEMENTAL CONDITIONS:

A. All related Division 26 work must be complete prior to functional performance verification, unless approved in writing by the Owner's Project Manager. An exception to this is system training denoted or approved to be performed after occupancy and any required situational or approved deferred performance verification. Required work includes completion and acceptance of the following tasks for all systems, including but not limited to:

1. Submission of all data requested by the Commissioning Authority.

2. Correction of all identified issues or written approval by the Owner for exception from this milestone

3. Completed and signed start-up and pre-functional checklist documentation
4. Required training of Owner personnel completed and approved
5. Submission of acceptable and complete O&M manuals approved by the A/E.

B. Remedial Work: Completion of remedial work required as a result of failed functional performance verification shall be the responsibility of the Contractor. The time period for completion of remedial work required as a result of failed functional performance verification shall be a minimum of fourteen (14) calendar days prior to the date of Owner's acceptance of Substantial Completion: the time period shall be greater as required to meet the contractual Substantial Completion date.

C. The Contractor shall reimburse the Owner for liquidated damages for costs incurred due to delays in Substantial Completion of the project. These damages shall include costs for Owner's commissioning team members.

1.6 AUTHORITY OF THE COMMISSIONING AUTHORITY: Throughout the commissioning process, the commissioning Authority's role is primarily one of an observer/witness, monitoring the installation, start-up, and operation of the electrical systems. The commissioning Authority shall have no authority to alter design or installation procedures. If acceptable performance cannot be achieved, it will be the Commissioning Authority's responsibility to apprise the Owner, design engineer, and/or contractor of the deficiency. Corrective actions shall be the responsibility of the Owner, design engineer, and/or contractor; and not that of the Commissioning Authority. The Commissioning Authority shall have the authority to require and review tests and demonstrations to verify proper performance and report all deficiencies findings to the owner.

PART 2 – PRODUCTS

NOT APPLICABLE TO THIS SPECIFICATION SECTION

PART 3 – EXECUTION

3.1 COMMISSIONING TEAM AND CHECKLISTS

A. The General contractor shall designate team members to participate in the pre-functional checks and functional performance verification specified herein. In addition, the project manager, the architect/engineer, and the manufacturer will represent the Owner. The team members shall be designated as follows:

Designation	Function
CxA	Commissioning Authority
GC	General Contractor
EC	Electrical Contractor
O	Owner
A/E	Architect/Engineer
MC	Mechanical Contractor
MFR	Manufacturer

B. The Pre-Functional Checklists attached in Appendix A and Functional Performance Verifications attached in Appendix B assign responsibility for specific commissioning activity tasks. The Contractor and responsible Installing subcontractor(s) and any additional commissioning team members identified on the checklist shall initial and date the appropriate forms for each task indicated in these Checklists. One form shall be completed for each piece of commissioned equipment or system. By initialing and dating the entry, the responsible Installing Contractor shall indicate completion and verification of proper installation in

accordance with Contract requirements and acceptance of responsibility for the installation of the equipment and/or systems.

1. Forms are to be initialed and dated at the time of completion of the specific checklist task item.
2. Where additional forms are required, the Contractor shall be responsible for photocopying or replicating the appropriate form(s).

3.2 RESPONSIBILITIES: Each member of the commissioning team has responsibilities to the successful completion of the commissioning process as follows:

A. The Owner's Representatives shall perform their normal construction contract administration functions.

B. The Architect shall provide adequate support to the Consulting Electrical Engineer as related to his/her duties in the commissioning process. It shall also be the Architect's responsibility, either directly or through his assignee, to assure that the commissioning Authority is:

1. Provided copies of approved shop drawings as they are returned to the Contractor.
2. Notified of time, date, and place of all regularly scheduled progress meetings, and of any special meetings that may be called regarding electrical systems.
3. Copied on all correspondence pertinent to the electrical systems including but not limited to minutes of progress meetings, responses to contractor requests for information, change order documentation.

C. The Consulting Electrical Engineer shall perform his normal construction contract administration functions including resolution of Contractor Requests for Information on electrical documents and installation.

D. The Contractor shall, in addition to his normal responsibilities for construction of the project, assure that his subcontractors recognize the authority of the Commissioning Authority and perform in accordance with the requirements of the commissioning process. The contractor shall assure that proper notification, at least 72 hours in advance, is provided to the Commissioning Authority for any milestone events pertaining to the following electrical systems installation:

1. Site and Building Lighting System Controls including Timeclock Control, and Occupancy/ Vacancy Sensors

E. The Electrical Subcontractor shall perform his normal contract obligations and be responsive to the authority of the Commissioning Authority.

F. The Electrical Subcontractor shall, in addition to his normal responsibilities for construction of the project, assure that proper notification of the milestones of the electrical systems installation as cited in Paragraph D. are provided to the General Contractor. The Electrical Subcontractor shall assure that his subcontractors recognize the authority of the commissioning Authority and perform in accordance with the requirements of the commissioning process.

G. The Commissioning Authority will follow the procedures as set forth in the paragraph titled Commissioning Authority Procedures to execute his responsibility for:

1. Verifying that the required electrical systems are installed and operating in accordance with Contract Documents.

2. Assuring that Owner's Operating and Maintenance personnel are fully trained on systems operation and maintenance.
3. Assuring that Close Out documentation is properly provided to the Owner.

3.3 TESTS

A. The pre-functional checks and functional performance verification shall be performed in a manner that essentially duplicates the checking, testing, and inspection methods established in the related Sections. Where checking, testing and inspection methods are not specified in other Sections, methods shall be established that will provide the information required. Testing and verification required by this Section shall be performed throughout the commissioning process. Requirements of this Section do not supplant those in related Sections but may expand upon them. The Contractor shall provide all materials, services, and labor required performing the pre-functional checks and functional performance verification. A pre-functional check or functional performance verification shall be aborted if any system deficiency prevents the successful completion of the test or if any non-Owner commissioning team member is not present for the test. After two failed tests, the Contractor shall reimburse the Owner for all Owner costs associated with additional testing. These costs shall include costs for Owner commissioning team members.

1. Pre-Functional Checks: Pre-functional checks shall be performed for the items indicated on the checklists in Appendix A. Deficiencies discovered during these checks shall be corrected and re-tested in accordance with the applicable Contract requirements.
2. Functional Performance Verification: Electrical test requirements are listed in each specific equipment/ system specification section under Part 3 Execution.

   The Commissioning Authority will witness and document the contractor assisted testing for the following systems:

   1. Site and Building Lighting System Controls including Timeclock Control and Occupancy/ Vacancy Sensors

   Upon failure of any functional performance verification item, the Contractor shall correct all deficiencies in accordance with the applicable contract requirements. The checklist shall then be repeated until it has been completed with no errors.

3.4 COMMISSIONING AUTHORITY PROCEDURES: The Commissioning Authority will perform systems commissioning following the procedures listed herein, and all members of the Commissioning Team shall cooperate fully with the execution of these procedures. To achieve electrical systems commissioning, the Commissioning Authority shall:

A. Perform unscheduled walks through the building to observe and keep abreast of the lighting control systems installation progress, means, and methods. Commissioning Authority's presence in the building will be for his benefit in preparing to commission the building and shall in no way be construed as superseding the authority of the project Architect/Engineers.

B. Review lighting control systems Shop Drawings and Submittals concurrently with the Project Consulting Electrical Engineer. The purpose of this review is primarily one of familiarization with equipment to be furnished on the project for on-site verification by the commissioning Authority and in no way relieves the Consulting Electrical Engineer of his duties or supersedes his authority for shop drawing review. Note: The Contractor may proceed with equipment procurement after receipt of Architect/Engineer approval of Shop Drawings and/or Submittals.

C. Issue Pre-Functional Check Lists relevant to the project for Contractor monitoring and verification of installation progress (See Appendix A).

D. Visit the project periodically to observe the actual work being performed.

E. Review Contractor prepared Operating and Maintenance Manuals and be present during Electrical Contractor instructions to the Owner's operating personnel regarding operations and maintenance of the electrical system.

F. Review Contractor prepared As-Built drawings and all certifications required for submission by project specifications.

G. Furnish a written report and recommend acceptance of the electrical system upon satisfactorily completing the commissioning process. Commissioning Authority's recommendation to accept systems shall occur prior to Substantial Completion (i.e. Owner acceptance).

H. Recommendations for approval, when appropriate, will be forwarded to the project Architect/Engineer for inclusion in their final submission of project close out documentation to the Owner.

3.5 CONTRACTOR COMMISSIONING PROCEDURES: The Contractor and all relevant Sub-Contractors shall, in addition to being responsive to the procedures cited for execution by the Commissioning Authority in paragraph titled Commissioning Authority Procedures, perform as follows to achieve satisfactory electrical systems commissioning. The Contractor shall:

A. Demonstrate the performance of each system to the Commissioning Authority and Owner's Representative when ready. Schedule the sub-Trade Representatives as may apply to demonstrate the performance of the equipment and systems.

B. Evaluations

1. The Owner's Commissioning Authority shall observe the calibrations and measurements associated with the functional performance verification of the equipment, systems and control systems identified herein; set the time schedule of functional performance verification; and make any necessary corrective or remedial work recommendations to ensure that the commissioned equipment and systems function as described in and perform in accordance with design intent.

2. The relevant subcontractor shall operate all equipment and systems in support of the commissioning work effort and shall provide all labor, equipment, and materials necessary to allow operational and performance verification of all commissioned equipment and systems.

C. At a minimum, the performance and operation demonstrations of the following equipment and/or systems will be required:

1. Site and Building Lighting System Controls

D. Sampling techniques may be employed for performance verification of multiple identical pieces of equipment/systems such as lighting controls, circuit breakers, and branch circuits, etc. Performances of all such equipment/systems shall be verified via field verification performed for 25% of each type of identical pieces of equipment/systems. Commissioning Authority's selection of sample equipment/systems to be field verified shall be at his/her discretion.

E. The Contractor shall repeat any measurement contained in the pre-functional checklists or functional performance test sheets where required by the Commissioning Authority for verification or diagnostic purposes.

F. Should any performance verification reveal operation or performance not in accordance with Contract Documents, the Contractor shall rectify the deficiency, and re-inspection shall be performed. Should operation or performance still not be as specified on the re-inspection due to Contractor's work, the time and expenses of the Commissioning Authority to make further re-inspections shall be considered as additional cost to the Owner. The total sum of such costs shall be deducted from the final payment to the Contractor.

3.6 SATISFACTORY COMPLETION: The Contractor's personnel shall be made available to execute all aspects of the commissioning process until the Owner accepts final results. Commissioning tasks and meetings may be repeated until the Owner is satisfied and will not be fixed as one-time, one-chance events for the Contractor.

3.7 CLOSE OUT SUBMITTALS:

A. Close out documents, consisting of but not limited to As-Built Drawings and Certificates of Inspections submitted to the Architect/Engineer shall be copied to the Commissioning Authority for concurrent review.

B. Operating and Maintenance Manuals shall be submitted for Architect/Engineer review and approval well before any equipment/systems demonstrations or training occurs. The approved O&M Manuals shall be employed during demonstrations and training.

COMMISSIONING APPENDICIES

Appendix A: Pre-Functional Checklists

1. Lighting Controls

Pre-Functional Checklists forms may be updated by the CxA after CxA review of approved submittals.

Lighting Controls **Checked By**_____ **Date**_____

Room No: ; Sensor Type:

Checklist Item	YES	NO	REMARKS
Installation			
Sensor installed, calibrated, aimed properly			
Sensor located per design			
Calibration adjustment accessible to authorized personnel but not occupants			
Lighting installed and located per design.			
Power wiring completed			
Fixture lens cleaned			

Comments:

Room No: ; Sensor Type:

Checklist Item	YES	NO	REMARKS
Installation			
Sensor installed, calibrated, aimed properly			
Sensor located per design			
Calibration adjustment accessible to authorized personnel but not occupants			
Lighting installed and located per design.			
Power wiring completed			
Fixture lens cleaned			

Comments:

Room No: ; Sensor Type:

Checklist Item	YES	NO	REMARKS
Installation			
Sensor installed, calibrated, aimed properly			
Sensor located per design			
Calibration adjustment accessible to authorized personnel but not occupants			
Lighting installed and located per design.			
Power wiring completed			
Fixture lens cleaned			

Comments:

Appendix B: Functional Performance Verification

System / Equipment

1. Site and Building Lighting System Controls including Timeclock Control, Occupancy/ Vacancy Sensors, and Daylight Harvesting

Lighting Controls **Date/Time/:**_____

Participants: _____ **CxA Sign-off:**_____

1. OCCUPANCY SENSOR: The occupancy sensor utilizes an ultrasonic sensor which detects movement within its range. When motion is detected the lighting system will turn on. It will turn off once the area is vacated and the specified time delay has elapsed.

Lighting in room shall initially be off. Also ensure that occupancy can be sensed in all areas of the room so that lights do not go off when room is occupied.

Person to enter room and lights to turn on automatically. Person to leave room and lights to turn off after the specified length of time.

Verify 100% of rooms with occupancy sensors.

	Pass	Fail
Room #		
Lights come on when person enters room.		
Document time lapse until lights turn off after exiting room		
Room #		
Lights come on when person enters room.		
Document time lapse until lights turn off after exiting room		
Room #		
Lights come on when person enters room.		
Document time lapse until lights turn off after exiting room		
Room #		
Lights come on when person enters room.		
Document time lapse until lights turn off after exiting room		
Room #		
Lights come on when person enters room.		
Document time lapse until lights turn off after exiting room		
Room #		
Lights come on when person enters room.		
Document time lapse until lights turn off after exiting room		
Room #		
Lights come on when person enters room.		
Document time lapse until lights turn off after exiting room		
Room #		
Lights come on when person enters room.		
Document time lapse until lights turn off after exiting room		
Room #		
Lights come on when person enters room.		
Document time lapse until lights turn off after exiting room		

SECTION 285000 - SECURITY CONTROL SYSTEM **(*AD-01R)**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Provisions of the Contract and of the Contract Documents apply to this section.

1.2 DESCRIPTION OF WORK

A. The general contractor shall contract the services of a qualified Security Controls System Contractor (SCSC) and shall be responsible for the Security Controls System Contractor (SCSC) and the systems they shall provide as part of the Division 28 specification sections.

B. All Work associated with a complete and fully functional Security Control System shall be provided by the Security Controls System Contractor (SCSC). This Work and system shall include, but may not be limited to, all conduit, raceway, wire, terminations, backboxes, devices, equipment, products, services, and overall systems integration. The installation or furnishing of such Work by other trades, including the Electrical Subcontractor, shall not be acceptable unless they are a direct subcontractor to the SCSC.

C. The SCSC shall provide all equipment, shop drawing submittals, testing reports, and samples as described in Specification Sections 285000, 285010, 285020, 285030, 285100, 285200, 285260, 285300, 285400, 285500, and 285900.

D. The SCSC shall provide a software data flow diagram/chart indicating in what programs and where all control logic will reside. Provide a detailed description of software solution and all secondary software or drivers used to interface or integrate all the security systems. All computers listed throughout the security control system in specification sections 285000 – 285900 shall use Windows 10 or better operating system. All servers listed throughout the Security Control System specification sections 285000 – 285900 shall use Windows Server 2016 or better.

E. All software shall be readily available through conventional sources and all programming shall be written utilizing language simplistic enough to be modified in the future by Owner's qualified staff or a third party integrator. If it is found the SCSC provided non-modifiable programming language or encrypted software but did not disclose this information, the system shall be completely redeveloped with modifiable programming methods at the SCSC's expense.

F. The SCSC shall turn over to the Owner all programming passwords, source codes and programming schedules at Substantial Completion. Prior to final payment, the SCSC shall provide all software, licenses, information, training, and any other items needed to allow the Owner to make future modifications to programming utilizing options other than the original SCSC.

G. Summary

1. The SCSC shall be responsible for coordinating with Division 8, Division 11, and Division 26, the power and cabling requirements of all electric strikes, electric locks, door position indicators, or any other device associated with and controlled/monitored by the Security Control System. This coordination includes the identification and resolution of potential conflicts in the scope of work between these Divisions.
2. Types of Security Control System components/features/interfaces:

a. The SCSC shall be responsible for all Division 28 field device installation, terminations, and equipment configuration.
b. Provide a complete fully functional Security Control System.
c. Provide all conduit, raceway, wire, terminations, backboxes, and equipment for a complete system. All security cabling shall be in conduit the entire distance of the run unless otherwise noted.
d. Provide proper control of detention hardware as supplied by Division 11 and security hardware as supplied by Division 8. Coordinate all architectural doors with security devices to ensure proper lock, lock power, and control wiring to these locations.
e. Provide all necessary distributed AC/DC system power, unless otherwise noted.
f. The complete Security Control System shall be connected through UPS power and generator power.
    1) Provide interface with UPS to VGUI system for annunciation of UPS trouble alarms on the VGUI.
    2) Provide interface with emergency generator to VGUI system for annunciation of generator trouble alarms on the VGUI.
g. Prior to fabrication, coordinate exact location and installation of Security Control System with other trades.
h. Provide complete system test and written operational certification to the Architect/Engineer and Owner prior to substantial completion.
i. Provide Owner training by factory-trained and authorized personnel as specified.
j. Turn over to Owner all termination point and interconnection schedules, all programming source codes including VGUI software, PLC development software, VMS software, VMS viewing software, video system software and applicable license required for operations. This is to also include the VGUI and security management system and runtime licenses.
k. Flat VGUI panel Control Consoles to integrate the controlling and monitoring of all doors, alarms, video, intercoms, card access and other designated device annunciations. VGUI Control shall have the ability to monitor all security devices and components throughout the entire facility during normal operations.
l. VGUI control and card reader interface with secure elevator.
m. Audio Communications system.
n. Provide IP based color video System with network video recording.
o. Provide Video Client workstations as indicated on the drawings.
p. Provide cameras, lenses, housings and accessories for interior and exterior applications.
q. Provide complete Access Control System and interface with indicated architectural doors, barrier arm gates and pedestrian gates for remote control and/or monitoring. Coordinate with the Owner to ensure the Access Control System provided under this contract can use all types of cards and credentials currently being used by the Owner. Provide interface with existing access control system.
r. Provide all furniture-mounted and wall-mounted duress alarms
s. Provide Security System Interface, cabling & connection for remote warranty troubleshooting and maintenance. Coordinate VPN connection with the Owner's IT department during submittals. Connection shall be able to be physically disconnected when use is not required.

t. Interface to plumbing system for water shutoff in holding areas via VGUI control.
u. Interface to lighting control for holding areas via VGUI control.
v. Provide Talk-thru Units (TTU) and Talk-thru Communicators (TTC).
w. Coordinate all lighting pole mounted camera locations with Division 26. Coordinate conduit, wiring, and termination responsibility.
x. Provide all spare components as specified.
y. Provide walk-through metal detectors (magnetometers) and X-ray units as indicated on contract documents.
z. Other controls, annunciation & monitoring indicated in the Division 285xxx specification sections and on the Drawings.

H. Electrical Contractor: (SCSC shall coordinate with EC & GC)

1. Coordinate all electrical requirements with both the SCSC and General Contractor.
2. The Division 26 contractor shall be responsible for the coordination of conduits/cable raceways of architectural door frames with security hardware provided by Division 8. The SCSC shall be responsible for coordinating with Division 8, Division 11, and Division 26, for the power and cabling requirements of all electric strikes, locks, door position switches, or any other device associated and controlled/monitored by the Security Control System.
3. Provide termination of all 120-volt power connections required by the Security Control System for the computer and monitoring equipment at various security control stations.
4. Lighting and Receptacle control relays and terminations shall be done by the electrical contractor. SCSC to coordinate interface to relays and termination of outputs.
5. Provide all 120V power connections from emergency/generator power panels.
6. Coordinate with the SCSC and provide 120V power for:
   a. At the vehicle drive up card reader / intercom / camera post
   b. At all power supplies in hardware sets for architectural doors, as listed in Specification Section 087100 – Door Hardware.

I. General Contractor: (SCSC shall coordinate and make the GC aware of these requirements)

1. Coordinate the inter-related work of the SCSC, Div. 11, Div. 8, millwork provider, and Div. 26 Contractors.
2. Include detailed scheduling information for Security Control System installation and testing in the construction schedule. Provide the SCSC two months of testing and troubleshooting of the installation of his equipment near the end of the project. When the system is completely installed, provide the SCSC free access and total control with no other construction traffic for a period of two weeks for proper testing and certification of the system.
3. Provide coordination to ensure that control rooms and Security Electronics rooms are completed as early as possible to facilitate installation of control wiring. Control room(s) and Security Electronics equipment room(s) shall be free of airborne contaminants from cutting, grinding, painting, masonry work, etc., prior to the installation of any Security Electronics equipment. HVAC system must be started and running at a temperature and humidity level required for the operation of the equipment in the spaces.

4. Conduct periodic coordination meetings between security, electrical, plumbing, masonry and all other contractors to make everyone aware of critical areas of construction. Distribute the meeting minutes and attendance to the Architect/Engineer and Owner.
5. Provide coordination with the SCSC to complete the inspections, submittal and closeout documentation as described in the general provisions.

J. Detention Equipment Contractor (DEC):
1. Coordinate with the General Contractor, Electrical Contractor and SCSC.
2. Furnish, install, and terminate detention hardware.
3. Provide all the necessary and proper adjustments for correct hardware operation.

1.3 QUALITY ASSURANCE

A. Work shall be in accordance with the applicable federal, state, and local codes or standards current at the commencement of installation. Where more than one code or regulation is applicable, the more stringent shall apply. All Security Contractor Licensing requirements for contractors and subcontractors shall be enforced as per applicable codes and statutes (refer to the Virginia Department of Criminal Justice Services; www.dcjs.virginia.gov).

B. Cable installation, identification and termination shall be performed in accordance with the Manufacturer's technical installation guidance, in addition to the applicable codes and statutes.

C. All conduit within the secure perimeter shall be concealed when possible. If exposed, all conduit shall be mounted as close to ceiling as possible. Conduit, backboxes, and devices shall be mounted tight to the surface utilizing tamper resistant security screws.

D. All screws and fasteners for the new equipment within the security perimeter shall be tamper resistant security screws, requiring a special tool.

E. In the absence of the Manufacturer's recommendations on conductor applications, the Security Control Systems Contractor (SCSC) shall ensure that the cabling selected meets all technical requirements of the equipment to be installed.

F. An SCSC is required for this project. It is critical that the SCSC understands and meets the requirements of the Contract Documents, the equipment specified and security control systems integration. And, that the equipment is properly installed and functionally ready for use at time of completion specified for the facilities.

G. Division and separation of total responsibility for contract delivery of the security control systems will not be acceptable.

H. The SCSC shall be able to respond on site with qualified personnel to emergency service within 12 hours of notification.

I. The SCSC shall be responsible for providing a complete security control system. This shall include but not be limited to, cabling, cabling raceways, terminations of all system cabling, all distributed AC and/or DC power, field devices and control components, systems start-up, acceptance testing, training, and the complete and total integration of all systems utilizing 'In-House' software programming expertise.

J. Available Security Control System Contractors (SCSC):

1. Accurate Controls Inc. – Ripon, WI
2. Cornerstone – Madison, AL
3. Pavion – Mechanicsville, VA
4. Esitech Inc. – Richmond, VA
5. Johnson Controls – Montgomery, AL
6. Montgomery Technology Inc. (MTI) – Greenville, AL
7. Stanley Security Solutions, Noblesville, IN
8. South Western Communications – Decatur, AL

K. It is not, however, the intent of the Owner or Architect to unfairly restrict competition. Other equally competent SCSCs who meet the 'qualification criteria' specified herein shall be added to the list of 'Available Security Control System Contractors (SCSC)' by addendum. Verbal approval will not satisfy this requirement. Grounds for disqualification shall exist if, in the opinion of the Architect, the information submitted is inaccurate or does not comply with the requirements of this specification. There will be no exceptions. All competent non-listed SCSCs may request to be listed by submitting the data requested in the paragraph 'Qualification Criteria for the SCSC', a minimum of fifteen (15) days prior to bid receipt date. If the bid date is extended for any reason, the qualification period will not be extended.

L. Qualification Criteria for the SCSC

1. Contractor Qualification Statement AIA–A305 shall be filled out in its entirety. Some of the additional criteria in this section may have similar requirements as those found in the A305 form, but such similarities shall not create an exemption to answer the questions on the A305 form.
2. The SCSC shall have been actively engaged in the design and delivery of electronics security control system solutions. Provide a historical narrative of the company from inception; including history of ownership, partnership, incorporation and/or other organizational information. Include information on the growth of the firm over time to include number of employees, relocation(s) of the firm, mergers and acquisitions. Use only the current corporate/business entity, intending on bidding and performing the work.
3. Provide documentation of experience. List two (2) projects completed in the last 10 years for the state in which this project is located. Out of state experience will not be considered. List only projects with cost of security electronics portion in excess of $165,000 and of similar scope. Documentation is to include project names, addresses, description of systems, and the names, addresses, telephone numbers, and contact persons of the contractor and/or owner for whom the work was done.
4. Provide statement that firm has been in business for minimum of five continuous years under the current name.
5. Provide a resume of all key employees in supervisory positions; include their current position, time of service in current position, years as a full-time employee of the SCSC, and number of years of experience in the corrections and criminal justice markets.
6. Submit a block diagram of two previous projects which are similar in scope outlining all major and minor system components within the security control system as well as related systems, describing the integration of both hardware and software required for the complete system.

7. List of projects currently under construction including project size, scope and location.
8. Submit a listing of all jobs which the SCSC is presently or has been involved in litigation and the status thereof.
9. Provide a list of all jobs where your firm has been involved in liquidated damages or where delay damages were filed against your firm.
10. Submit a current letter from the proposed security control system equipment manufacturer's stating that the SCSC is factory trained, fully authorized distributor and installer of their complete line of products.
11. Provide signed statement that SCSC has not been found guilty of charges relating to conflicts of interest or to any criminal activity relating to construction methods, bidding, bid rigging, or bribery in the past five years.
12. Provide signed statement that SCSC has not been found guilty of charges relating to employment of illegal aliens on construction projects in the past five years.
13. Provide a letter from 'A' rated surety company that your company will be able to provide a Performance/Payment bond for this project if awarded the project.
14. The SCSC shall have sufficient financial ability to perform the contract that would result from such procurement. If a bond is required to ensure performance of a contract, evidence that the Contractor can acquire a surety bond from a corporation included on the United States Treasury list of acceptable surety corporations in the amount and type required by the public body shall be sufficient to establish the financial ability of such SCSC to perform the contract resulting from such procurement.
15. Name, address and telephone number of organization's current Bonding Company and level of bonding capacity.
16. The SCSC shall indicate complete and total compliance with the provisions of this specification by letter signed by an officer of the corporation or a principal if other ownership currently exists.
17. Provide the security control system contractor's license number.

1.4 SECURITY CONTROL SYSTEM TRAINING

A. Provide supervisory, operational, and maintenance training outlines and training materials thirty (30) days prior to training.

B. Provide complete supervisory and operator training for the Owner's personnel at the end of construction.

1. Provide three (3) eight-hour sessions on consecutive days at times set by the Owner. This may include 2nd and 3rd shift times to accommodate all officers. These should be scheduled as part of the Owner's pre-occupancy transition training.
2. Provide one (1) eight-hour session at a time set by the Owner for maintenance training of the system.

C. Provide an interactive training DVD's for all system operations and system troubleshooting. Provide system operations and system troubleshooting training on separate DVD's. Provide two copies of each.

1. This DVD shall be carefully organized and segmented so that training may be given on the complete system or on specific functions as may be appropriate.
2. The DVD shall contain computer-generated screen animation with narration describing icon selection, graphic animation and operation.
3. The maintenance portion of this DVD shall contain still images with graphics and narration describing all equipment states and troubleshooting methods including LED indication and text read out.

1.5 SUBMITTALS

A. The SCSC shall submit four (4) submittals for this project. Each submittal shall contain all the necessary criteria for all Div. 285xxx sections, and for each subsequent re-submittal if necessary. Submittals 1 (Product Data) and 2 (Shop Drawings) shall be submitted at the same time. Following this process will afford the submitted information to be reviewed more efficiently. All the necessary information the reviewer needs to properly evaluate the submission will be in the package each and every time it has to be reviewed. Failure to follow these submission requirements shall constitute the submittal(s) as being non-compliant and will be returned as "Rejected/Resubmit".

B. It shall be the responsibility of the Architect and OWNER to completely review and approve all details of the VGUI control console screens prior to release for final software production. Any applicable changes made prior to release for software production shall be made at no cost to the Owner. (Refer to Part 3 - Execution, paragraph 'Software Supports'.)

C. The submittal packages shall consist of one (1) reproducible (digital format) copy for each of the four (4) submittal types listed below. Each of the submittal types listed below shall include information from all the Div. 285XXX sections, as stated in paragraph A above. Provide electronic bookmarks, hyperlinks and divider pages to help navigate to and within the documents. Bookmarks and divisions shall match what is provided in the submittal's table of contents.

1. Product Data:
   a. Provide Title Page and Table of Contents. Organize document by spec sections as listed in the Project Manual. Provide electronic bookmarks and divider pages to allow reviewer to navigate to spec sections and the different items within each section.
   b. A Bill of Materials for each system, which shall include manufacturer names, model numbers, and quantities of all equipment proposed. It is acceptable to combine the Bill of Materials with the Table of Contents or section headings, provided all the required information is provided.
   c. Technical product information clearly marked to identify the principal component(s) proposed. Information shall be listed in same order as presented in Table of Contents.
   d. Specifications information for each type of cable required (power and data) and its application.
   e. Markings: Submit for approval the SCSC's proposed wire marking, panel label, zone label, terminal strip numbering & terminal strip identification styles and typical text as outlined.
   f. Shall be submitted at same time as Shop Drawings Submittal.

2. Shop Drawings:
   a. All drawings shall be computer-generated for expedient modifications if required. At completion of the project, these drawings, along with any field changes, shall become part of the Contract Documents. Refer to paragraph titled "Record Drawings" ahead.
   b. Building Floor Plan / Device Layout drawings: These drawings shall indicate the accurate locations of all equipment associated with each system in respect to architectural and structural conditions. Size drawings of components, equipment layouts and other small size areas to the common scale of 1/8", 1/2" or 1" per foot. Size drawings of larger areas to the common scale of 1/4" or 1/8" per foot. Drawings shall include explicit notes on the termination of all conductors and shields for each location. Architectural backgrounds shall be in accordance with the latest architectural drawings and shall be complete with elevations, sections, and details as required to depict the installation. These drawings shall be approved prior to starting work.
   c. Equipment Room Layout Floor Plans:
      1) Scaled plan drawings indicating the placement of all required security control system components/racks and their relationship with all other adjacent objects.
      2) Indicate clearance and maintenance access requirements, and confirm all necessary clearances around components for both installation and maintenance have been coordinated.
      3) Dimension the location of and provide installation details of the security control system's 'Head-End' racks, including mounting and anchorage provisions.
      4) Provide elevations of each rack indicating the location of all equipment and components.
   d. Control Room Enlarged Floor Plans and Elevations: Provide detail drawings depicting the plan location and elevation of all equipment to be provided within each security control room.
   e. Block Diagrams:
      1) Provide block diagrams of all systems/sub-systems showing interconnects and relationships as a complete system.
      2) Describe all power requirements and connections. Indicate line and low voltage information, all UPS, battery back-up, and emergency/generator power.
   f. Provide complete "point to point" wiring diagrams for all systems and subsystems. Indicate all components in the communications path from Central Control through all intervening system components, including terminal boards to the individual end devices. Document dedicated leased lines and associated equipment required to complete a transmission path. Where conductors are grouped into a cable for long site runs, a single line properly identified shall be indicated. Where these cables fan out for termination, individual wire terminations and markings shall be indicated.
   g. Wire management details for the installation of cable harnesses inside racks, equipment cabinets, and consoles, control panels and other areas of exposed cable.
   h. Shall be submitted at the same time as the Product Data Submittal.

3. Test Procedure:
   a. Provide written document detailing the test procedure for substantial completion of the system provided. These procedures shall include all tests recommended by the equipment manufacturer and by this specification.
   b. Provide samples of system approval test sheets for review.
4. Screen Shots:
   a. VGUI Control Console "Screens": Submit for approval a detail drawing or screen snap shot of each control console "screen" depicting the exact layout to full size scale. Screens that distort the building floor plan layout are not acceptable. Representation of all colors shall be included, as well as the operator's orientation of the control panel in relationship to the control room and building.
   b. Include a glossary of all icons available and a description of their function and actions shown beside an image of each of their varying states of status.
   c. The review and approval of this submittal will only serve as a basis for proceeding forward with Phase I meeting of Software Support as described in paragraph 3.3.A. A second Screen Shot submittal shall be provided after the Phase I meeting to reflect any decisions made during that process.

1.6 TESTING

A. The Security Control System shall be assembled and tested at the SCSC's shop. Refer to paragraph 3.3.B for Phase II expectations and requirements.

B. Submit approved substantial completion test sheets seven (7) days prior to scheduled testing date.

C. Conduct with Owner and/or Architect a comprehensive system test of all system components per the approved test plan. At completion of all testing, provide substantial completion test sheets.

1.7 RECORD DRAWINGS

A. The SCSC shall obtain, pay for, and keep up-to-date and available to the Owner or its representative, complete black-line prints as well as magnetic media copies of all computer drawings of the project, clearly annotated with "as-built" data as the work is performed. This data shall include the following:
   1. Routing of conduit and raceway.
   2. Routing of signal and power wire and cables, including the designations assigned to each wire/cable and field terminations schedules.
   3. Accurate location of all equipment installed under the specifications.
   4. A complete equipment list for each functional area.

B. Upon completion and for inclusion into the Final Record Sets of drawings of this project, all as-built information shall be transferred to a full size set of AutoCAD drawings and transmitted to the A/E within 30 days of substantial completion.

1.8 GUARANTEE

A. The SCSC shall guarantee all equipment & systems for a period of two (2) years commencing with Substantial Completion. The guarantee shall cover all costs for Warranty Services, including parts, labor, prompt field service, pick-up and transportation.

B. The SCSC shall also provide an extended warranty for computer hardware that includes critical maintenance support services for a period of five (5) years commencing with Substantial Completion. Critical support services shall be available 24 hours per day, 365 days per year, with 4 hour onsite response time.

C. The Owner shall be listed and registered as the owner of all SCSC provided equipment and software no later than the completion of the contractual warranty period.

1.9 WARRANTY AND PREVENTATIVE MAINTENANCE SERVICES

A. The SCSC shall design the Security Control System to provide for remote PC connection with the new security control system. This remote connection shall be used by the SCSC during the warranty period for remote system troubleshooting and maintenance. The Owner/user will activate and de-activate the local communications device to ensure that unauthorized remote access to the security control system will not occur.

B. Maintenance services within this scope of work shall include a preventative maintenance and system optimization inspection to be conducted every three (3) months during the first year of warranty. These visits shall be recorded at the site by signing in the Owner's daily operations log book and shall include, as a minimum, the following:

1. Configuration Checks on video recorders
2. Verify the integrity of all system software including Remote Viewing Stations.
3. Configuration Checks on Access Control System Components and Software.
4. Cleaning of air filters.
5. Adjustment of video monitors picture controls.
6. Tuning of video camera views (i.e., focus, iris).
7. Configuration and through-put tests of system network (i.e., network switches)
8. Inspection of cables and connections.
9. Inspect and test all UPS units, including batteries and cables.

C. Service response requirements shall include the following:

1. Twenty-four (24) hour phone number to reach in-house troubleshooting personnel.
2. Ability to restore functionality within eight (8) hours after notification on a twenty-four (24) hour basis.
3. Service technicians trained by the manufacturers of the system components.
4. Provide remote support within a four hour response time during regular business hours - 7am – 6pm, Monday – Friday, excluding holidays.

PART 2 - PRODUCTS

2.1 Refer to appropriate Division 28 section for specific product information.

PART 3 - EXECUTION

3.1 INSPECTION

A. Check location, "roughing in", and field dimensions prior to beginning work.

B. Do not begin installation until all unsatisfactory conditions have been corrected.

C. Verify field measurements are as indicated on Drawings and as instructed by manufacturer.

D. Verify that required utilities are available, in proper location, and ready for use.

3.2 INSTALLATION/APPLICATION OF ALL SECURITY PRODUCTS

A. Field testing and inspection will be performed under the provisions of Section 285000.

B. Replace equipment, components, & wiring as required to achieve a fully functional system.

3.3 SOFTWARE SUPPORT

A. PHASE I

1. Within three (3) months of receiving the approved shop drawing submittal, the SCSC shall request in writing a preliminary meeting with the Owner/Architect to discuss and demonstrate his working VGUI, programmed 'In-House' for the specific operations and functions of this project's Security Control System. SCSC shall coordinate any proposed dates directly with the Architects Security System Specialist before any formal proposal or acceptance of dates by the GC. (*AD-03) Also the SCSC shall present an extensive outlined analysis of all his 'In-House' software's performance possibilities and their potential applications and/or approval to be utilized on this project. Refer to paragraph 1.5.C.4 of this section for the 'VGUI Screens' shop drawing submittal requirements.

