GMC

ADDENDUM NO.1

PROJECT: **Carey Station Urban Water Reuse Facility 0.5 MGD to 1.0 MGD Expansion**
For Piedmont Water Company
GMC PROJECT NO. CAUG230002

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1. Revisions

1.1 46 51 15 1.5.B - Total quantity of diffusers should be changed to 190
1.2 Add Specification 320519 - Geosynthetics for Exterior Improvements, see Appendix B
1.3 Add Specification 081113 - Hollow Metal Doors and Frames, See Appendix C
1.4 Add Specification 087100 - Door Hardware, See Appendix D
1.5 Add Specification 074113 - Standing-Seam Metal Roof Panels, see Appendix E
1.6 Add Specification 095113 – Acoustical Panel Ceilings, see Appendix F
1.7 Replace Specification 466123 Tertiary Filtration entirely, See Appendix G
1.8 Replace Specification 00 41 13 - Bid Form, See Appendix H
1.9 See Or-Equal List in Appendix I

2. Questions

2.1 **Please provide additional design information for the aluminum grating walkways shown on Drawing D-301. There is a proposed aluminum grating walkway that joins an existing walkway. What is the design of the existing walkway?**
Answer: See attached PDF files for the existing walkway design (Appendix A). Proposed aluminum grating walkway shall match the existing in Sections B and A on Sheets S4 and S5, respectively. Additional sheets shown for clarity on section location.

2.2 **For the new reject and equalization ponds the drawings indicate a liner is to be installed. Please provide a specification on the liner and if any geotextile will be required under the liner. The drawings also contradict with specification section 312000 paragraph 3.16 which calls for a bentonite liner. Please clarify which is correct and provide additional details.**
Answer: Liner shall use specification 320519 - Geosynthetics for Exterior Improvements in Appendix B. Delete specification section 312000 paragraph 3.16 which calls for a bentonite liner. Geotextiles may be used to compensate for irregular subgrades.

2.3 **Will Piedmont Water Company provide electricity on the job site?**
Answer: The contractor shall have the power company set up a temporary meter for their electrical needs/usage.

GMC

2.4 **SECTION 13 31 00 – FIBERGLASS REINFORCED BUILDING ENCLOSURE**
2.2 SYSTEM DESCRIPTION.
Provide one-piece molded construction FRP shelter of the following type: 1. Size: 12'-0" W x 16'-0" D x 7'-11" H. I see an 8x8 FRP Building shown on the plans (pages D-801 and D-802) for a Pump Bldg. Can you tell me where the building in the above specifications is located and or named?

Answer: FRP Building shall be 8'-0" W x 8'-0" D x 7'-6" H.

2.5 **Please provide information on the door/frame material and the door hardware required. The schedule on plan sheet A-814 does not provide any information and there are no division 8 specifications.**
Answer: See Specification 081113 - Hollow Metal Doors and Frames Appendix C and Speciation 087100 - Door Hardware in Appendix D.

2.6 **Please provide specifications for the standing seam metal roof system required.**
Answer: See Specification 074113 - Standing-Seam Metal Roof Panels in Appendix E

2.7 **Please clarify the finish ceiling requirements in the electrical building. Detail A on plan sheet A-811 shows gypsum board ceiling over metal framing, but detail A on plan sheet A-813 shows a suspended acoustical tile ceiling. If an acoustical ceiling is required, please provide specifications.**
Answer: Use acoustical ceiling, see specification 095113 – Acoustical Panel Ceilings in Appendix F

2.8 **Plan sheet A-814 has signage notes, but there is no other reference to signage in the plans or the specs. Please clarify if there is any signage required.**
Answer: No signages.

2.9 **Question from VLR manufacturer – "The existing VLR tanks have diffusers in them, are they to be re-used? Some oxygen delivery capacity was assumed from the diffusers for the VLR tanks."**
Answer: These diffusers are not to be reused. All aeration capacity shall be provided by the existing surface aerators and new fine bubble diffusers in the fine bubble tank.

2.10 **Question from VLR manufacturer – "46 51 15 2.3.I - One (1) ORP probe is to be provided with mounting kit. Drawing I-301 shows the ORP probe placed in the fine bubble tank. It was intended to place the ORP probe in one of the VLR tanks and move a DO probe from the VLR tanks to the fine bubble aeration tank. Are**

there existing DO instruments within the VLR tanks, and are there existing controls for the VLR?"
Answer: Contractor shall locate the ORP probe in the 2nd VLR tank. There are no existing DO instruments within the VLR tanks. VLR manufacturer shall add one (1) DO probe in the scope of supply including mounting kit for the fine bubble tank.

2.11 **The existing asphalt driveway is in bad shape and will likely not be salvageable after construction. Please consider adding replacement of the asphalt road in the scope of work.**
Answer: Yes, add the replacement the existing asphalt road in the scope of work – use detail 1 on C-613.

2.12 **Can the bid date be extended until Feb 26, 2025.**
Answer: No, the bid date will not be extended until Feb 26,2025.

3. Acknowledgement

3.1 Receipt of Addendum No. 1 shall be acknowledged via e-mail to liang.wang@gmcnetwork.com and confirm that the addendum has been received.

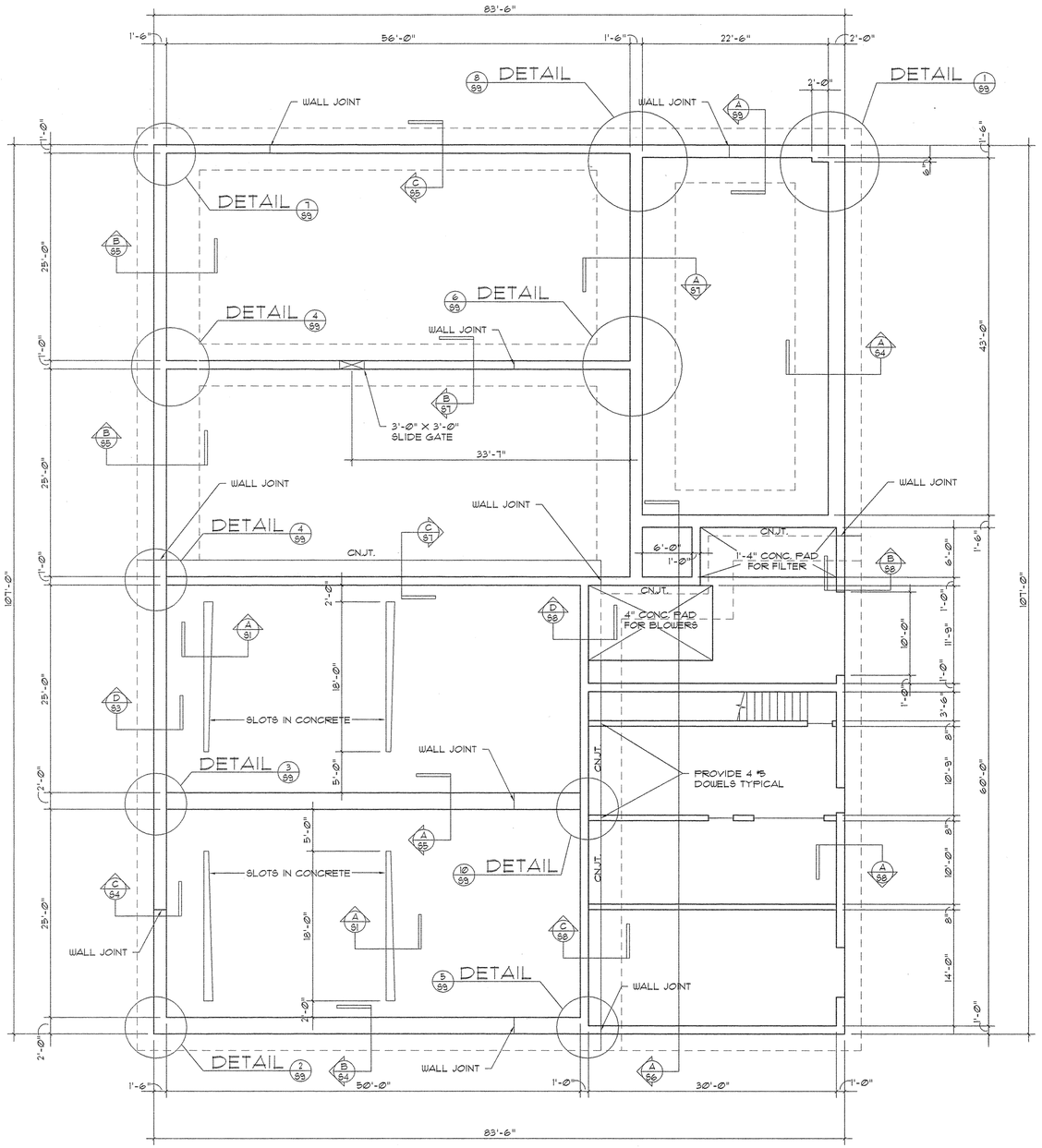
4. Conclusion

4.1 This is the end of Addendum Number 1, dated February 14, 2025

Liang Wang

_____
Liang Wang, PE

Appendix A



FOUNDATION PLAN

SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. COORDINATE THESE DRAWINGS WITH THE EXISTING CONDITIONS, PROCESS & EQUIPMENT SHOP DRAWINGS. CONTRACTOR TO VERIFY ALL DIMENSIONS BEFORE WORK IS STARTED FOUNDATION IS DESIGNED USING A SOIL BEARING CAPACITY OF 2000 PSF. IF THE EXISTING CONDITIONS VARY FROM WHAT IS SHOWN, OR IF THE SOIL BEARING CAPACITY IS QUESTIONABLE, THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY.

2. REMOVE ALL TOPSOIL, ROOT SYSTEM OR OTHER DELETERIOUS MATERIAL UNDER PROPOSED COLUMN AND WALL FOOTINGS AND REPLACE WITH SUITABLE COMPACTED FILL OR CRUSHED STONE. ENGINEERS DECISION ON QUESTIONABLE MATERIAL SHALL BE FINAL.

3. ALL BUILDING AREAS SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT AS DETERMINED IN ACCORDANCE WITH ASTM D698, CURRENT EDITION.

4. ALL FOOTINGS TO BE CENTERED UNDER THE COLUMNS OR WALLS THEY SUPPORT, UNLESS NOTED OTHERWISE ON THE DRAWING.

5. WHERE A DETAIL IS SHOWN FOR ONE CONDITION, IT SHALL ALSO APPLY FOR ALL LIKE OR SIMILAR CONDITIONS, UNLESS NOTED OTHERWISE.

6. EXTEND ALL FOOTING REINFORCEMENT TO FAR SIDE OF FOOTING, TYPICALLY ALLOWING 3 INCHES OF COVER.

7. ALL CONCRETE SHALL HAVE A MINIMUM 28 -DAY COMPRESSIVE STRENGTH OF 4000 PSI AND SHALL CONTAIN FIBERMESH AT THE RATE OF 1.5 POUNDS PER CUBIC YARD.

8. CONCRETE REINFORCING STEEL SHALL COMPLY WITH THE REQUIREMENTS OF ASTM A615, GRADE 60 AND FREE OF ANY FORM RELEASE AGENTS. ALL ANCHOR BOLTS SHALL BE SIZE AND STRENGTH SPECIFIED. WELDED WIRE MESH SHALL BE IN ACCORDANCE WITH ASTM A-185.

9. ALL STRUCTURAL STEEL SHALL COMPLY WITH THE REQUIREMENTS OF ASTM 992 GRADE 50. CONNECTIONS SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS UNLESS APPROVED BY THE STRUCTURAL ENGINEER PRIOR TO FABRICATION. CONNECTION BOLTS SHALL BE ASTM A325 UNLESS NOTED OTHERWISE. ALL WELDING TO BE PERFORMED BY A CERTIFIED WELDER AND ADHERING TO AWS D1.1 FOR WELDING OF STRUCTURAL SHAPES.

10. ALL STEEL DECK SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH ALL THE REQUIREMENTS OF THE STEEL DECK INSTITUTE.

11. ALL STRUCTURAL STEEL AND COLD FORMED SECTION SHALL BE FABRICATED AND ERECTED IN STRICT ACCORDANCE TO THE MANUAL OF STEEL CONSTRUCTION BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION AND TO THE METAL BUILDING MANUFACTURER ASSOCIATION CODE OF STANDARD PRACTICES.

12. ALL ROOF OPEN WEB STEEL JOIST TO MANUFACTURED AND ERECTED IN ACCORDANCE WITH THE STEEL JOIST INSTITUTE MANUALS AND RECOMMENDATIONS USING Fy = 50 KSI.

13. PROVIDE SOUTHERN SPECIES PLYWOOD RATED FOR INDICATED SPANS AND LOADS BY AMERICAN PLYWOOD ASSOCIATION. INSTALL IN ACCORDANCE WITH ALL RECOMMENDATIONS BY THE AMERICAN PLYWOOD ASSOCIATION INCLUDING SIZE AND SPACING OF FASTENERS.