2. The SCSC shall prepare a detailed report summarizing all software design and function criteria to be submitted to the Owner/Architect for approval by appropriate parties no later than two weeks after the date of the Phase I meeting. The custom software that operates the security control system shall be designed specifically from this document.

3. The Phase I meeting shall outline the requirements of the custom software as it relates to integrating all the individual components and devices making up the Security Control System (VGUI, VMS, Intercommunications, Alarms, Locks, etc.)

B. PHASE II

1. Prior to the scheduled date for job site delivery of the VGUI control stations, the SCSC shall request a second meeting with the Owner/User and Architect/Engineer at their manufacturing facility. SCSC shall coordinate any proposed dates directly with the Architects Security System Specialist before any formal proposal or acceptance of dates by the GC. (*AD-03) The SCSC shall provide a full demonstration of the completed control consoles with a fully functional simulation of all the security control system software. The design and function of the 'In-House' software shall match the exact performance as specified in the detailed Phase I report. The SCSC shall include in their bid all expenses (travel, per diem, hotel and food) for four (4)

(*AD-03)

owner representatives and two (2) architect representatives to attend the factory testing of the systems for a two (2) day period.

2. All deviations in the performance of the hardware or software shall be documented during this meeting, by the Architect/Engineer and SCSC, on a "pre–punch list". This "pre-punch list" shall be 100% corrected by the SCSC prior to delivering the equipment to the job site. Any additional comments shall now be incorporated.
3. During this time period, the SCSC shall perform all tests and critical conditioning on the security system to prepare the detailed diagnostic information and operational procedures for the service/operations manual.

C. PHASE III

1. Immediately following the installation of the security control system, the SCSC shall work with the Owner, the facility personnel, and the Architect/Engineer to correct any hardware problems or operational deviations from the original Phase I software design document. The SCSC shall modify the hardware/software as necessary to solve any problem resulting from poor installation.
2. Upon achieving a 100% functional security control system as determined by the Architect/Engineer, a documented release form provided by the SCSC shall be signed by the Owner and retained on file with the Project Manager. The SCSC shall continue to work on the installed hardware/software at no cost to the Owner or Architect/Engineer until the Owner's satisfaction is obtained by fulfilling the Phase I, II, and III document and a system release form is filed.

3.4 SPARES FOR ALL SECURITY CONTROL SYSTEM SECTIONS

A. Each system provided by SCSC shall be built with the space, capacity, headend equipment and licenses to expand by 15 percent above those indicated for work of this project.

B. Provide the following shelf spares:

1. Provide one (1) PLC of each type used.
2. Provide one (1) PLC input and one (1) PLC output module of each type used
3. Provide one (1) PLC system power supply
4. Provide one (1) Power supply of each type used
5. Provide one (1) Duress station of each type used
6. Provide one (1) Card reader and one (1) Keypad/Card Reader of each type used
7. Provide one (1) Intercom station and one (1) Intercom master station
8. Provide one (1) Speaker (ceiling mount) with baffle and one (1) wall mount Speaker
9. Provide two (2) pre-programmed Fixed cameras and one (1) pre-programmed Multi-lens and PTZ camera with licenses of each type used.
10. Provide one (1) 24" VMS video monitor.
11. Provide one (1) 24" VGUI station with PC fully loaded with software for plug-and-play operation when an officer station VGUI/computer goes down.
12. Provide ten (10) relays, terminals, and fuses of each type used.

13. Provide one (1) spare of each type of surge protector.
14. Provide one (1) spare Glass Break sensor of each type used.
15. Provide two (2) hard drives of type installed on this project for video archive storage.

END OF SECTION 285000

SECTION 31 20 00 – EARTH MOVING (*AD-03)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.

B. Refer to Section 01 21 00 and the Bid Form for information concerning required allowances and unit prices.

C. Refer to Section 31 10 00 for topsoil stripping and Sections 32 92 00 and 32 93 00 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

1.4 DEFINITIONS

A. Excavation: Removal of all material (except for rock) 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 Engineer.

C. Additional Excavation: Removal, disposal and replacement of materials beyond the limits indicated in the definition of "Excavation" at the direction of the Engineer. 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 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. Paragraph 4.3.4 of General Conditions refers to certain conditions that may require additional excavation work. This paragraph is further defined herein and, where there are conflicts, is superseded by this section.

B. Claims for concealed, unknown, or unanticipated subsurface conditions are limited to those circumstances where:

1. Additional excavation work is required below the contract limits indicated to provide acceptable bearing for building pad, structures or pavements.
2. Additional excavation work is required to raise, lower, or revise the footings, foundations or other parts of the building to provide acceptable bearing.
3. Additional excavation work below the utility trench design elevations, for utilities outside the limits of the building, as required to provide acceptable bearing for the utility.
4. Rock is encountered between existing grade and design subgrade.

C. The risks of concealed, unknown, or unanticipated subsurface conditions (except for rock) 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. The risks of concealed, unknown, or unanticipated subsurface conditions below the elevations stated above shall be considered as Additional Excavation.

D. During construction, if concealed, unknown, or unanticipated subsurface conditions are encountered which require that footings, foundations or other parts of the building be raised, lowered or revised to provide acceptable bearing for the building or if, outside the building limits, additional depth of utility trench excavation below the design subgrade or subsoil elevations is required, immediately notify the Engineer upon discovery of such condition prior to disturbing the material encountered.

E. Payment for additional work

1. Additional excavation shall be counted toward the unit price allowances established in the Bid Form. The Owner reserves the right to negotiate said unit price allowance prior to the Award of Contract.
2. Lowering of footings and trenches shall be counted toward the unit price allowances established in the bid form.
3. Rock removal, if required, shall be paid for at a negotiated amount. Rock payment lines are limited to the following:

    a. Two feet outside of concrete work for which forms are required, except footings.
    b. One foot outside perimeter of footings, two feet below bottom of footings.
    c. In pipe trenches, 6 inches below invert elevation of pipe and 2 feet wider than outside diameter of pipe, but not less than 3 feet minimum trench width.
    d. Outside dimensions of concrete work where no forms are required.
    e. Under slabs on grade, 6 inches below bottom of concrete slab.

4. No payment will be made for unauthorized excavation.

1.6 EARTHWORK BALANCE ADJUSTMENTS

A. Adjustments of grades may be allowed with prior written approval of the Engineer 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 Contract responsibility. No additional payment will be made for these adjustments.

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.

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.

D. The Owners testing agency will test crushed recycled concrete for use as pavement base course.

1.8 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt existing utilities serving offsite property owners 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.
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 SM, SW, SP, GP, CL, ML, SC, GC, GM and GW with dimensions not to exceed 2 inches in diameter. All material used for structural fill shall be evaluated by the owner's geotechnical engineer to determine if it is suitable for the intended purpose.

B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups OL, OH, PT, GT, CH, MH.

C. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2 inches in any dimension (2 inches for material used in trench backfill), debris, waste, frozen materials, vegetation and other deleterious matter.

D. Imported material for structural fill shall comply with ASTM D2487 soil classification groups SM, SP, SW, GP, or GW with dimensions not to exceed 2 inches in diameter. Offsite borrow material shall have a plasticity index less than 20.

2.2 ACCESSORIES

A. Non-woven Geotextile Fabric (for drainage): Mirafi 140N, or equivalent.

B. Woven Geotextile Fabric (for reinforcement): Mirafi 600X, 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 "Site Clearing."

C. Protect and maintain erosion and sedimentation controls, which are specified in "Erosion Control" during earthwork operations.

D. The Contractor will limit traffic on stripped or undercut subgrades. The Contractor will utilize light weight, track-mounted dozer equipment for stripping.

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.

C. 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.

D. Soils encountered may require discing, 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 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: If Rock is encountered the Owner's Geotechnical Engineer will verify that the material qualifies for classification as 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" minimum.
   c. Under footings – Two feet below bottom of footing, One foot outside of perimeter of footing.

2. A surveyor licensed in the Commonwealth of Virginia and employed by the Contractor shall calculate the quantity of material removed as Rock Excavation. The quantity of rock calculated shall not exceed the volume determined by the payment limits. The Owner's Project Representative shall review the quantity calculated within 48 hours of receiving the survey notes. The cost of quantifying the material shall be included in the unit price allowance(s) for Rock Excavation (Mass and Trench).

3.4 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, and 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 6 inches below required elevation and backfill with a 6-inch layer of crushed stone or gravel 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, and other construction and for review. Do not disturb bottom of excavations intended for bearing surface.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

A. Cut surface under pavements to comply with cross-sections, elevations and grades as indicated.

3.6 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 6 inches below required elevation and backfill with a 6-inch layer of crushed stone or gravel 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 ¼ 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.

3.7 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 as excavation progresses.

3.8 SUBGRADE INSPECTION

A. Notify Engineer 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 Engineer 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 trunk weighing not less than 15 tons.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, 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 Engineer, without additional compensation.

3.9 ADDITIONAL EXCAVATION

A. Additional Excavation (Mass): Remove excavated materials and dispose of **off-site**(*AD-03) as directed by the Engineer. Replace this excavated material with satisfactory material placed and compacted according to the requirements of the "Placement and Compensation" section.

B. Additional Excavation in Trenches: Remove excavated materials and dispose of **off-site** (*AD-03) as directed by the engineer. Replace this excavated material with stone.

C. Additional Excavation in Footings: Remove excavated materials and dispose of **off-site**(*AD-03) as directed by the Engineer. 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 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. The cost of quantifying the material shall be included in the unit price allowance(s) for the type of Additional Excavation.

E. Protect the subgrade during construction:

1. 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.
2. During construction limit traffic on approved subgrade. Construction traffic on the approved subgrade may damage the approved subgrade. Correct subgrade damaged in this manner. No additional payment will be made to correct subgrade damaged in the manner.

3.10 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 Engineer.
2. Elsewhere, backfill and compact unauthorized excavations as indicated for authorized excavations of same classification unless otherwise directed by the Engineer.

3.11 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.

3.12 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 slopes surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material. Plow, scarify, bench or break up slopes 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.

3.13 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 Engineer 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 or piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 3 percent 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 3 percent 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% 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.

3.15 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 Engineer 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% 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.

3.16 GRADING

A. General: Rough grading of areas within the Project, including cut and fill section and adjacent transition areas, shall be reasonable 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: Slopes 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 ½ inch.
3. Pavements: Plus or minus ½ inch.

F. Grading inside Building Lines: Finish subgrade to a tolerance of ½ inch when tested with a 10-foot straightedge.

3.17 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. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape subbase and base course to required crown elevations and cross-slope grades.
4. Place subbase and base course 6 inches or less in compacted thickness in a single layer.
5. 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.
6. 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 D698.

H. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construction 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 D698.

3.18 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.

3.19 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 engineer, 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 engineer with written certification that fill, and compaction was competed 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 of each of his reports, recommendations and/or opinions to the Engineer and the Owner. Pertinent information will be provided to the Contractor as required.

3.20 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.

3.21 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.

3.22 DISPOSAL OF WASTE MATERIALS

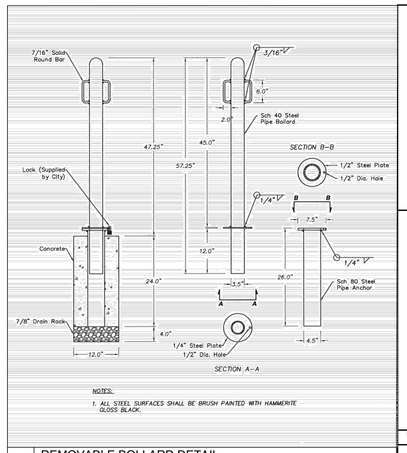
A. Removal from Owner's Property: Remove waste materials, including trash and debris, and dispose of it off Owner's property in a legal manner.

B. Dispose of 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.

D. Disposal of waste materials will be at the Contractor's expense and will not be grounds for requesting additional compensation.

END OF SECTION

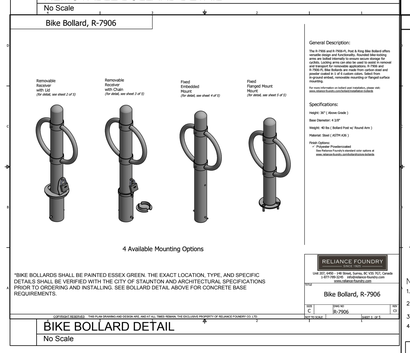


NOTES:

1. ALL STEEL SURFACES SHALL BE BRUSH PAINTED WITH HAMMERITE GLOSS BLACK.

REMOVABLE BOLLARD DETAIL

No Scale



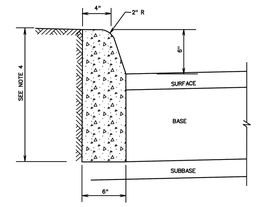
BIKE BOLLARD DETAIL

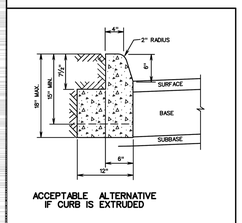
No Scale

CG-2

NOTES:

1. THIS ITEM MAY BE PRECAST OR CAST IN PLACE.
2. CONCRETE TO BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST.
3. CURB HAVING A RADIUS OF 300 FEET OR LESS (MEASURE OF CURB) WILL BE PAID FOR AS RADIAL CURB.
4. THE DEPTH OF CURB MAY BE REDUCED AS MUCH AS 3" (3" DEPTH OR INCREASED AS MUCH AS 3" (3" DEPTH IN ORDER THAT THE BOTTOM OF CURB WILL COINCIDE WITH THE TOP OF A COURSE OF THE PAVEMENT SUBSTRUCTURE. WITH ADJUSTMENT IN THE TOP TO BE AS SHOWN. NO ADJUSTMENT IN THE PROFILE SHALL BE MADE FOR A DECREASE OR AN INCREASE IN DEPTH.
5. CG-2 IS TO BE USED ON ROADWAYS MEETING THE CRITERIA FOR CURB AND GUTTER AS APPROVED A DP IN THE VDOT ROAD DESIGN MANUAL, IN THE SECTION ON GS URBAN STANDARDS.

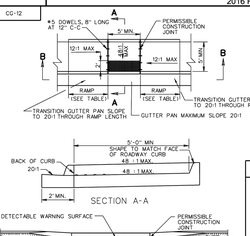


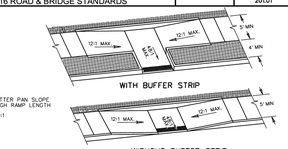


ACCEPTABLE ALTERNATIVE IF CURB IS EXTRUDED

SPECIFICATION REFERENCE	STANDARD 6" CURB	VDOT ROAD AND BRIDGE STANDARDS
105 502	VIRGINIA DEPARTMENT OF TRANSPORTATION 2016 ROAD & BRIDGE STANDARDS	REVISION DATE: SHEET 1 OF 1 201.01

CG-12

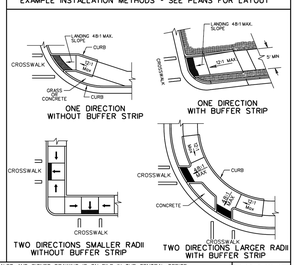




NOTES:

1. FOR GENERAL NOTES ON THE DETECTABLE WARNING SURFACE, SEE SHEET 1 OF 5.
2. THE REQUIRED LENGTH OF A PARALLEL RAMP IS LIMITED TO 15 FEET, REGARDLESS OF THE SLOPE.
3. GUTTER PAN SHALL BE A MAXIMUM SLOPE OF 20:1 AT THE RAMP OPENING.
4. DIAGONAL PLACEMENT IS NOT PERMITTED.

EXAMPLE INSTALLATION METHODS - SEE PLANS FOR LAYOUT



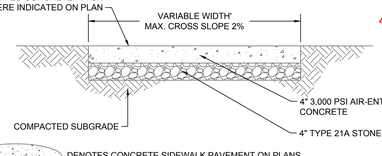
TYPE B PARALLEL APPLICATION		
ROADWAY GRADE IN PERCENT	MINIMUM RAMP LENGTH IN FEET	
	4" CURB	6" CURB
0	4	6
1	5	7
2	5	8
3	6	9
4	8	12
5	10	15
6	14	15

VDOT ROAD AND BRIDGE STANDARDS	A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.	SPECIFICATION REFERENCE
SHEET 3 OF 5 / REVISION DATE 04/19	CG-12 DETECTABLE WARNING SURFACE TYPE B (PARALLEL) APPLICATION VIRGINIA DEPARTMENT OF TRANSPORTATION	105 502 504

2016 ROAD & BRIDGE STANDARDS

NON-SLIP BROOM FINISH (TYP.) EXCEPT WHERE STAMPED CONCRETE FINISH WHERE INDICATED ON PLAN

*AD-03



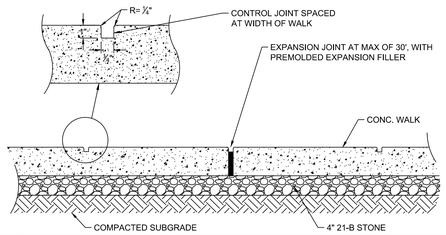
DENOTES CONCRETE SIDEWALK PAVEMENT ON PLANS (BROOM FINISH)

DENOTES CONCRETE PAVEMENT ON PLANS (STAMPED FINISH)

NOTE: SIDEWALKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH VDOT STANDARDS.

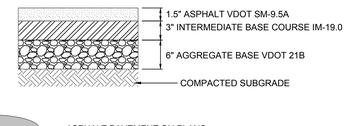
CONCRETE SIDEWALK PAVEMENT SECTION

No Scale



CONCRETE SIDEWALK JOINT DETAIL

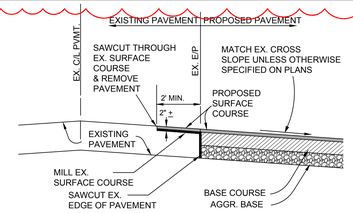
No Scale



ASPHALT PAVEMENT ON PLANS

ASPHALT PAVEMENT SECTION

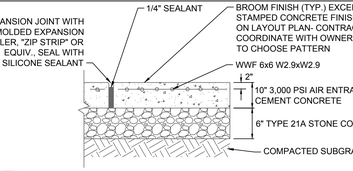
No Scale



NOTE: PROPOSED PAVEMENT MUST TIE IN WITH EXISTING PAVEMENT

PAVEMENT REPLACEMENT JOINT DETAIL

No Scale

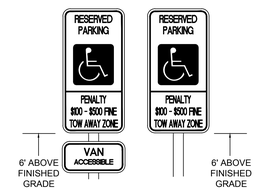


DENOTES CONCRETE SERVICE AREA PAVEMENT ON PLANS (BROOM FINISH)

DENOTES CONCRETE SERVICE AREA PAVEMENT ON PLANS (STAMPED FINISH)

HEAVY DUTY CONCRETE SECTION

No Scale

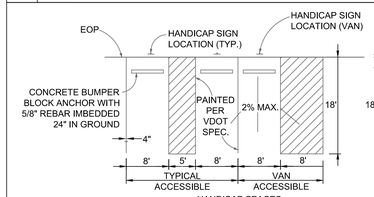


SPACES SHALL BE IDENTIFIED BY ABOVE GRADE SIGNS AS RESERVED FOR PHYSICALLY DISABLED PERSONS. PROVIDE ONE (1) R-7-8 SIGN AT EACH PARKING SPACE INDICATED ON SITE PLAN. SIGN SHALL BE ALUMINUM (PAINTED WHITE) WITH GREEN LETTERS AND INTERNATIONAL WHEELCHAIR SYMBOL. SIGN SHALL BE PLACED ON STEEL POST 1-1/2" O PAINTED BLACK SET IN MIN. 2' OF CONCRETE.

VA. SIGN FOR THE DISABLED ON 0.80 GAUGE ALUMINUM. COLORS: GREEN BORDER & LEGEND, BLUE SYMBOL FOR ACCESSIBILITY, WHITE BACKGROUND.

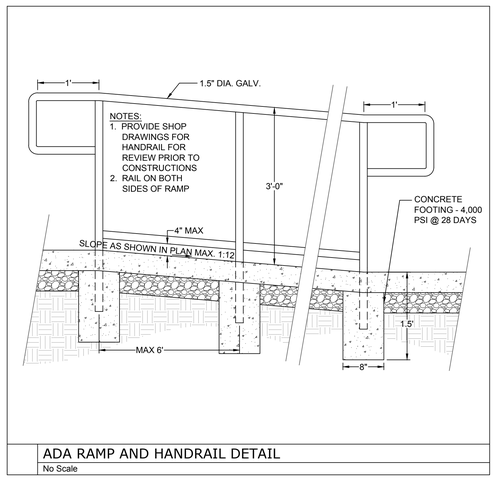
ADA PARKING SIGNS

No Scale



TYPICAL PARKING SPACE DETAILS

No Scale

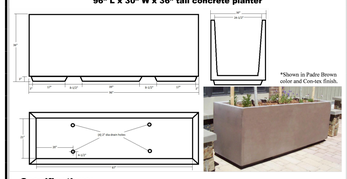


ADA RAMP AND HANDRAIL DETAIL

No Scale

DAWN ENTERPRISES
OUR PRODUCTS. YOUR SPACE.

Specification Sheet
Model #: PC96x30x36REC
96" L x 30" W x 36" tall concrete planter

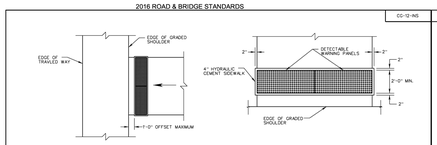


Specifications:

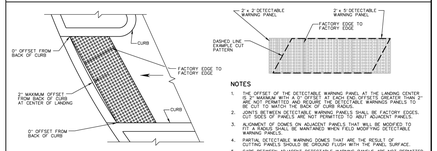
- **Dimensions:** 96" L x 30" W x 36" tall with 3" tall x 3" deep toe kick at base.
- **Weight:** 3600lbs
- **Materials:** 3/8" steel rebar, Type III Portland cement conforming to ASTM C150. All aggregate conforming to ASTM C33. All Steel Rebar conforming to ASTM – A 615. Due to the natural air entraining properties of Portland Type III cement, additional air entraining agents are not required. Air void content naturally occurring in a Type III Portland Cement mixture conforms to ASTM C457.
- **Stress Load:** Minimum 5000 PSI at 28 days
- **Color & Finish Options:** Please reference standard color/finish sheet.
- **Warranty:** One year warranty against manufacturer's defects.

800-262-3296 275 Progress Drive, Suite B, Manchester, CT 06042 www.godawn.com

2016 ROAD & BRIDGE STANDARDS — CG-12-INS



TYPICAL INSTALLATION FOR SHARED-USE PATH WITH SHOULDER



NOTES

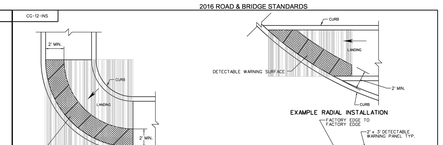
1. THE OFFSET OF THE DETECTABLE WARNING PANEL AT THE LANDING CENTER SHALL BE 2" MAXIMUM FROM THE BACK OF CURB. GAPS BETWEEN PANELS ARE NOT PERMITTED AND REQUIRE THE DETECTABLE WARNINGS PANELS TO BE CUT TO MATCH THE SHAPE OF CURB RADIUS.
2. JOINTS BETWEEN DETECTABLE WARNING PANELS SHALL BE FACTORY EDGES. CUT SIDES OF PANELS ARE NOT PERMITTED TO ABUT ADJACENT PANELS.
3. ALIGNMENT OF DOMES ON ADJACENT PANELS THAT WILL BE MODIFIED TO FIT A RADIUS SHALL BE MAINTAINED WHEN FIELD MODIFYING DETECTABLE WARNING PANELS.
4. PARTIAL DETECTABLE WARNING DOMES THAT ARE THE RESULT OF CUTTING PANELS SHOULD BE GROUND FLUSH WITH THE PANEL SURFACE.
5. GAPS BETWEEN ADJACENT DETECTABLE WARNING PANELS ARE NOT PERMITTED.
6. SEE PLANS FOR CROSSWALK MARKINGS, TURNING AREAS, ROUTE WIDTHS, GRADE CHANGES, AND RAMP CONFIGURATIONS.

TYPICAL INSTALLATION ON RADIUS (SIDEWALKS OR SHARED USE PATHS)

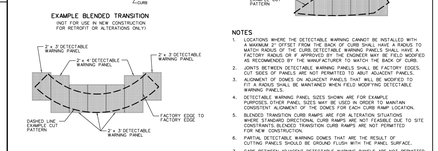
SPECIFICATION REFERENCE	A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.	VDOT ROAD AND BRIDGE STANDARDS	
105 502 504	CG-12 DETECTABLE WARNING SURFACE DETECTABLE WARNING INSTALLATION VIRGINIA DEPARTMENT OF TRANSPORTATION	REVISION DATE: NEW 04/19	SHEET 1 OF 2: 204.06

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS — CG-12-INS



EXAMPLE BLENDED TRANSITION (NOT FOR USE IN NEW CONSTRUCTION FOR RETROFIT OR ALTERATIONS ONLY)



NOTES

1. LOCATIONS WHERE THE DETECTABLE WARNING CANNOT BE INSTALLED WITH A MINIMUM 2' OFFSET FROM THE BACK OF CURB SHALL HAVE A RADIUS TO MATCH RADIUS OF THE CURB.DETECTABLE WARNING PANELS SHALL HAVE A MINIMUM 2' OFFSET FROM THE BACK OF CURB AT THE CENTER OF LANDING AS RECOMMENDED BY THE MANUFACTURER TO MATCH THE BACK OF CURB.
2. JOINTS BETWEEN DETECTABLE WARNING PANELS SHALL BE FACTORY EDGES. CUT SIDES OF PANELS ARE NOT PERMITTED TO ABUT ADJACENT PANELS.
3. ALIGNMENT OF DOMES ON ADJACENT PANELS THAT WILL BE MODIFIED TO FIT A RADIUS SHALL BE MAINTAINED WHEN FIELD MODIFYING DETECTABLE WARNING PANELS.
4. DETECTABLE WARNING PANEL SIZES SHOWN ARE FOR EXAMPLE PURPOSES. OTHER PANEL SIZES MAY BE USED IN ORDER TO MAINTAIN CONSISTENT ALIGNMENT OF THE DOMES FOR EACH CURB RAMP LOCATION.
5. BLENDED TRANSITION CURB RAMPS ARE FOR ALTERATIONS SITUATIONS WHERE STANDARD DIRECTIONAL CURB RAMPS ARE NOT FEASIBLE DUE TO SITE CONSTRAINTS. BLENDED TRANSITION CURB RAMPS ARE NOT PERMITTED FOR NEW CONSTRUCTION.
6. PARTIAL DETECTABLE WARNING DOMES THAT ARE THE RESULT OF CUTTING PANELS SHOULD BE GROUND FLUSH WITH THE PANEL SURFACE.
7. GAPS BETWEEN ADJACENT DETECTABLE WARNING PANELS ARE NOT PERMITTED.
8. SEE PLANS FOR CROSSWALK MARKINGS, TURNING AREAS, ROUTE WIDTHS, GRADE CHANGES, AND RAMP CONFIGURATIONS.

SPECIFICATION REFERENCE	A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.	VDOT ROAD AND BRIDGE STANDARDS	
105 502 504	CG-12 DETECTABLE WARNING SURFACE METHOD OF INSTALLING DETECTABLE WARNINGS ON A RADIUS VIRGINIA DEPARTMENT OF TRANSPORTATION	SHEET 2 OF 2: 204.07	REVISION DATE: NEW 04/19

2016 ROAD & BRIDGE STANDARDS

MOSELEYARCHITECTS
3200 NORFOLK STREET, RICHMOND, VA 23230
PHONE (804) 794-7555 FAX (804) 355-9680
MOSELEYARCHITECTS.COM

TIMMONS GROUP
ENGINEERING | DESIGN | TECHNOLOGY

COMMONWEALTH OF VIRGINIA
JEREMY L. FOX
Lic. No. 60786
02/21/2024
PROFESSIONAL ENGINEER

STAUNTON J&DR COURTS FACILITY

City of Staunton
2040 West Beverley Street, Staunton, VA 24401

PROJECT NO: 603874
DATE: DECEMBER 4, 2023

REVISIONS

DATE	DESCRIPTION
01/22/24	PER CITY COMMENTS
02/13/24	PER CITY COMMENTS
02/21/24	PER CITY COMMENTS
03/14/24	*AD-01R
03/22/24	*AD-03

*AD-01R

*AD-03

NOTES AND DETAILS

C1.1

8/16/2023 11:57:00 AM

8/16/2023 11:57:00 AM

STAUNTON J&DR COURTS FACILITY

City of Staunton
2040 West Beverley Street, Staunton, VA 24401

EXISTING CONDITIONS AND DEMOLITION

C2.0

PROJECT NO: 190901
DATE: DECEMBER 4, 2023

DATE	REVISIONS DESCRIPTION
01/22/24	PER CITY COMMENTS
02/13/24	PER CITY COMMENTS
02/21/24	PER CITY COMMENTS
03/14/24	AD-01R
03/22/24	AD-03

AD-03
AD-01R
AD-01

LEGEND
REMOVE EXISTING ASPHALT

COMMONWEALTH OF VIRGINIA
JEREMY L. FOX
Lic. No. 60786
PROFESSIONAL ENGINEER
02/21/2024

MOSELEYARCHITECTS

3200 NORFOLK STREET, RICHMOND, VA 23230
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MOSELEYARCHITECTS.COM

TIMMONS GROUP
ENGINEERING | DESIGN | TECHNOLOGY

LEGEND:

- NEW CONCRETE
- NEW HEAVY DUTY CONCRETE
- NEW ASPHALT PAVEMENT
- NEW TRAFFIC RATED STAMPED CONCRETE
- NEW PEDESTRIAN STAMPED CONCRETE
- NEW STRIPING
- NEW GRASS AREA

*AD-03

NOTE: DAMAGED ASPHALT BEYOND THE EXTENTS OF PAVEMENT DELINEATED/HATCHED AS "REMOVE EXISTING ASPHALT" ON C2.0 TO BE REPLACED AT CONTRACTORS EXPENSE.

UNDERGROUND POWER CONNECTION TO TRANSFORMER TO BE COORDINATED WITH DOMINION POWER. CONTRACTOR TO PROVIDE AND INSTALL CONDUIT FOR DOMINION TO FEED POWER THROUGH.

MOSELEYARCHITECTS
3200 NORFOLK STREET, RICHMOND, VA 23230
PHONE (804) 794-7555 FAX (804) 355-9680
MOSELEYARCHITECTS.COM

TIMMONS GROUP
ENGINEERING | DESIGN | TECHNOLOGY

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02/ 21/ 2024
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REVISIONS

DATE	DESCRIPTION
01/22/24	PER CITY COMMENTS
02/13/24	PER CITY COMMENTS
02/21/24	PER CITY COMMENTS
03/14/24	*AD-01R
03/22/24	*AD-03

LAYOUT PLAN

SCALE 1"=30'
0 30' 60'

C4.0

8/16/2023 11:57:00 AM

UTILITY NOTES:
1. ALL UTILITIES (WATER AND SEWER) MORE THAN 5 FEET FROM THE BUILDING SHALL BE PUBLIC AND THE ALL APPROVAL TESTING AND INSPECTIONS SHALL BE THE RESPONSIBILITY OF PUBLIC WORKS.
2. CONTRACTOR SHALL EXCAVATE, FULLY EXPOSE, AND PREPARE THE WATER MAIN FOR TAPPING. THE CITY WILL CONDUCT THE ACTUAL TAP AND WILL INSTALL THE TAPPING SLEEVE AND VALVE, WHICH SHALL BE SUPPLIED BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMAINDER OF CONSTRUCTION OF THE WATER LINES FROM THE TAPPING SLEEVE AND VALVE, INCLUDING ALL PIPE, FITTINGS, VALVES, AND APPURTENANCES, MAINS, SERVICES, AND FIRE HYDRANTS, ALSO INCLUDING ALL BACKFILL, COMPACTION, AND SURFACE RESTORATION.

MATCHLINE

TIE TO EXISTING 6" WATERLINE ON BEVERLEY COURT WITH 6" X 6" TAPPING SLEEVE AND VALVE.

11.25° BEND

45° BENDS

45° BENDS

BEVERLY COURT
DB. 334, PG. 284 (AUGUSTA CO.)

ADDITIONAL PARCELS
(CITY GIS)

MATCHLINE

UNNAMED VARIABLE WIDTH GRAVEL ALLEY (AKA ARMENTROUT ST.) DB. 334; PG. 284 (AUGUSTA CO.)

WEST BEVERLEY STREET
ROUTE 254
(VARIABLE WIDTH R/W)

OWNER TO COORDINATE OVERHEAD POWER RELOCATION WITH POWER COMPANY TO AVOID CONFLICTS WITH PROPOSED LIGHT POLES AND TRASH RECEPTACLE.

LIGHT POLE (TYP.)

11.25°+22.5°+45° BEND

6" DIP WATERLINE (PRESSURE CLASS 350)

6" GATE VALVE

3" X 6" TEE FOR DOMESTIC LINE.

6" X 6" TEE AND 6" GATE VALVE

*AD-03

3" GATE VALVE

6" X 6" TEE AND (3) GATE VALVES

UNDERGROUND POWER CONNECTION TO TRANSFORMER TO BE COORDINATED WITH DOMINION POWER. CONTRACTOR TO PROVIDE AND INSTALL CONDUIT FOR DOMINION TO FEED POWER THROUGH.

3" WATER METER IN METER BOX SEE DETAIL SHEET C1.0

3" GATE VALVE

6" DIP FIRE LINE

3" DIP DOMESTIC WATERLINE

FIRE RPZ BACKFLOW PREVENTER INSIDE

45° BENDS

45° BENDS

4" SANITARY SEWER CLEANOUT INV. OUT: 1549.65'

4" PVC SANITARY SEWER LINE @ 2.0% MIN.

FIRE HYDRANT ASSEMBLY

FDC LOCATION

LIGHT POLE (TYP.)

EX. WATER LINE TO BE REMOVED AND TRENCH TO BE UTILIZED FOR REPLACEMENT

RECONNECT EX. WATER METER M W/ TYPE II-A CONNECTION

RECONNECT EX. WATER METER M W/ TYPE II-A CONNECTION

RECONNECT EX. WATER METER M W/ TYPE II-A CONNECTION

6" DIP WATERLINE (PRESSURE CLASS 350)

45° BENDS

TIE TO EXISTING 6" WATERLINE ON WEST BEVERLEY STREET WITH 6" X 6" TAPPING SLEEVE AND VALVE.

PROPOSED PERMANENT PUBLIC ACCESS EASEMENT (1324 SF) (EXHIBIT UNDER SEPARATE COVER)

PROPOSED TEMPORARY CONSTRUCTION EASEMENT (4083 SF) (EXHIBIT UNDER SEPARATE COVER)

4" SANITARY SEWER CLEANOUT INV. OUT: 1548.47

TIE TO EX. SAN. MANHOLE (CORE DRILLED AND FLEXIBLE BOOT INSTALLED)
TOP = 1551.24'
EX. 4" DIP INV. IN = 1547.56'
EX. 8" DIP INV. IN = 1544.23'
EX. 8" DIP INV. OUT = 1543.93'
PROP. 4" DIP INV. IN: 1547.92'

11.25° BEND

APPROXIMATE LOCATION OF GAS LINE. (COORDINATE WITH GAS COMPANY)

22.5° BENDS

6" DIP WATERLINE (PRESSURE CLASS 350)

TIE TO EXISTING 6" WATERLINE STUB ON BIRCH STREET. REMOVE PLUG/CAP FROM EXISTING 6" STUB-OUT AND CONNECT WITH 6"X6" TEE. INSTALL 6" GATE VALVE ON EAST AND SOUTH SIDE OF TEE AND EXTEND 20' STUB-OUT AND PLUG FOR FUTURE CONNECTION.

BIRCH STREET (32' R/W)
DB. 210, PG. 118 (AUGUSTA CO.)

SCALE 1"=30'
0 30' 60'

MOSELEYARCHITECTS
3200 NORFOLK STREET, RICHMOND, VA 23230
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TIMMONS GROUP
ENGINEERING | DESIGN | TECHNOLOGY

COMMONWEALTH OF VIRGINIA
JEREMY L. FOX
Lic. No. 60786
PROFESSIONAL ENGINEER
02/ 21/ 2024

STAUNTON J&DR COURTS FACILITY

City of Staunton
2040 West Beverley Street, Staunton, VA 24401

PROJECT NO: 603874
DATE: DECEMBER 4, 2023

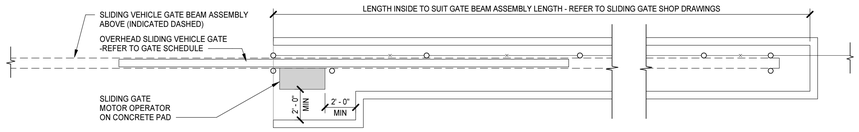
REVISIONS

DATE	DESCRIPTION
01/22/24	PER CITY COMMENTS
02/13/24	PER CITY COMMENTS
02/21/24	PER CITY COMMENTS
03/14/24	*AD-01R *AD-01R
03/22/24	*AD-03 *AD-03

UTILITY PLAN

C4.1

8/16/2023 11:57:00 AM



1 TYP A1.1.1 **TYPICAL SLIDING GATE TROUGH PLAN**

1/4" = 1'-0"

ARCHITECTURAL SITE PLAN KEYNOTES

REPRESENTED BY n

APPLIES TO DRAWINGS A1.1.1 - A1.1.2

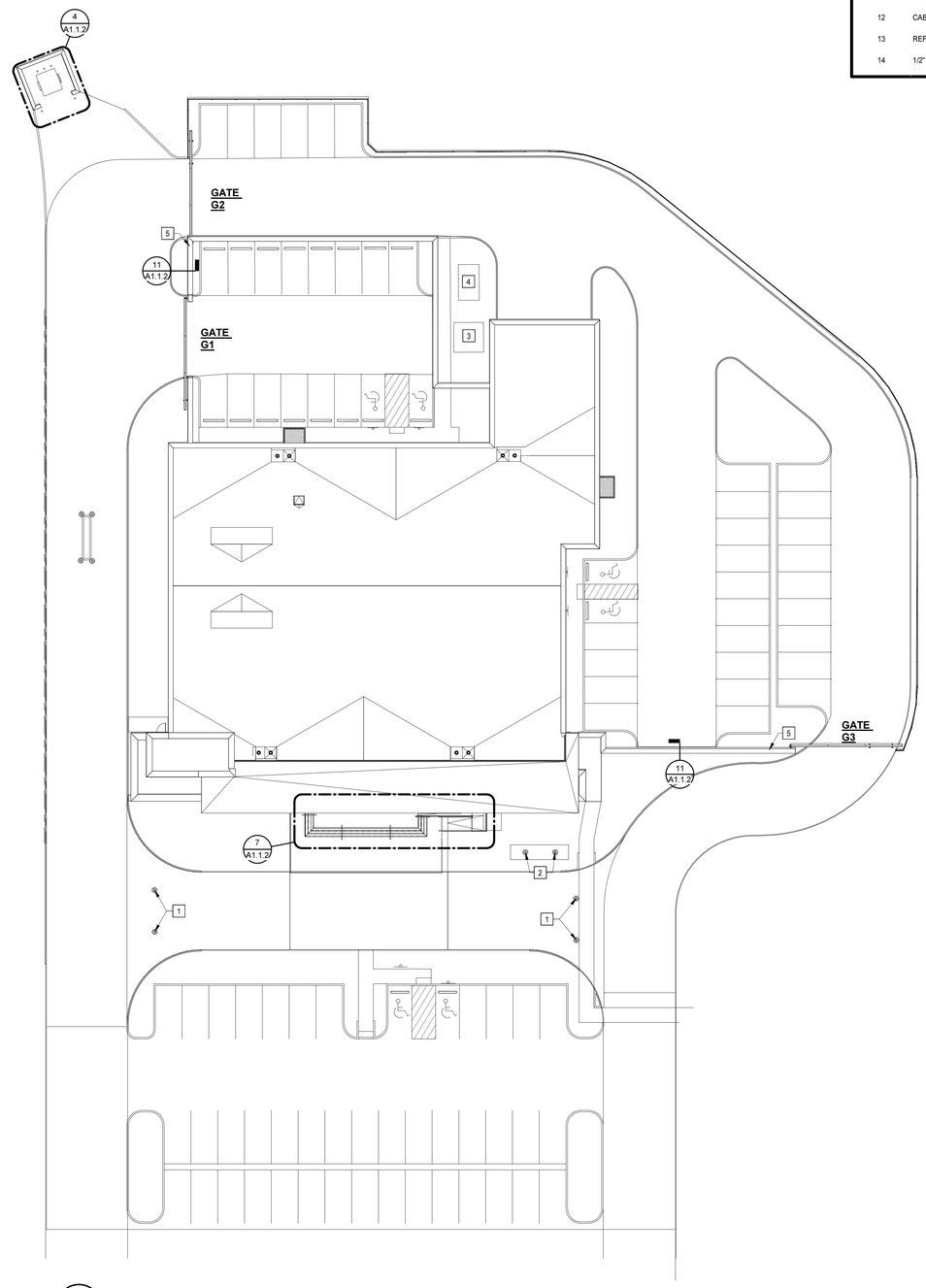
AD-03

1	REMOVABLE BOLLARD. REFER TO REMOVABLE BOLLARD DETAIL ON C1.0
2	FLAGPOLE - REFER TO DETAIL 2 ON A1.1.1. PROVIDE (1) 30'-0" LEFT FLAGPOLE AND (1) 25'-0" RIGHT FLANKING FLAGPOLE
3	GENERATOR
4	TRANSFORMER
5	SITE WALL
6	BOLLARD - REFER TO DETAIL 3 ON A1.1.2
7	DUMPSTER - NIC
8	PERIMETER BENT PLATE FRAME
9	LOUVER GATE PANEL
10	GALVANIZED STEEL GATE POST AND CONNECTIONS TO FOOTINGS BY GATE MANUFACTURER
11	30" CANE BOLT AND ATTACHMENT SLEEVES, 4" EXTENSION INTO GROUND SLEEVE PIPES SET IN CONCRETE APRON AT OPEN AND CLOSED POSITIONS. CANE AND SLEEVES TO INCLUDE SLOT AND CLEAT TO HOLD CANE IN RAISED POSITION
12	CABLE RAIL HANDRAIL SYSTEM
13	REFER TO CIVIL DRAWINGS FOR FINISH GRADE
14	1/2" ISOLATION JT W/ FILLER STRIP AND SEALANT

GATE SCHEDULE

GATE #	GATE TYPE	MATERIAL	GATE SIZE	LOCATION	HARDWARE SET	NOTES
G1	SLIDING BI-PARTING GATE	BLACK VINYL COATED GALV STL	24'-0"W X 10'-0"H	SECURE PARKING	--	INTERFACE W/ SECURITY CONTROL SYSTEM FOR REMOTE OPERATION
G2	SLIDING VEHICLE GATE	BLACK VINYL COATED GALV STL	25'-0"W X 10'-0"H	STAFF PARKING EXIT/ENTRY	--	INTERFACE W/ SECURITY CONTROL SYSTEM FOR REMOTE OPERATION: NOTE 1
G3	SLIDING BI-PARTING GATE	BLACK VINYL COATED GALV STL	25'-0"W X 10'-0"H	STAFF PARKING EXIT	--	INTERFACE W/ SECURITY CONTROL SYSTEM FOR REMOTE OPERATION: NOTE 1

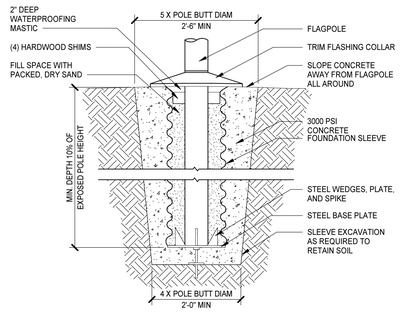
NOTE 1: PROVIDE KNOX BOX ADJACENT TO GATE



N **ARCHITECTURAL SITE PLAN**

1" = 20'-0"

AD-03



NOTE: FLAGPOLE FOUNDATION DIMENSIONS INDICATED ARE MINIMUM DIMENSIONS. COMPLY WITH THE MORE RESTRICTIVE BETWEEN THE DIMENSIONS INDICATED HERE AND THE FLAG POLE MANUFACTURER'S REQUIREMENTS

2 A1.1.1 **DETAIL - FLAG POLE BASE**

3/4" = 1'-0"

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COMMONWEALTH OF VIRGINIA
ANTHONY J. BELL III
Lic. No. 009147
3 | 1 | 2024
ARCHITECT

STAUNTON J&DR COURTS FACILITY

2040 WEST BEVERLEY STREET
CITY OF STAUNTON, VA 24401

PROJECT NO: 830874
DATE: MARCH 1, 2024

REVISIONS

DATE	DESCRIPTION
03/22/24	AD-03

ARCHITECTURAL SITE PLAN

A1.1.1

3/20/2024 8:46:50 AM

KEYNOTES

REPRESENTED BY n

APPLIES TO DRAWINGS A2.0.0

1	PARTIAL DEMOLITION OF EXISTING BUILDING. REMOVE ROOF, ROOF STRUCTURE, INTERIOR WALLS, AND THREE EXTERIOR WALLS DOWN TO THE TOP OF SLAB. EXISTING WALL COMPONENTS BELOW TOP OF SLAB TO REMAIN.
2	EXISTING EXTERIOR WALL TO REMAIN
3	PROTECTIVE COVER CANOPY TO BE REMOVED. OPENINGS IN VENEER AT DEMOED CANOPY TO BUILDING CONNECTIONS TO BE INFILLED, TOOTH IN WITH SALVAGED BRICK.
4	NEW CMU WALL ASSEMBLY. REFER TO DETAILS ON THIS SHEET

GENERAL NOTES

1. THE SCOPE OF WORK INDICATED ON THIS SHEET IS TO BE INCLUDED IN BID ADD ALTERNATE NO 1.
2. REFER TO HAZARDOUS MATERIALS REPORT AND SECTION 028000 HAZARDOUS MATERIALS REMEDIATION.
3. FILL ANY EXPOSED OPEN CMU CELL AFTER WALL DEMOLITION AND OPEN HOLES IN CONCRETE SLAB AFTER COLUMN DEMOLITION WITH GRAVEL.
4. REMOVE AND DISPOSE OF NON-ACTIVE FIRE SUPPRESSION SYSTEM. CUT AND CAP SPRINKLER PIPE IN THE SPACES TO REMAIN.

AD-03

GENERAL DEMOLITION NOTES AND STRUCTURAL SCOPE

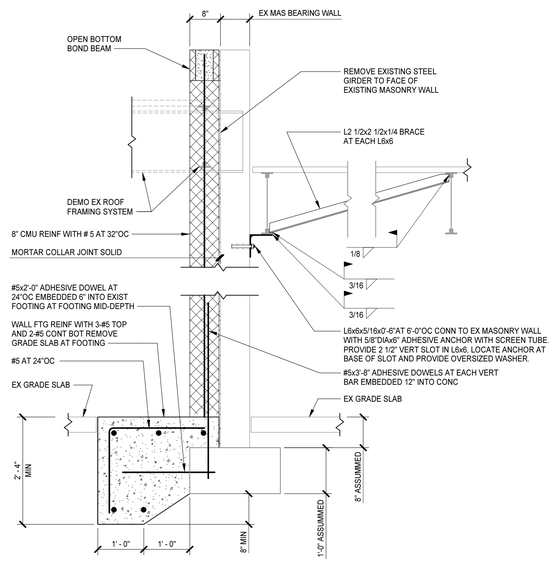
DESCRIPTION OF THE EXISTING STRUCTURE TO BE DEMOLISHED IS BASED ON A LIMITED OBSERVATION CONSISTING OF A SINGLE SITE VISIT. EXISTING BUILDING DRAWINGS WERE NOT PROVIDED TO MOSELEY.

THE STRUCTURE IS A SINGLE-LEVEL STEEL-FRAMED BUILDING CONSISTING OF STEEL ROOF DECK SUPPORTED BY STEEL ROOF JOISTS AND STEEL BEAM GIRDERS WHICH IN TURN ARE SUPPORTED BY INTERIOR STEEL COLUMNS, ONE INTERIOR CMU BEARING WALL, AND THE EXTERIOR BEARING MASONRY WALLS. A MEZZANINE CONSISTING OF A SLAB SUPPORTED BY JOISTS AND CMU BEARING WALLS IS LOCATED AT THE BACK RIGHT CORNER OF THE BUILDING TO BE DEMOLISHED. WE ANTICIPATE THE FLOOR IS A GRADE SLAB 4 TO 6' IN THICKNESS. WE ANTICIPATE THE EXTERIOR WALLS AND ANY INTERIOR MASONRY PARTITIONS ARE SUPPORTED BY SHALLOW STRIP FOOTINGS. WE ALSO ANTICIPATE STEEL COLUMNS ARE SUPPORTED BY SHALLOW ISOLATED COLUMN FOOTINGS.

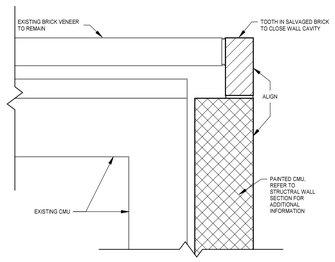
THE FOLLOWING BUILDING ELEMENTS (OF THE BIG LOTS BUILDING) SHALL BE REMOVED.

1. THE ROOF STRUCTURE.
2. THE STEEL COLUMNS TO GRADE SLAB ELEVATION. FRAME CUT STEEL AT GRADE ELEVATION.
3. EXTERIOR AND INTERIOR WALLS TO GRADE SLAB ELEVATION.
4. THE INTERIOR GRADE SLAB SHALL REMAIN EXCEPT FOR THE PORTION AT THE WALL FOOTING ADJACENT TO THE EXISTING PARTY WALL.
5. REFER TO THE WALL SECTION LOCATED ON THIS DRAWING FOR DETAILS AT THE EXISTING PARTY WALL.
6. THE 11 COLUMN LONG PRECAST CONCRETE CANOPY ELEMENT AT THE FRONT ELEVATION.

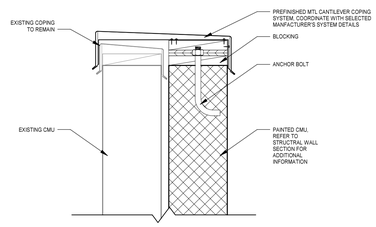
THE EXISTING MASONRY PARTY WALL. THE WALL THAT ABUTS AT THE EXTENTS OF BUILDING DEMOLITION, IS A BEARING WALL AND SHALL REMAIN. THE STEEL ROOF STRUCTURE SHALL BE REMOVED IN A MANNER AS TO NOT DAMAGE THIS WALL. AFTER BUILDING DEMOLITION, A SECONDARY REINFORCED CMU WALL, ABUTTING THE EXISTING WALL, SHALL BE CONSTRUCTED. THIS WALL IS DESIGNED TO RESIST LOADING AS IT IS NOW A PERMANENT EXTERIOR WALL AND A CONTINUOUS CONCRETE STRIP FOOTING SHALL BE PLACED TO A DEPTH TO PROTECT THIS WALL FROM FROST HEAVE. REFER TO THE WALL SECTION BELOW FOR ADDITIONAL DETAILS. THIS WALL AND WALL FOOTING SHALL BE INSPECTED BY THE OWNER'S SPECIAL INSPECTOR.



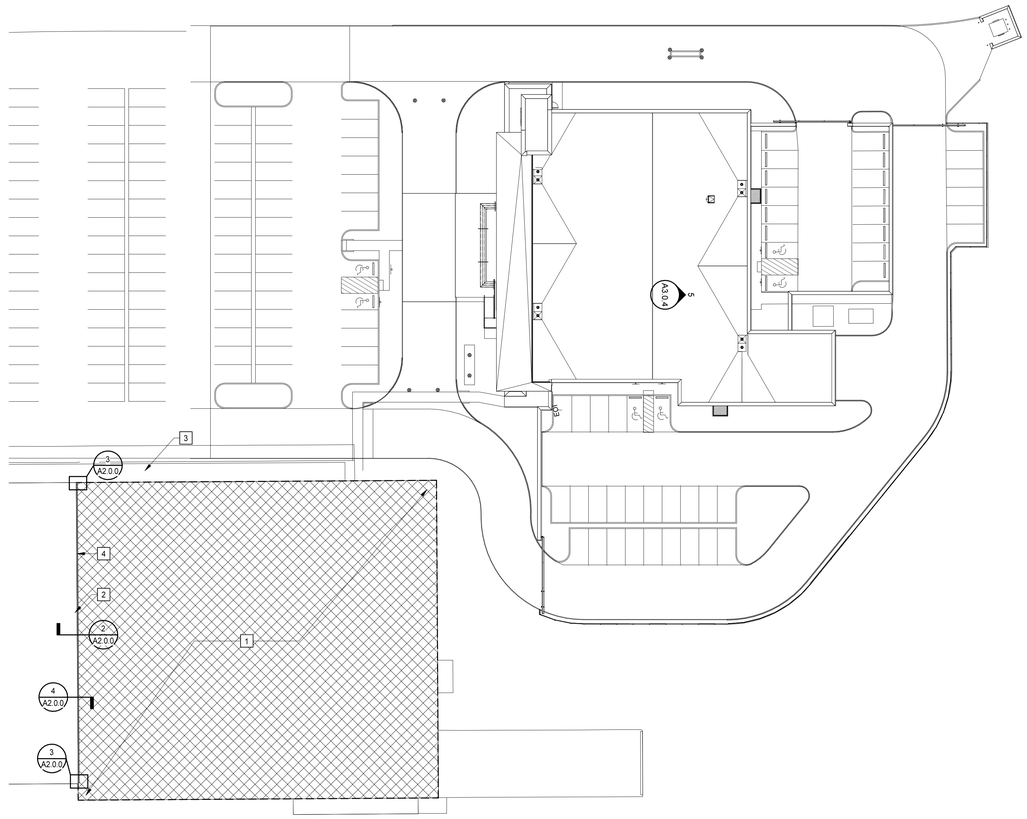
4 A2.0.0 **NEW/EXISTING CMU WALL**
3/4" = 1'-0"



3 A2.0.0 **WALL TERMINATION DETAIL**
1 1/2" = 1'-0"



2 A2.0.0 **TOP OF WALL CONDITION**
1 1/2" = 1'-0"



SITE PLAN
1" =1'-0"

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3/1/2024
ARCHITECT

STAUNTON J&DR COURTS FACILITY

2040 WEST BEVERLEY STREET
CITY OF STAUNTON, VA 24401

PROJECT NO: 630874
DATE: MARCH 1, 2024

REVISIONS

DATE	DESCRIPTION
03/14/24	AD-01R
03/22/24	AD-03

ADD ALTERNATE NO 1 - PARTIAL BUILDING DEMOLITION PLAN AND DETAILS

A2.0.0

3/21/2024 6:46:08 AM

FINISH PLAN LEGEND

NAME
NUMBER
Floor Finish
Base Finish
Wall Finish
Ceiling Finish
Wainscot

FINISH PLAN TAG

IF SHOWN

C-TILE-1 — WALL FINISH EXTENTS

QT-3 QT-1 — FLOOR FINISH TRANSITION, CHANGE OF MATERIAL

PREDOMINATE WALL FINISH; REFER TO A3.0.1 AND FINISH FLOOR PLANS FOR ADDITIONAL INFORMATION.

FLOOR PATTERN LEGEND

CONC-LH
TERR
LVT
CTILE-A/B/C
PTILE-A
RST/RSR
PTILE-B

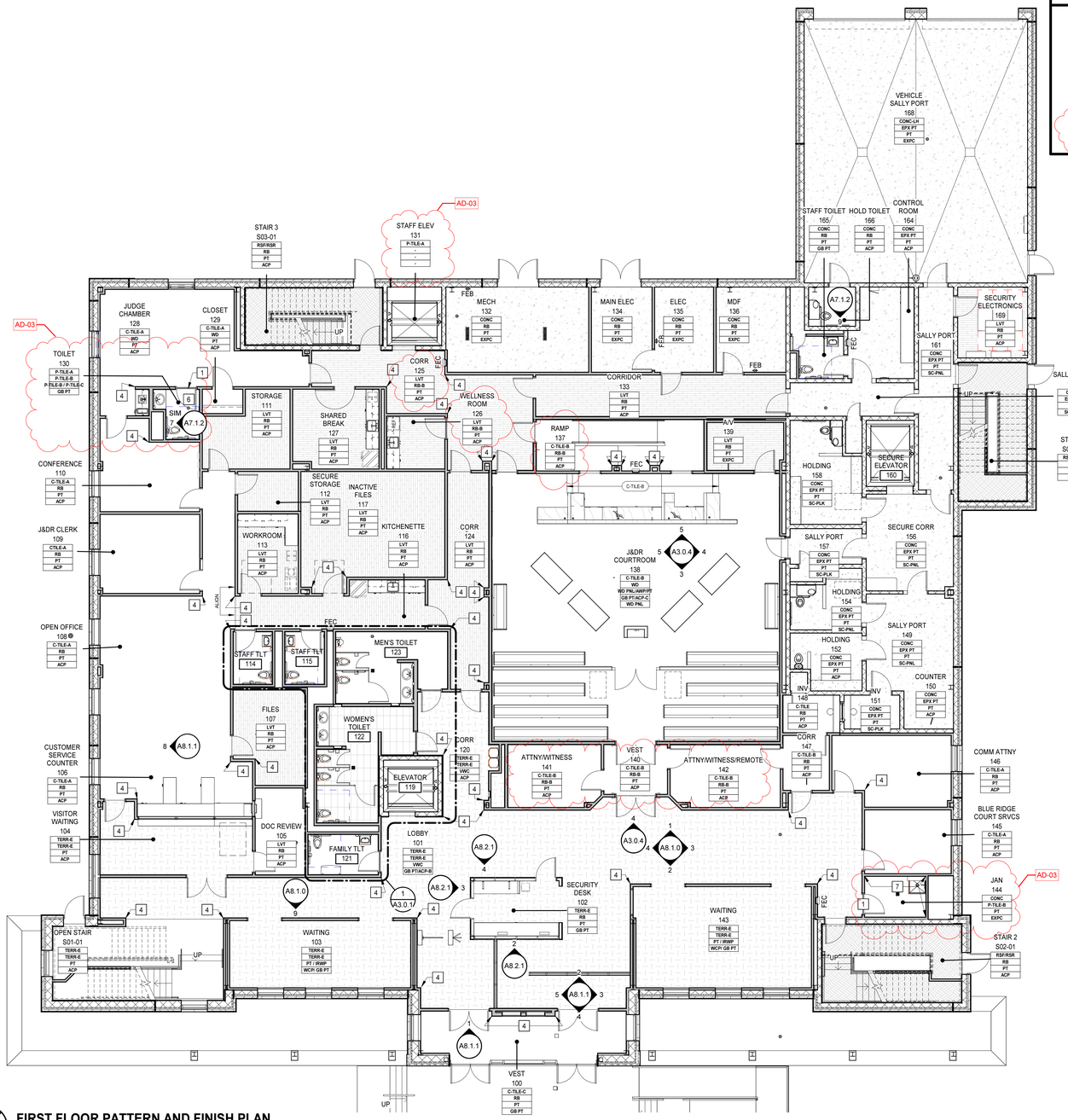
NOTE:
REFER TO FINISH SCHEDULE FOR SPECIFIC FINISH LOCATION TYPES "A" "B" "C" ETC.

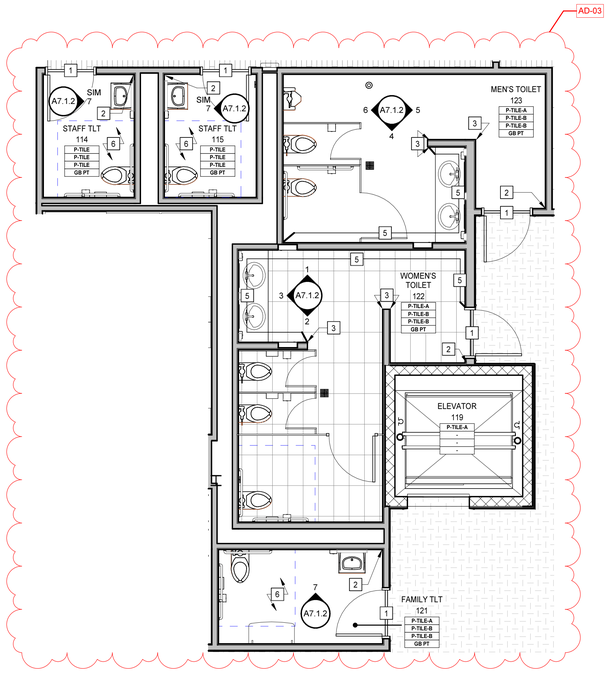
FINISH PLAN KEYNOTES

REPRESENTED BY n

APPLIES TO DRAWINGS A3.0.1 - A3.0.n

1	STONE THRESHOLD
2	FULL TILE INSTALL START POINT
3	FULL HEIGHT TILE METAL CORNER GUARD
4	FULL HEIGHT PVC CORNER GUARD
5	ACCENT WALL TILE. REFERENCE FINISH SCHEDULE AND COORDINATING ELEVATIONS ON A7 SERIES
6	ACCENT TILE CONTINUES ALONG ENTIRE PERIMETER OF ROOM.
7	WAINSCOT. REFER TO FINISH SCHEDULE





1 A3.0.1 A3.0.1 **ENLARGED FIRST FLOOR PUBLIC RESTROOMS**
1/4" = 1'-0"

N **FIRST FLOOR PATTERN AND FINISH PLAN**
1/8" = 1'-0"

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ANTHONY J. BELL III
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3/1/2024
ARCHITECT

STAUNTON J&DR COURTS FACILITY

2040 WEST BEVERLEY STREET
CITY OF STAUNTON, VA 24401

PROJECT NO: 630874
DATE: MARCH 1, 2024

REVISIONS

DATE	DESCRIPTION
03/14/24	AD-01R
03/22/24	AD-03

FIRST FLOOR PATTERN AND FINISH PLAN

A3.0.1

3/22/2024 6:42:31 AM

FINISH PLAN LEGEND

NAME
NUMBER
Floor Finish
Base Finish
Wall Finish
Ceiling Finish
Wainscot
→ FINISH PLAN TAG
→ IF SHOWN

PREDOMINATE WALL FINISH; REFER TO A3.0.1 AND FINISH FLOOR PLANS FOR ADDITIONAL INFORMATION.

C-TILE-1 — WALL FINISH EXTENTS

CT-1 / CT-1 — FLOOR FINISH TRANSITION, CHANGE OF MATERIAL

FLOOR PATTERN LEGEND

- CONC-LH
- LVT
- PTILE-A [PORCELAIN TILE]
- PTILE-B [PORCELAIN TILE]
- TERR
- CTILE-A/B/C [CARPET TILE]
- RST/RSR

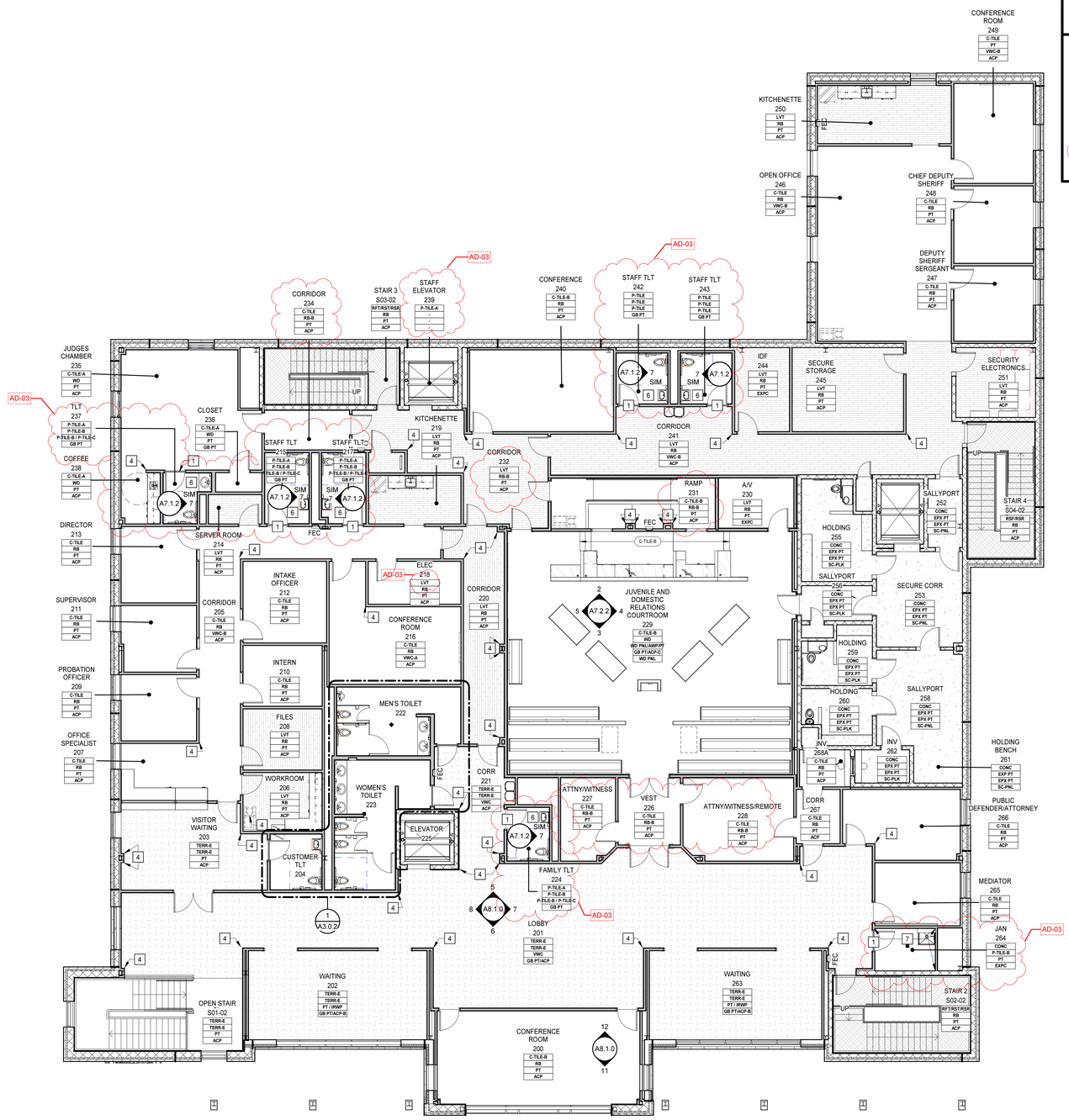
NOTE:
REFER TO FINISH SCHEDULE FOR SPECIFIC FINISH LOCATION TYPES "A" "B" "C" ETC.

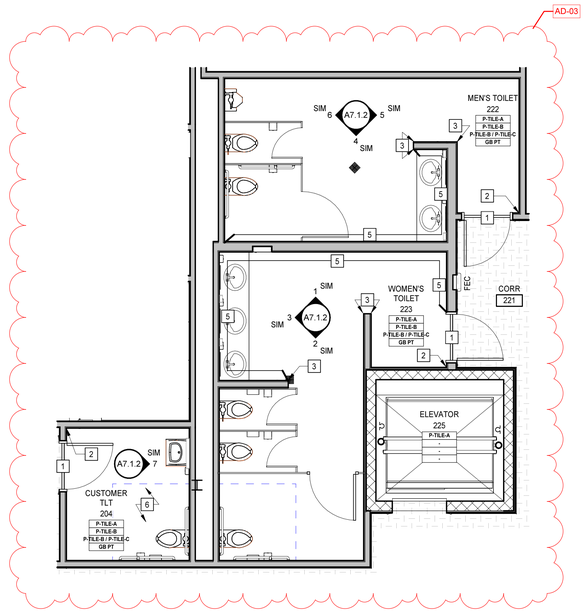
FINISH PLAN KEYNOTES

REPRESENTED BY n

APPLIES TO DRAWINGS A3.0.1 - A3.0.n

1	STONE THRESHOLD
2	FULL TILE INSTALL START POINT
3	FULL HEIGHT TILE METAL CORNER GUARD
4	FULL HEIGHT PVC CORNER GUARD
5	ACCENT WALL TILE. REFERENCE FINISH SCHEDULE AND COORDINATING ELEVATIONS ON A7 SERIES
6	ACCENT TILE CONTINUES ALONG ENTIRE PERIMETER OF ROOM.
7	WAINSCOT. REFER TO FINISH SCHEDULE





1 A3.0.2 A3.0.2 **ENLARGED SECOND FLOOR PUBLIC RESTROOMS**
1/4" = 1'-0"

N **SECOND FLOOR PATTERNS AND FINISH PLAN**
1/8" = 1'-0"

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STAUNTON J&DR COURTS FACILITY

2040 WEST BEVERLEY STREET
CITY OF STAUNTON, VA 24401

PROJECT NO: 630874
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REVISIONS

DATE	DESCRIPTION
03/14/24	AD-01R
03/22/24	AD-03

SECOND FLOOR PATTERN AND FINISH PLAN

A3.0.2

3/22/2024 6:42:36 AM

FINISH SCHEDULE

NUMBER	NAME	FLOOR	BASE	WALLS NORTH	WALLS EAST	WALLS SOUTH	WALLS WEST	WAINSCOT	CEILING	NOTES
100	VEST	C-TILE-C	RB	PT	PT	PT	PT		GB PT	
101	LOBBY	TERR-E	TERR-E	VWC-A / PT	VWC-A / PT	VWC-A / PT	VWC-A / PT	VWC-B	GB PT/ACP-B	4, 6
102	SECURITY DESK	TERR-E	RB	PT	PT	PT	PT		GB PT	6
103	WAITING	TERR-E	TERR-E	IRWC / PT	IRWC / PT	IRWC / PT	IRWC / PT	IRWC	WCP/ GB PT	2, 4
104	VISITOR WAITING	TERR-E	TERR-E	IRWC / PT	IRWC / PT	IRWC / PT	IRWC / PT	IRWC	ACP	6
105	DOC REVIEW	LVT	RB	PT	PT	PT	PT		ACP	
106	CUSTOMER SERVICE COUNTER	C-TILE-A	RB	PT	PT	PT	PT		ACP	
107	FILES	LVT	RB	PT	PT	PT	PT		ACP	
108	OPEN OFFICE	C-TILE-A	RB	PT	PT	PT	PT		ACP	
109	J&DR CLERK	CTILE-A	RB	PT	PT	PT	PT		ACP	
110	CONFERENCE	C-TILE-A	RB	PT	PT	PT	PT		ACP	
111	STORAGE	LVT	RB	PT	PT	PT	PT		ACP	
112	SECURE STORAGE	LVT	RB	PT	PT	PT	PT		ACP	
113	WORKROOM	LVT	RB	PT	PT	PT	PT		ACP	
114	STAFF TLT	P-TILE	P-TILE	P-TILE	P-TILE	P-TILE	P-TILE		GB PT	2, 4, 7
115	STAFF TLT	P-TILE	P-TILE	P-TILE	P-TILE	P-TILE	P-TILE		GB PT	2, 4, 7
116	KITCHENETTE	LVT	RB	PT	PT	PT	PT		ACP	
117	INACTIVE FILES	LVT	RB	PT	PT	PT	PT		ACP	
119	ELEVATOR	P-TILE-A	-	-	-	-	-		-	5
120	CORR	TERR-E	TERR-E	PT	PT	PT	PT		ACP	4, 6
121	FAMILY TLT	P-TILE-A	P-TILE-B	P-TILE-B / P-TILE-C	P-TILE-B	P-TILE-B	P-TILE-B		GB PT	2, 7
122	WOMEN'S TOILET	P-TILE-A	P-TILE-B	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B	P-TILE-B / P-TILE-C		GB PT	2, 4
123	MEN'S TOILET	P-TILE-A	P-TILE-B	P-TILE-B	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B		GB PT	2, 4
124	CORR	LVT	RB	PT	PT	PT	PT		ACP	
125	CORR	LVT	RB-B	PT	PT	PT	PT		ACP	
126	WELLNESS ROOM	LVT	RB-B	PT	PT	PT	PT		ACP	
127	SHARED BREAK	LVT	RB	PT	PT	PT	PT		ACP	
128	JUDGE CHAMBER	C-TILE-A	WD	PT	PT	PT	PT		ACP	
128b	COFFEE	C-TILE	WD	PT	PT	PT	PT		ACP	
129	CLOSET	C-TILE-A	WD	PT	PT	PT	PT		ACP	
130	TOILET	P-TILE-A	P-TILE-B	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C		GB PT	2, 4, 7
131	STAFF ELEV	P-TILE-A	-	-	-	-	-		-	5
132	MECH	CONC	RB	PT	PT	PT	PT		EXPC	
133	CORRIDOR	LVT	RB	PT	PT	PT	PT		ACP	
134	MAIN ELEC	CONC	RB	PT	PT	PT	PT		EXPC	
135	ELEC	CONC	RB	PT	PT	PT	PT		EXPC	
136	MDF	CONC	RB	PT	PT	PT	PT		EXPC	
137	RAMP	C-TILE-B	RB-B	PT	PT	PT	PT		ACP	
138	J&DR COURTROOM	C-TILE-B	WD	WD PNL/PT	AWP/PT	AWP/PT	AWP/PT	WD PNL	GB PT/ACP-C	2, 4, 6
139	A/V	LVT	RB	PT	PT	PT	PT		EXPC	
140	VEST	C-TILE-B	RB-B	PT	PT	PT	PT		ACP	
141	ATTNY/WITNESS	C-TILE-B	RB-B	PT	PT	PT	PT		ACP	
142	ATTNY/WITNESS/REMOTE	C-TILE-B	RB-B	PT	PT	PT	PT		ACP	
143	WAITING	TERR-E	TERR-E	IRWC / PT	IRWC / PT	IRWC / PT	IRWC / PT	IRWC	WCP/ GB PT	2, 4
144	JAN	CONC	P-TILE-B	PT / P-TILE-B	PT / P-TILE-B	PT / P-TILE-B	PT		EXPC	3
145	BLUE RIDGE COURT SRVCS	C-TILE-A	RB	PT	PT	PT	PT		ACP	
146	COMM ATTNY	C-TILE-A	RB	PT	PT	PT	PT		ACP	
147	CORR	C-TILE-B	RB	PT	PT	PT	PT		ACP	
148	INV	C-TILE	RB	PT	PT	PT	PT		ACP	
149	SALLY PORT	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PNL	
150	COUNTER	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		ACP	
151	INV	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PLK	
152	HOLDING	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		ACP	
153	CHASE	CONC	--	--	--	--	--			
154	HOLDING	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PNL	
155	CHASE	CONC	--	--	--	--	--			
156	SECURE CORR	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PNL	
157	SALLY PORT	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PLK	
158	HOLDING	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PLK	
159	CHASE	CONC	--	--	--	--	--			
160	SECURE ELEVATOR	P-TILE	-	-	-	-	-		ACP	5
161	SALLY PORT	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PNL	
163	SALLY PORT	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PNL	
164	CONTROL ROOM	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		ACP	
165	STAFF TOILET	CONC	RB	EPX PT	EPX PT	EPX PT	EPX PT		GB PT	
166	HOLD TOILET	CONC	RB	PT	PT	PT	PT		ACP	
167	CHASE	CONC	-	-	-	-	-			
168	VEHICLE SALLY PORT	CONC-LH	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		EXPC	
169	SECURITY ELECTRONICS	LVT	RB	PT	PT	PT	PT		ACP	