14. ALL CONCRETE BLOCK SHALL BE GRADE A HOLLOW LOAD-BREARING UNITS CONFORMING TO ASTM C90. ALL MORTAR SHALL BE TYPE S ATTAINING A STRENGTH OF 1800 PSI WITHIN 28 DAYS.

15. ROOF TRUSS DESIGN LOADS SHALL BE AS FOLLOWS:

	ROOF
TOP CHORD LIVE LOAD	20 PSF
TOP CHORD DEAD LOAD	10 PSF
BOTTOM CHORD LIVE LOAD	0 PSF
BOTTOM CHORD DEAD LOAD	10 PSF
TOP CHORD WIND UPLIFT LOAD	IN ACCORDANCE W/ THE SHAPE FACTORS DENOTED IN THE STANDARD BUILDING CODE

16. TRUSSES SHALL BE DESIGNED AND FABRICATED BY THE TRUSS MANUFACTURER. DESIGN SHALL CARRY THE SEAL OF AN ENGINEER REGISTERED IN THE STATE OF GEORGIA. CONFIGURATION AND SIZE OF WEB MEMBERS SHALL BE DETERMINED BY THE TRUSS MANUFACTURER. SHOP DRAWINGS AND CALCULATIONS FOR TRUSSES SHALL BE SUBMITTED FOR APPROVAL BEFORE FABRICATION. TRUSS SHOP DRAWINGS SHALL BE AVAILABLE AT THE SITE.

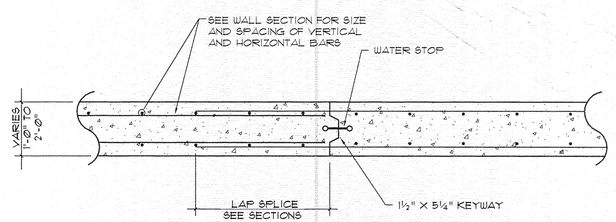
17. MAXIMUM LIVE LOAD DEFLECTION FOR ROOF TRUSSES = L/240.

18. LOADS ABOVE SHALL BE UTILIZED IN THE DESIGN OF GIRDER TRUSSES.

19. BOTTOM AND TOP CHORDS OF ALL ROOF TRUSSES SHALL BE BRACED BY 1"X 4"X 8' AT 10 FEET ON CENTER. ALL ADDITIONAL PERMANENT BRACING AS REQUIRED BY STRUCTURAL DESIGN OF THE TRUSSES AND FOR STABILITY OF THE TRUSSES AND FOR STABILITY OF THE TRUSSES SHALL BE INDICATED ON THE SHOP DRAWINGS. BRACING SHALL BE CONTINUOUS X - TYPE WITH HORIZONTAL STRUTS TOP AND BOTTOM, BETWEEN LESS THAN 4 TRUSSES, SPACED AT 20 FEET MAXIMUM. BRACING SHALL BE ATTACHED TO EACH TRUSS.

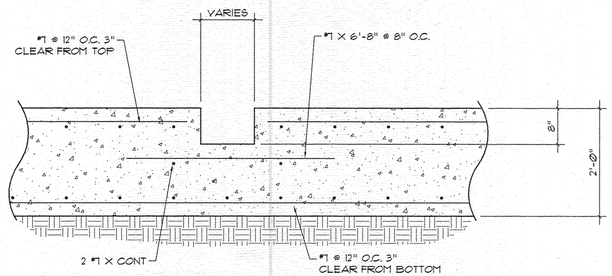
20. THE CONTRACTOR SHALL PROVIDE ADEQUATE TEMPORARY BRACING FOR THE TRUSSES DURING ERECTION.

21. TRUSS DESIGN SHALL ACCOUNT FOR LOAD IMPOSED UPON TRUSSES BY WEIGHT OF MECHANICAL UNITS. SEE MECHANICAL PLANS FOR UNIT LOCATION. VERIFY WEIGHT OF UNIT W/ EQUIP. SELECTED.



TYP. FLOOR OR WALL JOINT CN.JT.

SCALE: 3/4" = 1'-0"



SECTION A/S1

SCALE: 3/4" = 1'-0"

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WASTEWATER TREATMENT FACILITY

NO.	DATE	REVISION
1	2/11/03	GENERAL REVISIONS

PIEDMNT WATER FACILITY

CAREY STATION URBAN WATER REUSE FACILITY

FOUNDATION PLAN

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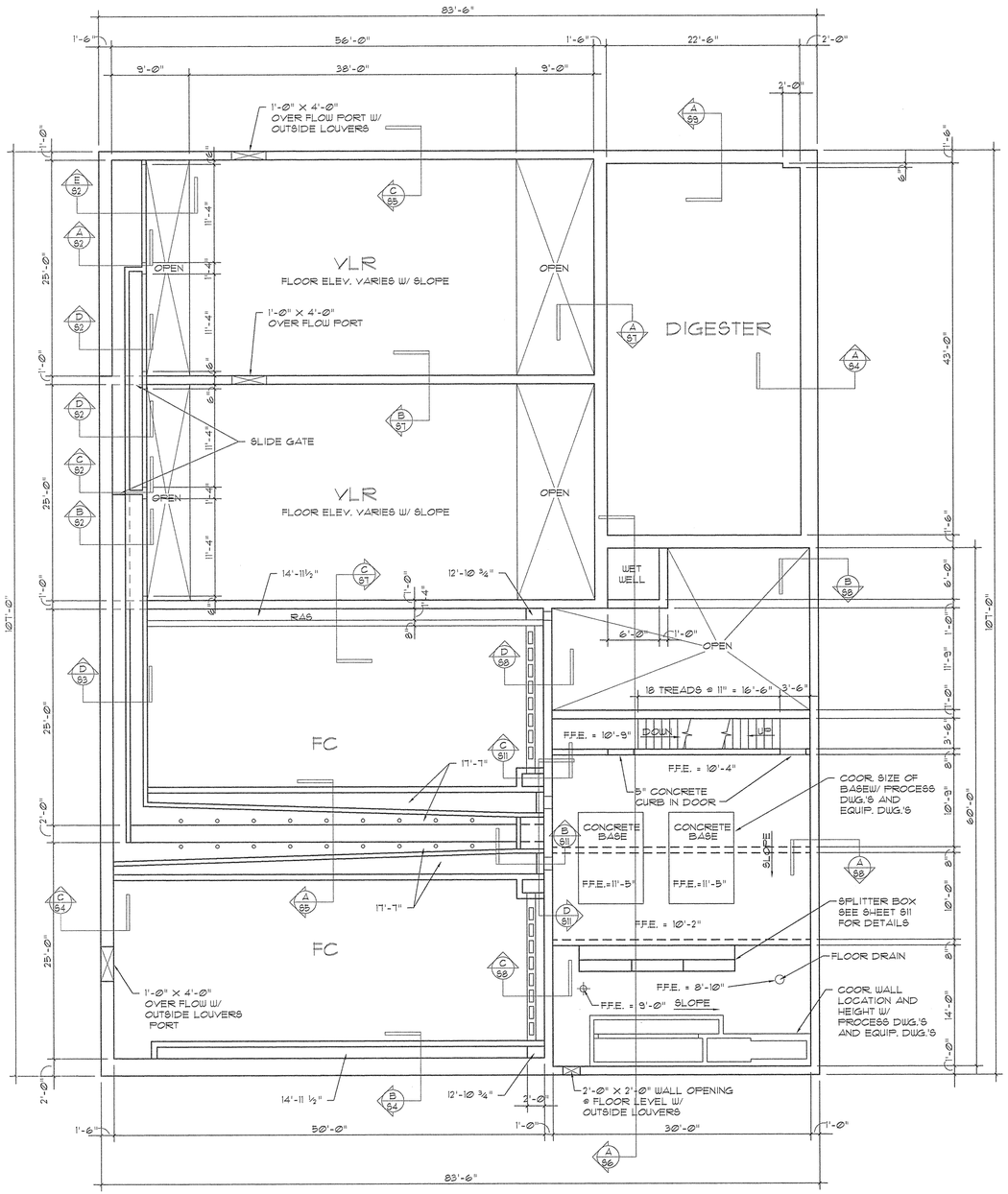
10/30/02	CS001	SHOWN	S1

REVISION DATE: 02/11/03 | CAD FILE: 02-185



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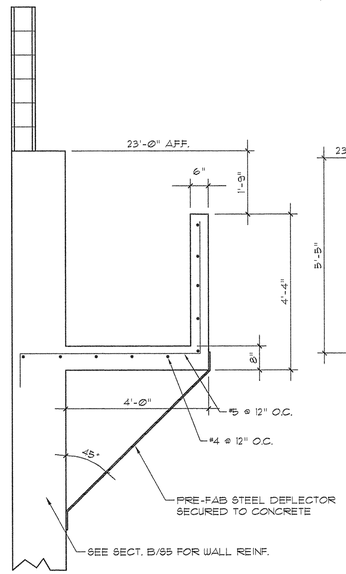

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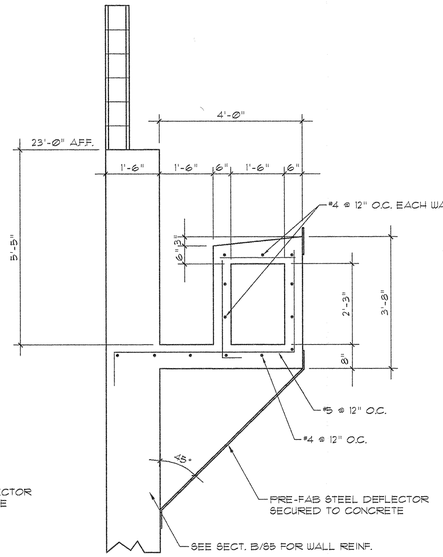

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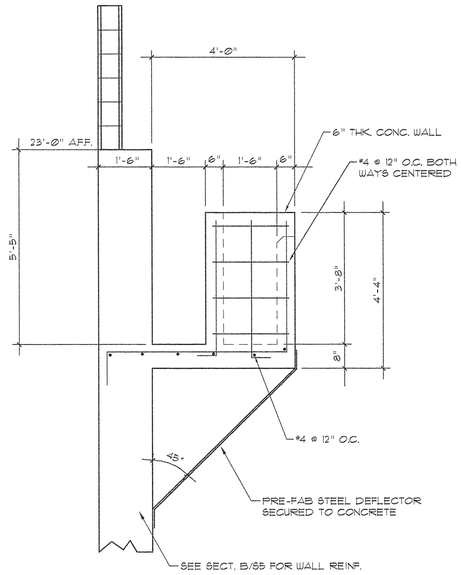

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SECTION (D/S2)
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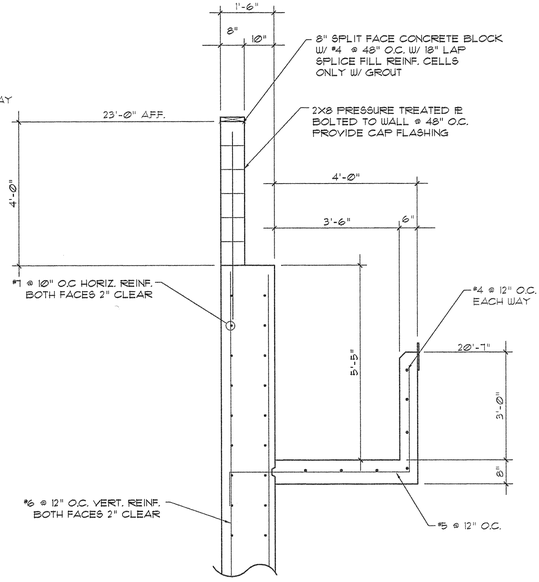

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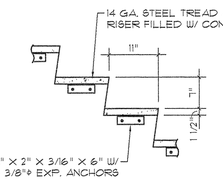

TYP. STAIR DETAIL
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INTERMEDIATE SLAB PLAN

DATE	PROJ. NO.	SCALE:	DWG. NO.
10/30/02	CS001	SHOWN	S2
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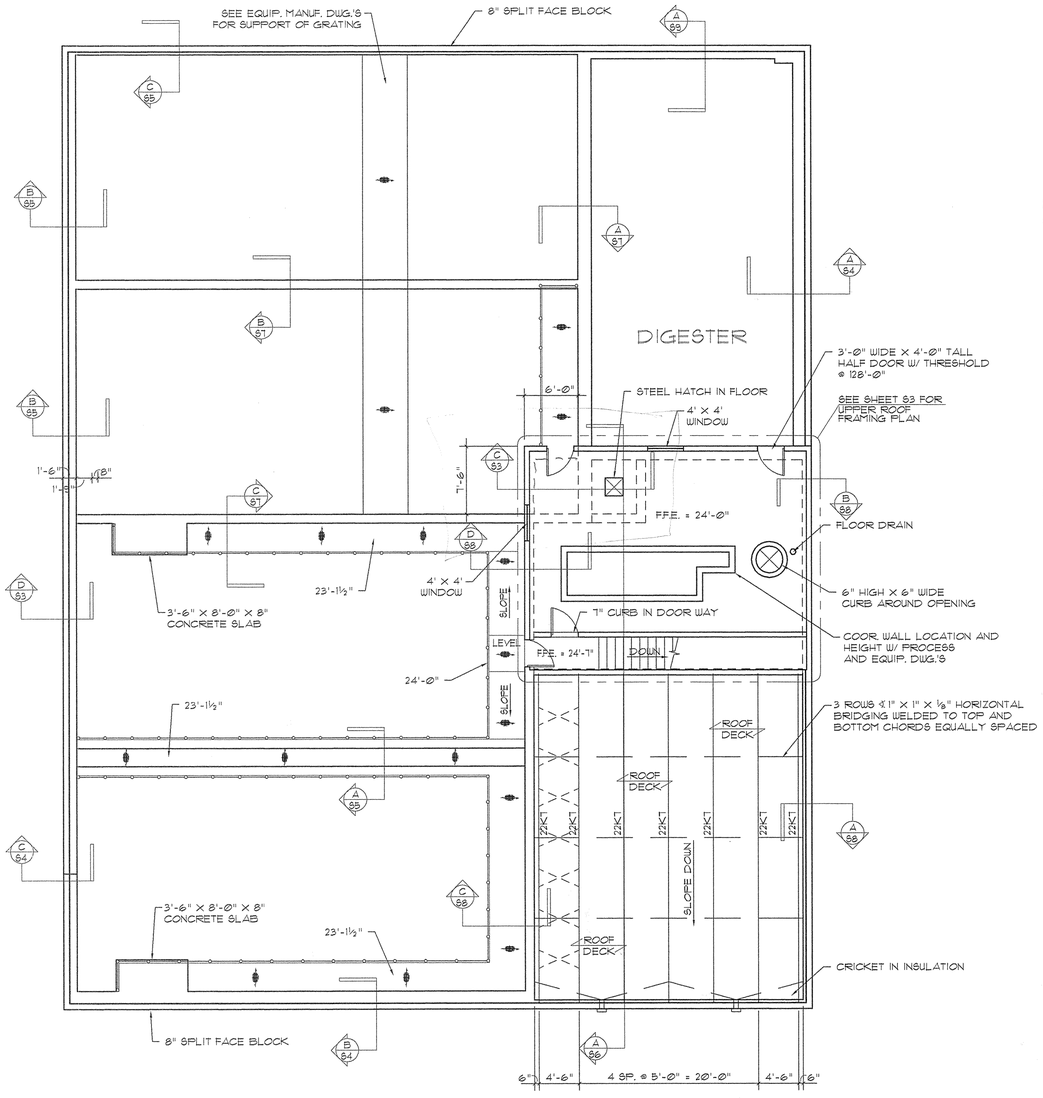

UPPER SLAB PLAN
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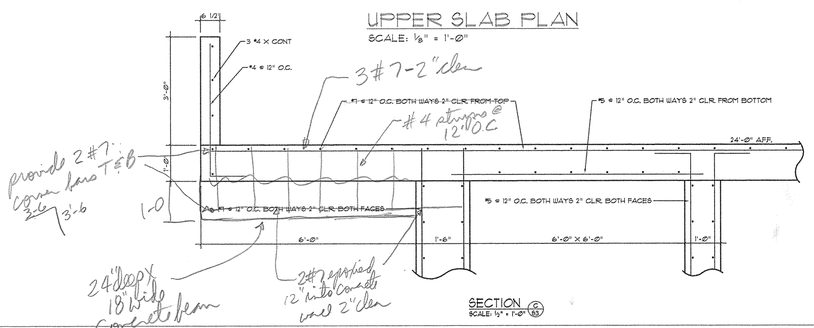

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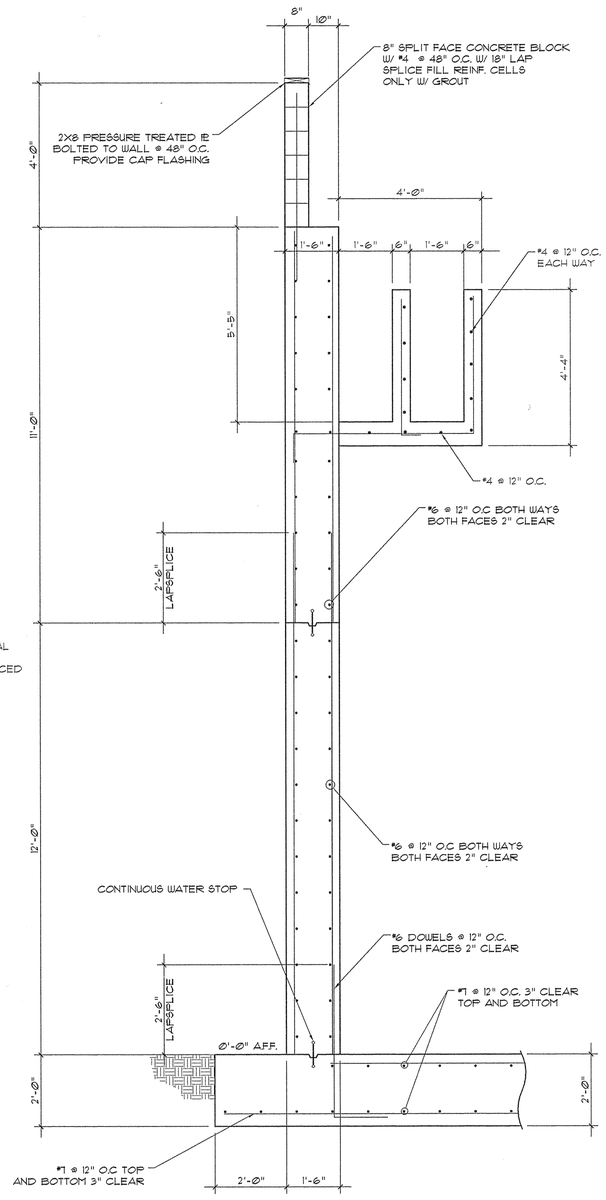

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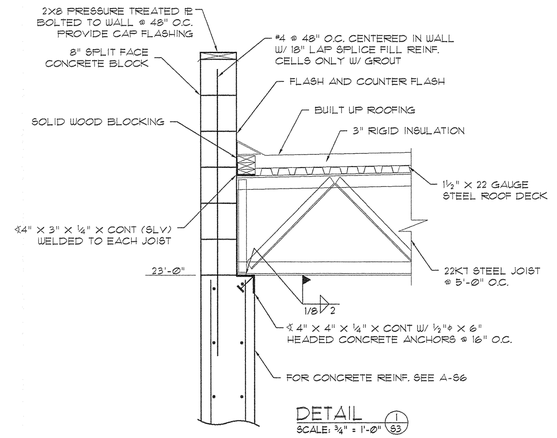

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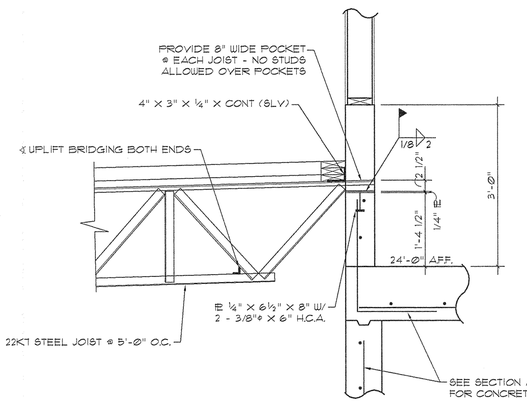

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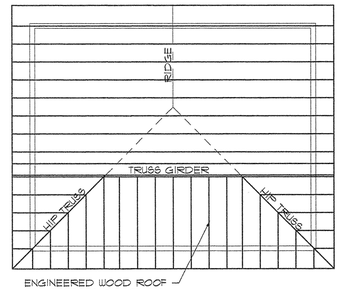

UPPER ROOF FRAMING PLAN
SCALE: ⅛" = 1'-0"

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WASTEWATER TREATMENT FACILITY

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PIEDMINT WATER FACILITY

CAREY STATION URBAN WATER REUSE FACILITY

UPPER SLAB PLAN

DATE	PROJ. NO.	SCALE:	DWG. NO:
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REVISION DATE: 02/11/03 CAD FILE: 02-185

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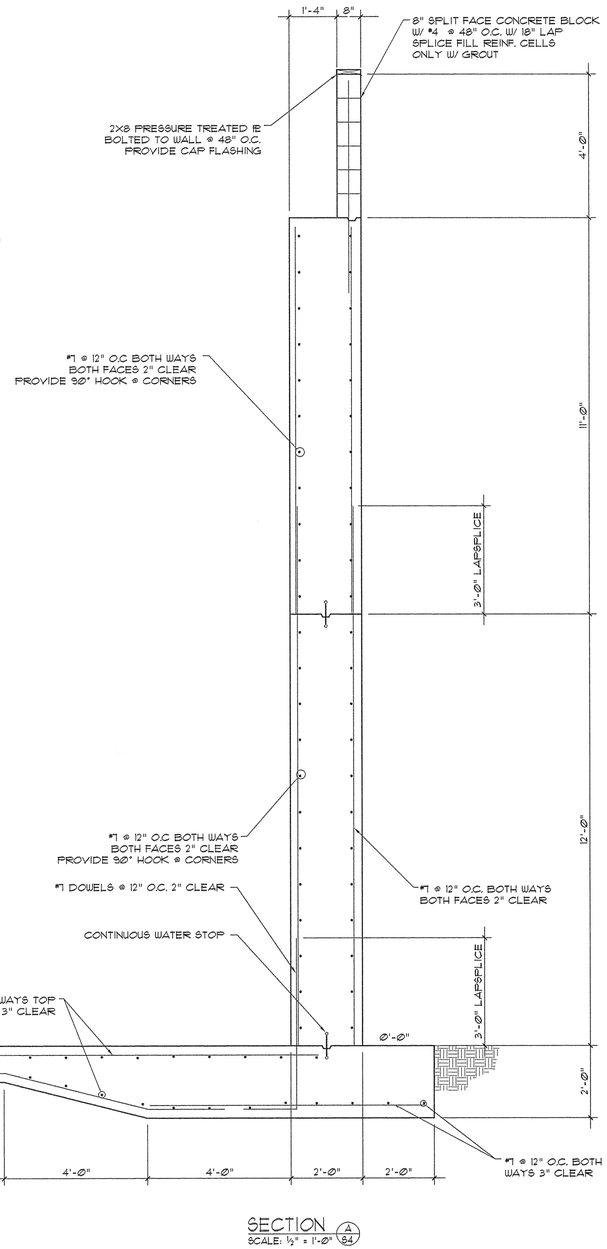

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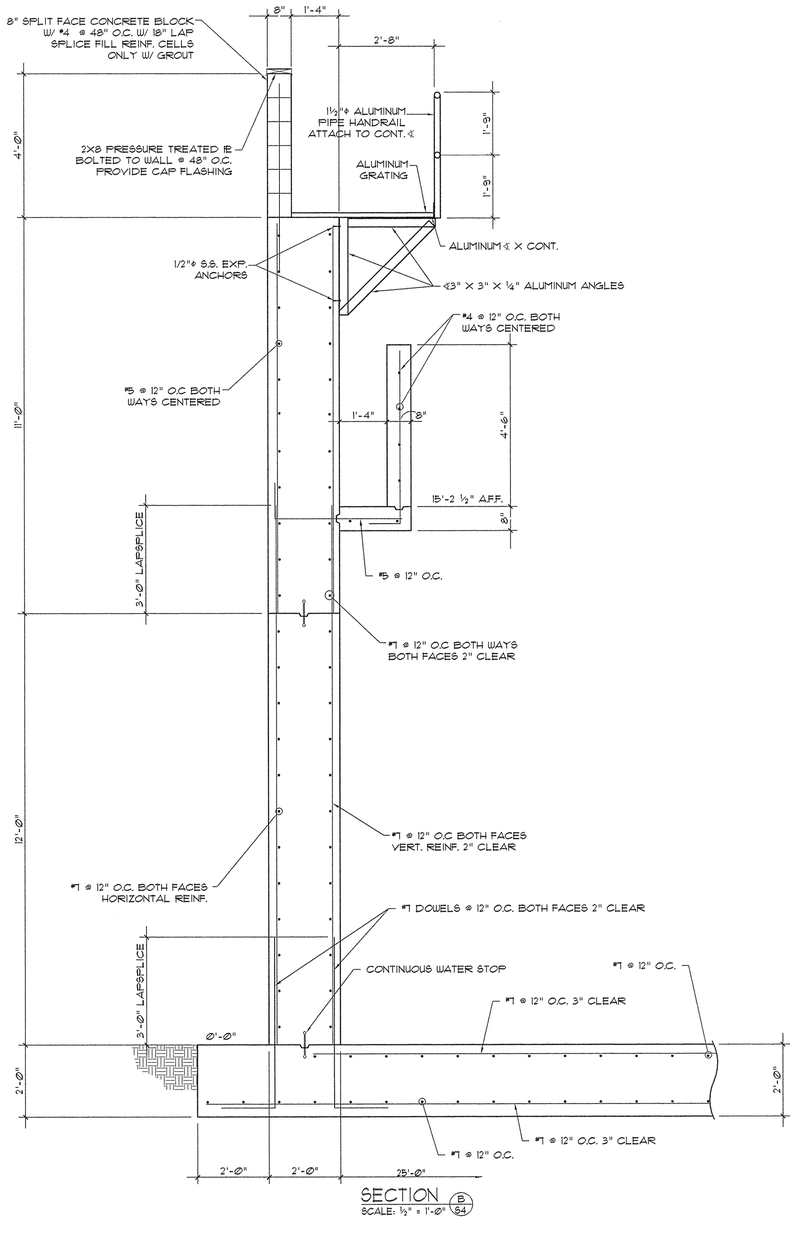