FINISH SCHEDULE

NUMBER	NAME	FLOOR	BASE	WALLS NORTH	WALLS EAST	WALLS SOUTH	WALLS WEST	WAINSCOT	CEILING	NOTES
200	CONFERENCE ROOM	C-TILE-B	RB	PT	PT	PT	PT		ACP	
201	LOBBY	TERR-E	TERR-E	VWC-A / PT	VWC-A / PT	VWC-A / PT	VWC-A / PT	VWC-B	GB PT/ACP	4, 6
202	WAITING	TERR-E	TERR-E	IRWC / PT	IRWC / PT	IRWC / PT	IRWC / PT	IRWC	GB PT/ACP-B	2, 4, 6
203	VISITOR WAITING	TERR-E	TERR-E	PT	PT	PT	PT		ACP	2, 4, 6
204	CUSTOMER TLT	P-TILE-A	P-TILE-B	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C		GB PT	2, 7
205	CORRIDOR	C-TILE	RB	PT	PT	PT	PT		ACP	
206	WORKROOM	LVT	RB	PT	PT	PT	PT		ACP	
207	OFFICE SPECIALIST	C-TILE	RB	PT	PT	PT	PT		ACP	
208	FILES	LVT	RB	PT	PT	PT	PT		ACP	
209	PROBATION OFFICER	C-TILE	RB	PT	PT	PT	PT		ACP	
210	INTERN	C-TILE	RB	PT	PT	PT	PT		ACP	
211	SUPERVISOR	C-TILE	RB	PT	PT	PT	PT		ACP	
212	INTAKE OFFICER	C-TILE	RB	PT	PT	PT	PT		ACP	
213	DIRECTOR	C-TILE	RB	PT	PT	PT	PT		ACP	
214	SERVER ROOM	LVT	RB	PT	PT	PT	PT		ACP	
215	STAFF TLT	P-TILE-A	P-TILE-B	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C		GB PT	2, 4, 7
216	CONFERENCE ROOM	C-TILE	RB	PT	PT	PT	PT		ACP	
217	STAFF TLT	P-TILE-A	P-TILE-B	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C		GB PT	2, 4, 7
218	ELEC	LVT	RB	PT	PT	PT	PT		ACP	
219	KITCHENETTE	LVT	RB	PT	PT	PT	PT		ACP	
220	CORRIDOR	LVT	RB	PT	PT	PT	PT		ACP	
221	CORR	TERR-E	TERR-E	VWC-A / PT	VWC-A / PT	VWC-A / PT	VWC-A / PT	VWC-A	ACP	4, 6
222	MEN'S TOILET	P-TILE-A	P-TILE-B	P-TILE-B	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C		GB PT	2, 4
223	WOMEN'S TOILET	P-TILE-A	P-TILE-B	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B	P-TILE-B / P-TILE-C		GB PT	2, 4
224	FAMILY TLT	P-TILE-A	P-TILE-B	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C		GB PT	2, 4, 7
225	ELEVATOR	P-TILE-A	-	-	-	-	-		-	5
226	VEST	C-TILE	RB-B	PT	PT	PT	PT		ACP	
227	ATTNY/WITNESS	C-TILE	RB-B	PT	PT	PT	PT		ACP	
228	ATTNY/WITNESS/REMOTE	C-TILE	RB-B	PT	PT	PT	PT		ACP	
229	JUVENILE AND DOMESTIC RELATIONS COURTROOM	C-TILE-B	WD	WD PNL/PT	AWP/PT	AWP/PT	AWP/PT	WD PNL	GB PT/ACP-C	2, 4, 6
230	A/V	LVT	RB	PT	PT	PT	PT		EXPC	
231	RAMP	C-TILE-B	RB-B	PT	PT	PT	PT		ACP	
232	CORRIDOR	LVT	RB-B	PT	PT	PT	PT		ACP	
233	ROOF ACCESS	CONC	RB	PT	PT	PT	PT		EXPC	
234	CORRIDOR	C-TILE	RB-B	PT	PT	PT	PT		ACP	
235	JUDGES CHAMBER	C-TILE-A	WD	PT	PT	PT	PT		ACP	
236	CLOSET	C-TILE-A	WD	PT	PT	PT	PT		GB PT	
237	TLT	P-TILE-A	P-TILE-B	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C	P-TILE-B / P-TILE-C		GB PT	2, 4, 7
237b	CLOSET	CONC	RB	EPX PT	EPX PT	EPX PT	EPX PT		ACP	
238	COFFEE	C-TILE-A	WD	PT	PT	PT	PT		ACP	
239	STAFF ELEVATOR	P-TILE-A	-	-	-	-	-		-	5
240	CONFERENCE	C-TILE-B	RB	PT	PT	PT	PT		ACP	
241	CORRIDOR	LVT	RB	PT	PT	PT	PT		ACP	
242	STAFF TLT	P-TILE	P-TILE	P-TILE	P-TILE	P-TILE	P-TILE		GB PT	2, 4
243	STAFF TLT	P-TILE	P-TILE	P-TILE	P-TILE	P-TILE	P-TILE		GB PT	2, 4
244	IDF	LVT	RB	PT	PT	PT	PT		EXPC	
245	SECURE STORAGE	LVT	RB	PT	PT	PT	PT		ACP	
246	OPEN OFFICE	C-TILE	RB	PT	PT	PT	PT		ACP	
247	DEPUTY SHERIFF SERGEANT	C-TILE	RB	PT	PT	PT	PT		ACP	
248	CHIEF DEPUTY SHERIFF	C-TILE	RB	PT	PT	PT	PT		ACP	
249	CONFERENCE ROOM	C-TILE	PT	PT	PT	PT	PT		ACP	
250	KITCHENETTE	LVT	RB	PT	PT	PT	PT		ACP	
251	SECURITY ELECTRONICS	LVT	RB	PT	PT	PT	PT		ACP	
252	SALLYPORT	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PNL	
253	SECURE CORR	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PNL	
254	SECURE ELEVATOR	P-TILE	-	-	-	-	-		-	5
255	HOLDING	CONC	EPX PT	PT	PT	PT	PT		SC-PLK	
256	SALLYPORT	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PLK	
257	CHASE	CONC	-	-	-	-	-		SC-PLK	
258	SALLYPORT	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PNL	
259	HOLDING	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PLK	
260	HOLDING	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PLK	
261	HOLDING BENCH	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PNL	
262	INV	CONC	EPX PT	EPX PT	EPX PT	EPX PT	EPX PT		SC-PLK	
263	WAITING	TERR-E	TERR-E	IRWC / PT	IRWC / PT	IRWC / PT	IRWC / PT	IRWC	GB PT/ACP-B	2, 4, 6
264	JAN	CONC	P-TILE-B	PT / P-TILE-B	PT / P-TILE-B	PT	PT		EXPC	3
265	MEDIATOR	C-TILE	RB	PT	PT	PT	PT		ACP	
266	PUBLIC DEFENDER/ATTORNEY	C-TILE	RB	PT	PT	PT	PT		ACP	
267	CORR	C-TILE	RB	PT	PT	PT	PT		ACP	

NOTE:

1. REFER TO COORDINATING ENLARGED PLANS FOR FLOOR PATTERNS.
2. REFER TO COORDINATING ELEVATIONS FOR WALL PATTERN INSTALLATION.
3. P-TILE WAINSCOT @ 4'-0" AFF. HORIZONTAL STACK PATTERN INSTALL.
4. REFER TO COORDINATING ELEVATION(S) FOR EXTENT OF WALL FINISHES.
5. TO BE SELECTED FROM MFR'S FULL RANGE OF FINISHES.
6. WOOD PAINTED TRIM MOULDINGS; REFER TO COORDINATING ELEVATIONS FOR EXTENT OF LOCATIONS.
7. ACCENT TILE CONTINUES ALONG ENTIRE PERIMETER OF ROOM.

AD-03

FINISH SCHEDULE GENERAL NOTES

UNLESS OTHERWISE NOTED:

A. FINISH SCHEDULE DESCRIBES ONLY THE BASIC OR PREDOMINANT SURFACE FINISH. REFER TO ELEVATIONS FOR SPECIFIC EXTENTS OF FINISHES.

B. PROVIDE SAME FINISHES AS THE ADJACENT SPACE IN ALCOVES AND CONTINUOUS SPACES WITHOUT DESIGNATED SPACE NUMBERS.

C. CASEWORK FINISHES ARE NOT NOTED IN THE FINISH SCHEDULE. REFER TO CASEWORK ELEVATIONS AND SPECIFICATIONS FOR MATERIALS AND FINISHES.

D. DIRECTIONAL WALL FINISH INDICATORS (NORTH, EAST, SOUTH, WEST) REFER TO THE "PLAN" NORTH ORIENTATION.

E. BULKHEADS AND SOFFITS MAY NOT BE INDICATED IN FINISH SCHEDULES. REFER TO RCP DETAILS, AND OTHER DOCUMENTS FOR EXTENT.

F. PROVIDE CONTINUOUS SEALANT BETWEEN INTERIOR SLAB-ON-GRADE AND VERTICAL ELEMENT WHERE JOINT IS NOT CONCEALED BY FINISH BASE OR OTHER CONSTRUCTION

G. REFER TO SPECIFICATIONS FOR INFORMATION ON FINISH FIRE CLASSIFICATION RATING.

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3/1/2024
ARCHITECT

STAUNTON J&DR COURTS FACILITY

2040 WEST BEVERLEY STREET
CITY OF STAUNTON, VA 24401

PROJECT NO: 630874
DATE: MARCH 1, 2024

REVISIONS

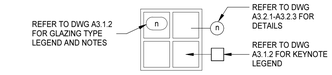
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03/14/24	AD-01R
03/22/24	AD-03

FINISH SCHEDULE

A3.0

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GENERAL NOTES



A. PROVIDE MANUAL ROLLERSHADES AT ALL EXTERIOR WINDOWS UNO. REFER TO FRAME ELEVATIONS AND SPECIFICATION FOR ADDITIONAL INFORMATION.

GLAZING TYPES

REPRESENTED BY n

1. 1/4" CLEAR
2. 1" TINTED INSULATING
3. 1" SPANDREL PANEL
4. 1/2" LAMINATED
5. BALLISTIC-RESISTANT
6. FIRE-RATED

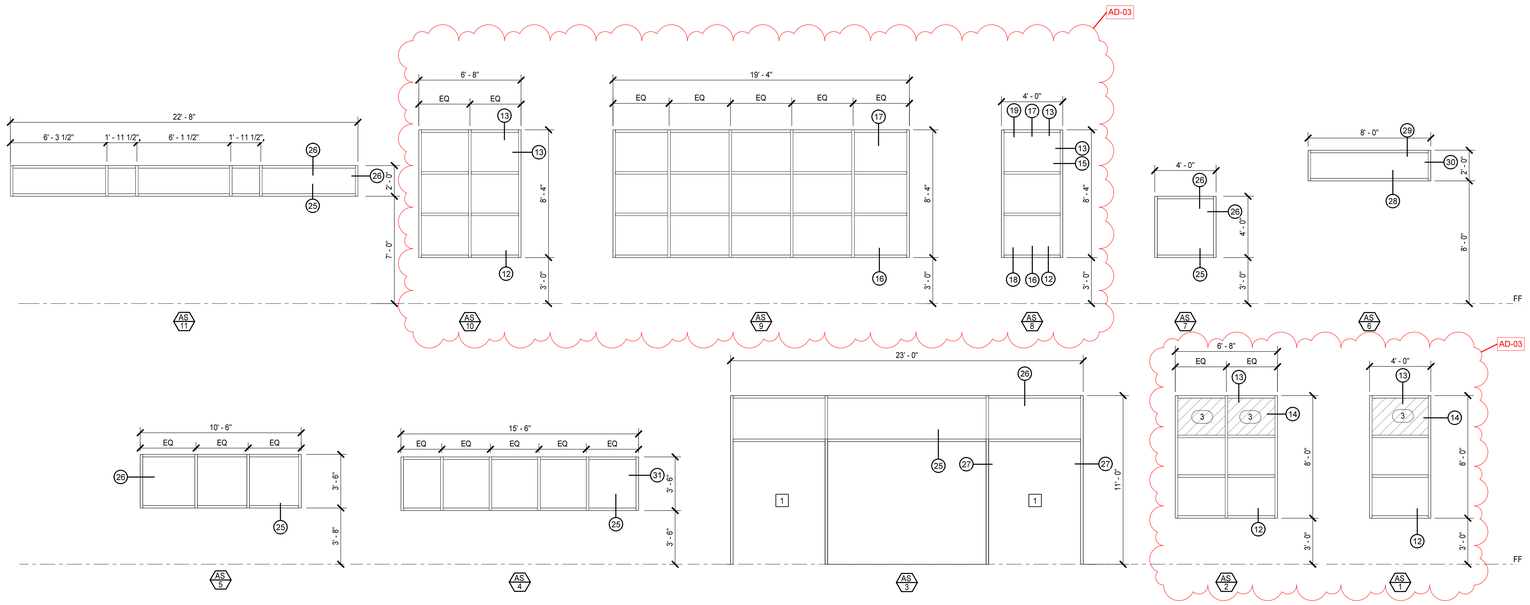
NOTES:
1. ALL GLAZING IN INTERIOR FRAMES SHALL BE TYPE 1, UNO
2. ALL GLAZING IN EXTERIOR FRAMES SHALL BE TYPE 2, UNO
3. GLAZE ALL OPENINGS IN FRAMES UNLESS SPECIFICALLY INDICATED OTHERWISE
4. ALL GLAZING SHALL BE SAFETY GLASS UNLESS INDICATED OTHERWISE

DOOR, FRAME AND GLAZING TYPE KEYNOTES

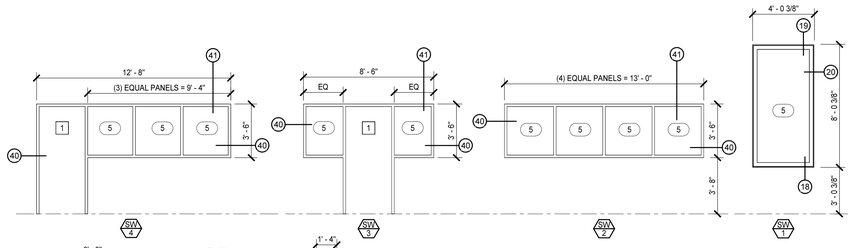
REPRESENTED BY n

APPLIES TO DRAWING A3.1.2

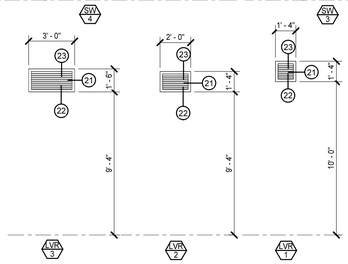
1	SIZE AS REQUIRED TO ACCOMMODATE DOOR, HARDWARE AND FRAME COMPONENTS



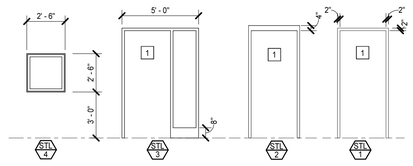
ALUMINUM STOREFRONT FRAME TYPES
1/4" = 1'-0"



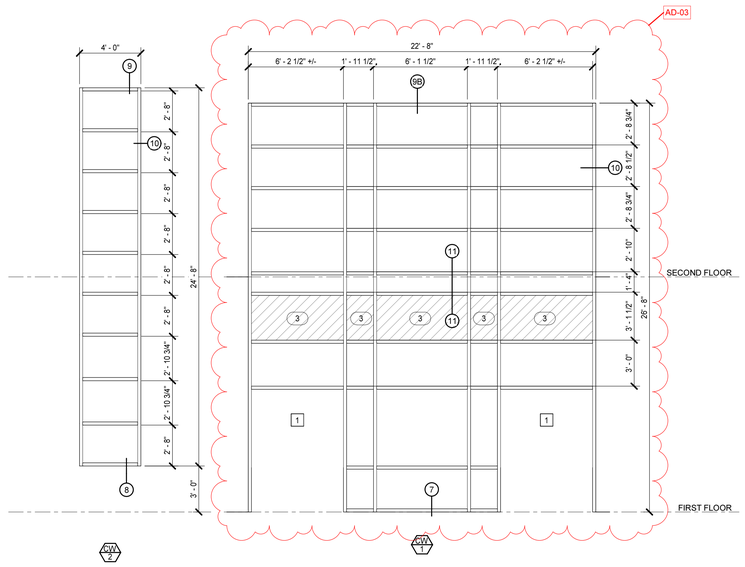
SECURITY WINDOW TYPES
1/4" = 1'-0"



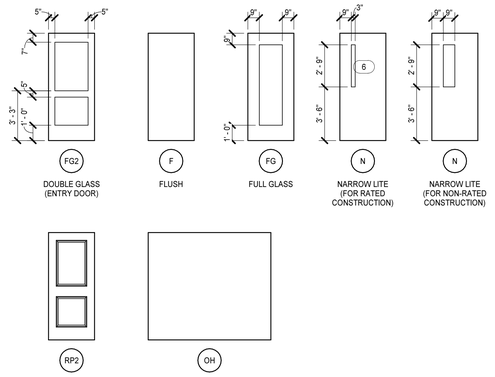
LOUVER TYPES
1/4" = 1'-0"



STEEL FRAME TYPES
1/4" = 1'-0"



ALUMINUM CURTAINWALL TYPES
1/4" = 1'-0"



DOOR TYPES
NO SCALE

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CITY OF STAUNTON, VA 24401

PROJECT NO: 630874
DATE: MARCH 1, 2024

REVISIONS

DATE	DESCRIPTION
03/22/24	AD-03

DOOR, FRAME AND GLAZING TYPES

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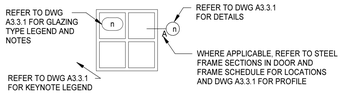
DETENTION WINDOW SCHEDULE

NO	GLAZING			FRAME						FIRE RATING	NOTES
		STOP SIDE				DETAILS					
	TYPE	INSIDE	OUTSIDE	TYPE	NO.	HEAD	JAMB 1	JAMB 2	SILL		
148	SG-1P	•		DHM	3	9	6	7	9 SIM	---	
268A	SG-1P	•		DHM	3	9	6	7	9 SIM	---	

DETENTION DOOR SCHEDULE

NUMBER	HDWR SET NO.	DOOR				FRAME						KEYING		FIRE RATING	OPTIONS		NOTES
		TYPE	SIZE (NOMINAL)	MATL	SECURITY GLAZING TYPE	TYPE	NUMBER	HEAD DETAIL	JAMB DETAIL	JAMB DETAIL	SILL DETAIL	SECURITY	MASTER		SHUTTER	FOOD PASS	
D04-01A	SH1	DF	3' - 0"x7' - 0"x2"	DHM	---	DHM	1	11	10	10	---	M1	---	---			
D04-01B	SH2A	DN	3' - 0"x7' - 0"x2"	DHM	SG-14F	DHM	1	9	8	8	---	M2	MA	45 MIN			
D04-02	SH2	DN	3' - 0"x7' - 0"x2"	DHM	SG-14F	DHM	1	9	8	8	---	M2	MA	45 MIN			
D149	SH2A	DG	3' - 0"x7' - 0"x2"	DHM	SG-2P	DHM	1	9	8	8	---	M2	MA	--			
D151	SH7	DN	3' - 0"x7' - 0"x2"	DHM	SG-3P	DHM	2	9	8	8	---	B2	BA	--			
D152	SH3	DN	3' - 0"x7' - 0"x2"	DHM	SG-3P	DHM	1	9	8	8	---	M3	MA	--	•	•	
D154	SH3	DN	3' - 0"x7' - 0"x2"	DHM	SG-3P	DHM	1	9	8	8	---	M3	MA	--	•	•	
D157B	SH2	DN	3' - 0"x7' - 0"x2"	DHM	SG-2P	DHM	1	9	8	8	---	M1	---	--			
D158	SH3	DN	3' - 0"x7' - 0"x2"	DHM	SG-3P	DHM	1	9	8	8	---	M3	MA	--	•	•	
D161A	SH2A	DG	3' - 0"x7' - 0"x2"	DHM	SG-2P	DHM	1	9	8	8	---	M2	MA	--			
D161B	SH2A	DN	3' - 0"x7' - 0"x2"	DHM	SG-2P	DHM	1	9	8	8	---	M2	MA	--			
D161C	SH2A	DG	3' - 0"x7' - 0"x2"	DHM	SG-2P	DHM	1	9	8	8	---	M2	MA	--			
D163	SH2	DN	3' - 0"x7' - 0"x2"	DHM	SG-1P	DHM	1	9	8	8	---	M1	---	--			
D164	SH4	DN	3' - 0"x7' - 0"x2"	DHM	SG-10	DHM	1	9	8	8	---	M4	---	--			
D166	SH7	DN	3' - 0"x7' - 0"x2"	DHM	SG-2P	DHM	2	9	8	8	---	B2	BA	--			
D168C	SH1	DF	3' - 0"x7' - 0"x2"	DHM	---	DHM	1	11	10	10	---	M1	---	--			
D169	SH7A	DF	3' - 0"x7' - 0"x2"	DHM	---	DHM	2	9	8	8	---	B1	BA	--			
D251	SH7A	DF	3' - 0"x7' - 0"x2"	DHM	---	DHM	2	9	8	8	---	B1	BA	--			
D252A	SH2A	DN	3' - 0"x7' - 0"x2"	DHM	SG-2P	DHM	1	9	8	8	---	M1	---	--			
D252B	SH2A	DN	3' - 0"x7' - 0"x2"	DHM	SG-2P	DHM	1	9	8	8	---	M2	MA	--			
D255	SH3	DN	3' - 0"x7' - 0"x2"	DHM	SG-3P	DHM	1	9	8	8	---	M3	MA	--	•	•	
D256B	SH2	DN	3' - 0"x7' - 0"x2"	DHM	SG-2P	DHM	1	9	8	8	---	M1	---	--			
D258	SH2A	DN	3' - 0"x7' - 0"x2"	DHM	SG-2P	DHM	1	9	8	8	---	M2	MA	--			
D259	SH3	DN	3' - 0"x7' - 0"x2"	DHM	SG-3P	DHM	1	9	8	8	---	M3	MA	--	•	•	
D260	SH3	DN	3' - 0"x7' - 0"x2"	DHM	SG-3P	DHM	1	9	8	8	---	M3	MA	--	•	•	
D262	SH7	DN	3' - 0"x7' - 0"x2"	DHM	SG-2P	DHM	2	9	8	8	---	B2	BA	--			

DETENTION DOOR, FRAME AND GLAZING TYPE GENERAL NOTES



A. USE 5-3/4" FRAME WIDTH UNLESS INDICATED OTHERWISE. USE SINGLE RABBET FRAME SECTIONS AT GLAZING. VERIFY ACTUAL GLAZING THICKNESS PRIOR TO PREDRILLING FOR GLAZING STOPS. FRAME FACE DIMENSIONS ARE 2" UNLESS INDICATED OTHERWISE.

B. REFER TO DETAIL ON A3.3.1 FOR TYPICAL GLAZING STOP. WINDOW NUMBER INDICATES ROOM NUMBER IN WHICH GLAZING STOP SHALL BE LOCATED. THIS APPLIES TO DETENTION WINDOWS ONLY.

C. REFER TO ARCH DRAWINGS FOR ALL DIMENSIONS AND WALL TYPES. REFER TO STRUCTURAL DRAWINGS FOR LINTEL INFORMATION.

D. 12 GA CLOSURES SHALL BE CONTINUOUS FROM TOP TO BOTTOM OF SHORTER FRAME. CLOSURES SHALL BE SIZED TO OVERLAP THE FRAME FACE 1/2", CLAMPED IN PLACE AND PLUG WELDED TO EACH FRAME SECTION THROUGH 1/2" DIAMETER HOLES AT 4'-0" OC VERTICALLY LOCATED 3/4" FROM THE EDGE OF THE CLOSURE. WELDS SHALL BE GROUND SMOOTH AND FILLED WITH EPOXY FILLER. FILL ALL INTERIOR FRAMES SOLID WITH GROUT.

E. REFER TO SPECIFICATION SECTION 111950 FOR SECURITY GLAZING TYPES.

F. REFER TO DETENTION FRAME SECTIONS ON A3.3.1 INDICATED BY UPPERCASE LETTERS ("A", "B", "C") AS REFERENCED FROM DETENTION DOOR & DETENTION WINDOW FRAME TYPES.

G. THE DEC SHALL FIELD VERIFY AND COORDINATE ALL DIMENSIONS AND MOUNTING CONDITIONS PRIOR TO INSTALLATION OF DHM.

H. DHM AND SHM SHALL BE USED INTERCHANGEABLY TO REFER TO SECURITY HOLLOW METAL AND DETENTION HOLLOW METAL. REFER TO SPECIFICATION SECTION 111910.

I. REFER TO SECURITY HARDWARE SPECIFICATION SECTION 111960 FOR HARDWARE SET NUMBERS REFERENCED ON A3.3.1.

J. UNLESS INDICATED OTHERWISE, REFER TO A3.3.1 FOR ALL HEAD, JAMB, AND SILL DETAILS REFERENCED IN DETENTION DOOR AND DETENTION WINDOW SCHEDULES.

K. PROVIDE FOOD PASS AT ALL DOORS WITH "●" INDICATED IN FOOD PASS COLUMN. PROVIDE FOOD PASS PER DETAIL ON A3.3.1.

L. ALL CONTROL ROOM GLAZING TO HAVE SHADING FILM PER SPECIFICATION SECTION 111950.

M. DOOR AND FRAME DETAILS INDICATE GENERAL CHARACTERISTICS OF DOOR AND FRAME SIZES AND COMPONENTS AND MAY NOT INDICATE EXACT FIELD CONDITIONS OR REQUIREMENTS. COORDINATE DETAILS WITH OTHER DRAWINGS AND SPECS TO DETERMINE ALL COMPONENTS (E.G., SEALANTS, ANCHORS, HARDWARE, LINTELS, CLIPS) REQUIRED FOR COMPLETE AND FUNCTIONAL INSTALLATION.

N. DOOR SWINGS ON FLOOR PLANS TAKE PRECEDENCE OVER SWINGS INDICATED ELSEWHERE (E.G., ELEVATIONS).

DETENTION DOOR & FRAME KEYNOTES

1. REFER TO ELEVATION 5/A3.3.1
2. NOT USED
3. NOT USED
4. NOT USED

DETENTION GLAZING TYPES

(ALL TYPES NOT NECESSARILY USED)

SG-1P = 3/4" ± THICK MULTI-PLY POLYCARBONATE GLAZING; ASTM F1915 GRADE 1

SG-2P = 1/2" ± THICK MULTI-PLY POLYCARBONATE GLAZING; ASTM F1915 GRADE 2

SG-3P = 3/8" ± THICK MULTI-PLY POLYCARBONATE GLAZING; ASTM F1915 GRADE 3

SG-10 = 1" ± THICK MULTI-PLY GLASS CLAD POLYCARBONATE GLAZING; ASTM F1915 GRADE 1 + SHADING FILM

SG-11 = 1" ± THICK MULTI-PLY GLASS CLAD POLYCARBONATE GLAZING; ASTM F1915 GRADE 1

SG-12 = 1" ± THICK MULTI-PLY GLASS CLAD POLYCARBONATE GLAZING; ASTM F1915 GRADE 2 + MIRRORPANE

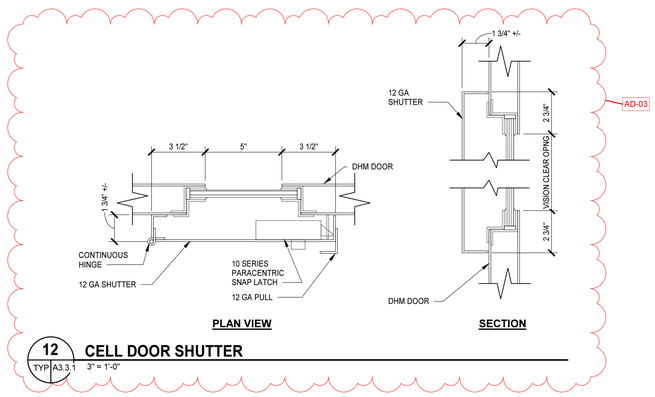
SG-13F = 1 1/8" ± THICK MULTI-PLY GLASS CLAD POLYCARBONATE GLAZING; ASTM F1915 GRADE 1, UL FIRE 45 MIN. + SHADING FILM

SG-14F = 1 1/8" ± THICK MULTI-PLY GLASS CLAD POLYCARBONATE GLAZING; ASTM F1915 GRADE 1, UL FIRE 45 MIN.