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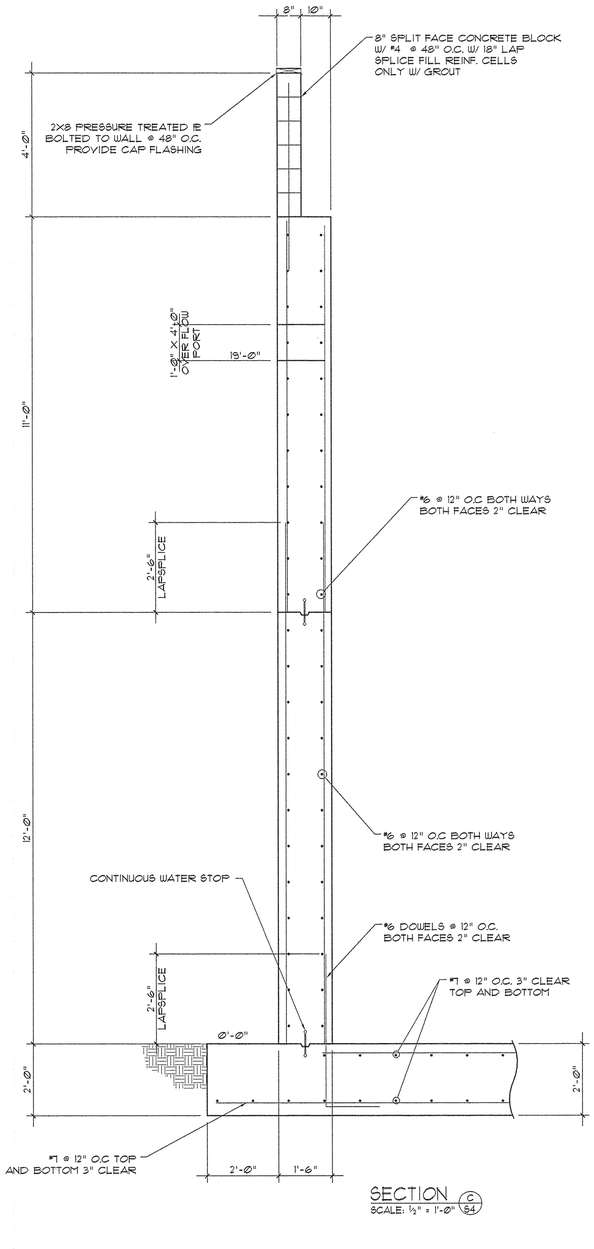

SECTION (C/S4) SCALE: ½" = 1'-0"

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WASTEWATER TREATMENT FACILITY

NO.	DATE	REVISION
1	2/11/03	GENERAL REVISIONS

PIEDMINT WATER FACILITY
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SECTIONS

DATE	PROJ. NO.	SCALE:	DWG. NO.
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REVISION DATE: 02/11/03 CAD FILE: 02-105

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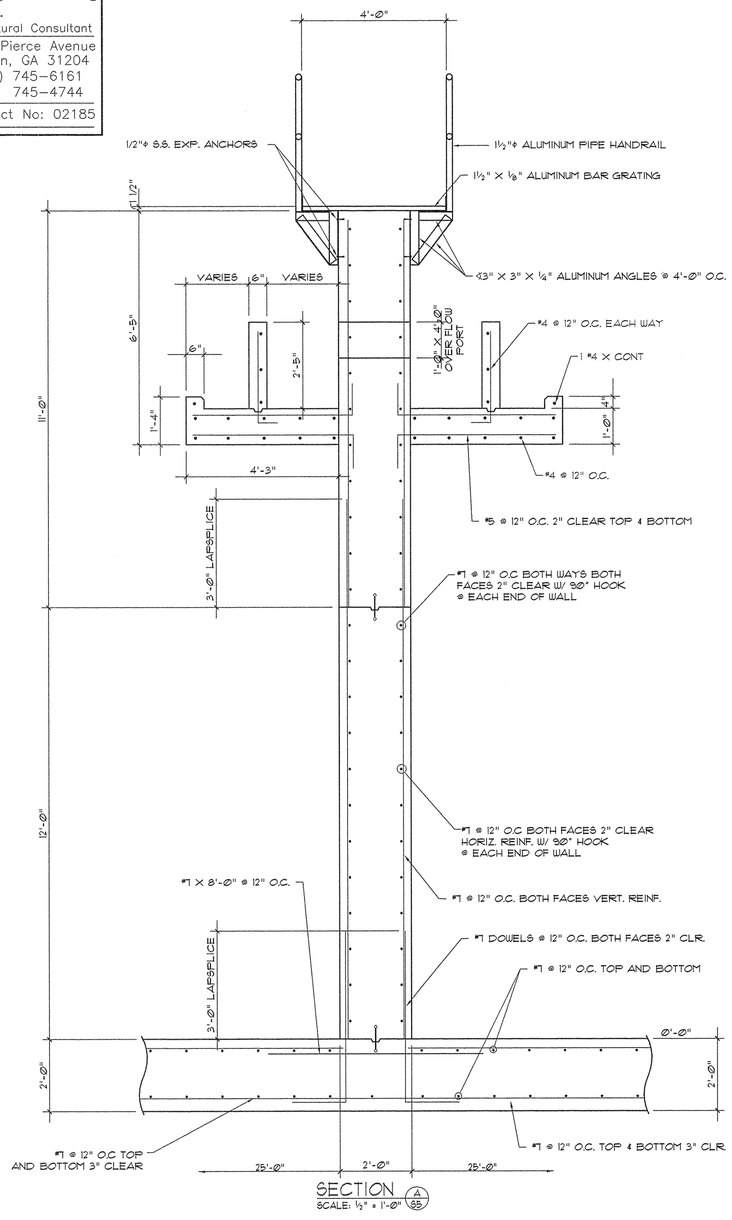

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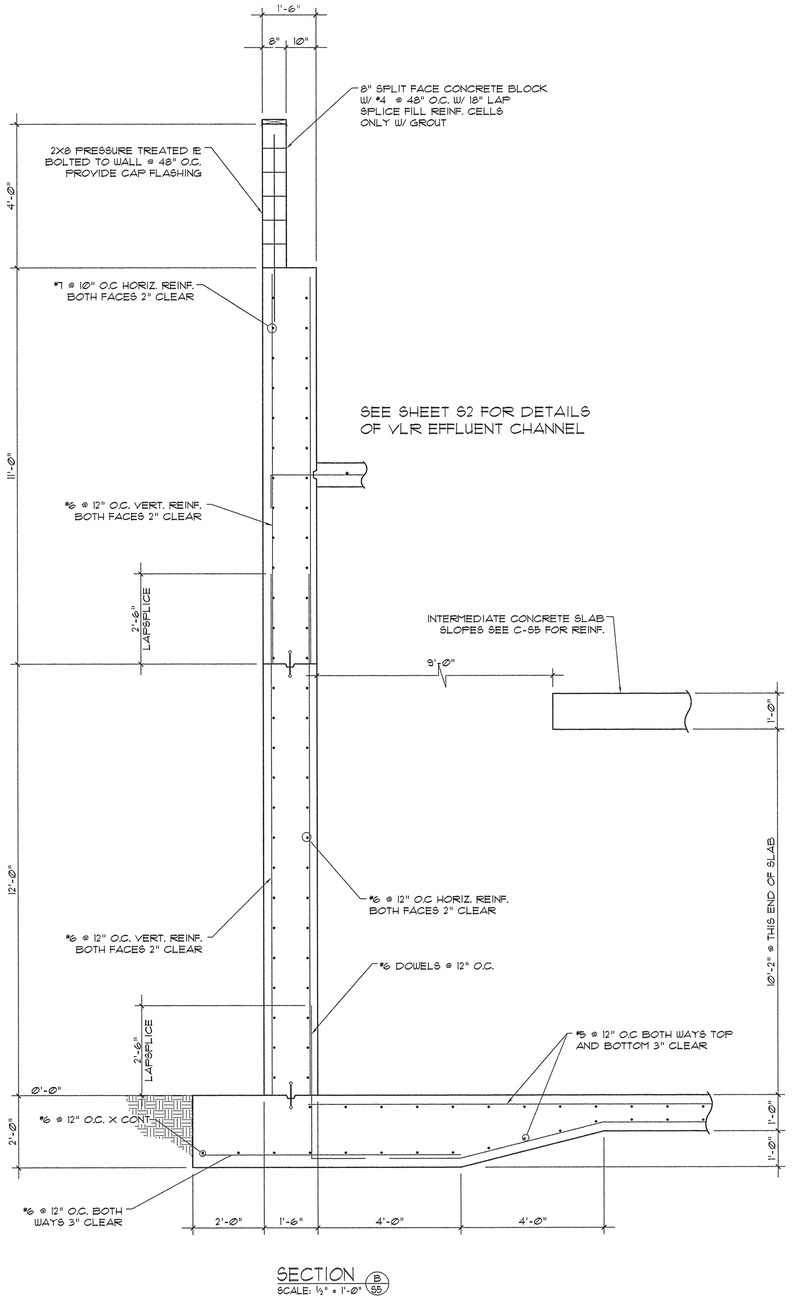

SEE SHEET S2 FOR DETAILS OF VLR EFFLUENT CHANNEL

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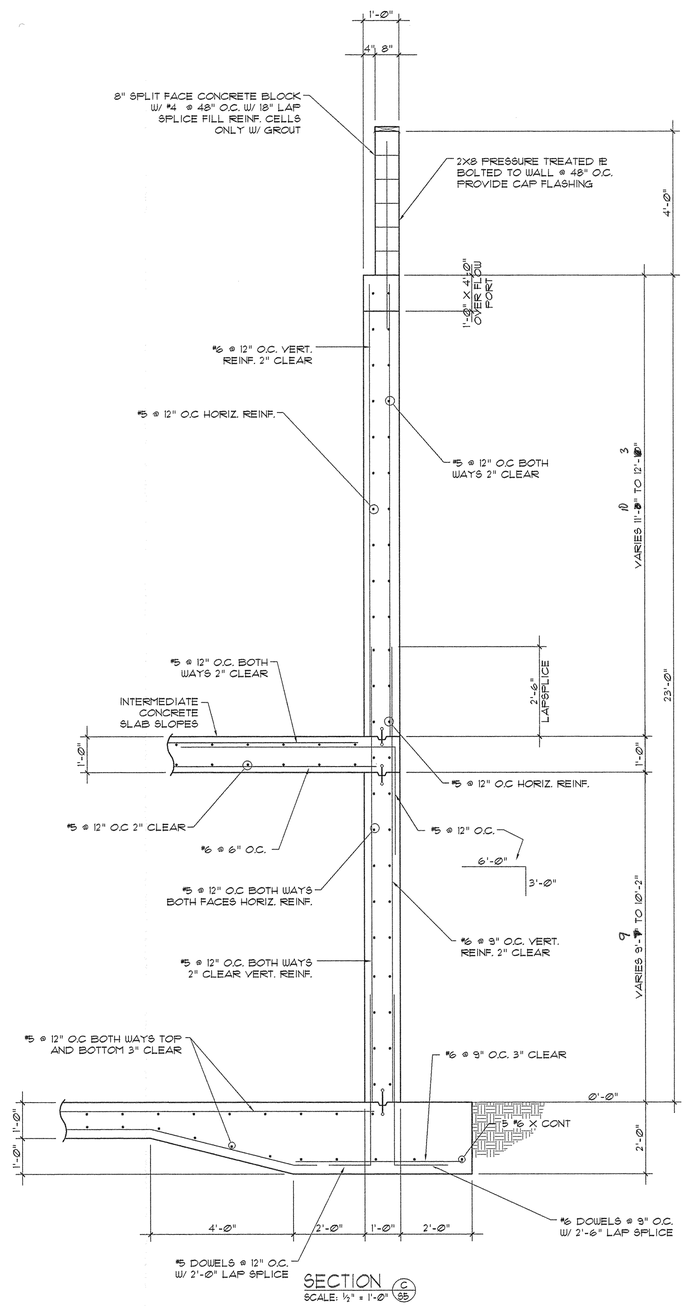

SECTION (C/S5)
SCALE: ½" = 1'-Ø"

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QUALIFLUENT
WASTEWATER TREATMENT FACILITY

NO.	DATE	REVISION
1	2/11/03	GENERAL REVISIONS

PIEDMINT WATER FACILITY
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SECTIONS

DATE	PROJ. NO.	SCALE	DWG. NO.
10/30/02	CS001	SHOWN	S5
REVISION DATE: 02/11/03		CAD FILE: 02-185	

Appendix B

SECTION 32 05 19 – GEOSYNTHETICS FOR EXTERIOR IMPROVMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This specification includes furnishing and installing HDPE and LLDPE geomembranes with a formulated sheet density of 0.940 g/cc or greater associated with HDPE geomembranes and a formulated sheet density of 0.939 or less for LLDPE geomembranes.

1.2 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. D 638, Standard Test Method for Tensile Properties of Plastics.
2. D 751, Standard Test Methods for Coated Fabrics.
3. D 792, Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
4. D 1004, Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
5. D 1204, Standard Test Method for Linear Dimensional Changes of Non Rigid Thermoplastic Sheeting or Film at Elevated Temperature.
6. D 1238, Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
7. D 1505, Standard Test Method for Density of Plastics by Density-Gradient Technique.
8. D 1603, Standard Test Method for Carbon Black in Olefin Plastics.
9. D 3895, Test Method for Oxidative Induction Time of Polyolefins by Thermal Analysis.
10. D 4218, Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.
11. D 4437, Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.
12. D 4833, Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products.
13. D 5199, Standard Test Method for Measuring Nominal Thickness of Smooth Geomembranes.
14. D 5397, Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefins using Notched Constant Tensile Load Test.
15. D 5596, Standard Practice for Microscopical Examination of Pigment Dispersion in Plastic Compounds.
16. D 5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
17. D 5721, Practice for Air-Oven Aging of Polyolefin Geomembranes.
18. D 5820, Test Method for Air Testing.
19. D 5885, Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High Pressure Differential Scanning Calorimetry.
20. D 5994, Standard Test Method for Measuring Nominal Thickness of Textured Geomembranes
21. D 6365, Standard Practice for the Nondestructive Testing of Geomembrane Seams using The Spark Test

22. D5820-95, Pressurized Air Channel Test for Dual Seamed Geomembranes

B. Geosynthetic Research Institute (GRI):

1. GRI GM 9, Cold Weather Seaming of Geomembranes
2. GRI GM 10, The Stress Crack Resistance of HDPE Geomembrane Sheet
3. GRI GM 13, Test Properties, Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes
4. GRI GM 14, Test Frequencies for Destructive Seam Testing Selecting, variable intervals for taking geomembrane destructive samples using the method of attributes.
5. GRI GM 12, Measurement of the Asperity Height of Textured Geomembranes Using a Depth Gage
6. GRI GM 17, Test Methods, Test Properties and Testing Frequency for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes
7. GRI GM 19, Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Related work specified elsewhere includes:

1. Section 31 25 00 – Erosion and Sedimentation Controls
2. Section 33 31 00 – Sanitary Utility Sewerage Piping
3. Section 33 05 13 – Manholes and Structures

1.4 QUALIFICATIONS

A. Manufacturer's Qualifications: The manufacturer of geomembrane of the type specified or similar product shall have at least five years experience in the manufacture of such geomembrane. In addition, the geomembrane manufacturer shall have manufactured at least 1,000,000 M^2 (10,000,000 FT^2) of the specified type of geomembrane or similar product during the last five years.

B. Installer's Qualifications

1. The Geomembrane Installer shall be the Manufacturer, approved Manufacturer's Installer or a contractor approved by the Owner's Representative to install the geomembrane.
2. The Geomembrane Installer shall have at least three years experience in the installation of the specified geomembrane or similar. The Geomembrane Installer shall have installed at least 10 projects involving a total of 5,000,000 ft^2 of the specified type of geomembrane or similar during the last three years.
3. Installation shall be performed under the direction of a field Installation Supervisor who shall be responsible throughout the geomembrane installation, for geomembrane panel layout, seaming, patching, testing, repairs, and all other activities of the Geomembrane Installer. The Field Installation Supervisor shall have installed or supervised the

installation and seaming of a minimum of 10 projects involving a total of 5,000,000 ft^2 of geomembrane of the type specified or similar product.

4. Seaming shall be performed under the direction of a Master Seamer (who may also be the Field Installation Supervisor or Crew Foreman) who has seamed a minimum of 3,000,000 ft^2 of geomembrane of the type specified or similar product, using the same type of seaming apparatus to be used in the current project. The Field Installation Supervisor and/or Master Seamer shall be present whenever seaming is performed.
5. All seaming, patching, other welding operations, and testing shall be performed by qualified technicians employed by the Geomembrane Installer.

1.5 SUBMITTALS

A. Submit the following items in accordance with Section 01 33 00

B. Submit the following to the Engineer or Owner, for review and approval, within a reasonable time so as to expedite shipment or installation of the Geomembrane:

1. Documentation of manufacturer's qualifications.
2. Manufacturer's Quality Control program manual or descriptive documentation.
3. A material properties sheet, including at a minimum all properties specified in GRI GM 13, including test methods used.
4. Sample of the material.
5. Documentation of Installer's qualifications.

    a. Submit a list of at least ten completed facilities. For each installation, provide: name and type of facility; its location; the date of installation; name and telephone number of contact at the facility; type and thickness of geomembrane and; surface area of the installed geomembrane.
    b. Submit resumes or qualifications of the Installation Supervisor, Master Seamer and Technicians to be assigned to this project.
    c. Quality Control Program.

6. Example Material Warranty and Liner Installation Warranty

C. Shop Drawings

1. Submit copies of shop drawings for engineer's approval within a reasonable time so as not to delay the start of geomembrane installation. Shop drawings shall show the proposed panel layout identifying seams and details. Seams should generally follow the direction of the slope. Butt seams or roll-end seams should not occur on a slope unless approved by the Owner's Representative. Butt seams on a slope, if allowed, should be staggered.
2. Placement of geomembrane should not be allowed to proceed until Owner's Representative has received and approved the shop drawings.

D. Additional Submittals (In-Progress and at Completion)

1. Manufacturer's warranty.
2. Geomembrane installation warranty.
3. Daily written acceptance of subgrade surface.

4. Low-temperature seaming procedures if applicable.
5. Prequalification test seam samples.
6. Field seam non-destructive test results.
7. Field seam destructive test results.
8. Daily field installation reports.
9. Installation record drawing.

1.6 DELIVERY, STORAGE AND HANDLING

A. Each roll of geomembrane delivered to the site shall be labeled by the manufacturer. The label shall be firmly affixed and shall clearly state the manufacturer's name, product identification, material thickness, roll number, roll dimensions and roll weight.

B. Geomembrane shall be protected from mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions.

C. Rolls shall be stored away from high traffic areas. Continuously and uniformly support rolls on a smooth, level prepared surface.

1.7 PROJECT CONDITIONS

A. Geomembrane should not be installed in the presence of standing water, while precipitation is occurring, during excessive winds, or when material temperatures are outside the limits specified in Section 3.3.

1.8 WARRANTY

A. The manufacturer shall provide a 20-year prorated warranty on the geomembrane material. The warranty shall take effect upon project substantial completion.

B. The Geomembrane Installer shall guarantee the geomembrane installation against defects in the installation and workmanship for 1-year commencing with the date of final acceptance.

PART 2 - PRODUCTS

2.1 GEOMEMBRANCE

A. Manufacture
1. Agru America
2. Or Equal

B. The geomembrane shall consist of new, first quality products designed and manufactured specifically for the purpose of this work which shall have been satisfactorily demonstrated by prior testing to be suitable and durable for such purposes. The geomembrane rolls shall be seamless, high density polyethylene (HDPE - Formulated Sheet Density ≥ 0.94g/cc) or linear low density polyethylene (LLDPE - Formulated Sheet Density ≤ 0.939 g/cc) containing no

plasticizers, fillers or extenders and shall be free of holes, blisters or contaminants, and leak free verified by 100% in line spark or equivalent testing. The geomembrane shall be supplied as a continuous sheet with no factory seams in rolls.

C. Material conformance testing by the Owner's Representative, if required, will be conducted using in-plant sampling or as specified for the project.

2.2 GEOTEXTILE

A. Manufacture
   1. Agru America - AGRUTEX
   2. Or Equal

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION

A. The subgrade shall be prepared in accordance with the project specifications. The geomembrane subgrade shall be uniform and free of sharp or angular objects that may damage the geomembrane prior to installation of the geomembrane.

B. Geotextiles may be used to compensate for irregular subgrades.

C. The Geomembrane Installer and Owner’s Representative shall inspect the surface to be covered with the geomembrane on each day's operations prior to placement of geomembrane to verify suitability.

D. The Geomembrane Installer and Owner’s Representative shall provide daily written acceptance for the surface to be covered by the geomembrane in that day's operations. The surface shall be maintained in a manner, during geomembrane installation, to ensure subgrade suitability.

E. All subgrade damaged by construction equipment and deemed unsuitable for geomembrane deployment shall be repaired prior to placement of the geomembrane. All repairs shall be approved by the Owner's Representative and the Geomembrane Installer. This damage, repair, and the responsibilities of the contractor and Geomembrane Installer shall be defined in the preconstruction meeting.

3.2 GEOMEMBRANE PLACEMENT

A. The geomembrane shall be installed to the limits shown on the project drawings and essentially as shown on approved panel layout drawings.

B. No geomembrane material shall be unrolled and deployed if the material temperatures are lower than 32 degrees F unless otherwise approved by the Owner's Representative. The specified minimum temperature for material deployment may be adjusted by the Owner’s Representative. Temperature limitations should be defined in the preconstruction meeting. Typically, only the

quantity of geomembrane that will be anchored and seamed together in one day should be deployed.

C. No vehicular traffic shall travel on the geomembrane other than an approved low ground pressure Vehicle or equivalent.

D. Sand bags or equivalent ballast shall be used as necessary to temporarily hold the geomembrane material in position under the foreseeable and reasonably - expected wind conditions. Sand bag material shall be sufficiently close- knit to prevent soil fines from working through the bags and discharging on the geomembrane.

E. Geomembrane placement shall not be done if moisture prevents proper subgrade preparation, panel placement, or panel seaming. Moisture limitations should be defined in the preconstruction meeting.

F. Damaged panels or portions of the damaged panels which have been rejected shall be marked and their removal from the work area recorded.

G. The geomembrane shall not be allowed to "bridge over" voids or low areas in the subgrade. The geomembrane shall rest in intimate contact with the subgrade.

H. Wrinkles caused by panel placement or thermal expansion should be minimized.

I. In general, seams shall be oriented parallel to the line of the maximum slope. In corners and odd shaped geometric locations, the total length of field seams shall be minimized. Seams shall not be located at low points in the subgrade unless geometry requires seaming at such locations and if approved by the Owner's Representative.

J. Overlapping: The panels shall be overlapped prior to seaming to whatever extent is necessary to affect a good weld and allow for proper testing. In no case shall this overlap be less than 3 in..

3.3 SEAMING PROCEDURES

A. Cold weather installations should follow guidelines as outlined in GRI GM9.

B. No geomembrane material shall be seamed when liner temperatures are less than 32 degrees F unless the following conditions are complied with:

1. Seaming of the geomembrane at material temperatures below 32 degrees F is allowed if the Geomembrane Installer can demonstrate to the Owner's Representative, using pre-qualification test seams, that field seams comply with the project specifications, the safety of the crew is ensured, and geomembrane material can be fabricated (i.e. pipeboots, penetrations, repairs. etc.) at sub-freezing temperatures.
2. The Geomembrane Installer shall submit to the Owner's Representative for approval, detailed procedures for seaming at low temperatures, possibly including the following:

    a. Preheating of the geomembrane
    b. The provision of a tent or other device if necessary to prevent heat losses during seaming and rapid heat losses subsequent to seaming.

c. Number of test welds to determine appropriate seaming parameters

C. No geomembrane material shall be seamed when the sheet temperature is above 170 degrees F as measured by an infrared thermometer or surface thermocouple unless otherwise approved by the Owner's Representative. This approval will be based on recommendations by the manufacturer and on a field demonstration by the Geomembrane Installer using prequalification test seams to demonstrate that seams comply with the specification.