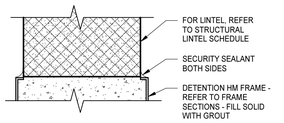
SG-15F = 1 1/8" ± THICK MULTI-PLY GLASS CLAD POLYCARBONATE GLAZING; ASTM F1915 GRADE 1, UL FIRE 90 MIN

SG-16F = 1" ± THICK MULTI-PLY GLASS CLAD POLYCARBONATE GLAZING; ASTM F1915 GRADE 2, UL FIRE 45 MIN

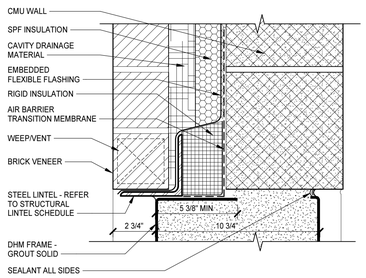
SG-20 = 1 1/8" ± THICK MULTI-PLY GLASS CLAD POLYCARBONATE GLAZING; UL 752, LEVEL 3 BALLISTICS RATED



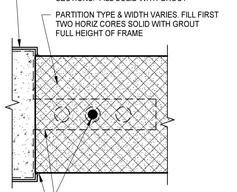
12 CELL DOOR SHUTTER
TYP A3.3.1 — 3" = 1'-0"



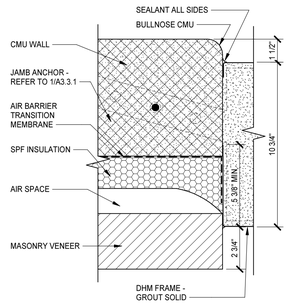
9 HEAD DETAIL - WRAP
TYP A3.3.1 — 3" = 1'-0"



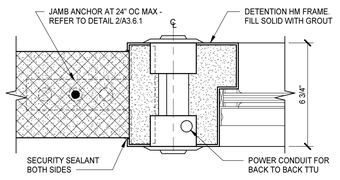
11 HEAD DETAIL
TYP A3.3.1 — 3" = 1'-0"



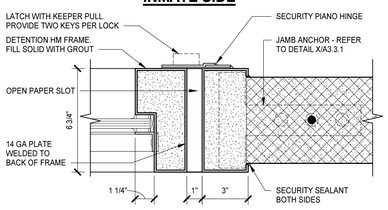
8 JAMB DETAIL - WRAP
TYP A3.3.1 — 3" = 1'-0"



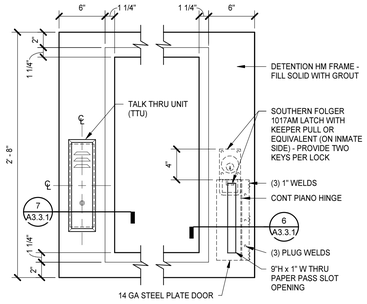
10 JAMB DETAIL
TYP A3.3.1 — 3" = 1'-0"



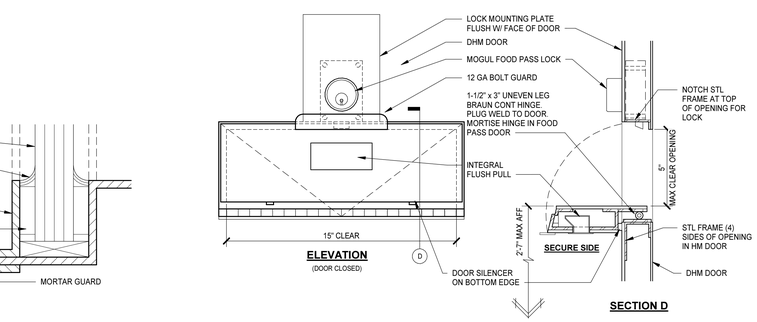
7 SECTION THRU TTU
A3.3.1 A3.3.1 — 3" = 1'-0"



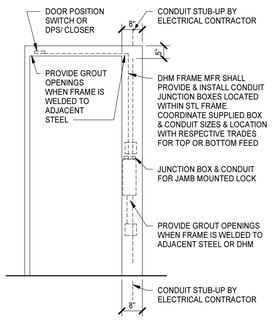
6 SECTION THRU PAPER PASS
A3.3.1 A3.3.1 — 3" = 1'-0"



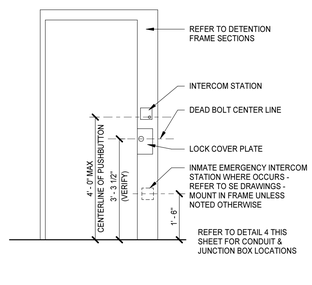
5 ELEVATION - VISITATION WINDOW
TYP A3.3.1 — 1 1/2" = 1'-0"



4 FRAME ELEVATION "A"
TYP A3.3.1 — 1/2" = 1'-0"



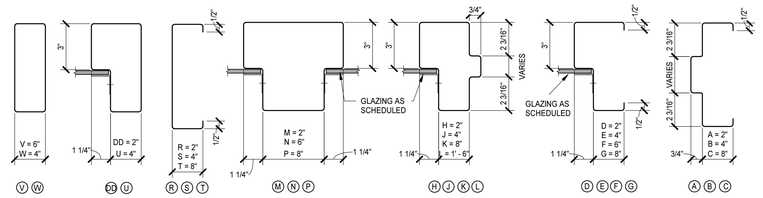
3 FRAME ELEVATION "B"
TYP A3.3.1 — 1/2" = 1'-0"



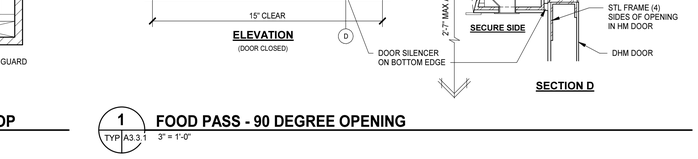
2 DETAIL - SECURITY GLAZING STOP
TYP A3.3.1 — 12" = 1'-0"

1 FOOD PASS - 90 DEGREE OPENING
TYP A3.3.1 — 3" = 1'-0"

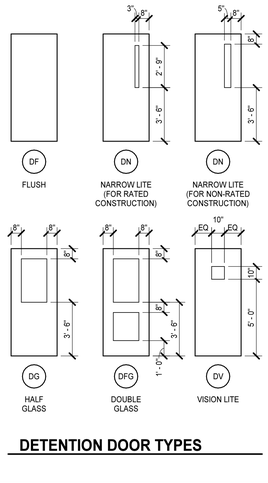
DETENTION FRAME SECTIONS



DETENTION FRAME TYPES



DETENTION DOOR TYPES



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STAUNTON J&DR COURTS FACILITY

2040 WEST BEVERLEY STREET
CITY OF STAUNTON, VA 24401

PROJECT NO: 630874
DATE: MARCH 1, 2024

REVISIONS	
DATE	DESCRIPTION
03/22/24	AD-03

DETENTION DOOR & WINDOW SCHEDULES & DETAILS

A3.3.1

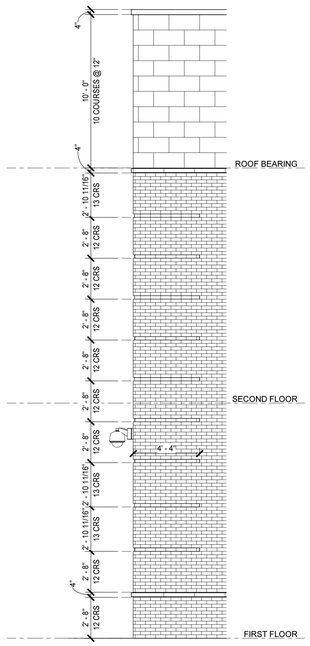
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BUILDING ELEVATION KEYNOTES

REPRESENTED BY n

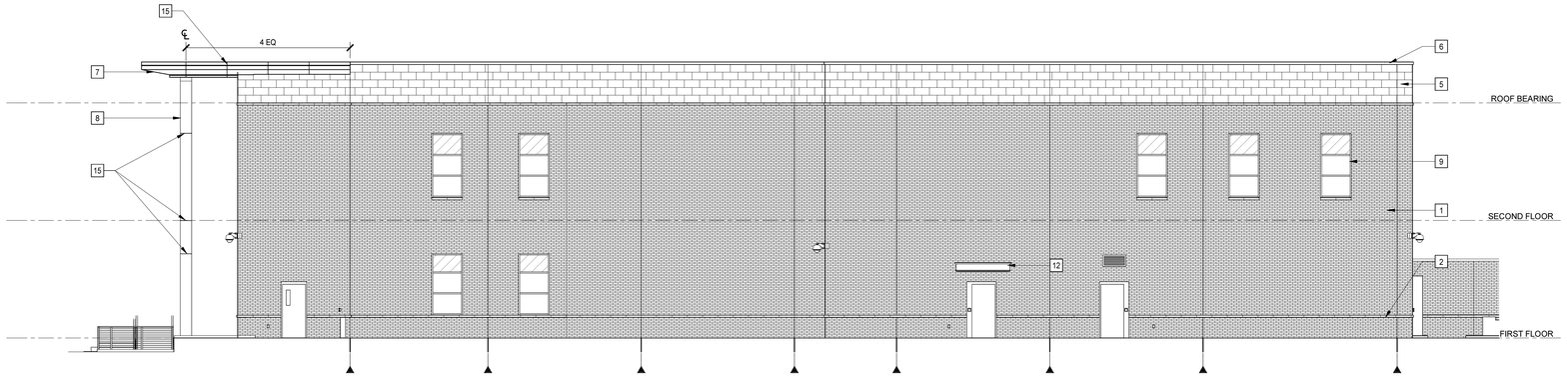
APPLIES TO DRAWINGS A4.1 - A4.2

1	FACE BRICK
2	CAST STONE BAND
3	BRICK REVEAL
4	CAST DIMENSIONAL LETTERS - CORBEL FONT
5	CALCIUM SILICATE AD-03
6	CAST STONE COPING
7	MCM PANEL WALL SYSTEM
8	MCM COLUMN COVER
9	ALUMINUM STOREFRONT SYSTEM
10	ALUMINUM CURTAIN WALL SYSTEM
11	OVERHEAD COILING DOOR
12	PROTECTIVE COVER
13	KNOX BOX
14	EXTERIOR CONCRETE STAIRS AND RAMPS
15	1/2" REVEAL, TYP
16	ALIGN, TYP



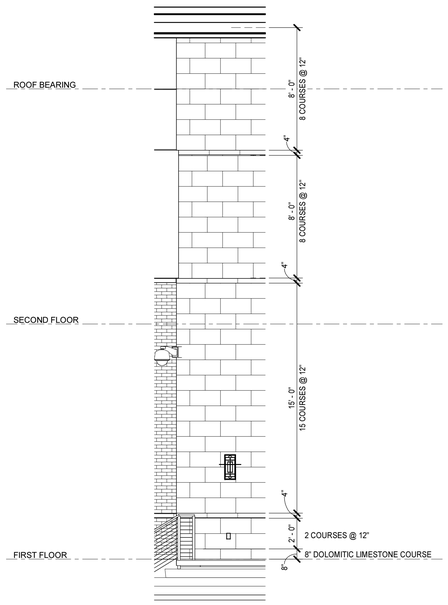
4 A4.1 | A4.1 ENLARGED CORNER COURSING DETAIL AT CORNER

1/4" = 1'-0"



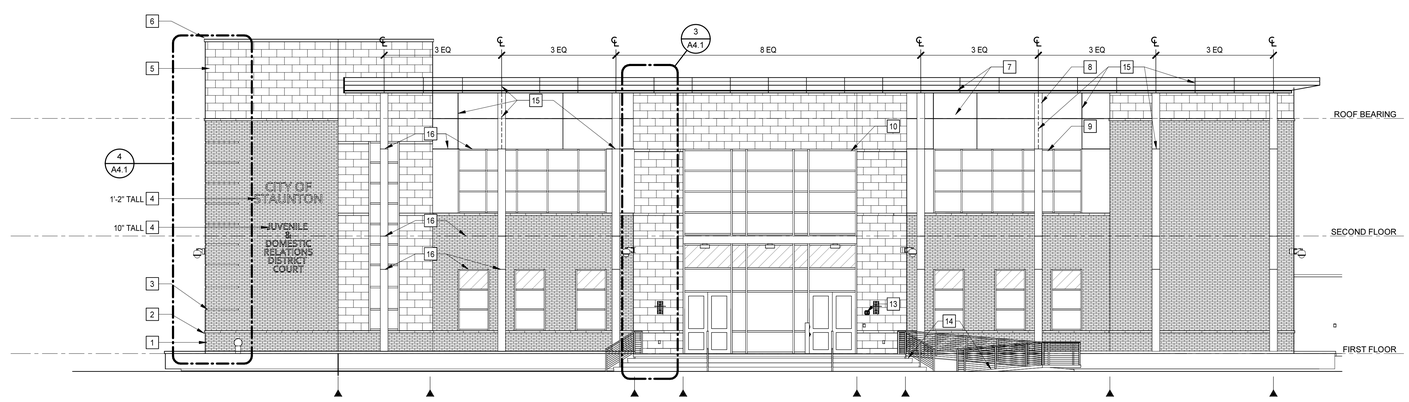
2 A2.1.0 | A4.1 BUILDING ELEVATION - PLAN EAST

1/8" = 1'-0"



3 A4.1 | A4.1 ENLARGED COURSING DETAIL AT ENTRY

1/4" = 1'-0"



1 A2.1.0 | A4.1 BUILDING ELEVATION - PLAN SOUTH

1/8" = 1'-0"

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03/22/24	AD-03

BUILDING ELEVATIONS

A4.1

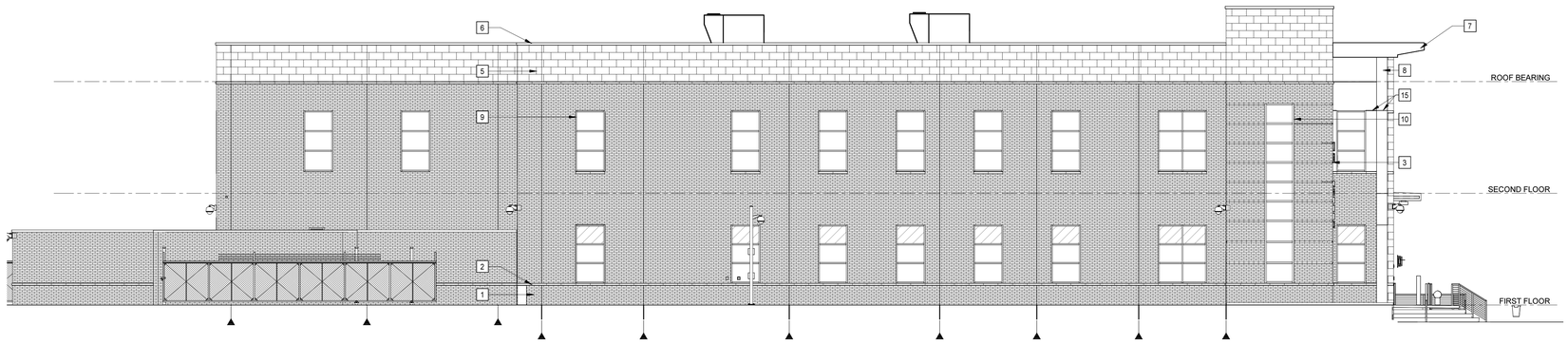
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BUILDING ELEVATION KEYNOTES

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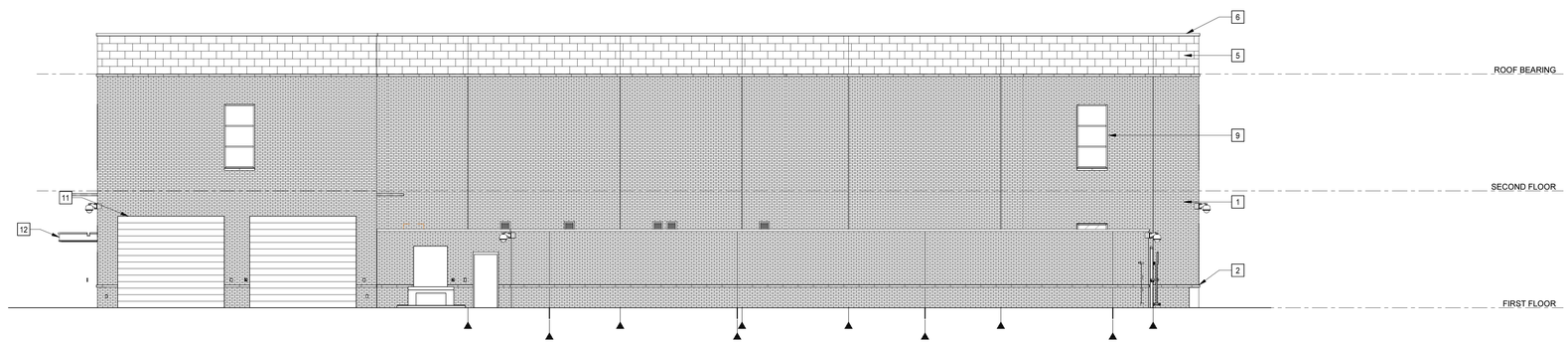
APPLIES TO DRAWINGS A4.1 - A4.2

1	FACE BRICK
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10	ALUMINUM CURTAIN WALL SYSTEM
11	OVERHEAD COILING DOOR
12	PROTECTIVE COVER
13	KNOX BOX
14	EXTERIOR CONCRETE STAIRS AND RAMPS
15	1/2" REVEAL, TYP
16	ALIGN. TYP



4 A2.1.0 A4.2 **BUILDING ELEVATION - PLAN WEST**

1/8" = 1'-0"



3 A2.1.0 A4.2 **BUILDING ELEVATION - PLAN NORTH**

1/8" = 1'-0"

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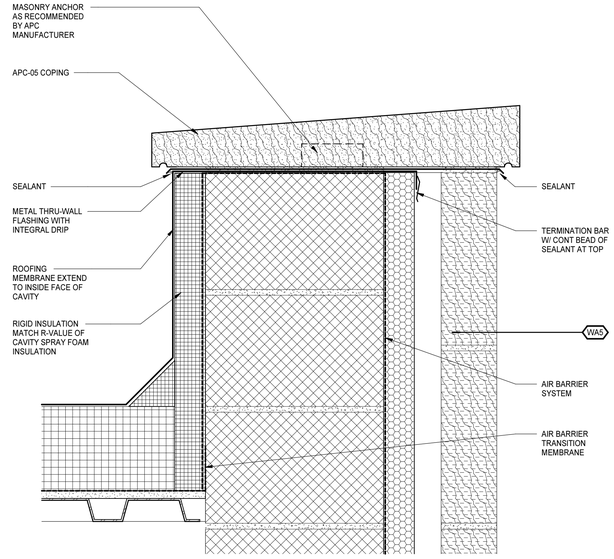
REVISIONS

DATE	DESCRIPTION
03/22/24	AD-03

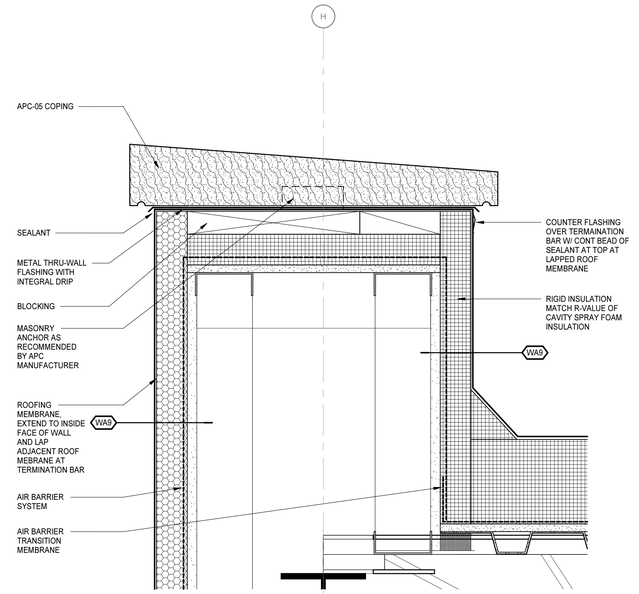
BUILDING ELEVATIONS

A4.2

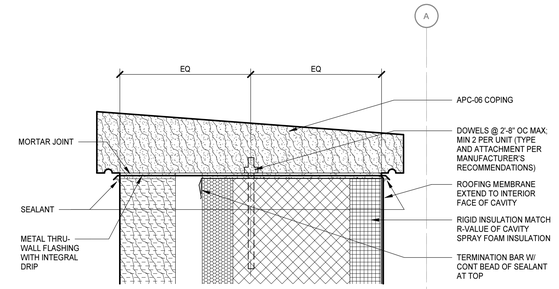
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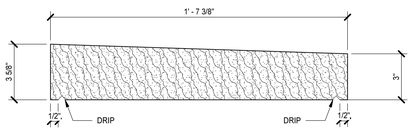
5 WA5 PARAPET COPING AT HIGH ROOF
A6.1.1 | A5.2.2 — 3" = 1'-0"



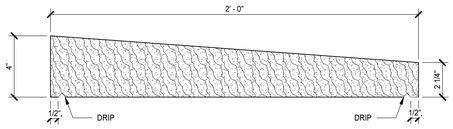
3 WA9 PARAPET COPING AT HIGH ROOF
A6.1.1 | A5.2.2 — 3" = 1'-0"



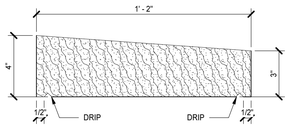
2 PARAPET COPING
A5.1.2 | A5.2.2 — 3" = 1'-0"



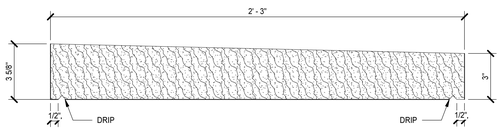
APC-06



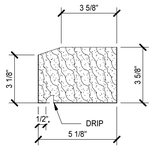
APC-05



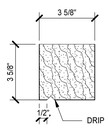
APC-03



APC-04

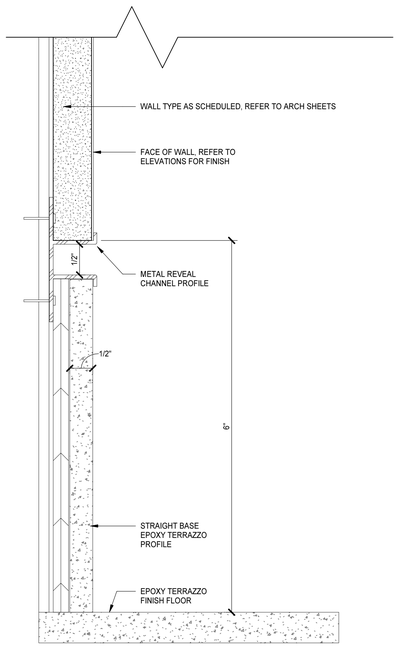


APC-02

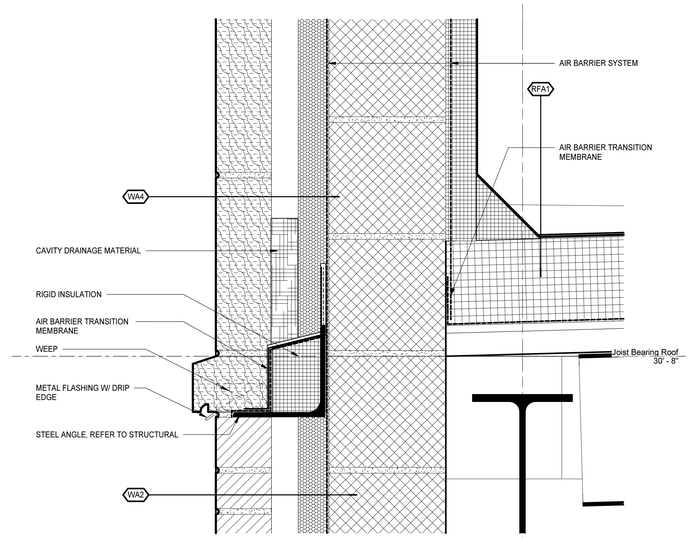


APC-01

CAST STONE SHAPES AD-03



4 SECTION DETAIL - RECESSED TERRAZZO WALL BASE
TYP | A5.2.2 — 12" = 1'-0"



1 ACP TRIM DETAIL AT PARAPET
A5.1.2 | A5.2.2 — 3" = 1'-0"

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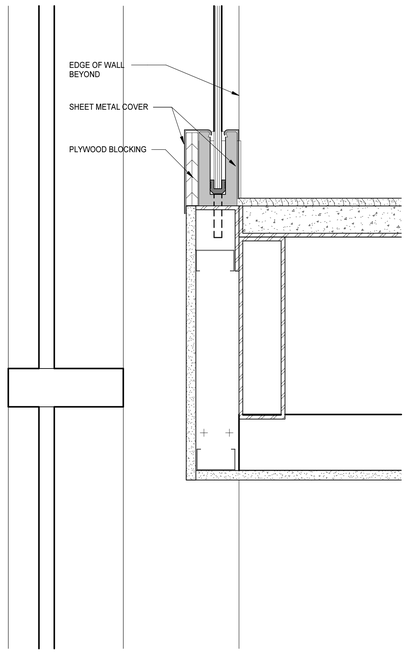
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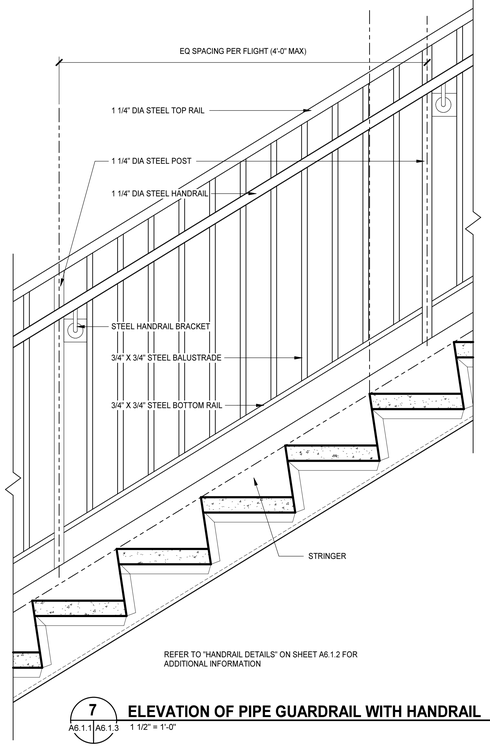
SECTION DETAILS

A5.2.2

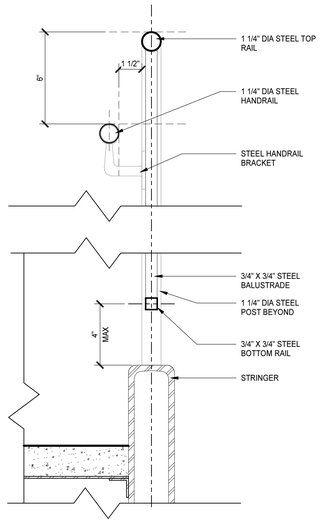
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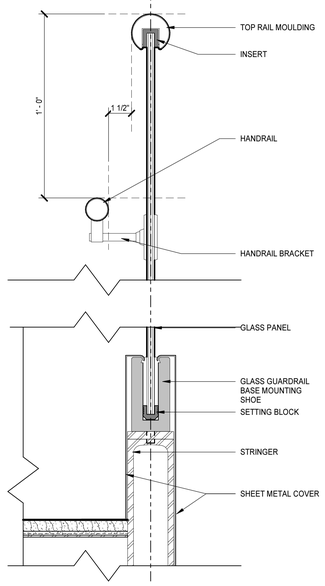
9 OPEN STAIR MIDDLE LANDING AT WINDOW
A5.1.2 A6.1.3 3" = 1'-0"



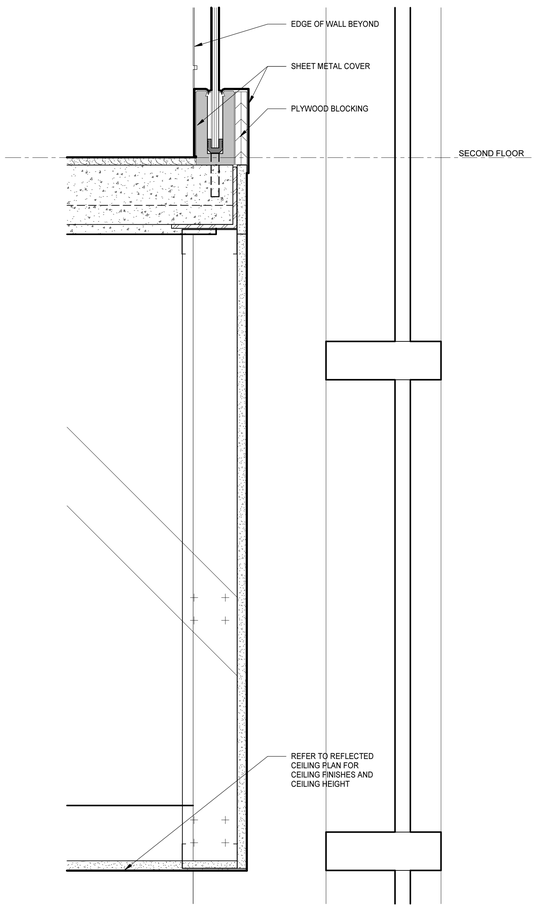
7 ELEVATION OF PIPE GUARDRAIL WITH HANDRAIL
A6.1.1 A6.1.3 1 1/2" = 1'-0"



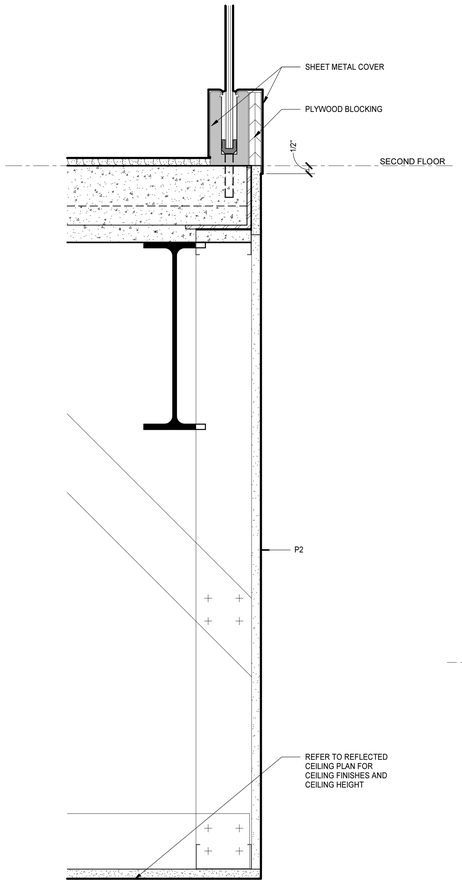
5 DETAIL AT PIPE GUARDRAIL WITH HANDRAIL
A6.1.3 3" = 1'-0"



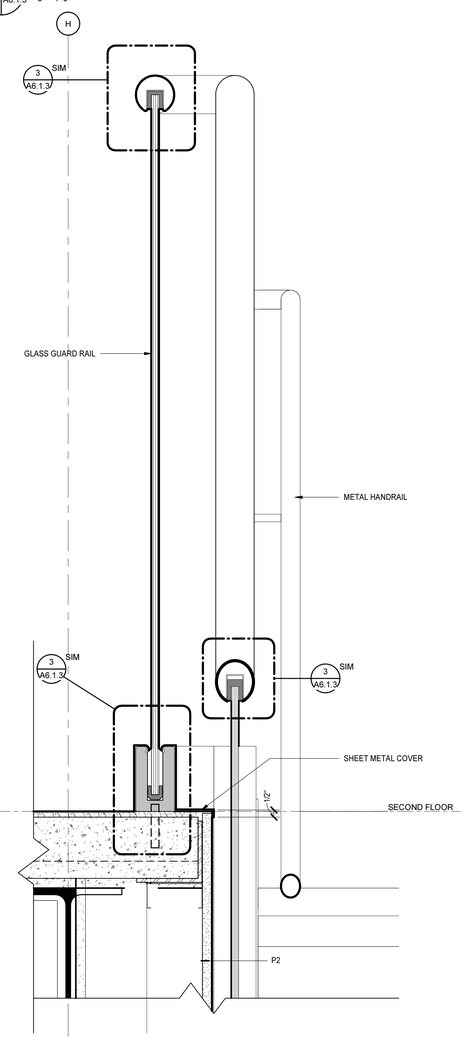
3 DETAIL AT GLASS GUARDRAIL WITH HANDRAIL
A6.1.3 A6.1.3 3" = 1'-0"



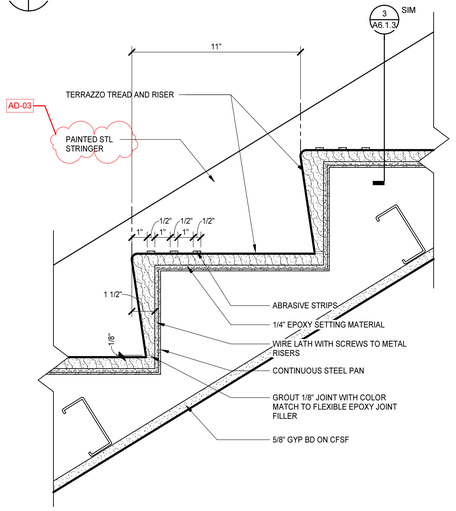
8 OPEN STAIR UPPER LANDING AT WINDOW
A6.1.1 A6.1.3 3" = 1'-0"



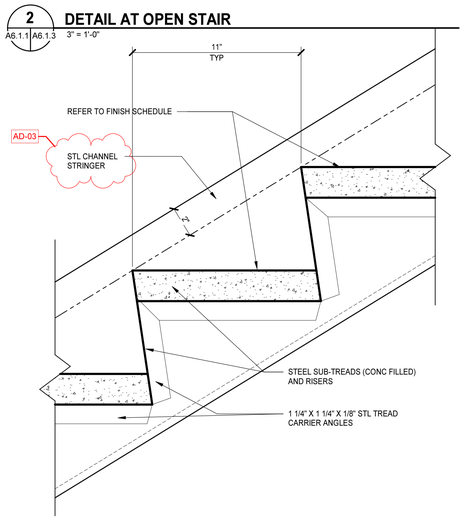
6 OPEN STAIR BULKHEAD DETAIL
A6.1.1 A6.1.3 3" = 1'-0"



4 OPEN STAIR SECTION DETAIL
A6.1.1 A6.1.3 3" = 1'-0"



1 DETAIL AT METAL PAN STAIR
A6.1.1 A6.1.3 3" = 1'-0"



2 DETAIL AT OPEN STAIR
A6.1.1 A6.1.3 3" = 1'-0"

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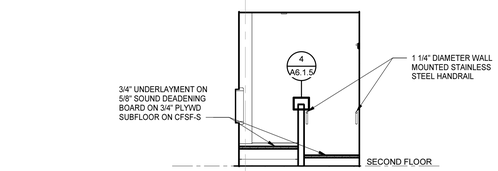
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ENLARGED STAIR DETAILS

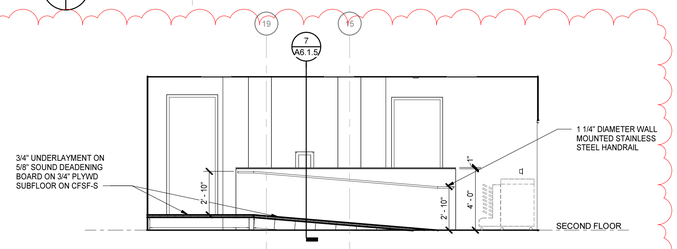
A6.1.3

3/22/2024 6:42:38 AM

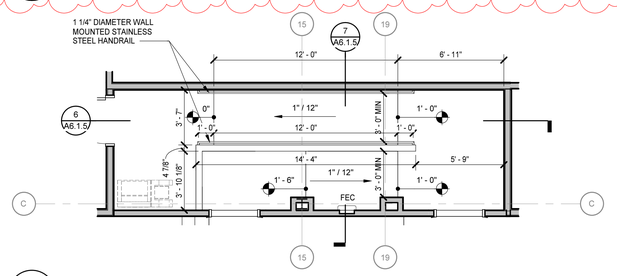


7 A6.1.5 A6.1.5 **RAMP SECTION**
1/4" = 1'-0"

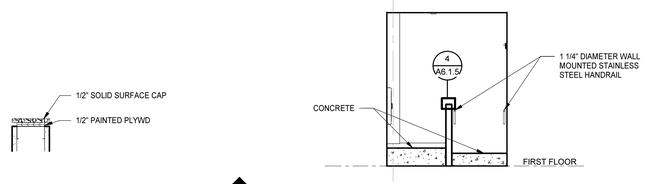
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6 A6.1.5 A6.1.5 **RAMP SECTION**
1/4" = 1'-0"

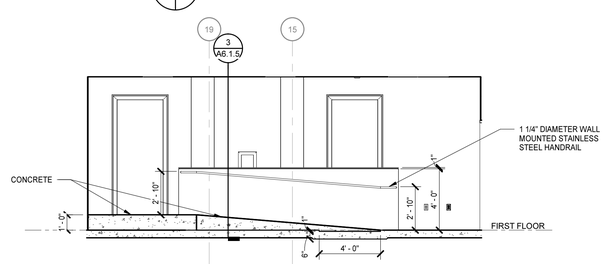


5 A7.2.2 A6.1.5 **ENLARGED SECOND FLOOR PLAN - RAMP 231**
1/4" = 1'-0"

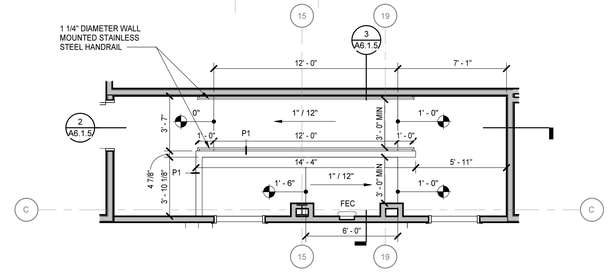


4 A6.1.5 A6.1.5 **DETAIL**
1 1/2" = 1'-0"

3 A6.1.5 A6.1.5 **RAMP SECTION**
1/4" = 1'-0"



2 A6.1.5 A6.1.5 **RAMP SECTION**
1/4" = 1'-0"



1 A7.2.1 A6.1.5 **ENLARGED FIRST FLOOR RAMP PLAN - RAMP 137**
1/4" = 1'-0"

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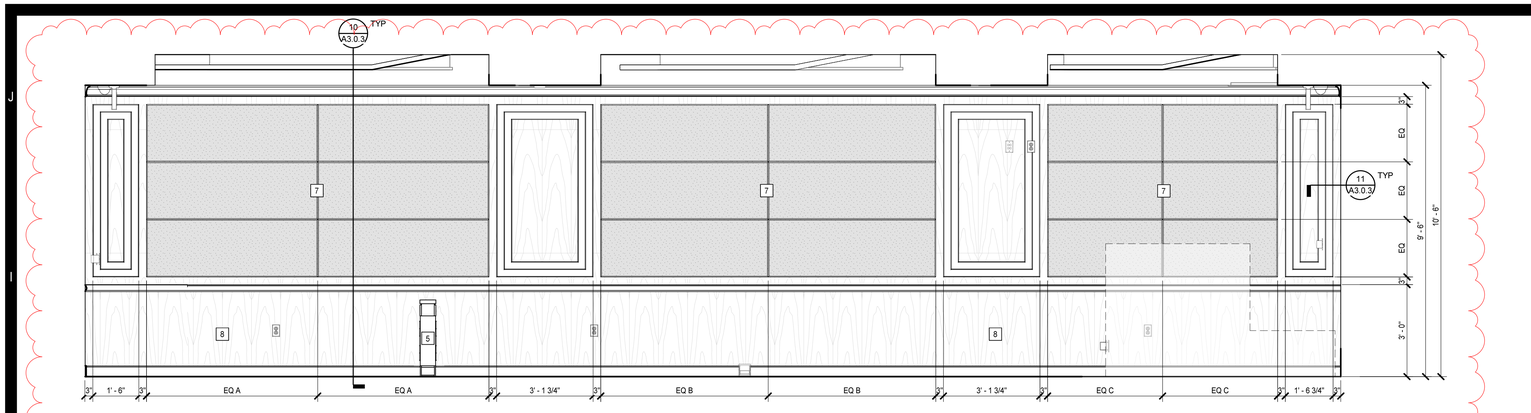
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DATE	DESCRIPTION
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ENLARGED RAMP PLANS & DETAILS

A6.1.5

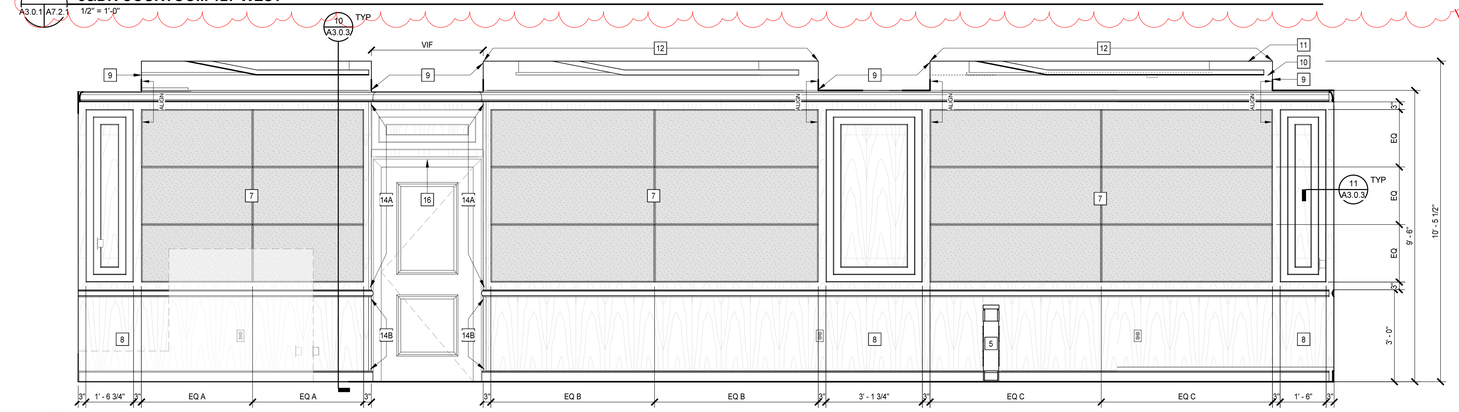
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5 J&DR COURTROOM 127 WEST