D. Seaming shall primarily be performed using automatic fusion welding equipment and techniques. Extrusion welding shall be used where fusion welding is not possible such as at pipe penetrations, patches, repairs and short (less than a roll width) runs of seams.

E. Fishmouths or excessive wrinkles at the seam overlaps shall be minimized and when necessary cut along the ridge of the wrinkles back into the panel so as to effect a flat overlap. The cut shall be terminated with a keyhole cut (nominal 10 mm (1/2 in) diameter hole) so as to minimize crack/tear propagation. The overlay shall subsequently be seamed. The key hole cut shall be patched with an oval or round patch of the same base geomembrane material extending a minimum of 150 mm (6 in.) beyond the cut in all directions.

3.4 PIPE AND STRUCTURE PENETRATION SEALING SYSTEM

A. Provide penetration sealing system as shown in the Project Drawings.

B. Penetrations shall be constructed from the base geomembrane material, flat stock, prefabricated boots and accessories as shown on the Project Drawings. The pre-fabricatedor field fabricated assembly shall be field welded to the geomembrane as shown on the Project Drawings so as to prevent leakage. This assembly shall be tested as outlined in section 3.5.C. Alternatively, where field non destructive testing cannot be performed, attachments will be field spark tested by standard holiday leak detectors in accordance with ASTM 6365 Spark testing should be done in areas where both air pressure testing and vacuum testing are not possible.

1. Equipment for Spark testing shall be comprised of but not limited to: A hand held holiday spark tester and conductive wand that generates a high voltage.
2. The testing activities shall be performed by the Geomembrane Installer by placing an electrically conductive tape or wire beneath the seam prior to welding. A trial seam containing a non welded segment shall be subject to a calibration test to ensure that such a defect (non welded segment) will be identified under the planned machine settings and procedures. Upon completion of the weld, enable the spark tester and hold approximately 25mm (1 in) above the weld moving slowly over the entire length of the weld in accordance with ASTM 6365. If there is no spark the weld is considered to be leak free.
3. A spark indicates a hole in the seam. The faulty area shall be located, repaired and retested by the Geomembrane Installer.
4. Care should be taken if flammable gases are present in the area to be tested.

3.5 FIELD QUALITY CONTROL

A. The Owner’s Representative shall be notified prior to all pre qualification and production welding and testing, or as agreed upon in the pre construction meeting.

B. Prequalification Test Seams

1. Test seams shall prepare and tested by the Geomembrane Installer to verify that seaming parameters (speed, temperature and pressure of welding equipment) are adequate.
2. Test seams shall be made by each welding technician and tested in accordance with ASTM D 4437 at the beginning of each seaming period. Test seaming shall be performed under the same conditions and with the same equipment and operator combination as production seaming. The test seam shall be approximately 10 feet long for fusion welding and 3 feet long for extrusion welding with the seam centered lengthwise. At a minimum, tests seams should be made by each technician 1 time every 4–6 hours; additional tests may be required with changes in environmental conditions.
3. Two 1 in wide specimens shall be die-cut by the Geomembrane Installer from each end of the test seam. These specimens shall be tested by the Geomembrane Installer using a field tensiometer testing both tracks for peel strength and also for shear strength. Each specimen should fail in the parent material and not in the weld, “Film Tear Bond" (F.T.D. failure). Seam separation equal to or greater than 25% of the track width shall be considered a failing test.
4. The minimum acceptable seam strength values to be obtained for all specimens tested are listed in Subsection 3.6.D.4 of this Section. Four specimens shall pass for the test seam to be a passing seam.
5. If a test seam fails, an additional test seam shall be immediately conducted. If the additional test seam fails, the seaming apparatus shall be rejected and not used for production seaming until the deficiencies are corrected and a successful test seam can be produced.
6. A sample from each test seam shall be labeled. The label shall indicate the date, geomembrane temperature, number of the seaming unit, technician performing the test seam and pass or fail description. The sample shall then be given to the Owner's Representative for archiving.

C. Field Seam Non-destructive Testing

1. All field seams shall be non-destructively tested by the Geomembrane Installer over the full seam length before the seams are covered. Each seam shall be numbered or otherwise designated. The location, date, test unit, name of tester and outcome of all non-destructive testing shall be recorded and submitted to the Owner's Representative.
2. Testing should be done as the seaming work progresses, not at the completion of all field seaming, unless agreed to in advance by the Owner's Representative. All defects found during testing shall be numbered and marked immediately after detection. All defects found should be repaired, retested and remarked to indicate acceptable completion of the repair.
3. Non-destructive testing shall be performed using vacuum box, air pressure or spark testing equipment.
4. Non-destructive tests shall be performed by experienced technicians familiar with the specified test methods. The Geomembrane Installer shall demonstrate to the Owner's Representative all test methods to verify the test procedures are valid.
5. Extrusion seams shall be vacuum box tested by the Geomembrane Installer in accordance with ASTM D 4437 and ASTM D 5641 with the following equipment and procedures:

    a. Equipment for testing extrusion seams shall be comprised of but not limited to: a vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the base, port hole or valve assembly and a vacuum

gauge; a vacuum pump assembly equipped with a pressure controller and pipe connections; a rubber pressure/vacuum hose with fittings and connections; a plastic bucket; wide paint brush or mop; and a soapy solution.

b. The vacuum pump shall be charged and the tank pressure adjusted to approximately 35 kPa (5 psig).

c. The Geomembrane Installer shall create a leak tight seal between the gasket and geomembrane interface by wetting a strip of geomembrane approximately 12 in by 48 in (length and width of box) with a soapy solution, placing the box over the wetted area, and then compressing the box against the geomembrane. The Geomembrane Installer shall then close the bleed valve, open the vacuum valve, maintain initial pressure of approximately 35 kPa (5 psig) for approximately 5 seconds. The geomembrane should be continuously examined through the viewing window for the presence of soap bubbles, indicating a leak. If no bubbles appear after 5 seconds, the area shall be considered leak free. The box shall be depressurized and moved over the next adjoining area with an appropriate overlap and the process repeated.

d. All areas where soap bubbles appear shall be marked, repaired and then retested.

e. At locations where seams cannot be non-destructively tested, such as pipe penetrations, alternate nondestructive spark testing (as outlined in section 3.5.B) or equivalent should be substituted.

f. All seams that are vacuum tested shall be marked with the date tested, the name of the technician performing the test and the results of the test.

6. Double Fusion seams with an enclosed channel shall be air pressure tested by the Geomembrane Installer in accordance with ASTM D 5820 and ASTM D 4437 and the following equipment and procedures:

a. Equipment for testing double fusion seams shall be comprised of but not limited to: an air pump equipped with a pressure gauge capable of generating and sustaining a pressure of 210 kPa (30 psig), mounted on a cushion to protect the geomembrane; and a manometer equipped with a sharp hollow needle or other approved pressure feed device.

b. The Testing activities shall be performed by the Geomembrane Installer. Both ends of the seam to be tested shall be sealed and a needle or other approved pressure feed device inserted into the tunnel created by the double wedge fusion weld. The air pump shall be adjusted to a pressure of 210 kPa (30 psig), and the valve closed,. Allow 2 minutes for the injected air to come to equilibrium in the channel, and sustain pressure for 5 minutes. If pressure loss does not exceed 28 kPa (4 psig) after this five minute period the seam shall be considered leak tight. Release pressure from the opposite end verifying pressure drop on needle to ensure testing of the entire seam. The needle or other approved pressure feed device shall be removed and the feed hole sealed.

c. If loss of pressure exceeds 28 kPa (4 psig) during the testing period or pressure does not stabilize, the faulty area shall be located, repaired and retested by the Geomembrane Installer.

d. Results of the pressure testing shall be recorded on the liner at the seam tested and on a pressure testing record.

D. Destructive Field Seam Testing

1. One destructive test sample per 500 linear ft seam length or another predetermined length in accordance with GRI GM 14 shall be taken by the Geomembrane Installer from a location specified by the Owner's Representative. The Geomembrane Installer shall not be informed in advance of the sample location. In order to obtain test results prior to completion of geomembrane installation, samples shall be cut by the Geomembrane Installer as directed by the Owner's Representative as seaming progresses.
2. All field samples shall be marked with their sample number and seam number. The sample number, date, time, location, and seam number shall be recorded. The Geomembrane Installer shall repair all holes in the geomembrane resulting from obtaining the seam samples. All patches shall be vacuum box tested or spark tested. If a patch cannot be permanently installed over the test location the same day of sample collection, a temporary patch shall be tack welded or hot air welded over the opening until a permanent patch can be affixed.
3. The destructive sample size shall be 12 in wide by 36 in long with the seam centered lengthwise. The sample shall be cut into three equal sections and distributed as follows: one section given to the Owner's Representative as an archive sample; one section given to the Owner's Representative for laboratory testing as specified in paragraph 5 below; and one section retained by the Geomembrane Installer for field testing as specified in paragraph 4 below.
4. For field testing, the Geomembrane Installer shall cut 10 identical 1 in wide replicate specimens from his sample. The Geomembrane Installer shall test five specimens for seam shear strength and five for peel strength. Peel tests will be performed on both inside and outside weld tracks. To be acceptable, 4 of 5 test specimens must pass the stated criteria in section 2.1 with less than 25% separation. If 4 of 5 specimens pass, the sample qualifies for testing by the testing laboratory if required.
5. If independent seam testing is required by the specifications it shall be conducted in accordance with ASTM 5820 or ASTM D4437.
6. Reports of the results of examinations and testing shall be prepared and submitted to the Owner's Representative.
7. For field seams, if a laboratory test fails, that shall be considered as an indicator of the possible inadequacy of the entire seamed length corresponding to the test sample. Additional destructive test portions shall then be taken by the Geomembrane Installer at locations indicated by the Engineer; typically 10ft on either side of the failed sample and laboratory seem tests shall be performed. Passing tests shall be an indicator of adequate seams. Failing tests shall be an indicator of non-adequate seams and all seams represented by the destructive test location shall be repaired with a cap-strip extrusion welded to all sides of the capped area. All cap-strip seams shall be non-destructively vacuum box tested until adequacy of the seams is achieved. Cap strip seams exceeding 150 ft in length shall be destructively tested.

E. D. Identification of Defects

1. Panels and seams shall be inspected by the Installer and Owner's Representative during and after panel deployment to identify all defects, including holes, blisters, undispersed raw materials and signs of contamination by foreign matter.

F. Evaluation of Defects: Each suspect location on the liner (both in geomembrane seam and non-seam areas) shall be non-destructively tested using one of the methods described in Section 3.6.B. Each location which fails non-destructive testing shall be marked, numbered, measured and posted on the daily "installation" drawings and subsequently repaired.

1. If a destructive sample fails the field or laboratory test, the Geomembrane Installer shall repair the seam between the two nearest passed locations on both sides of the failed destructive sample location.
2. Defective seams, tears or holes shall be repaired by reseaming or applying a extrusion welded cap strip.
3. Reseaming may consist of either:

    a. Removing the defective weld area and rewelding the parent material using the original welding equipment; or
    b. Reseaming by extrusion welding along the overlap at the outside seam edge left by the fusion welding process.

4. Blisters, larger holes, and contamination by foreign matter shall be repaired by patches and/or extrusion weld beads as required. Each patch shall extend a minimum of 6 in beyond all edges of the defects.
5. All repairs shall be measured, located and recorded.

G. Verification of Repairs on Seams: Each repair shall be non-destructively tested using either vacuum box or spark testing methods. Tests which pass the non-destructivetest shall be taken as an indication of a successful repair. Failed tests shall be reseamed and retested until a passing test results. The number, date, location, technician and test outcome of each patch shall be recorded.

H. Daily Field Installation Reports: At the beginning of each day's work, the Installer shall provide the Engineer with daily reports for all work accomplished on the previous work day. Reports shall include the following:

1. Total amount and location of geomembrane placed;
2. Total length and location of seams completed, name of technicians doing seaming and welding unit numbers;
3. Drawings of the previous day's installed geomembrane showing panel numbers, seam numbers and locations of non-destructive and destructive testing;
4. Results of pre-qualification test seams;
5. Results of non-destructive testing; and
6. Results of vacuum testing of repairs.

I. Destructive test results shall be reported prior to covering of liner or within 48 hours.

3.6 LINER ACCEPTANCE

A. Geomembrane liner will be accepted by the Owner's Representative when:

1. The entire installation is finished or an agreed upon subsection of the installation is finished;
2. All Installer’s QC documentation is completed and submitted to the owner
3. Verification of the adequacy of all field seams and repairs and associated geomembrane testing is complete.

3.7 ANCHOR TRENCH

A. Construct as specified on the project Drawings

3.8 DISPOSAL OF SCRAP MATERIALS

A. On completion of installation, the Geomembrane Installer shall dispose of all trash and scrap material in a location approved by the Owner, remove equipment used in connection with the work herein, and shall leave the premises in a neat acceptable manner. No scrap material shall be allowed to remain on the geomembrane surface.

END OF SECTION 32 05 19

Appendix C

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes hollow-metal work.

B. Related Requirements:

1. Section 08 71 00 - Door Hardware for Hollow-Metal Doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.

4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification:

1. For each type of exposed finish required, prepared on Samples of not less than 3” x 5”.
2. For "Doors" and "Frames", prepare Samples approximately 8” x 10” to demonstrate compliance with requirements for quality of materials and construction:

a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

E. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.7 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two (2) removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4”-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Republic Doors and Frames
2. Steelcraft; an Allegion brand
3. Or Approved Equal

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Standard-Duty Doors and Frames: SDI A250.8, Level 1. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level C according to SDI A250.4
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches
c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.032 inch.
d. Edge Construction: Model 2, Seamless
e. Core: Polyurethane with vertical steel stiffener

3. Frames:

a. Materials: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction:

1) Knock down - for frames in gypsum board partitions, except fire rated frames
2) Full profile welded - frames in masonry and concrete walls, fire rated frames over 7'-0" in gypsum board.

4. Exposed Finish: Prime, Factory

C. Heavy-Duty Doors and Frames: SDI A250.8, Level 2. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches
c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
d. Edge Construction: Model 2, Seamless
e. Core: Polyurethane with vertical steel stiffener

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch.
b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction:

1) Knock down - for frames in gypsum board partitions, except fire rated frames
2) Full profile welded - frames in masonry and concrete walls, fire rated frames over 7'-0" in gypsum board.

4. Exposed Finish: Prime, Factory

D. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level A according to SDI A250.4
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches
c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.053 inch.
d. Edge Construction: Model 3, Stile and Rail
e. Core: Core: Polyurethane, vertical steel stiffener

3. Frames:

   a. Materials: Metallic-coated, steel sheet, minimum thickness of 0.053 inch.
   b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
   c. Construction:

      1) Knock down - for frames in gypsum board partitions, except fire rated frames
      2) Full profile welded - frames in masonry and concrete walls, fire rated frames over 7'-0" in gypsum board.

4. Exposed Finish: Prime, Factory

E. Hollow-Metal Doors and Frames: NAAMM-HMMA 860. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level A according to SDI A250.4
2. Doors:

   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches
   c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.032 inch.
   d. Edge Construction: Continuously welded with no visible seam
   e. Core: Polyurethane, steel stiffened

3. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch for frames that receive hollow-metal doors; minimum thickness of 0.042 inch for frames that receive hollow-core wood doors.
   b. Materials: Metallic-coated steel sheet, minimum thickness of 0.042 inch - 0.053 inch.
   c. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
   d. Construction:

      1) Knock down - for frames in gypsum board partitions, except fire rated frames
      2) Full profile welded - frames in masonry and concrete walls, fire rated frames over 7'-0" in gypsum board.

4. Exposed Finish: Prime

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level B according to SDI A250.4
2. Doors:

a. Type: As indicated in the Door and Frame Schedule
b. Thickness: 1-3/4 inches
c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A40 coating.
d. Edge Construction: Model 2, Seamless
e. Core: Polyurethane with vertical steel stiffener

1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 °F x h x sq. ft./Btu when tested according to ASTM C 1363.

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
b. Construction:

1) Knock down - for frames in gypsum board partitions, except fire rated frames
2) Full profile welded - frames in masonry and concrete walls, fire rated frames over 7'-0" in gypsum board.

4. Exposed Finish: Prime Factory

C. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level A according to SDI A250.4
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches
c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
d. Edge Construction: Model 3, Stile and Rail
e. Core: Polyurethane with vertical steel stiffener

1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 °F x h x sq. ft./Btu when tested according to ASTM C 1363.

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.

b. Construction:

1) Knock down - for frames in gypsum board partitions, except fire rated frames
2) Full profile welded - frames in masonry and concrete walls, fire rated frames over 7'-0" in gypsum board.

4. Exposed Finish: Prime Factory

D. Hollow-Metal Doors and Frames: NAAMM-HMMA 860. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level A according to SDI A250.4
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches
c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum G60A60 coating.
d. Edge Construction: Continuously welded with no visible seam.
e. Core: Steel stiffened.

1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 °F x h x sq. ft./Btu when tested according to ASTM C 1363.

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum G60A60 coating.
b. Construction:

1) Knock down - for frames in gypsum board partitions, except fire rated frames
2) Full profile welded - frames in masonry and concrete walls, fire rated frames over 7'-0" in gypsum board.

4. Exposed Finish: Prime

2.5 BORROWED LITES

A. Hollow-metal frames of metallic-coated steel sheet, minimum thickness of 0.053 inch.

B. Construction: Full profile welded

2.6 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2" wide x 10" long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.8 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011, hot-dip galvanized according to ASTM A 153, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4", as measured according to ASTM C 143.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-

developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.9 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than six (6) inches apart. Spot weld to face sheets no more than five (5) inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
2. Fire Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.
3. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
4. Top Edge Closures: Close top edges of doors with inverted closures of same material as face sheets.
5. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
7. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four (4) spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 16" from top and bottom of frame. Space anchors not more than 32" o.c., to match coursing, and as follows:

1) Two (2) anchors per jamb up to 60" high.
2) Three (3) anchors per jamb from 60" – 90" high.
3) Four (4) anchors per jamb from 90" – 120" high.
4) Four (4) anchors per jamb plus one additional anchor per jamb for each 24" or fraction thereof above 120" high.

b. Stud-Wall Type: Locate anchors not more than 18" from top and bottom of frame. Space anchors not more than 32" o.c. and as follows:

1) Three (3) anchors per jamb up to 60" high.
2) Four (4) anchors per jamb from 60" – 90" high.
3) Five (5) anchors per jamb from 90" – 96" high.
4) Five (5) anchors per jamb plus one (1) additional anchor per jamb for each 24" or fraction thereof above 96" high.

c. Compression Type: Not less than two (2) anchors in each frame.
d. Post-Installed Expansion Type: Locate anchors not more than six (6) inches from top and bottom of frame. Space anchors not more than 26" o.c.

6. Head Anchors: Two (2) anchors per head for frames more than 42" wide and mounted in metal-stud partitions.
7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three (3) door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two (2) door silencers.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow-metal work.

5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.10 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Factory Finish: Clean, pretreat, and apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, complying with SDI A250.3.

1. Color and Gloss: As selected by Engineer from manufacturer's full range.

2.11 ACCESSORIES

A. Louvers: Provide louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.

1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.
2. Lightproof Louver: Stationary louvers constructed with baffles to prevent light from passing from one side to the other.
3. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same qualified testing and inspecting agency that established fire-resistance rating of door assembly.

B. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field-apply bituminous coating to backs of frames that will be filled with grout containing anti-freezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: ± 1/16 inch, measured at door rabbet on a line 90° from jamb perpendicular to frame head.
    b. Alignment: ± 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: ± 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: ± 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

    a. Between Door and Frame Jambs and Head: 1/8 inch ± 1/32 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch ± 1/32 inch.
    c. At Bottom of Door: 5/8 inch ± 1/32 inch.
    d. Between Door Face and Stop: 1/16 inch to 1/8 inch ± 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

D. Glazing: Comply with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9” o.c. and not more than 2” o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.

F. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 11 13

Appendix D

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:

    a. Swinging Doors
    b. Sliding Doors
    c. Folding Doors

2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

B. Related Requirements:

1. Coordinate products specified in Part 2 with Division 08 Sections in subparagraphs below. Astragals, silencers, and cylinders can be specified in this Section or with doors and frames.
2. Division 8 – Openings
3. Division 13 – Special Construction

1.3 COORDINATION

A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.

1. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation and Keying Conference: Conduct conference at Project site.

1. Conference participants shall include Installer's Architectural Hardware Consultant.
2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:

a. Flow of traffic and degree of security required
b. Preliminary key system schematic diagram
c. Requirements for key control system
d. Requirements for access control
e. Address for delivery of keys

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For electrified door hardware

1. Include diagrams for power, signal, and control wiring.
2. Include details of interface of electrified door hardware and building safety and security systems.

C. Samples: For each exposed product in each finish specified, in manufacturer's standard size.

1. Tag Samples with full product description to coordinate Samples with door hardware schedule.

D. Samples for Initial Selection: For each type of exposed finish

E. Samples for Verification: For each type of exposed product, in each finish specified.

1. Sample Size: Full-size units or minimum 2” x 4” Samples for sheet and 4-inch-long Samples for other products.

a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

2. Tag Samples with full product description to coordinate Samples with door hardware schedule.

F. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule after or concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:

a. Identification number, location, hand, fire rating, size, and material of each door and frame.
b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
e. Fastenings and other installation information.
f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
g. Mounting locations for door hardware.
h. List of related door devices specified in other Sections for each door and frame.

G. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and Architectural Hardware Consultant.

B. Product Certificates: For each type of electrified door hardware.

1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.

C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

D. Field quality-control reports.

E. Sample Warranty: For special warranty

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals.

B. Schedules: Final door hardware and keying schedule.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity
2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC).

1.10 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of doors and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three (3) years from date of Substantial Completion unless otherwise indicated below:

a. Exit Devices: Two (2) years from date of Substantial Completion.
b. Manual Closers: Ten (10) years from date of Substantial Completion.
c. Concealed Floor Closers: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of door hardware from single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

A. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the ABA standards of the Federal agency having jurisdiction.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 90°, the door will take at least five (5) seconds to move to a position of 12° from the latch.
5. Adjust spring hinges so that, from an open position of 70°, the door will take at least 1.5 seconds to move to the closed position.

2.3 SCHEDULED DOOR HARDWARE

A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.

1. Door hardware is scheduled in Part 3.

2.4 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies
b. Stanley Commercial Hardware; a division of Stanley Security Solutions
c. Or approved equal

2.5 SELF-CLOSING HINGES AND PIVOTS

A. Self-Closing Hinges and Pivots: BHMA A156.17

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies
b. Stanley Commercial Hardware; a division of Stanley Security Solutions
c. Or approved equal

2.6 CENTER-HUNG AND OFFSET PIVOTS

A. Center-Hung and Offset Pivots: BHMA A156.4

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Hager Companies
b. Stanley Commercial Hardware; a division of Stanley Security Solutions
c. Or approved equal

2.7 CONTINUOUS HINGES

A. Continuous Hinges: BHMA A156.26; minimum 0.120-inch-thick, hinge leaves with minimum overall width of 4”; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

B. Pin-and-Barrel-Type Hinges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hager Companies
    b. Select Products Limited
    c. Stanley Commercial Hardware; a division of Stanley Security Solutions
    d. Or approved equal

2.8 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch latch bolt throw.
2. Mortise Locks: Minimum 3/4-inch latch bolt throw.
3. Deadbolts: Minimum 1-inch bolt throw.

C. Lock Backset: 2-3/4 inches unless otherwise indicated.

D. Strikes: Provide manufacturer's standard strike for each lock bolt or latch bolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

E. Locks and Latches: BHMA A156.2, BHMA A156.12, BHMA A156.13, BHMA A156.16

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Best Access Systems; Stanley Security Solutions, Inc.
    b. Corbin Russwin, Inc.; an ASSA ABLOY Group company
    c. Stanley Commercial Hardware; a division of Stanley Security Solutions
    d. Yale Security Inc; an ASSA ABLOY Group company
    e. Or approved equal

2.9 EXIT LOCKS AND EXIT ALARMS

A. Exit Locks and Alarms: BHMA A156.29, Grade 1

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Precision Hardware, Inc.; a Stanley company
    b. SARGENT Manufacturing Company; ASSA ABLOY
    c. Or approved equal

2.10 SURFACE BOLTS

A. Surface Bolts: BHMA A156.16

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allegion plc
b. Trimco
c. Or approved equal

2.11 MANUAL FLUSH BOLTS

A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allegion plc
b. Trimco
c. Or approved equal

2.12 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Precision Hardware, Inc.; a Stanley company
b. SARGENT Manufacturing Company; ASSA ABLOY
c. Yale Security Inc; an ASSA ABLOY Group company
d. Or approved equal

2.13 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Best Access Systems; Stanley Security Solutions, Inc.
b. Corbin Russwin, Inc.; an ASSA ABLOY Group company
c. Hager Companies
d. SARGENT Manufacturing Company; ASSA ABLOY
e. Stanley Commercial Hardware; a division of Stanley Security Solutions

f. Yale Security Inc; an ASSA ABLOY Group company
g. Or approved equal

B. Standard Lock Cylinders: BHMA A156.5; Grade 2 permanent cores; face finished to match lockset.

1. Core Type: Interchangeable

C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide ten (10) construction master keys.