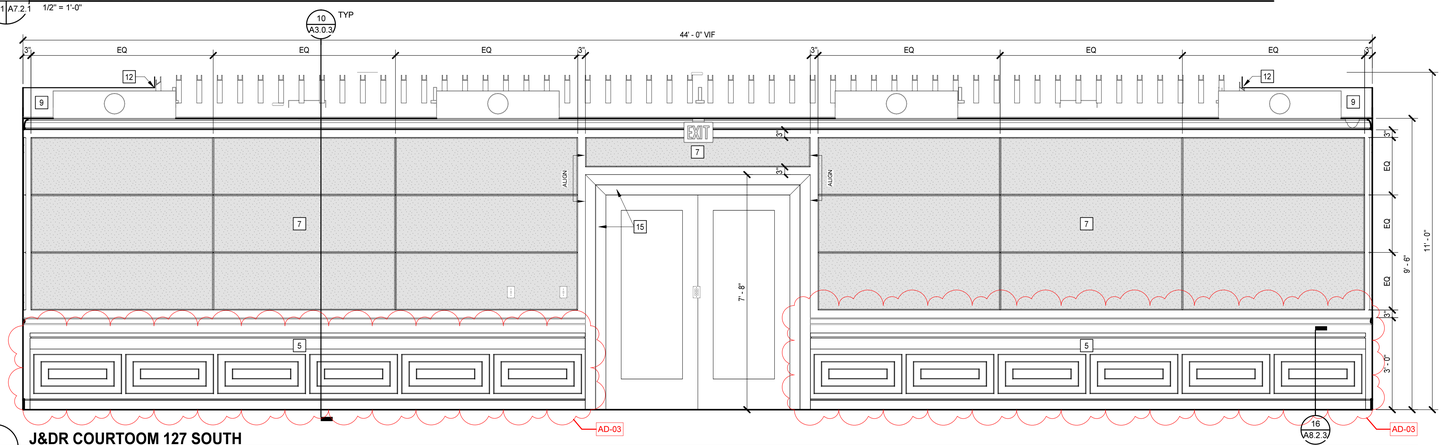
A3.0.1 | A7.2.1 1/2" = 1'-0"

AD-03



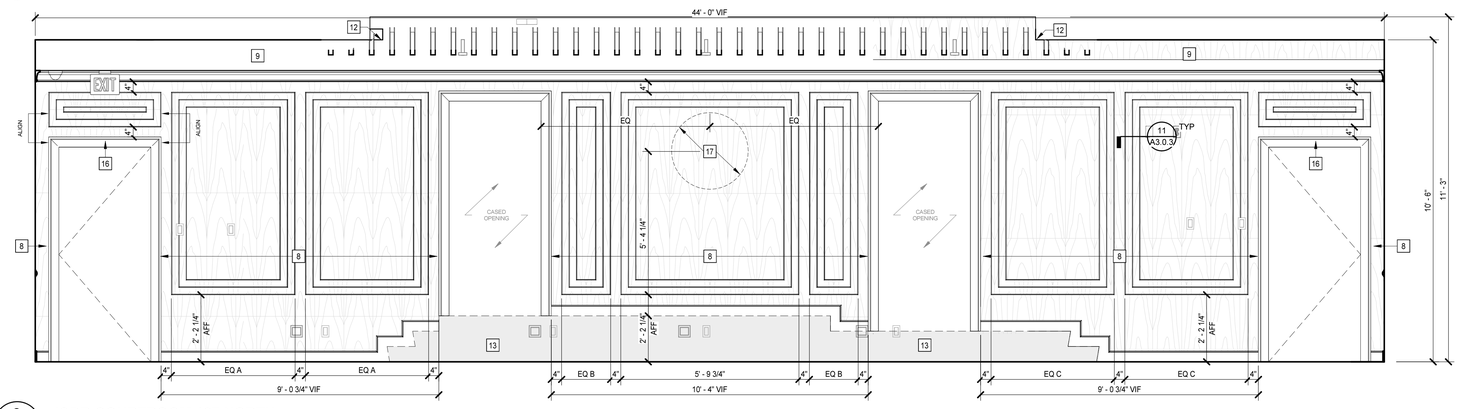
4 J&DR COUTROOM 127 EAST

A3.0.1 | A7.2.1 1/2" = 1'-0"



3 J&DR COURTROOM 127 SOUTH

A3.0.1 | A7.2.1 1/2" = 1'-0"



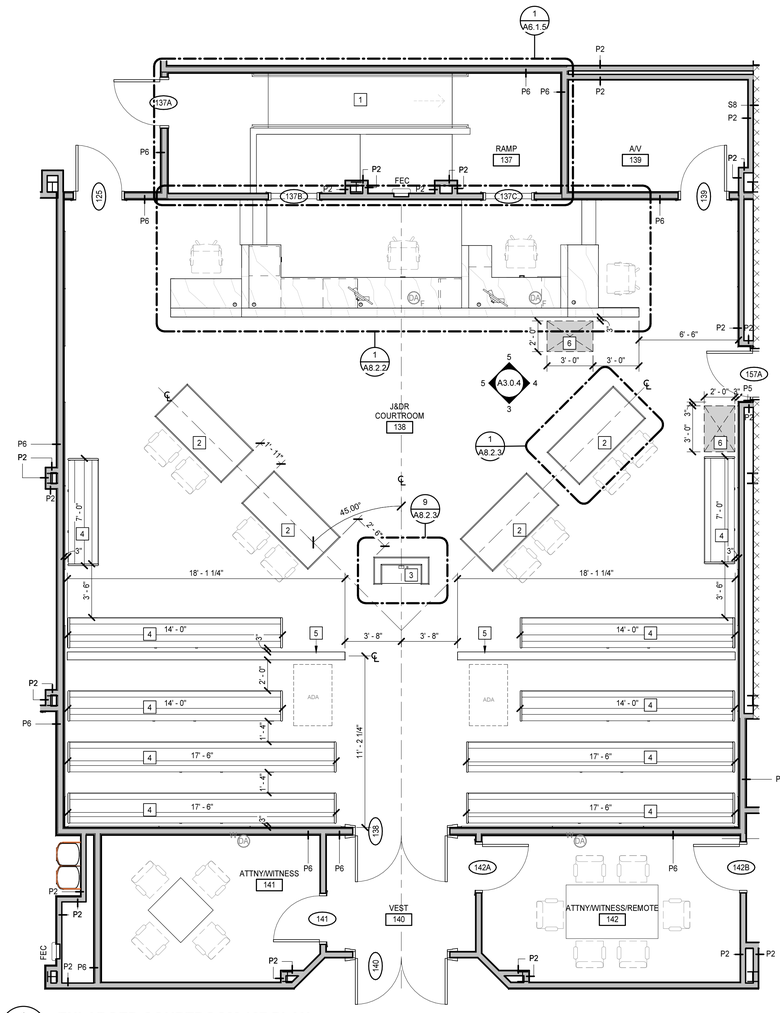
2 J&DR COURTROOM 127 NORTH

A3.0.1 | A7.2.1 1/2" = 1'-0"

KEYNOTES

APPLIES TO DRAWINGS A7.2.n

1	ACCESSIBLE RAMP
2	LITIGANT'S TABLE
3	WITNESS PODIUM
4	FIXED BENCH
5	SPECTATOR RAILING FIXED TO FLOOR
6	NEOPRENE PAD RECESSED DEEP IN TO CONC SLAB UNDERNEATH CARPET FINISH
7	FABRIC STRETCHED ACOUSTIC PANELS
8	BOOK MATCH PLYWOOD VENEER PANEL WITH TRANSPARENT FINISH
9	GYP BULKHEAD, REFER TO RCP
10	DASHED LINES INDICATE ACOUSTIC BAFFLE GRID SYSTEM, EXPOSED
11	BLACK ACP BEYOND OPEN ACOUSTIC BAFFLE SYSTEM
12	ANGLED CEILING SHAPE ON 10'-6" AFF PLANE, REFER TO RCP FOR FURTHER DETAILS
13	BENCH LANDING, REFER TO PLAN FOR DIMENSIONS
14A	PVC CORNERGUARD, MATCH WALL PAINT COLOR
14B	PVC CORNERGUARD, MATCH WD VENEER COLOR
15	WOOD DOOR TRIM, TYP. REFER TO 5/A3.0.3
16	WOOD DOOR TRIM, TYP. REFER TO 7/A3.0.3
17	CITY SEAL, DIRECT MOUNT ON STANDOFFS



1 ENLARGED COURTROOM 127 PLAN

A2.1.0 | A7.2.1 1/4" = 1'-0"

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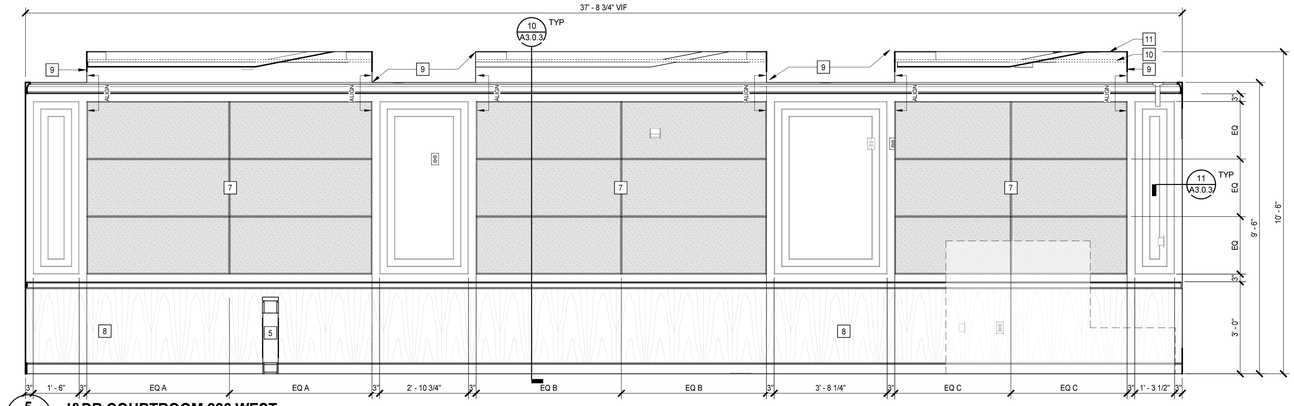
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03/22/24	AD-03

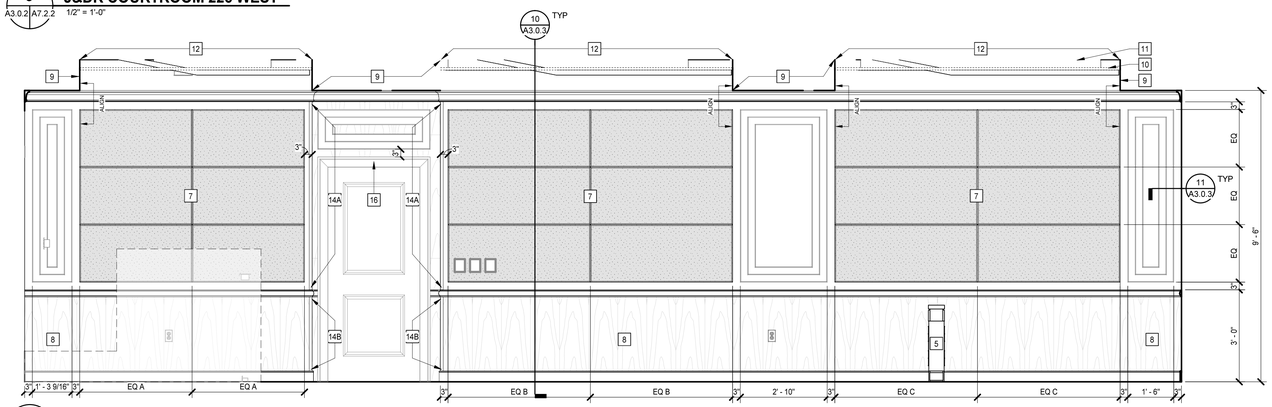
ENLARGED FIRST FLOOR COURTROOM AND ELEVATIONS

A7.2.1

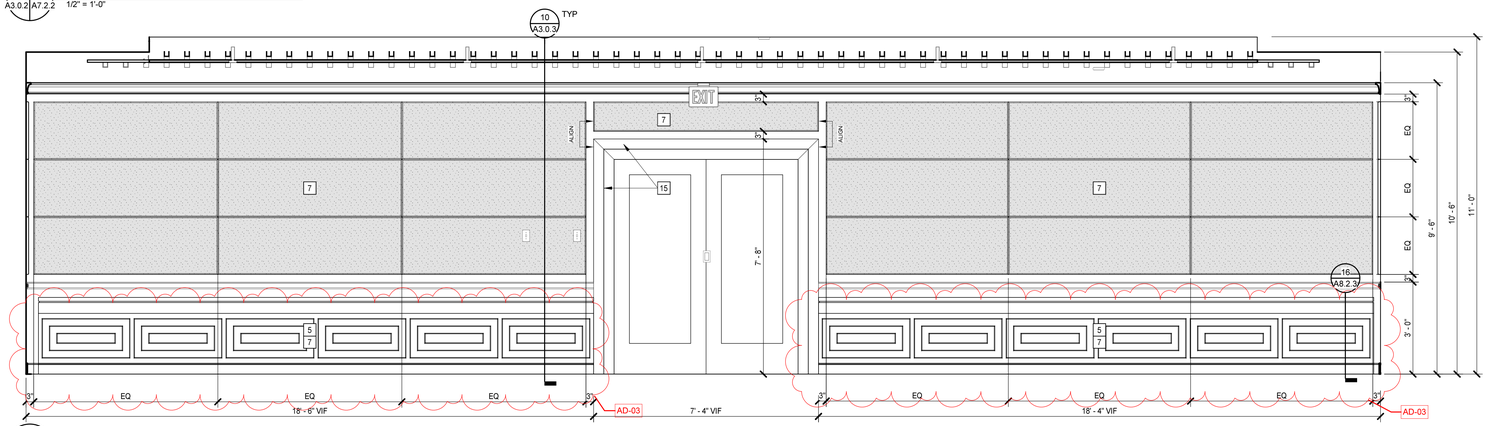
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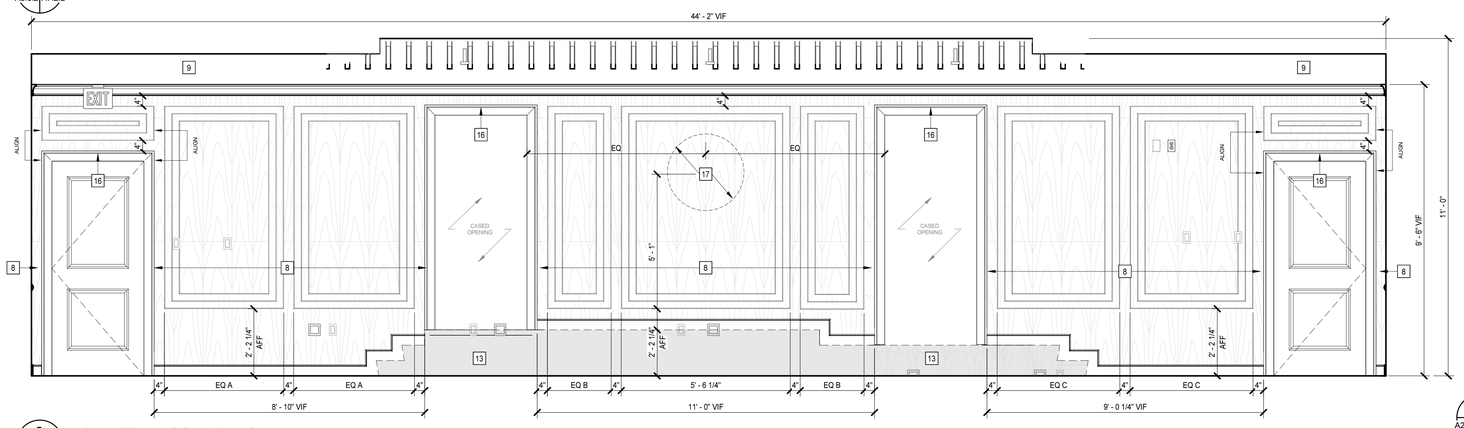
5 J&DR COURTROOM 226 WEST
A3.0.2 A7.2.2 1/2" = 1'-0"



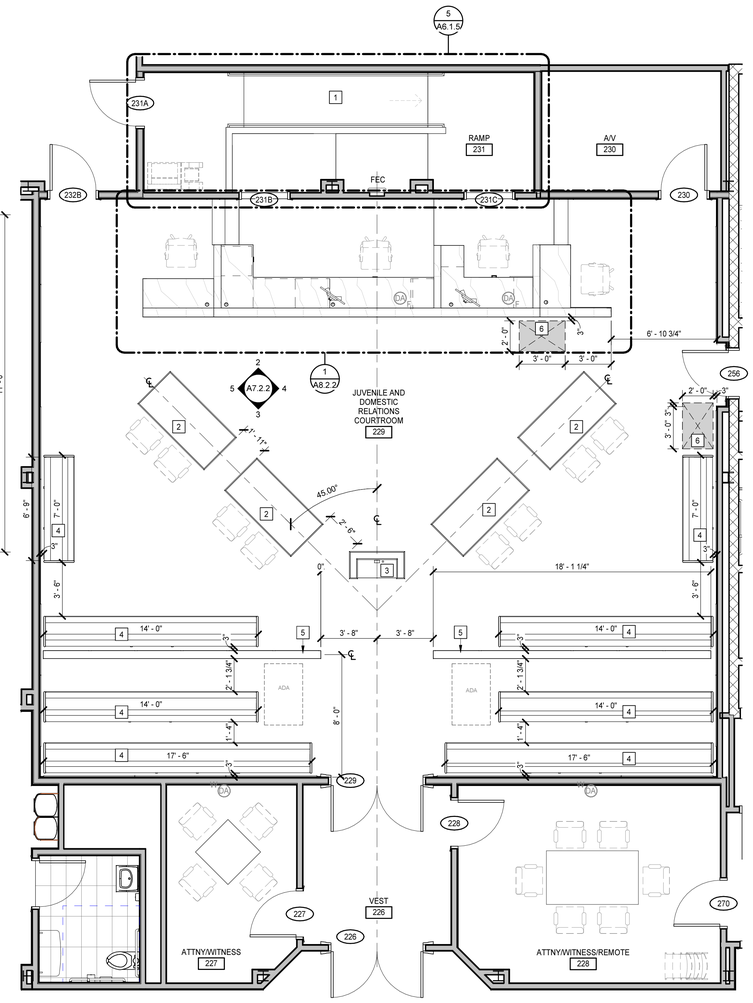
4 J&DR COURTROOM 226 EAST
A3.0.2 A7.2.2 1/2" = 1'-0"



3 J&DR COURTROOM 226 SOUTH
A3.0.2 A7.2.2 1/2" = 1'-0"



2 J&DR COURTOOM 226 NORTH
A3.0.2 A7.2.2 1/2" = 1'-0"



1 ENLARGED COURTROOM 226 PLAN
A2.2.0 A7.2.2 1/4" = 1'-0"

KEYNOTES

APPLIES TO DRAWINGS A7.2.n

1	ACCESSIBLE RAMP
2	LITIGANT'S TABLE
3	WITNESS PODIUM
4	FIXED BENCH
5	SPECTATOR RAILING FIXED TO FLOOR
6	NEOPRENE PAD RECESSED DEEP IN TO CONC SLAB UNDERNEATH CARPET FINISH
7	FABRIC STRETCHED ACOUSTIC PANELS
8	BOOK MATCH PLYWOOD VENEER PANEL WITH TRANSPARENT FINISH
9	GYP BULKHEAD, REFER TO RCP
10	DASHED LINES INDICATE ACOUSTIC BAFFLE GRID SYSTEM, EXPOSED
11	BLACK ACP BEYOND OPEN ACOUSTIC BAFFLE SYSTEM
12	ANGLED CEILING SHAPE ON 10'-6" AFF PLANE, REFER TO RCP FOR FURTHER DETAILS
13	BENCH LANDING, REFER TO PLAN FOR DIMENSIONS
14A	PVC CORNERGUARD, MATCH WALL PAINT COLOR
14B	PVC CORNERGUARD, MATCH WD VENEER COLOR
15	WOOD DOOR TRIM, TYP. REFER TO 5/A3.0.3
16	WOOD DOOR TRIM, TYP. REFER TO 7/A3.0.3
17	CITY SEAL, DIRECT MOUNT ON STANDOFFS

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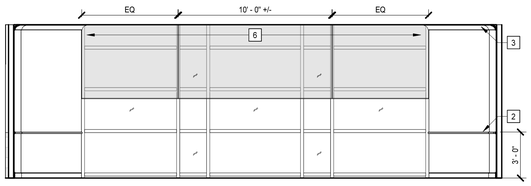
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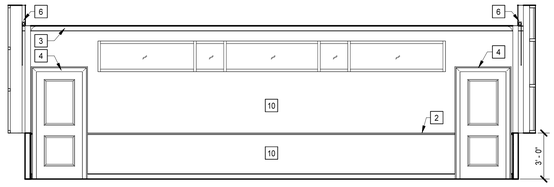
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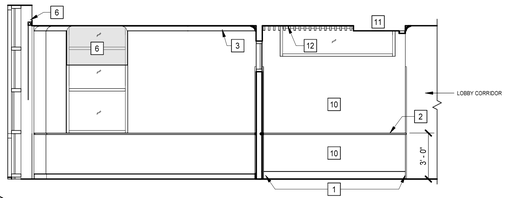
ENLARGED SECOND FLOOR COURTROOM AND ELEVATIONS

A7.2.2

3/22/2024 6:42:51 AM



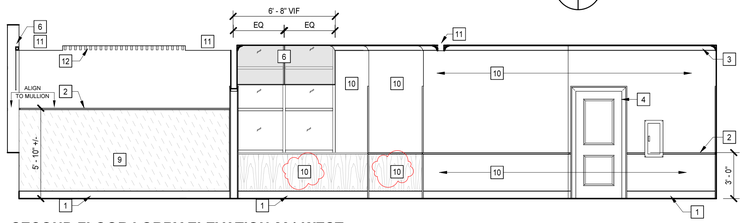


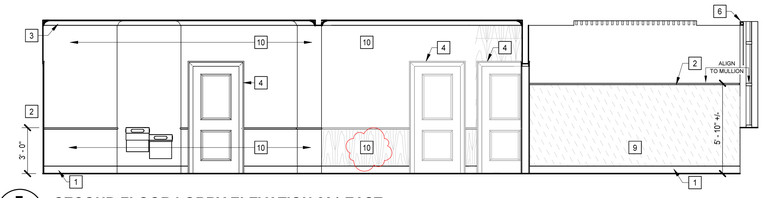


11 A2.2.0 A8.1.0 **CONFERENCE ROOM 200 SOUTH**
1/4" = 1'-0"

12 A2.2.0 A8.1.0 **CONFERENCE ROOM 200 NORTH**
1/4" = 1'-0"

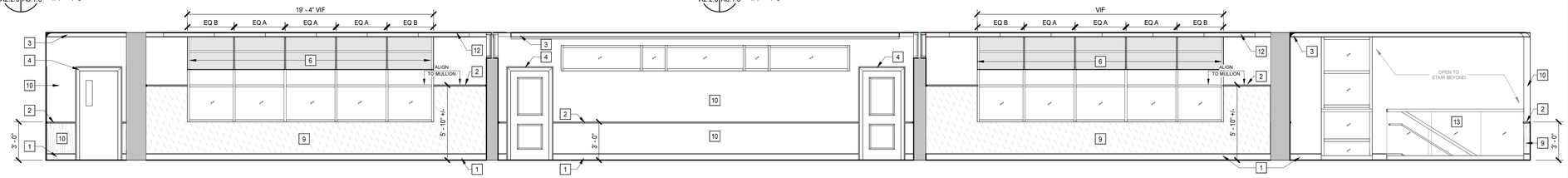
10 A2.2.0 A8.1.0 **SECOND FLOOR CONFERENCE 200 & LOBBY 201 ELEVATION WEST**
1/4" = 1'-0"



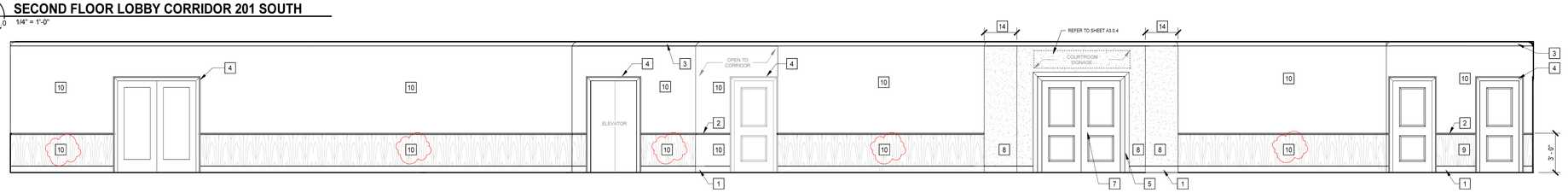


8 A2.2.0 A8.1.0 **SECOND FLOOR LOBBY ELEVATION 201 WEST**
1/4" = 1'-0"

7 A2.2.0 A8.1.0 **SECOND FLOOR LOBBY ELEVATION 201 EAST**
1/4" = 1'-0"

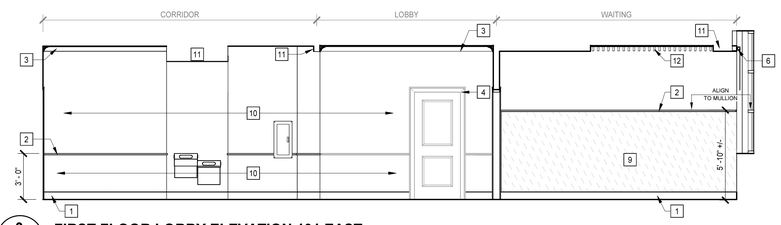


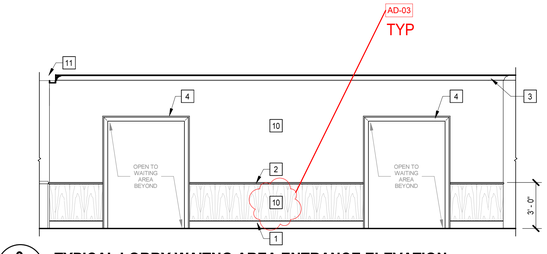
6 A2.2.0 A8.1.0 **SECOND FLOOR LOBBY CORRIDOR 201 SOUTH**
1/4" = 1'-0"



5 A2.2.0 A8.1.0 **SECOND FLOOR LOBBY CORRIDOR 201 NORTH**
1/4" = 1'-0"



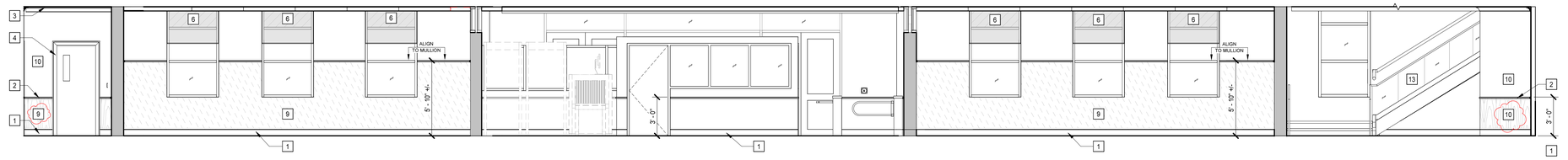




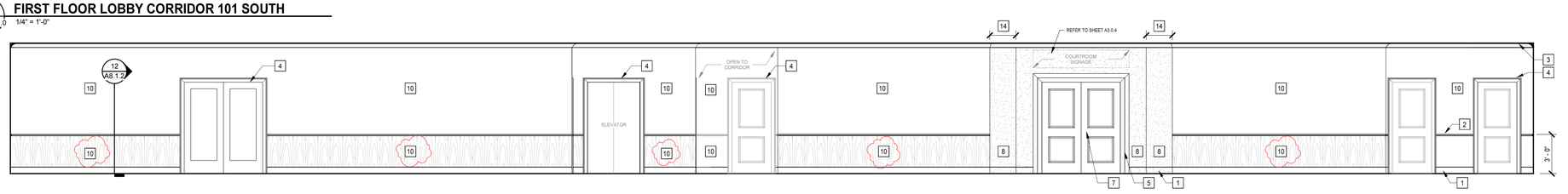
4 A2.1.0 A8.1.0 **FIRST FLOOR LOBBY ELEVATION 101 WEST**
1/4" = 1'-0"

3 A2.1.0 A8.1.0 **FIRST FLOOR LOBBY ELEVATION 101 EAST**
1/4" = 1'-0"

9 A2.1.0 A8.1.0 **TYPICAL LOBBY WAITNG AREA ENTRANCE ELEVATION**
1/4" = 1'-0"



2 A2.1.0 A8.1.0 **FIRST FLOOR LOBBY CORRIDOR 101 SOUTH**
1/4" = 1'-0"



1 A2.1.0 A8.1.0 **FIRST FLOOR LOBBY CORRIDOR 101 NORTH**
1/4" = 1'-0"

GENERAL INTERIOR ELEVATION NOTES

APPLICABLE TO ALL INTERIOR ELEVATIONS, UNLESS OTHERWISE NOTED:

A. THE FINISH SCHEDULE DESCRIBES ONLY THE BASIC OR PREDOMINANT ROOM FINISHES. FINISH KEYNOTES (IF ANY) MAY INDICATE INDICATE A DIFFERENT FINISH FROM THE SCHEDULE AND ARE DEFINED IN THE AREA(S) SPECIFICALLY NOTED.

B. WALLS SHOWN WITHOUT FINISH KEYNOTE: SHALL BE PAINTED AS SCHEDULED

C. WHERE SHOWN, PTOTECTIVE VINYL WALLCOVERING, TYPE III [VWC] INDICATE TWO DIFFERENT PATTERN STYLES NOTED IN THE INTERIOR FINISH LEGEND.

AD-03

INTERIOR FINISH LEGEND

AD-03

VWC-A VWC-B IRWC

INTERIOR ELEVATIONS KEYNOTES

APPLIES TO DRAWINGS A8.1.0

1	RECESSED EPOXY TERRAZZO WALL BASE, REFER TO SECTION DETAIL 4/A5.2.2
2	WOOD CHAIR RAIL, REFER TO 2/A3.0.3
3	WOOD CROWN, REFER TO 3/A3.0.3
4	WOOD DOOR TRIM, TYP. REFER TO 7/A3.0.3
5	WOOD DOOR TRIM, TYP. REFER TO 5/A3.0.3
6	MANUAL ROLLER SHADE MOUNTED TO RECESSED CEILING POCKET, REFER TO DETAIL 12/A5.2.3
7	COURTOOM DOOR DECORATIVE HARDWARE PULLS, TYP. REFER TO SPECIFICATIONS
8	3/8" THICK PRECAST TERRAZZO WALL PANEL CLADDING
9	IMPACT RESISTANT WALL COVERING (SHEET)
10	PROTECTIVE VINYL WALLCOVERING, TYPE III AD-03
11	SOFFIT/BULKHEAD, REFER TO RCP
12	ACOUSTIC BAFFLE ON GRID SYSTEM. REFER TO RCP AND SPECIFICATIONS FOR FURTHER DETAIL
13	METAL AND GLASS RAILING SYSTEM
14	NOTE -ANGLED WALL, REFER TO PLAN

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DATE: MARCH 1, 2024

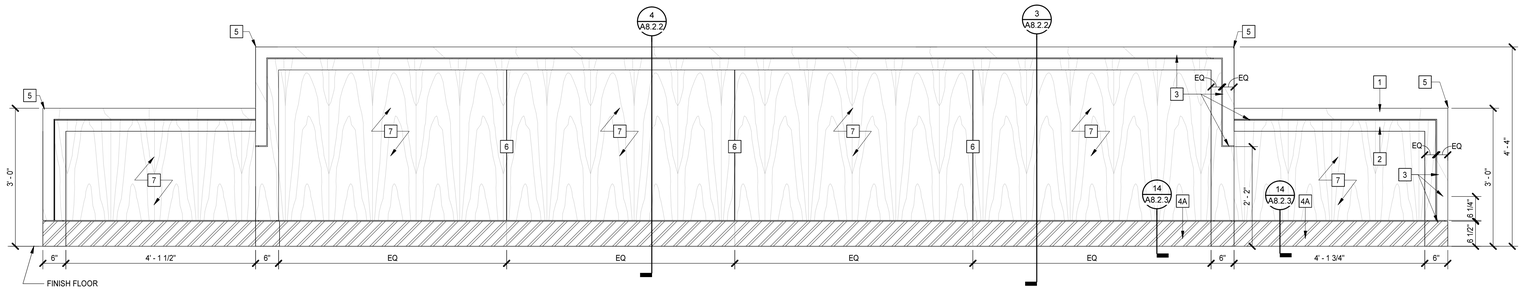
REVISIONS

DATE	DESCRIPTION
03/08/2024	AD-01
03/22/24	AD-03

FIRST AND SECOND FLOOR LOBBY ELEVATIONS

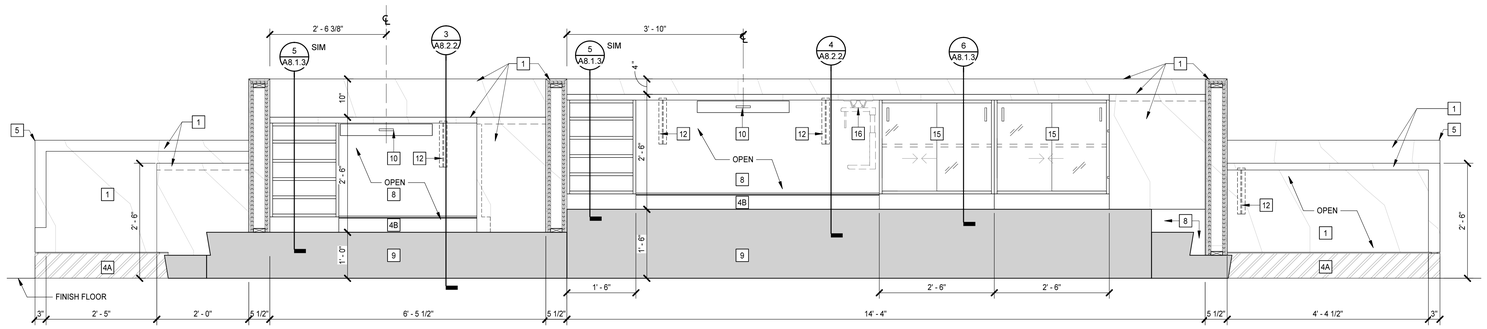
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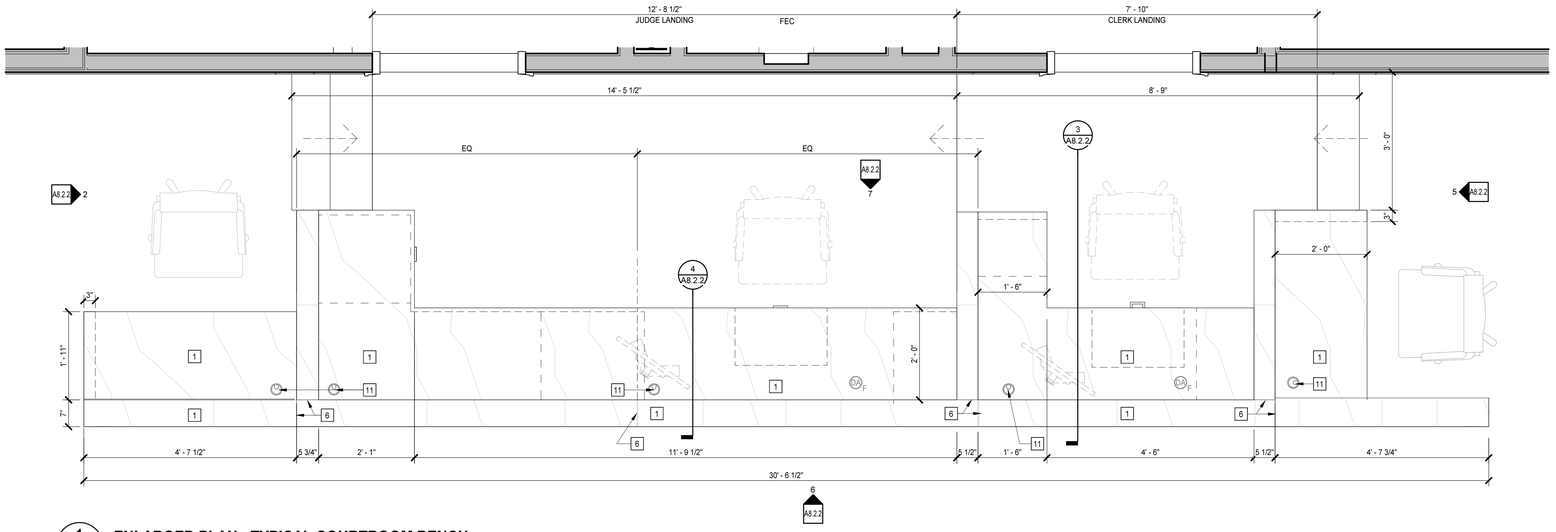
6 A8.2.2 A8.2.2 ELEVATION - TYPICAL COURTROOM BENCH FRONT

3/4" = 1'-0"



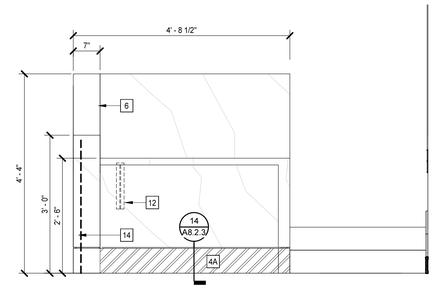
7 A8.2.2 A8.2.2 ELEVATION - TYPICAL COURTROOM BENCH BACK

3/4" = 1'-0"



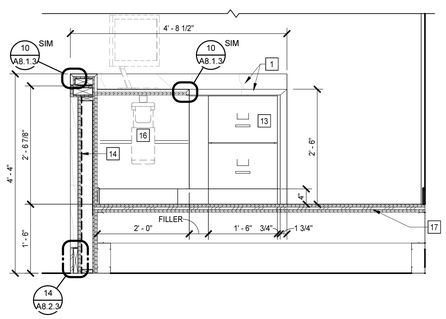
1 A7.2.1 A8.2.2 ENLARGED PLAN - TYPICAL COURTROOM BENCH

3/4" = 1'-0"



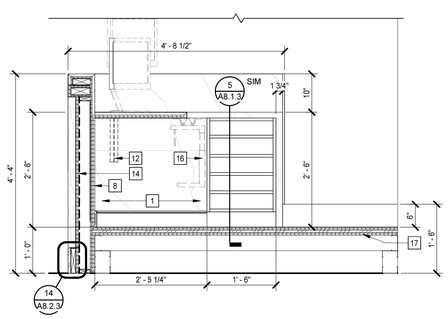
5 A8.2.2 A8.2.2 ELEVATION - TYPICAL COURT REPORTER - EAST

3/4" = 1'-0"



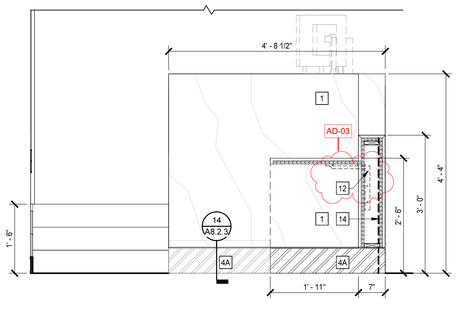
4 A8.2.2 A8.2.2 SECTION - JUDGE'S LANDING

3/4" = 1'-0"



3 A8.2.2 A8.2.2 SECTION - CLERK LANDING

3/4" = 1'-0"



2 A8.2.2 A8.2.2 ELEVATION - TYPICAL WITNESS - WEST

3/4" = 1'-0"

CASEWORK GENERAL NOTES

A. UNLESS INDICATED OTHERWISE, ALL COUNTERTOP(S):
- 2'-10" AFF MAX OR 2'-10" MAX TO TOP OF RIM AT DROP-IN SINKS AND LAVATORIES WHERE OCCURS
- 2'-1" DEEP
- BACKSPLASHES: 4" HIGH AT ALL SIDES AND BACK
- EXTEND COUNTERTOP 1/2" PAST BASE CABINET AT ALL EXPOSED CASEWORK ENDS
- COUNTERTOPS INDICATED WITH SURFACE GROMMETS TO HAVE UNDERMOUNT WIRE MANAGEMENT TROUGHS.
- FINISH **[SOLID SURFACE]**

B. UNLESS INDICATED OTHERWISE, ALL BASE CABINET(S):
- 2'-0" DEEP NOMINAL
- TOE KICKS: 4" NOMINAL HIGH (REDUCE AS NEEDED FOR TOLERANCES) AND 3" DEEP
- SINK LOCATIONS: FOR BARRIER FREE ACCESS, MINIMUM 3'-0" WIDE CLEAR KNEE SPACE REQUIRED INCLUDING INTERIOR WIDTH OF BASE CABINET WITH ATTACHED TOE KICK, IF SHOWN.
- ALL CABINET DRAWERS FABRICATED WITH SOFT-CLOSE FULL EXTENTION GLIDES.
- FINISH **[PLAM]**

A. BUILT-IN EQUIPMENT: SIZE OPENING (HEIGHT, WIDTH, AND DEPTH) AND ROUGH-IN REQUIREMENTS AS REQUIRED BASED ON APPROVED MANUFACTURER SUBMITTED.

B. ALL SHELVES: ADJUSTABLE WITH METAL PINS UNLESS INDICATED OTHERWISE.

C. PROVIDE FINISH END PANELS AT ALL EXPOSED CASEWORK ENDS.

D. LOCKS WHERE NOTED; IF ANY.

CASEWORK KEYNOTES

REPRESENTED BY n

APPLIES TO DRAWINGS A8.2.2

1	SOLID SURFACE MATERIAL
2	VENEER PLYWOOD WITH TRANSPARENT FINISH
3	1/4" REVEAL
4A	METAL FLUSH BASE WITH REVEAL
4B	WOOD BASE REFER TO 8/A3.0.3
5	MITERED AND EASED EDGE
6	SEAM LINE
7	VERTICAL BOOK MATCH WOOD VENEER PANEL WITH TRANSPARENT FINISH
8	3/4" PLYWOOD WITH PAINTED FINISH
9	3/4" UNDERLAYMENT ON 5/8" SOUND DEADENING BOARD ON 3/4" PLYWOOD SUBFLOOR ON CFSF-S
10	PENCIL DRAWER
11	GROMMET
12	CONCEALED, IN-WALL STUD MOUNTED UNDER COUNTER STEEL SUPPORT BRACKET.
13	LOCKING FILING CABINET
14	BOLD DASHED LINE INDICATES 1/2" LIGHTWEIGHT BALLISTIC ARMOR
15	BASE CABINETS WITH TEMPERED SLIDING GLASS DOORS WITH ROUTED/ETCHED FINGER PULLS
16	CPU HOLDER. NIC
17	3/4" UNDERLAYMENT ON 5/8" SOUND DEADENING BOARD ON 3/4" PLYWD SUBFLOOR ON CFSF-S

AD-03

AD-03

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DATE: MARCH 1, 2024

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DATE	DESCRIPTION
03/14/24	AD-01R
03/22/24	AD-03

COURTROOM BENCH PLAN, SECTION & DETAILS

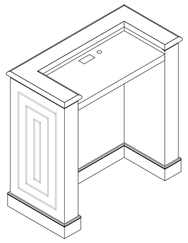
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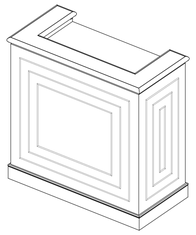
CASEWORK KEYNOTES

APPLIES TO DRAWINGS A8.2.3

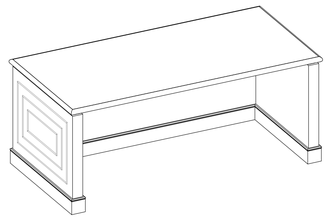
1A	SOLID SURFACE MATERIAL WITH BULLNOSE RADIUS EDGE
1B	SOLID SURFACE MATERIAL WITH MITERED AND EASED EDGE
2	VENEER PLYWOOD WITH TRANSPARENT FINISH
3	SURFACE POP-UP POWER GROMMET
4	PREFABRICATED UNDER MOUNT STEEL BRACKET
5	UNDERCMOUNT WIRE MANAGEMENT TROUGH
6	WOOD PANEL MOULDING TRIM, REFER TO SECTION DETAIL 11/A3.0.3
7	WOOD BASE REFER TO 8/A3.0.3
8	FINISHED PLYWOOD STOP TO MATCH FACE OF CASEWORK



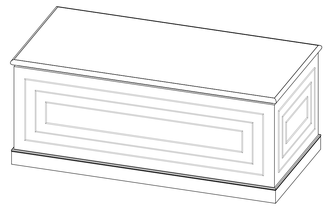
9B 3D VIEW REFERENCE - PODIUM BACK
NO SCALE



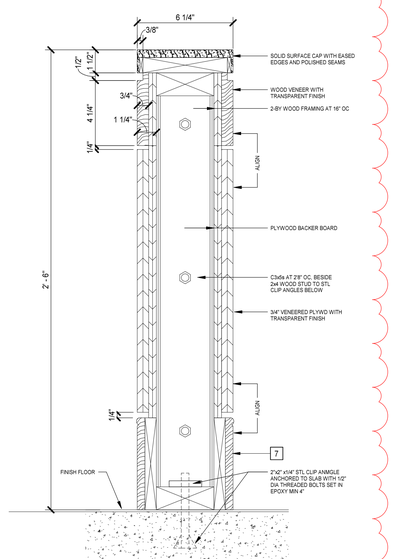
9A 3D VIEW REFERENCE - PODIUM FRONT
NO SCALE



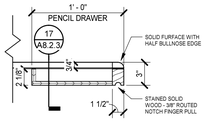
1B 3D VIEW REFERENCE - LITIGANTS DESK BACK
NO SCALE



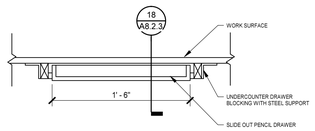
1A 3D VIEW REFERENCE - LITIGANTS DESK FRONT
NO SCALE



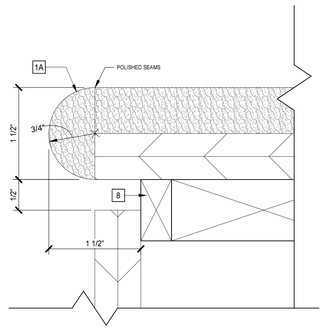
16 SECTION - SPECTATOR RAIL
TYP A8.2.3 3" = 1'-0"



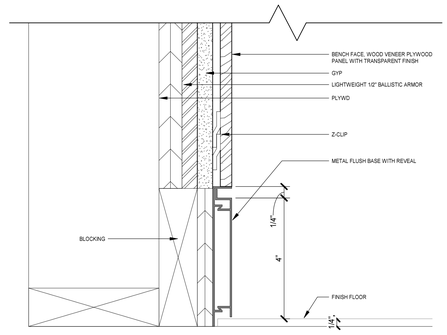
18 SECTION - PENCIL DRAWER
TYP A8.2.3 1 1/2" = 1'-0"



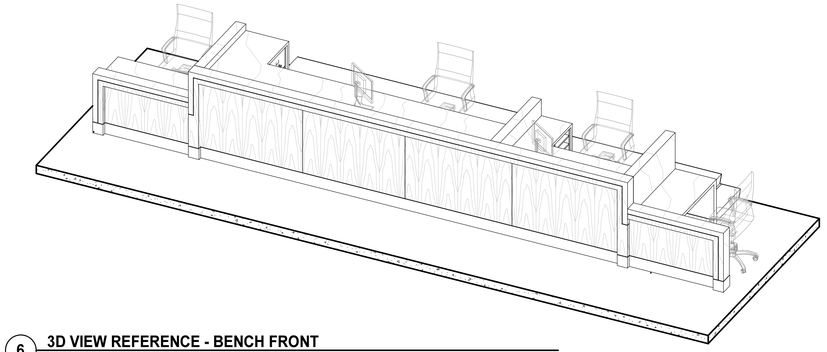
17 SECTION - PENCIL DRAWER
TYP A8.2.3 1 1/2" = 1'-0"



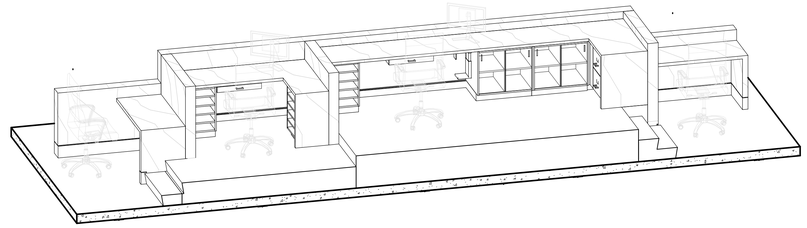
15 SECTION - COURTROOM REVEAL DETAIL
TYP A8.2.3 12" = 1'-0"



14 SECTION DETAIL - FLUSH RECESSED METAL BASE
TYP A8.2.3 6" = 1'-0"

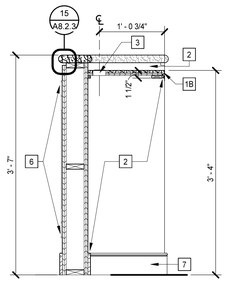


6 3D VIEW REFERENCE - BENCH FRONT
NO SCALE

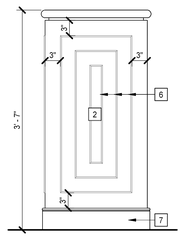


7 3D VIEW REFERENCE - BENCH BACK
NO SCALE

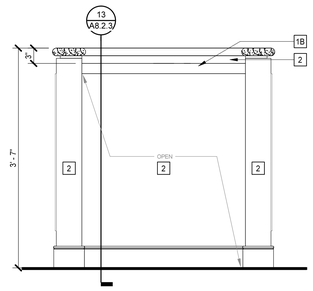
AD-03



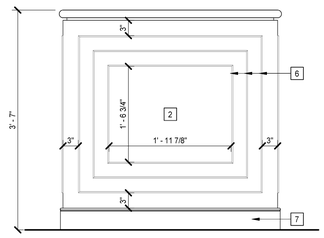
13 SECTION - WITNESS STAND
TYP A8.2.3 1" = 1'-0"



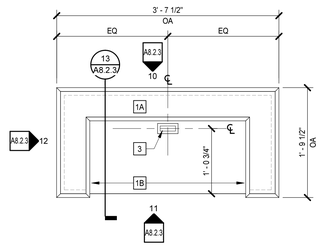
12 ELEVATION - WITNESS STAND SIDES
TYP A8.2.3 1" = 1'-0"



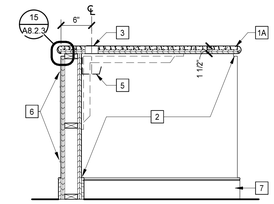
11 ELEVATION - WITNESS STAND BACK
TYP A8.2.3 1" = 1'-0"



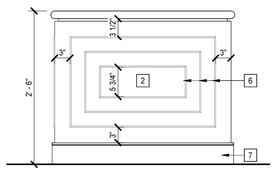
10 ELEVATION - WITNESS STAND FRONT
TYP A8.2.3 1" = 1'-0"



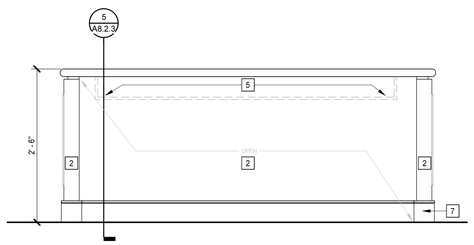
9 PLAN - WITNESS STAND
TYP A8.2.3 1" = 1'-0"



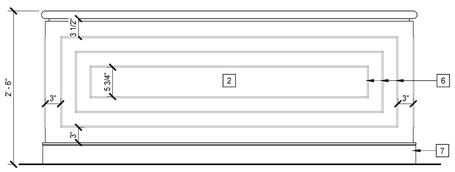
5 SECTION - LITIGANT'S TABLE
TYP A8.2.3 1" = 1'-0"



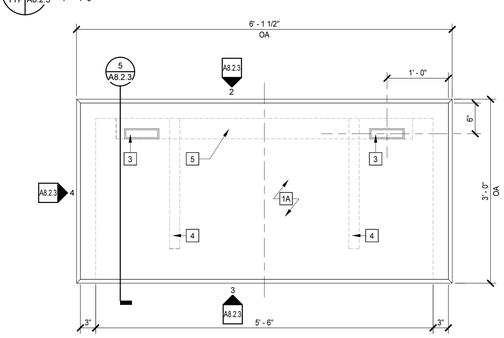
4 ELEVATION - LITIGANTS TABLE SIDES
TYP A8.2.3 1" = 1'-0"



3 ELEVATION - LITIGANT'S TABLE BACK
TYP A8.2.3 1" = 1'-0"



2 ELEVATION - LITIGANT'S TABLE FRONT
TYP A8.2.3 1" = 1'-0"



1 PLAN - LITIGANT'S TABLE
TYP A8.2.3 1" = 1'-0"

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PROJECT NO: 630874
DATE: MARCH 1, 2024

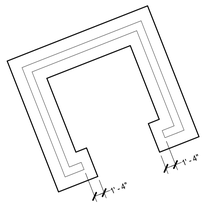
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COURTROOM CASEWORK DETAILS

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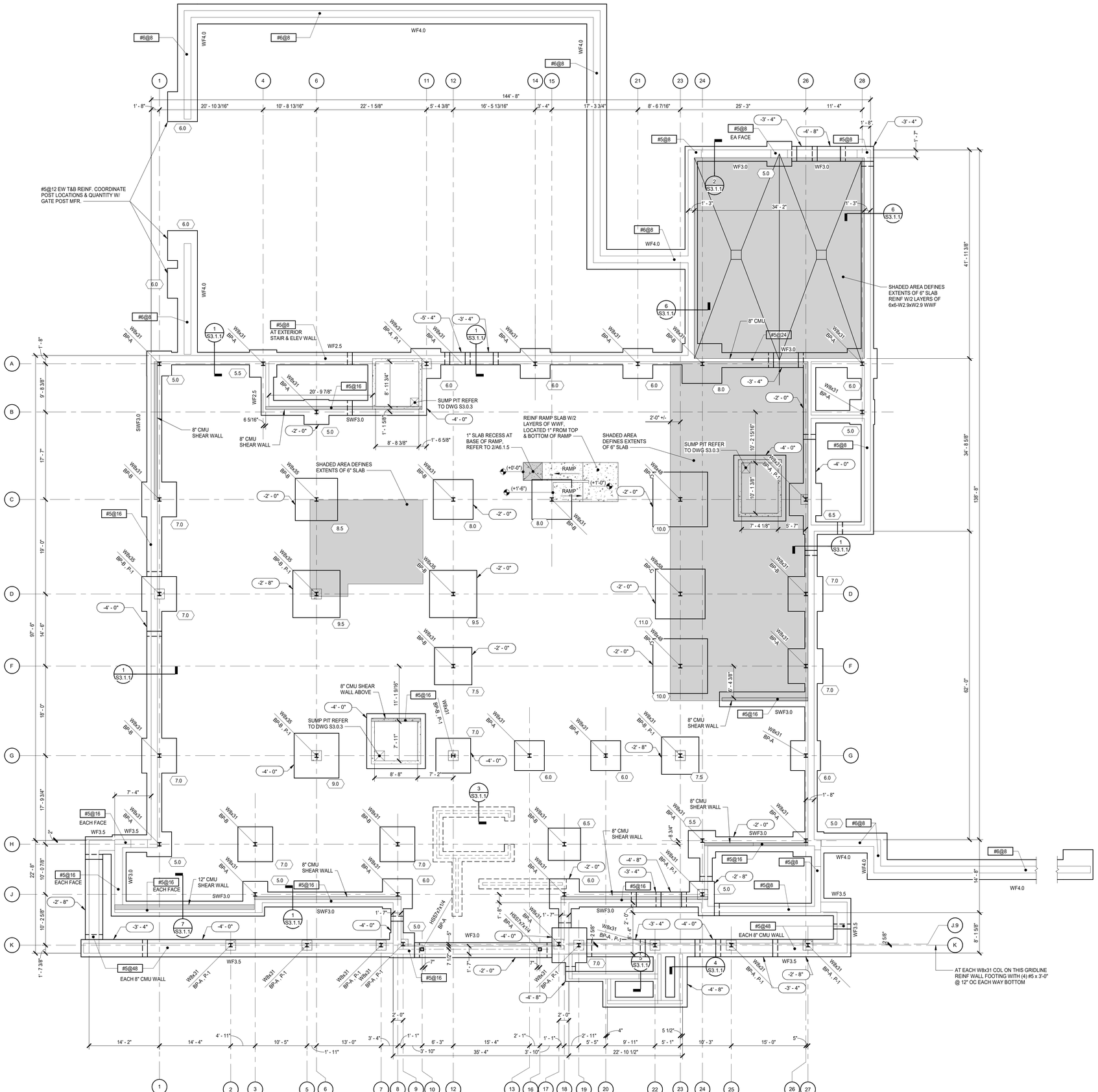


FOUNDATION PLAN - DUMPSTER ENCLOSURE

1/8" = 1'-0"

FOUNDATION PLAN NOTES - DUMPSTER ENCLOSURE:

1. REINFORCE 8" CMU WALLS WITH #5@8" OC.
2. PROVIDE WF4.0 WALL FOOTING.
3. PROVIDE BP-A AT GATE POSTS W/ (4) 5/8" DIAMETER x 8" SCREW ANCHORS.



FOUNDATION PLAN

1/8" = 1'-0"

FOUNDATION PLAN NOTES:

1. FINISHED FIRST FLOOR ELEVATION = 1553.75' = REFERENCE DATUM EL (+0'-0"). ALL STRUCTURAL ELEVATIONS INDICATED ARE REFERENCED FROM THIS ELEVATION, UNO.
2. LOWER LEVEL FLOOR CONSTRUCTION SHALL BE 4" NORMAL WEIGHT CONCRETE SLAB ON GRADE REINFORCED WITH 6x6-W2.9xW2.9 WWF (AT 1" FROM TOP OF SLAB) OVER VAPOR BARRIER OVER 6" GRANULAR BASE COURSE, UNO. FLOOR CONSTRUCTION INDICATED AS 6" SLAB ON GRADE SHALL BE NORMAL WEIGHT CONCRETE REINFORCED WITH 6x6-W2.9xW2.9 WWF (LOCATED AT 2" FROM TOP OF SLAB) OVER VAPOR BARRIER OVER 6" GRANULAR BASE COURSE.
3. REINFORCE EXTERIOR CMU WALLS, STAIR WALLS AND ELEVATOR WALLS WITH #5@24" OC, UNO.
4. BASE COURSE SHALL BE A CLEAN, DENSELY-GRADED "CRUSHER RUN" MATERIAL WITH A BALANCED FINE CONTENT, SUCH AS ***VDOT 21A OR 21B STONE.*** THE BASE COURSE SHALL BE COMPACTED AND SHALL BE FINISHED TO A FLAT, SMOOTH, LOW-FRICTION SURFACE. COMPACTION SHALL BE MONITORED BY THE ON-SITE TESTING AGENCY.
5. TOP OF ALL INTERIOR FOOTINGS SHALL BE (-0'-8"), UNO. TOP OF ALL EXTERIOR FOOTINGS SHALL BE (-2'-0"), UNO. SET BOTTOM OF ALL SITE WALL FOOTINGS A MINIMUM OF 2'-6" BELOW GRADE CONTRACTOR TO STEP FOOTINGS ACCORDINGLY.
6. ALL INTERIOR WALL FOOTINGS SHALL BE WF2.0, UNO. ALL EXTERIOR WALL FOOTINGS SHALL BE WF2.5, UNO.
7. COORDINATE FOOTING STEPS WITH ALL UNDERSLAB UTILITIES. REFER TO FOUNDATION NOTE #4 ON DRAWING S0.0.1.
8. REFER TO DRAWING S0.0.1 FOR GENERAL NOTES, PLAN LEGEND, AND STRUCTURAL ABBREVIATIONS.
9. REFER TO DRAWINGS S3.0.1 AND S3.0.2 FOR TYPICAL FOUNDATION DETAILS AND SCHEDULES.
10. AT OPENINGS IN SITE WALLS, PROVIDE LINTEL L1 AND L FOR BRICK SHELF PER NOTE #2 IN LINTEL SCHEDULE.
11. IF STEEL SUPPORT IS REQUIRED BY THE STAIR MANUFACTURER, POST SHALL BE HSS4x4x1/4 WITH FOOTING AS INDICATED PER THE THICKENED SLAB DETAILS ON DRAWING S3.0.2.
12. WALLS INDICATED AS ▭ ARE SHEAR WALLS. SHEAR WALLS SHALL BE GROUTED SOLID (UNO) WITH CONTROL JOINTS AS INDICATED AND NO CLOSER THAN 30'-0" OC. NO REINFORCING IN THESE WALLS IS ALLOWED TO BE CUT. LOCATE ALL PIPING AND CONDUIT OUTSIDE OF REINFORCED CELLS. TWO VERTICAL REINFORCING BARS, SPACED 8" APART, SHALL BE LOCATED AT EACH END OF THE SHEAR WALL. ALL VERTICAL REINFORCEMENT IS FULL WALL HEIGHT, UNO. BELOW GRADE SHEAR WALL PENETRATIONS SHALL BE LOCATED IN THE MIDDLE THIRD OF THE SHEAR WALL LENGTH.
13. PROVIDE HSS4x4x1/4 POSTS FOR STAIR LANDING SUPPORT.
14. FOR SLAB RECESS AT COURTROOM NEOPRENE PADS, REFER TO THE A7 SERIES OF DRAWINGS (KEYNOTE 6) AD-03

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PROFESSIONAL ENGINEER

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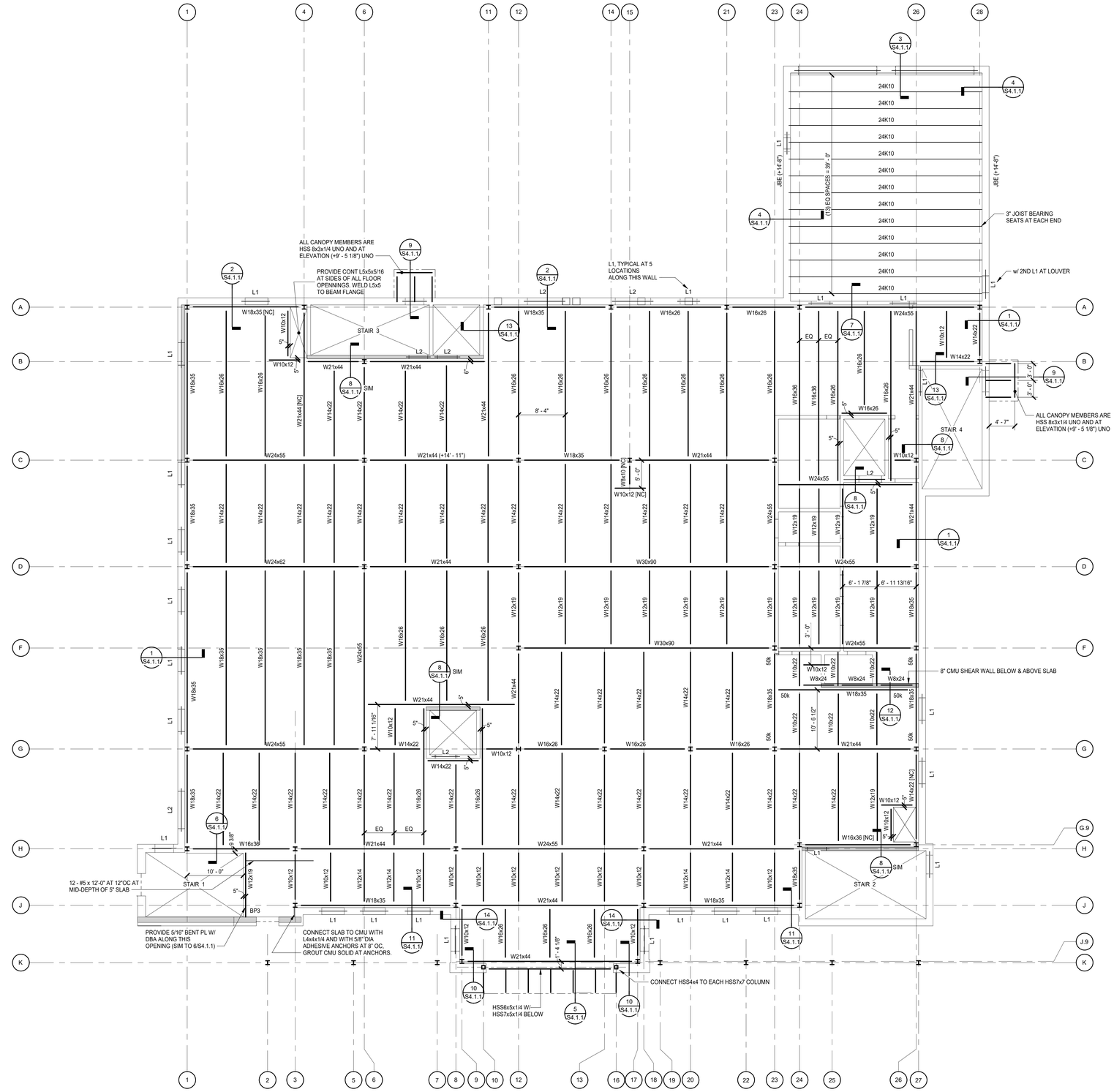
2040 WEST BEVERLY STREET
CITY OF STAUNTON, VA 24401

PROJECT NO: 630874	
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03/22/24	AD-03

FOUNDATION PLAN

S1.1.1

3/22/2024 11:37:13 AM



SECOND FLOOR FRAMING PLAN

1/8" = 1'-0"

FLOOR FRAMING PLAN NOTES:

1. TOP OF SECOND FLOOR SLAB (+15'-4") RELATIVE TO FINISHED FIRST FLOOR.
2. TOP OF STEEL BEAMS SHALL BE (-0'-5") RELATIVE TO FINISHED SECOND FLOOR, UNO.
3. TOP OF STEEL BEAMS INDICATED THUS (+X-X") ON PLAN SHALL BE REFERENCED FROM FINISHED FIRST FLOOR ELEVATION.
4. FLOOR CONSTRUCTION SHALL BE 3" NORMAL WEIGHT CONCRETE SLAB ON 2" COMPOSITE FLOOR DECK TYPE 2 (5" TOTAL SLAB THICKNESS). REINFORCE SLAB WITH 6x6-W2.9xW2.9 WWF AT MID-DEPTH. REFER TO DRAWING S4.0.1 FOR STEEL DECK SCHEDULE.
5. PLACE CONCRETE MONOLITHICALLY ON STEEL FLOOR DECK. CONSTRUCTION JOINTS MAY BE PERMITTED ONLY AFTER APPROVAL OF THE ARCHITECT / STRUCTURAL ENGINEER.
6. CONCRETE THICKNESS INDICATED ON FLOOR DECK SHALL BE OF A UNIFORM THICKNESS.
7. ALL FLOOR BEAMS SHALL RECEIVE 3/4" DIAMETER x 4" LONG HEADED SHEAR STUDS AT 12" OC, UNO.
   ALL BEAMS NOTED [NC] SHALL BE NON-COMPOSITE (SHEAR STUDS NOT REQUIRED)
   AT ALL FLOOR BEAMS AT OR LIGHTER THAN A W14x22, DESIGN END OF BEAM CONNECTION FOR A 20K REACTION, UNO.
   AT ALL W16 FLOOR BEAMS, DESIGN END OF BEAM CONNECTIONS FOR A 30K REACTION, UNO.
   AT ALL W18 FLOOR BEAMS, DESIGN END OF BEAM CONNECTIONS FOR A 40K REACTION, UNO.
   AT ALL W21 FLOOR BEAMS, DESIGN END OF BEAM CONNECTIONS FOR A 50K REACTION, UNO.
   AT ALL W24 FLOOR BEAMS, DESIGN END OF BEAM CONNECTIONS FOR A 70K REACTION, UNO.
   AT ALL W30 FLOOR BEAMS, DESIGN END OF BEAM CONNECTIONS FOR A 70K REACTION, UNO.
8. COMPOSITE BEAMS ARE DESIGNED UNSHORED.
9. ALL BEAMS ARE EQUALLY SPACED BETWEEN COLUMN GRIDLINES, UNO.
10. REFER TO DRAWING S0.0.1 FOR GENERAL NOTES, PLAN LEGEND, AND STRUCTURAL ABBREVIATIONS.
11. REFER TO DRAWINGS S4.0.1 AND S4.0.2 FOR TYPICAL FRAMING DETAILS AND SCHEDULES.
12. COMPOSITE SLABS (3" CONCRETE ON 2" DECK (5" TOTAL)) HAVE BEEN DESIGNED TO ACCOMMODATE A LIFT SIMILAR TO SKYJACK SJ3213 MICRO. LIFTS SHALL NOT EXCEED THIS TOTAL WEIGHT, WEIGHT PER SQUARE FOOT OF LIFT FOOTPRINT AREA OR INDIVIDUAL WHEEL LOAD. NO TWO LIFTS SHALL BE WITHIN 20 FEET OF EACH OTHER IN ANY DIRECTION AT ANY TIME. LIFTS SHALL NOT BE LOCATED ADJACENT TO STOCKPILES OF MATERIAL. FLOOR SLABS SHALL HAVE REACHED THEIR 28 DAY DESIGN STRENGTH PRIOR TO PLACING ANY LIFT ON THE SLAB.
13. FOR SLAB RECESS AT COURTROOM NEOPRENE PADS, REFER TO THE A7 SERIES OF DRAWINGS (KEYNOTE 6) — AD-03

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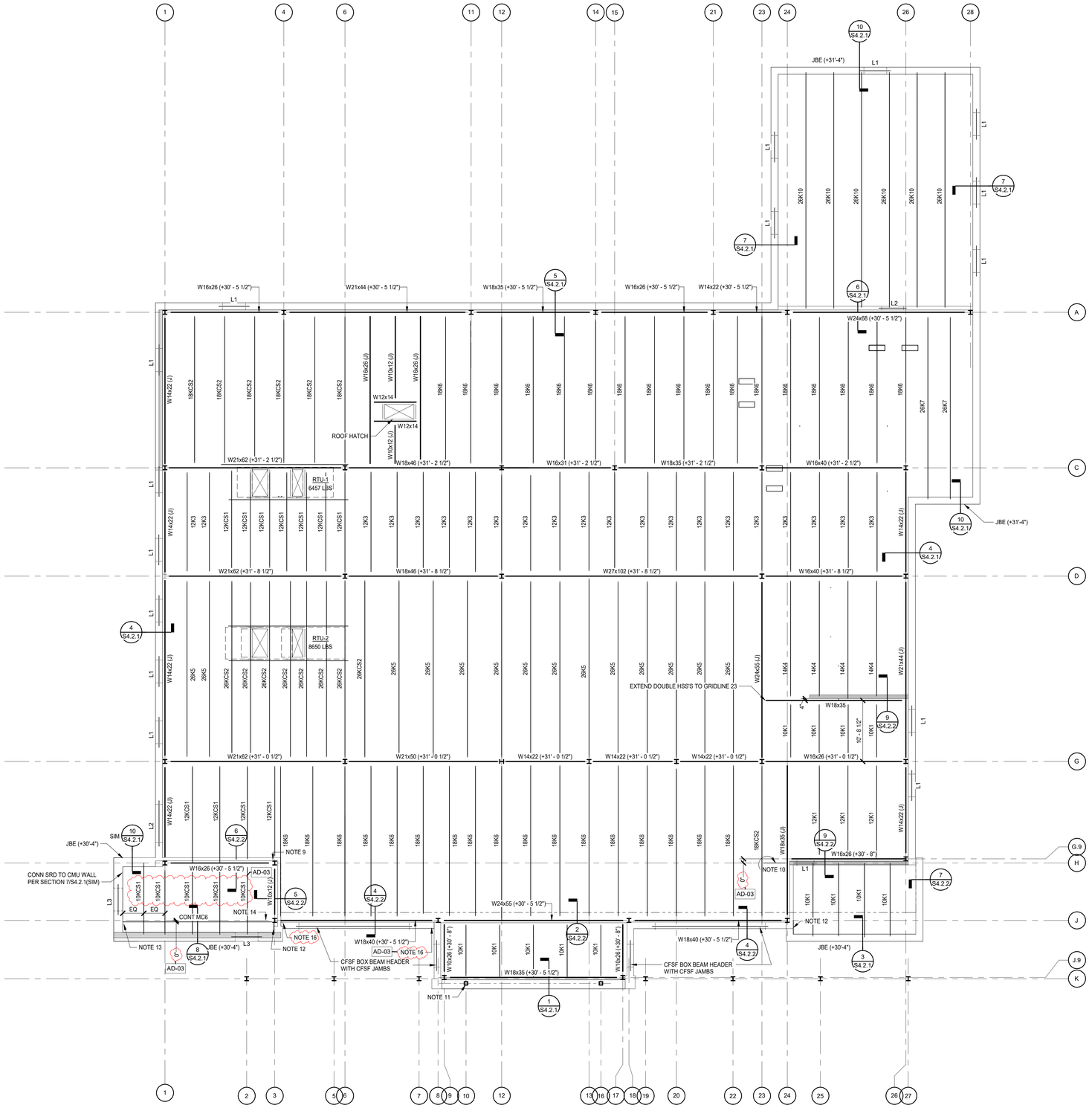
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SECOND FLOOR FRAMING PLAN

S2.1.1

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ROOF FRAMING PLAN

1/8" = 1'-0"

ROOF FRAMING PLAN NOTES:

1. TOP OF STEEL BEAMS INDICATED THUS (+X'-X") ON PLAN SHALL BE REFERENCED FROM FINISHED FIRST FLOOR ELEVATION.
2. STEEL ROOF DECK SHALL BE 1 1/2" WIDE RIB ROOF DECK (DECK TYPE 1), UNO. REFER TO STEEL DECK SCHEDULE ON DRAWING S4.0.1 FOR DECK TYPES INDICATED ON PLAN. REFER TO FRAMING PLAN AND ARCHITECTURAL AND STRUCTURAL SECTIONS FOR EXTENT OF DECK TYPES.
3. ALL BEAMS AND JOISTS ARE EQUALLY SPACED BETWEEN COLUMN GRIDLINES, UNO.
4. REFER TO DRAWING S0.0.1 FOR GENERAL NOTES, PLAN LEGEND, AND STRUCTURAL ABBREVIATIONS.
5. REFER TO DRAWINGS S4.0.1 AND S4.0.2 FOR TYPICAL FRAMING DETAILS AND SCHEDULES.
6. WHERE JOISTS BEAR ON TOP OF COLUMN, PROVIDE 1/2" CAP PLATE. COORDINATE SIZE TO ALLOW FOR JOIST BOLTS WHERE REQUIRED.
7. ELEVATOR HOIST BEAMS SHALL BE W6x25 (+28'-4") AND BEAR ON CMU ELEVATOR WALLS WITH BP1. COORDINATE HOIST BEAM LOCATION WITH APPROVED ELEVATOR SHOP DRAWINGS.
8. PROVIDE LINTEL AT L1 STAIR AND ELEVATOR DOOR OPENINGS, UNO.
9. BEAR JOIST ON STIFFENED L5x5x3/8 x 1'-0" SEAT WELDED TO COLUMN WITH 3/16" FILLET WELD ALL AROUND. COPE BEAM FLANGE IF NEEDED.
10. DOUBLE HSS2 1/2x2 1/2x1/4 WITH L4x4x1/4 x 0'-4" SEAT AT EACH END. WELD SEAT TO TOP CHORD OF JOIST AND BEAM FLANGE.
11. CONNECT EACH HSS7x7 COLUMN TO W18 TOP FLANGE WITH DOUBLE L CONNECTION TO ALLOW FOR 1" VERTICAL BEAM DEFLECTION.
12. L4x4x1/4 FOR STEEL ROOF DECK SUPPORT CONN L TO CMU PER 7/S4.2.2.
13. EXTEND MC6 TO CMU AND CONNECT TO CMU WITH L3x3x1/4x1'-4" SEAT AND (2) 5/8" DIAMETER SCREW ANCHORS SPACED 12" APART.
14. WELD MC6 WEB TO COLUMN WEB WITH L4x4x3/8 x 0'-5 1/2".
15. PROVIDE L FRAMING AT ROOF DRAINS. FOR DRAIN LOCATIONS, REFER TO DRAWING A10.1.
16. W18 TO COLUMN CONN SHALL BE FULLY WELDED. AD-03

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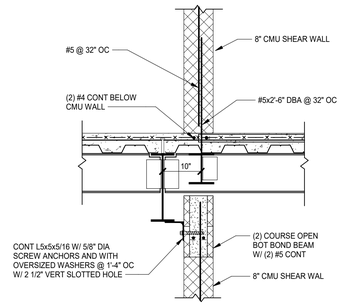
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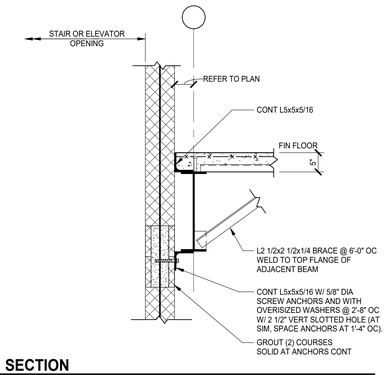
ROOF FRAMING PLAN

S2.2.1

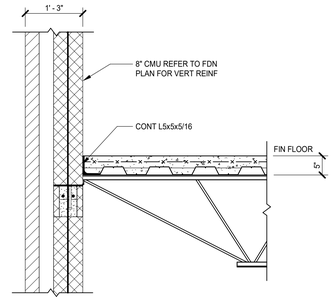
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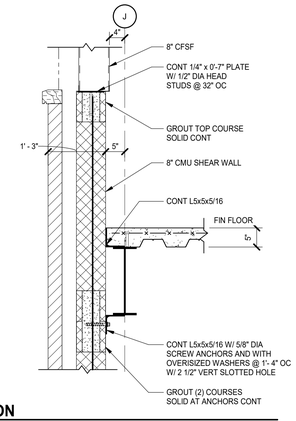
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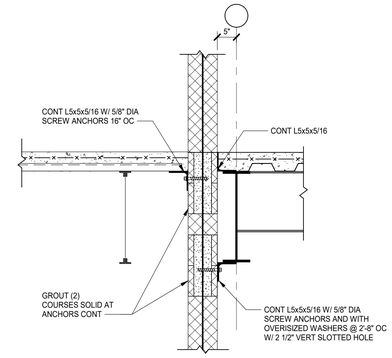
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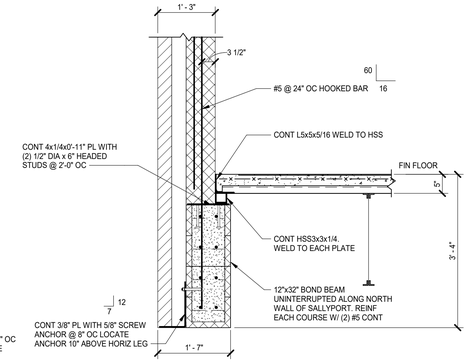
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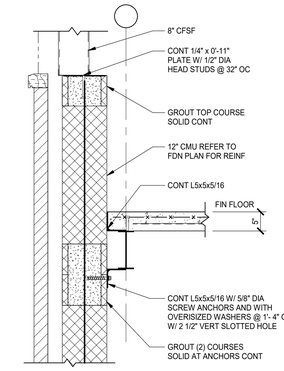
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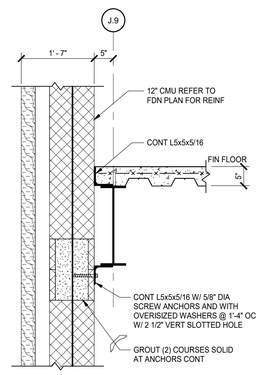
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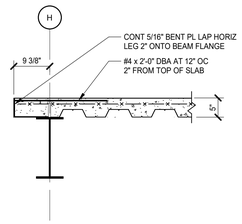
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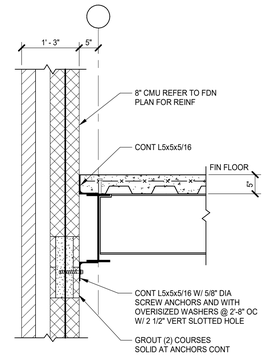
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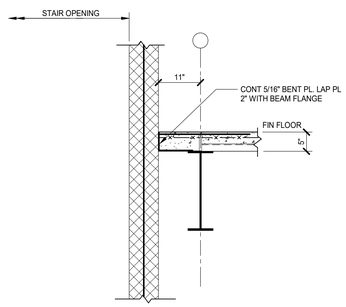
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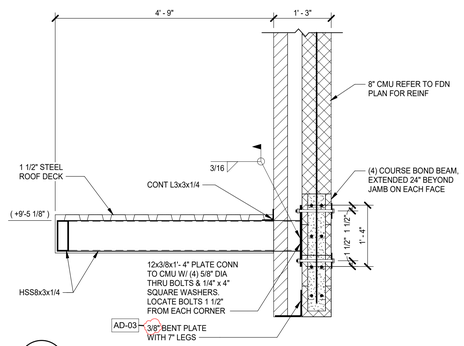
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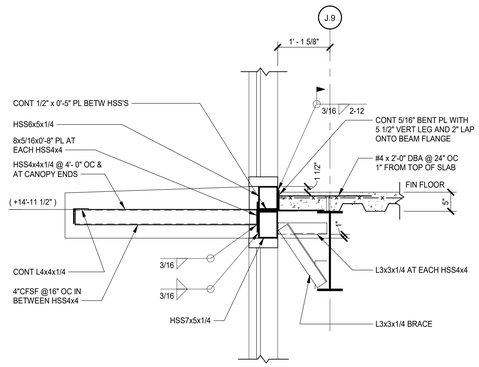
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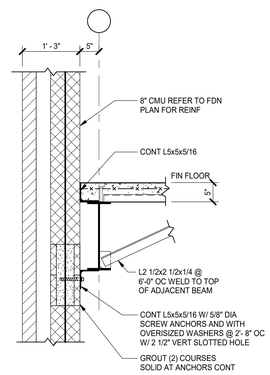
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9 SECTION S2.1.1 S4.1.1 — 3/4" = 1'-0"



5 SECTION S2.1.1 S4.1.1 — 3/4" = 1'-0"



1 SECTION S2.1.1 S4.1.1 — 3/4" = 1'-0"

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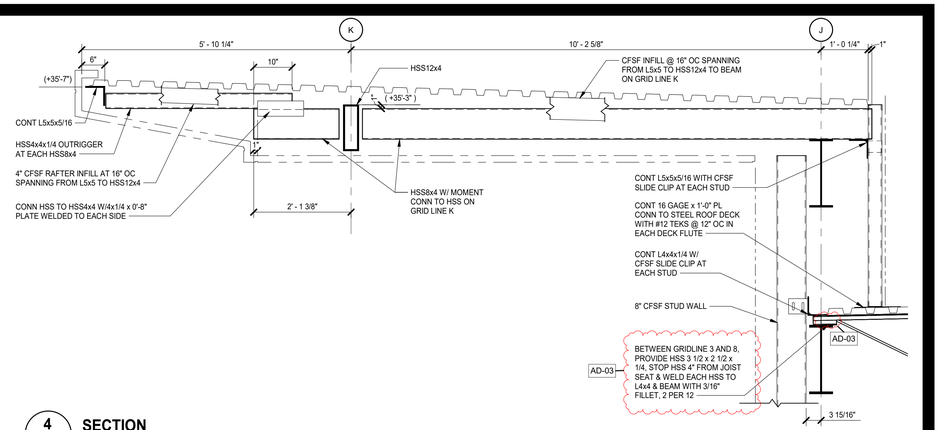
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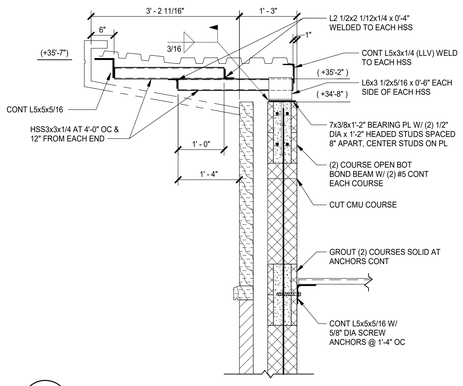
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S4.1.1

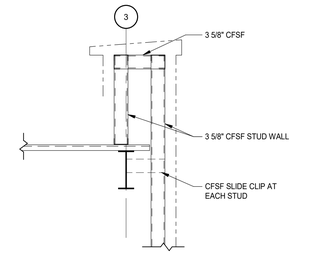
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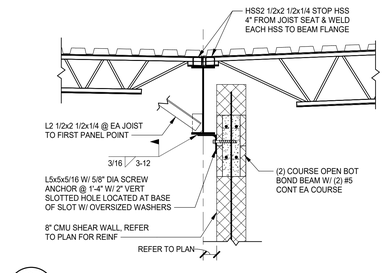
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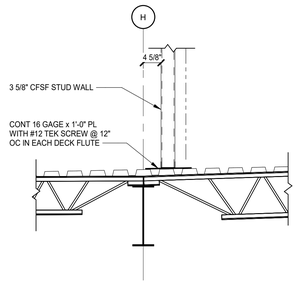
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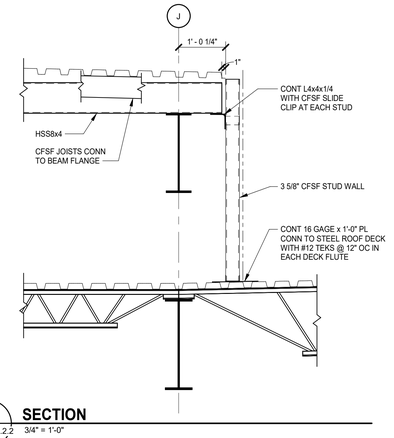
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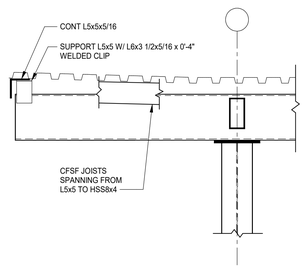
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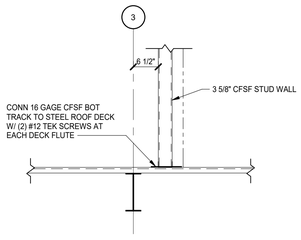
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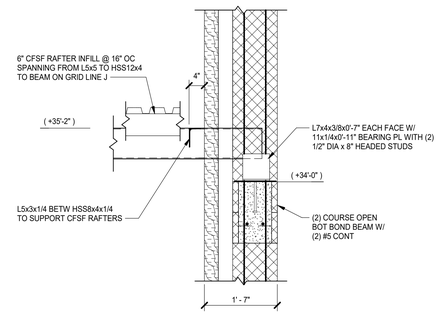
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8 SECTION S2.2.2 | S4.2.2 — 3/4" = 1'-0"



5 SECTION S2.2.1 | S4.2.2 — 3/4" = 1'-0"



1 SECTION S2.2.2 | S4.2.2 — 3/4" = 1'-0"

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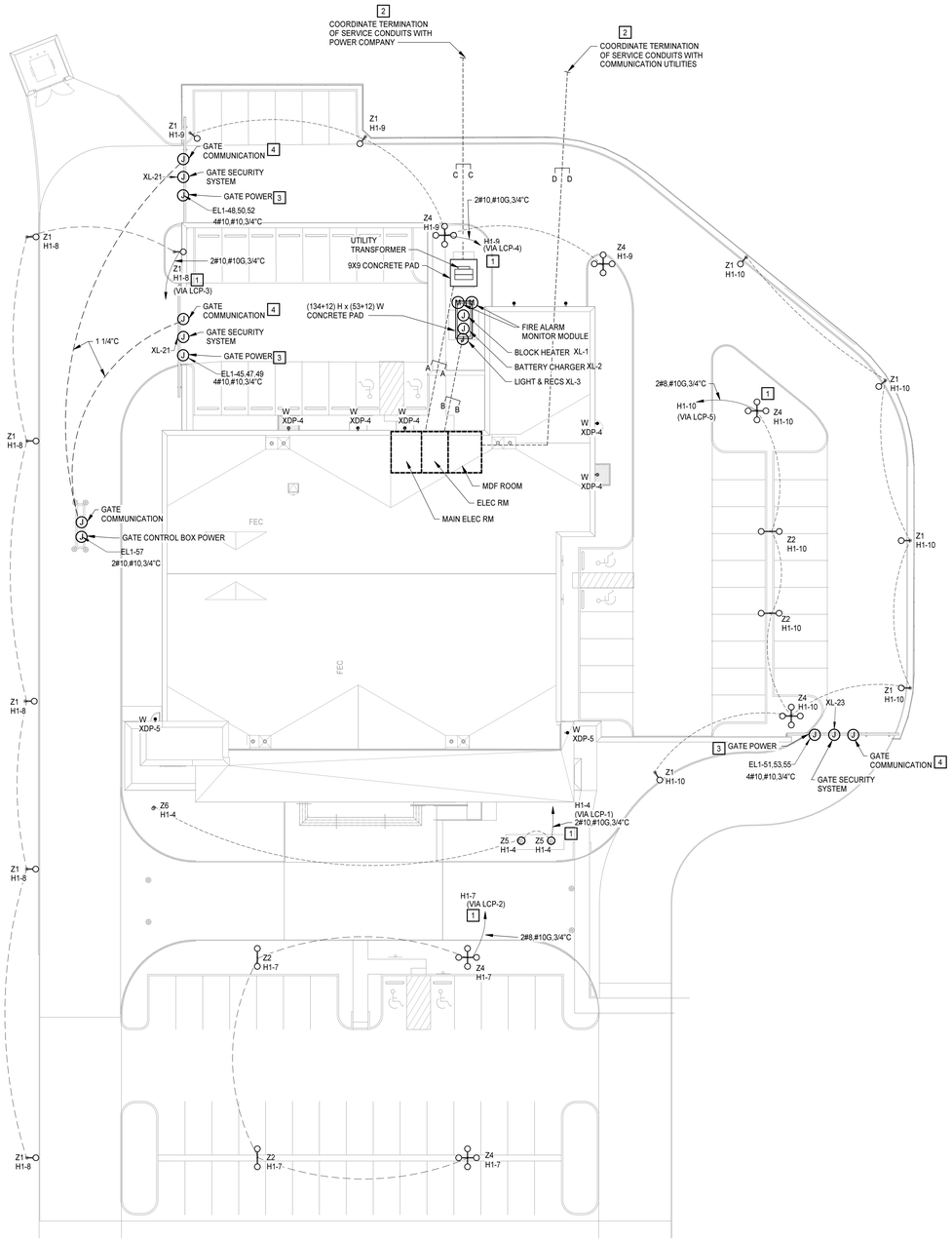
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FRAMING SECTIONS

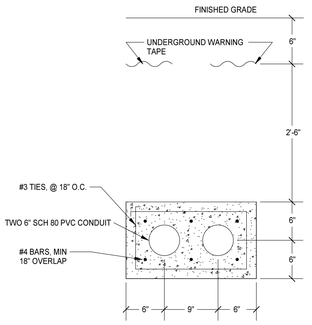
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SITE PLAN - ELECTRICAL

1" = 20'-0"



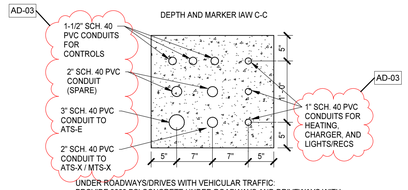
UNDER ROADWAYS/DRIVES WITH VEHICULAR TRAFFIC:
PROVIDE 3000 PSI CONCRETE UNDER ROADWAYS AND DRIVEWAYS WITH VEHICULAR TRAFFIC.
PROVIDE CONDUIT SPACERS EVERY 6'-0"

ELSEWHERE:
PROVIDE #10 SCREENINGS OR APPROVED ENGINEERED FILL THROUGHOUT
PROVIDE CONDUIT SPACERS EVERY 6'-0"
PROVIDE NYLON PULL CORD IN EACH CONDUIT.

TO UTILITY XFMR FOR UTILITY PRIMARY

DUCTBANK SECTION C -C

NO SCALE



UNDER ROADWAYS/DRIVES WITH VEHICULAR TRAFFIC:
PROVIDE 3000 PSI CONCRETE UNDER ROADWAYS AND DRIVEWAYS WITH VEHICULAR TRAFFIC.
PROVIDE CONDUIT SPACERS EVERY 6'-0"

ELSEWHERE:
PROVIDE #10 SCREENINGS OR APPROVED ENGINEERED FILL THROUGHOUT
PROVIDE CONDUIT SPACERS EVERY 6'-0"

GENERATOR TO ELEC. ROOM

DUCTBANK SECTION B-B - BUILDING B

NO SCALE

GENERAL NOTES

A. COORDINATE WITH CIVIL DRAWINGS FOR ALL SITE WORK INCLUDING UTILITY TRANSFORMER AND GENERATOR LOCATION .

B. COORDINATE WITH CIVIL PLAN FOR EXACT SITE LIGHTING LOCATIONS.

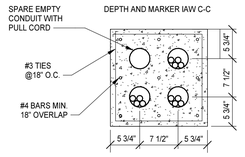
C. ELECTRICAL CONTRACTOR SHALL ROUTE ELECTRICAL CONDUITS TO AVOID CONFLICTS WITH SITE UTILITIES AND MAINTAIN REQUIRED EASEMENTS.

D. REFER TO SHEET E2.1.1 FOR EXTERIOR WALL LIGHT CONTROL.

KEYNOTES

APPLIES TO DRAWINGS E1.0
REPRESENTED BY n

1. PROVIDE CONDUIT/WIRES AS INDICATED FOR ENTIRE LENGTH OF THIS CIRCUIT. REFER TO LIGHTING CONTACTOR DETAIL ON E4.1 FOR SITE LIGHTING CONTROL.
2. REFER TO CIVIL PLANS FOR EXACT ROUTING.
3. COORDINATE WITH CIVIL PLANS FOR ADDITIONAL GATE INFORMATION.
4. PROVIDE 1 1/4"C FROM MDF ROOM TO THE GATE FOR GATE COMMUNICATION.



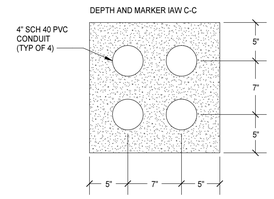
UNDER ROADWAYS/DRIVES WITH VEHICULAR TRAFFIC:
PROVIDE 3000 PSI CONCRETE UNDER ROADWAYS AND DRIVEWAYS WITH VEHICULAR TRAFFIC.
PROVIDE CONDUIT SPACERS EVERY 6'-0"

ELSEWHERE:
PROVIDE #10 SCREENINGS OR APPROVED ENGINEERED FILL THROUGHOUT
PROVIDE CONDUIT SPACERS EVERY 6'-0"

UTILITY XFMR TO SWITCHBOARD MDP

DUCTBANK SECTION A-A

NO SCALE



#10 SCREENINGS OR APPROVED ENGINEERED FILL THROUGHOUT
PROVIDE CONDUIT SPACERS EVERY 6'-0"

CONTRACTOR'S OPTION TO USE CONCRETE IN LIEU OF SAND.
PROVIDE NYLON PULL CORD IN EACH CONDUIT.

COMMUNICATION UTILITIES VIA PULL BOXES TO MDF ROOM

DUCTBANK SECTION D-D

NO SCALE

MOSELEYARCHITECTS
3200 NORFOLK STREET, RICHMOND, VA 23230
PHONE (804) 794-7555 FAX (804) 355-8690
MOSELEYARCHITECTS.COM

COMMONWEALTH OF VIRGINIA
BRIAN C. WELLS
Lic. No. 046269
03-01-24
PROFESSIONAL ENGINEER

STAUNTON J&DR COURTS FACILITY

City of Staunton
2040 West Beverley Street, Staunton, VA 24401

PROJECT NO: 630874
DATE: MARCH 1, 2024

REVISIONS	
DATE	DESCRIPTION
03-22-24	AD-03

SITE PLAN - ELECTRICAL

E1.0

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PANELBOARD SCHEDULE — MDP

LOCATION: MAIN ELEC 134 | FED FROM: C/T CABINET

800 A MCB SE RATED | 480/277 Wye | 3 PH 4 W | MOUNT: SURFACE | PANEL ASSEMBLY RATED (KAIC): 42 KAIC

CKT	BRKR	POLE	LOAD	A		B		C		LOAD	POLE	BRKR	CKT
1				8.0	36.5								2
3	100 A	3	ATS-X			5.9	37.1			ATS-E	3	225 A	4
5								6.1	39.4				6
7				30.4	40.4								8
9	225 A	3	H1			27.0	38.9			H2	3	225 A	10
11								26.1	35.4				12
13				11.1	14.4								14
15	90 A	3	STAFF ELEVATOR			11.1	14.4			PUBLIC ELEVATOR	3	125 A	16
17								11.1	14.4				18
19	--	1	SPACE ONLY	--	--					SPACE ONLY	1	--	20
21	--	1	SPACE ONLY			--	--			SPACE ONLY	1	--	22
23	--	1	SPACE ONLY					--	--	SPACE ONLY	1	--	24
25				--	--								26
27	--	3	SPACE ONLY			--	--			SPACE ONLY	3	--	28
29								--	--				30
31				--	--								32
33	--	3	SPACE ONLY			--	--			SPACE ONLY	3	--	34
35								--	--				36
37				--	0.0								38
39	--	3	SPACE ONLY			--	0.0			SPD	3	60 A	40
41								--	0.0				42
				141 kVA		134 kVA		132 kVA					
				509 A		486 A		477 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand
INTERIOR LIGHTING	23424 VA	125.00%	29280 VA
EXTERIOR LIGHTING	6977 VA	125.00%	8721 VA
RECEPTACLES	84060 VA	55.95%	47030 VA
AC / HEAT PUMP	105676 VA	100.00%	105676 VA
ELECTRIC HEAT	3300 VA	100.00%	3300 VA
KITCHEN	0 VA	0.00%	0 VA
MISCELLANEOUS	181620 VA	100.00%	181620 VA

Panel Totals

Total Conn. Load: 407.2 kVA
Total Est. Demand: 377.7 kVA
Total Conn. Current: 490 A
Total Est. Demand... 454 A

COPPER FEEDER SCHEDULE

FEEDER ID	# OF SETS	BUILDING WIRE QUANTITY & SIZE TYPE THHN - DRY TYPE THWN - WET	MINIMUM CONDUIT SIZE	FEEDER ID	# OF SETS	BUILDING WIRE QUANTITY & SIZE TYPE THHN - DRY TYPE THWN - WET	MINIMUM CONDUIT SIZE
30	1	3#10,#10 G	3/4"	30Y	1	4#10,#10 G	3/4"
35	1	3#8,#10 G	3/4"	35Y	1	4#8,#10 G	3/4"
40	1	3#8,#10 G	3/4"	40Y	1	4#8,#10 G	3/4"
45	1	3#6,#10 G	1"	45Y	1	4#6,#10 G	1"
50	1	3#6,#10 G	1"	50Y	1	4#6,#10 G	1"
60	1	3#4,#10 G	1"	60Y	1	4#4,#10 G	1"
70	1	3#4,#8 G	1 1/4"	70Y	1	4#4,#8 G	1 1/4"
80	1	3#3,#8 G	1 1/4"	80Y	1	4#3,#8 G	1 1/4"
90	1	3#2,#8 G	1 1/4"	90Y	1	4#2,#8 G	1 1/4"
100	1	3#1,#8 G	1 1/4"	100Y	1	4#1,#8 G	1 1/4"
110	1	3#2,#6 G	1 1/2"	110Y	1	4#2,#6 G	1 1/2"
125	1	3#1,#6 G	1 1/2"	125Y	1	4#1,#6 G	1 1/2"
150	1	3#1/0,#6 G	2"	150Y	1	4#1/0,#6 G	2"
175	1	3#2/0,#6 G	2"	175Y	1	4#2/0,#6 G	2"
200	1	3#3/0,#6 G	2"	200Y	1	4#3/0,#6 G	2"
225	1	3#4/0,#4 G	2 1/2"	225Y	1	4#4/0,#4 G	2 1/2"
250	1	3-250kCM,#4 G	2 1/2"	250Y	1	4-250kCM,#4 G	2 1/2"
300	1	3-350kCM,#4 G	2 1/2"	300Y	1	4-350kCM,#4 G	2 1/2"
350	2	3#2/0,#3 G	3"	350Y	2	4#2/0,#3 G	3"
400	2	3#3/0,#3 G	2"	400Y	2	4#3/0,#3 G	2"
450	2	3#4/0,#2 G	2 1/2"	450Y	2	4#4/0,#2 G	2 1/2"
500	2	3-250kCM,#2 G	2 1/2"	500Y	2	4-250kCM,#2 G	2 1/2"
600	2	3-350kCM,#1 G	3"	600Y	2	4-350kCM,#1 G	3"
700	2	3-500kCM,#1/0 G	4"	700Y	2	4-500kCM,#1/0 G	4"
800	3	3-350kCM,#1/0 G	3"	800Y	3	4-350kCM,#1/0 G	3"
1000	3	3-500kCM,#2/0 G	4"	1000Y	3	4-500kCM,#2/0 G	4"
1200	4	3-350kCM,#3/0 G	3"	1200Y	4	4-350kCM,#3/0 G	3"
1600	5	3-500kCM,#4/0 G	4"	1600Y	5	4-500kCM,#4/0 G	4"
2000	6	3-500kCM,#250 G	4"	2000Y	6	4-500kCM,#250 G	4"
800S	3	4-350kCM	4"	2500Y	7	4-500kCM,#350 G	4"
100U	1	3#1,#8 G	2"				
225U	1	3#4/0,#4 G	3"				

AD-03

NOTES:
1. ELECTRICAL CONTRACTOR TO VERIFY CONDUIT SIZE REQUIRED IF WIRE TYPES OTHER THAN THOSE LISTED ABOVE ARE USED.
2. FEEDER SIZES BASED ON TABLE 310.15(B)(16), 75° C.
3. SIZES ADJUSTED PER NEC 110.14.

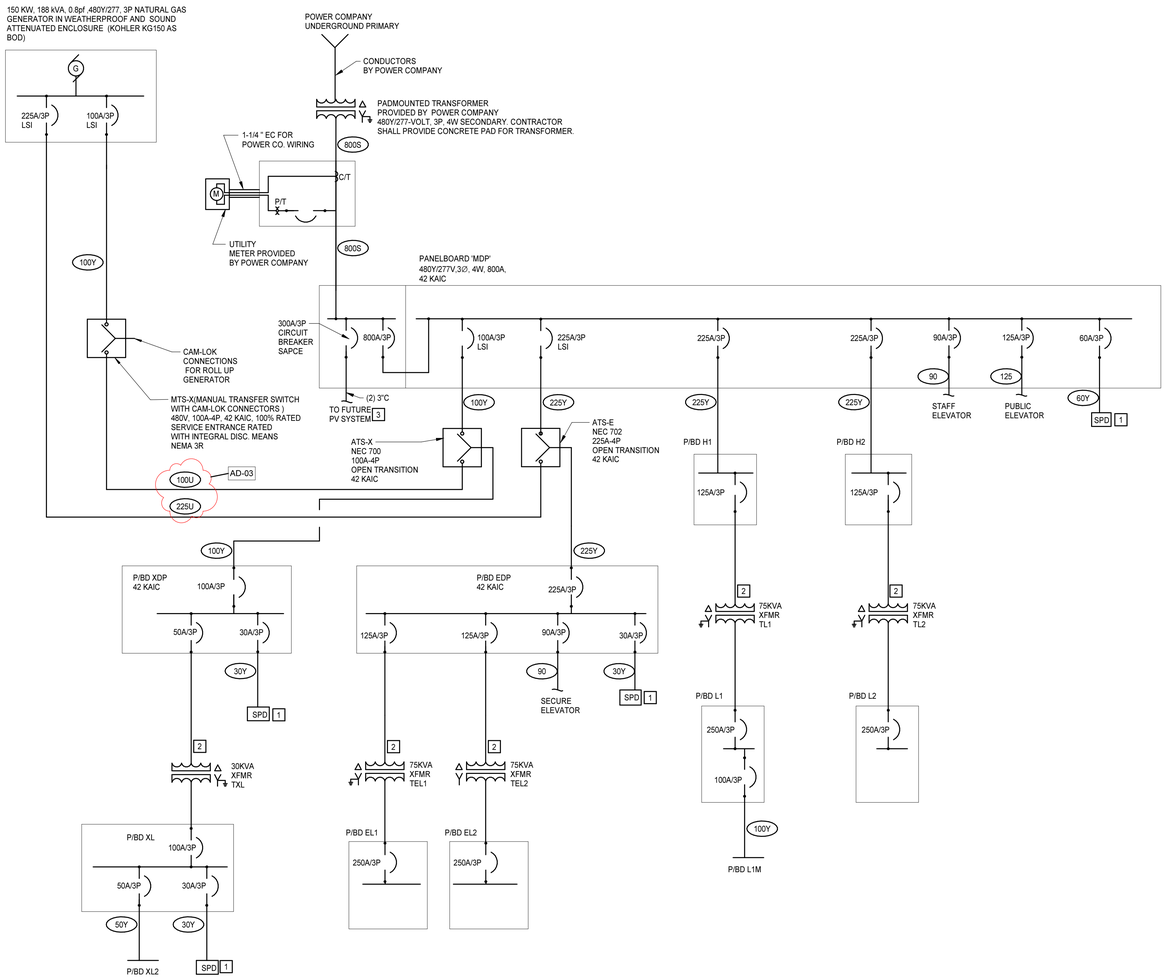
TRANSFORMER SCHEDULE

kVA	TYPE	PRIMARY	SECONDARY	COPPER PRIMARY FEEDER	COPPER SECONDARY FEEDER	BONDING CONDUCTOR
15 kVA	LINEAR	480V-3Ø	208Y/120V	3#10, #10 G, 3/4" C.	4#4, #8 G, 1-1/4" C.	#8
30 kVA	LINEAR	480V-3Ø	208Y/120V	3#6, #10 G, 1" C.	4#1, #6 G, 1-1/2" C.	#6
45 kVA	LINEAR	480V-3Ø	208Y/120V	3#4, #8 G, 1-1/4" C.	4#1/0, #6 G, 2" C.	#6
75 kVA	LINEAR	480V-3Ø	208Y/120V	3#1, #6 G, 1-1/2" C.	4-250kCM, #2 G, 2-1/2" C.	#2
112.5 kVA	LINEAR	480V-3Ø	208Y/120V	3#2/0, #6 G, 2" C.	(2 SETS) 4-3/0, #2 G, 2-1/2" C.	#2
150 kVA	LINEAR	480V-3Ø	208Y/120V	3#4/0, #4 G, 2-1/2" C.	(2 SETS) 4-250kCM, #2/0 G, 2-1/2" C.	#2/0
225 kVA	LINEAR	480V-3Ø	208Y/120V	(2 SETS) 3#2/0, #3 G, 2" C.	(3 SETS) 4-350kCM, #2/0 G, 3" C.	#2/0
300 kVA	LINEAR	480V-3Ø	208Y/120V	(2 SETS) 3#4/0, #2 G, 2-1/2" C.	(4 SETS) 4-350kCM, #4/0 G, 4" C.	#3/0
500 kVA	LINEAR	480V-3Ø	208Y/120V	(3 SETS) 3-350kCM, #1/0 G, 4" C.	(6 SETS) 4-350kCM, 300kCM G, 4" C.	#3/0

KEYNOTES

APPLIES TO DRAWINGS E5.1
REPRESENTED BY n

1. COORDINATE WITH SPD MANUFACTURER FOR SPD BREAKER SIZE.
2. REFER TO TRANSFORMER SCHEDULE FOR EXACT CONDUIT/CONDUCTOR SIZES.
3. PROVIDE (2) 3"C FOR FUTURE PV SYSTEM. REFER TO 1/E3.1 FOR ADDITIONAL INFORMATION.



POWER ONE - LINE DIAGRAM
NO SCALE

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PROJECT NO: 630874
DATE: MARCH 1, 2024

REVISIONS

DATE	DESCRIPTION
03-14-24	AD-01R
03-22-24	AD-03

POWER ONE-LINE DIAGRAM

E5.1

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