D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide ten (10) construction master keys.

2.14 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one (1) extra key blank for each lock. Supplier is to closely coordinate with owner and architect all keying requirements. All lock cylinders shall be construction master keyed using split key method. Incorporate decisions made in keying conference.

1. Master Key System: Change keys and a master key operate cylinders.

a. Provide three (3) cylinder change keys and five (5) master keys.

2. Existing System:

a. Master key or grand master key locks to Owner's existing system.
b. Re-key Owner's existing master key system into new keying system.

3. Keyed Alike: Key all cylinders to same change key.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE."

2.15 OPERATING TRIM

A. Operating Trim: BHMA A156.6; aluminum or stainless steel unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allegion plc
b. Hager Companies
c. Trimco
d. Or approved equal

2.16 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.

B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.

C. Astragals: BHMA A156.22

2.17 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. SARGENT Manufacturing Company; ASSA ABLOY
b. Stanley Commercial Hardware; a division of Stanley Security Solutions
c. Yale Security Inc; an ASSA ABLOY Group company
d. Or approved equal

2.18 CONCEALED CLOSERS

A. Concealed Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. SARGENT Manufacturing Company; ASSA ABLOY
b. Or approved equal

2.19 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies
b. Rockwood Manufacturing Company; an ASSA ABLOY Group company
c. Trimco
d. Or approved equal

2.20 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Allegion plc
b. Or approved equal

2.21 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies
b. Reese Enterprises, Inc.
c. Zero International, Inc.
d. Or approved equal

B. Maximum Air Leakage: When tested according to ASTM E 283 with tested pressure differential of 0.3-inch, as follows:

1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening
2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening
3. Gasketing on Double Doors: 0.50 cfm per foot of door opening

2.22 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies
b. National Guard Products, Inc.
c. Reese Enterprises, Inc.
d. Zero International, Inc.
e. Or approved equal

2.23 AUXILIARY DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Allegion plc
b. Or approved equal

2.24 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
3. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.25 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within 1/2 of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if

they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8
2. Custom Steel Doors and Frames: HMMA 831
3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one (1) hinge for every

30” of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one (1) intermediate offset pivot per door and one (1) additional intermediate offset pivot for every 30” of door height greater than.

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.
2. Furnish permanent cores to Owner for installation.

F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 92 00 "Joint Sealants."

G. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

I. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

J. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70° and so that closing time complies with accessibility requirements of authorities having jurisdiction.

3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

B. Occupancy Adjustment: Approximately three (3) months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include six (6) months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.8 DOOR HARDWARE SCHEDULE

A. Nomenclature

1. Manufacturer List

Code	Name
BE	Best Access Systems
DM	Dorma Door Controls
NA	National Guard
PR	Precision
ST	Stanley
TR	Trimco

2. Option List

Code	Name
36"	36" Door Width
3RO	Prefix option for 2000 Apex Series
B4E-HEAVY-KP	BEVELED 4 EDGES - KICK PLATES
CSK	COUNTER SINKING OF KICK and MOP PLATES
NFHD	Narrow Frame Bracket - Heavy Duty Arms
SNB (2)	SEX BOLTS (2)
VIB	Double Visual Indictor Option

3. Finish List

Code	Name
600	Primed for Painting
603	Zinc Plated
619	Satin Nickel Plated, Clear Coated
626	Satin Chromium Plated
630	Satin Stainless Steel
689	Aluminum Painted
AL	Aluminum

B. Hardware Set #1

1. Door #: 101A
2. Doors: Typical exterior single door

Qty	Unit	Product	Description	Color	Manufacturer
1	ea	Continuous Hinge	HD1100A x LAR		NA
1	ea	Lockset-Dormitory	45H-7T14H PATD	630	BE
1	ea	Closer w/ Spring Stop	8916 S-DS NFHD	689	DM
1	ea	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	ea	Door Sweep w/ Drip	C627 A x LAR		NA
1	ea	Drip Cap	16 A +4" ODW		NA
1	ea	Perimeter Gasketing	2525 C x LAR		NA
1	ea	Threshold	896 S x LAR	AL	NA

END OF SECTION 08 71 00

Appendix E

SECTION 07 41 13 – STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Prefinished standing seam roof panels, trim, and all related work, of the following type:

a. Formed roof panels with machine seamed sealed joints, at 16-inches on-center.
b. Finished underside of panels where exposed to view, similar to topside, except 2-coat system (primer and color coats).

2. Scope - Roofing Systems: The work in the Section includes all labor, materials, accessories, services and incidentals necessary for supplying, installing and testing of the prefinished metal roofing system described herein. Provide prefinished - all flashing, fascia panels, caps, copings, curbs, trim, closures, gutter design, etc., which are associated with and/or come in contact with roofing system's components, in same base metal as roofing panels, and panels, and make watertight junctions with work of other trades.

a. Curbs for mechanical equipment and other work as indicated or required by project conditions.

B. Perforated soffits, and additional and related items and work shall be provided at locations where indicated on the Drawings.

C. Related Requirements:

1. Related work specified elsewhere includes:

a. Section 05 50 00 - Metals Fabrication
b. Section 07 92 00 - Joint Sealants
c. Section 0 99 600 - High Performance Coatings

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide certified test results by a recognized testing laboratory or agency in accordance with specified test methods for each system.

B. Air Infiltration: Provide roof panel system with no air leakage when tested in accordance with ASTM E 283 at pressure differentials up to 1.57 psf.

C. Water Penetration: Provide panel systems with no water penetration as defined in the test method, when tested in accordance with ASTM E 331 at an inward static air pressure differential of not less than 6.24 psf and not more than 12.0 psf.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data including manufacturer's product specifications, standard details, certified product test results, installation instructions, and general recommendations, as applicable to materials and finishes for each component and for total panel system.

C. Shop Drawings specific to this project showing layouts of panels on roofs, details of edge conditions, joints, corners, panel profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory and field assembly work. The manufacturer's technical engineering department shall approve the drawings before they are submitted.

1.5 QUALITY ASSURANCE

A. Wind Uplift: Provide roof panel system including supports meeting at least the requirements of Underwriters Laboratories, Inc. for Class 90 wind uplift resistance. Wind load at the project site is 140 mph, unless a higher wind load is indicated on Structural Drawings or otherwise required by applicable codes.

B. Field Measurements: Where possible, prior to fabrication of panels, take field measurements of structure or substrates to receive panel system. Allow for trimming panel units where final dimensions cannot be established prior to fabrication. Terminal edges of panels, closures, and turned-down caps shall be to a neat straight line.

C. Manufacturer's Project Manager: The Manufacturer shall provide a Project Manager, who shall work with the personnel to develop the shop drawings for the project prior to installation of the roof. When beginning installation procedures, the manager shall be present at all times to instruct and manage the installer's crew. The entire installation shall be subject to the direction of the Project Manager, who shall be responsible for the proper and timely installation of the system.

1. The Project Manager shall attend a required Pre-Roofing Conference, and return to the project site when requested by the installer, and at beginning of this work, and 50% and 100% roof completion stages.

D. The Contractor shall hold a Pre-Roofing Conference prior to beginning roofing work, and provide typed minutes to Owner's Representative, Engineer, Roofing Contractor, Roofing Manufacturer, who are all required to be present.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver panels and other components so they will not be damaged or deformed. Package panels for protection against transportation damage.

B. Handling: Exercise care in unloading, storing, and erecting panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weather-tight ventilated covering. Store metal panels so that they will not accumulate water. Do not store panels in contact with earth, water, or other materials that might cause staining, denting, or other surface damage.

D. Deliver accessories, such as reglets, inserts, etc., which are to be installed by other trades and/or in conjunction with the work of other trades, far enough in advance so as not to delay the Work on the project.

1.7 WARRANTY AND GUARANTEE

A. Roofing Panel Warranty: Furnish the roofing system manufacturer's written warranty, covering failure of the metal roof system within the warranty period.

1. Warranty Periods (from date of Substantial Completion)

a. Weather-tightness: 20 years
b. Finishes: 20 years
c. Materials and Workmanship: 3 years

B. This warranty and guarantee shall be in addition to and not a limitation of other rights the Owner may have under the Contract Documents, and shall run concurrently with other project warrantees and guarantees.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers Vertical Rib, Machine-Seamed Joint, Standing Seam Metal Roof Panels; Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together. Roofing panels, closures, and all exposed trim, gutters, downspouts, and similar items shall be factory prefinished.

1. AEP Span.
2. American Buildings Company.
3. Architectural Building Components.
4. Architectural Roofing and Siding, Inc.
5. ATAS International, Inc.

6. Butler Manufacturing Co.
7. CENTRIA Architectural Systems.
8. Copper Sales Inc.
9. Fabral, Inc.
10. McElroy Metal, Inc.
11. Merchant & Evans, Inc.
12. Metal Fab Manufacturing, LLC.
13. Metal Sales Manufacturing Corporation.
14. Steelox Systems Inc.

2.2 MATERIALS

A. Prefinished Panels and Trim: Fabricate of minimum 24-gage metal, with minimum 50,000 p.s.i. yield, with prefinished roofing panels and closures, and 3-coat full strength (70-percent) Kynar 500 resin (20-year) finish for all roofing panels, exposed trim, gutters, downspouts, and similar items; Provide 2-coat finish on underside of panels where exposed to view in the finished work. Provide one of the following base metals:

1. ASTM A 792 aluminum-zinc allow coated steel sheet (“Galvalume”), or
2. ASTM A 653, G-90 (galvanized) zinc-coated steel sheet.
3. Panels shall be formed full length, without laps in a given run.
4. Where indicated with standing seams, all roof panels shall be formed with a 2-inch high vertical seam and finished width of 16 inches, with two intermediate stiffening ribs. All roof panels shall be roll formed in a single length from panel-break to plane-break.

B. Vertical Seams: Fabricate panel vertical seams of the same material, finish and length as the panels. Vertical seams shall contain factory applied sealant and shall be designed so that neither the paint finish nor metal are damaged by the required machine seaming.

C. Clips: Clips shall be 300-series SS (ASTM A-167) which shall provide for unlimited, unimpeded panel movement.

D. Ridge Caps, Flashing and Trim: All flashings and cover over all curbs, roof penetrations, etc., shall be of the same material, gauge and finish as the panels with which they are used, unless heavier gauge is required by project conditions.

E. Fasteners: All fasteners in the plane of the roof deck shall be covered. No exposed fasteners which would penetrate the panels, flashings, etc., will be permitted. Penetrating type fasteners will be allowed only in the vertical plane (i.e. fastening of ridge caps, hip covers, etc., and then only if neoprene washers are used externally). Materials used in all fasteners shall be non-magnetic stainless steel. All exposed fasteners shall match adjacent material, finish and/or color. Length and diameter of screws shall be sufficient to meet design criteria.

F. Closures: Precut closures from gray cross-linked closed-cell polyethylene composition foam to the exact profile of the members with which they are to function.

G. Sealants: Non-skinning, non-hardening, non-oxidizing butyl sealant, designed for metal-to-metal concealed joints. Field applied adhesive tape sealants shall be extruded polymeric butyl tape, non-skinning. Use no exposed sealants.

H. Bituminous Coating: Cold-Applied asphalt mastic, SSPC-12, compounded for 15-mil dry film thickness per coat, and approved for the intended use by both the mastic and roofing manufacturers.

2.3 METAL FINISHES

A. General: Apply coatings either before or after forming and fabricating panels, as required by coating process and as required for maximum coating performance capability. Protect coating either by application of strippable film or by packing plastic film or other suitable material between panels in a manner to properly protect the finish. Furnish air drying spray finish in matching color for touch up, in the event touch-up is allowed by the Engineer; However, it is probable that the Engineer will require replacement of any materials which exhibit any damage to finishes.

B. Roof Panels, Closures, Exposed Trim, Gutters, Downspouts, and Similar Items - Fluoropolymer Coating: Manufacturer's standard "Premium 70" three-coat (i.e.: primer, color coat and clear top coat), thermo-cured, full-strength 70 percent resin "Kynar 500" coating and 30 percent reflective gloss when tested in accordance with ASTM D 523; Provide 2-coat finish on underside of panels where exposed to view in the finished work.

1. Durability: Provide coating that has been field tested under normal range of weathering conditions for minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of No. 8 in accordance with ASTM D 659; and without fading in excess of 5 NBS units; and as otherwise indicated.
2. Colors: As selected by Engineer after Bid Date, from manufacturer's "standard" non-metallic colors; Minimum 15 colors to select from.

2.4 PANEL FABRICATION

A. General: Fabricate and finish panels and accessories at the factory, by manufacturer's standard procedures and processes, as required to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and dimensional requirements and with structural requirements.

B. Apply bituminous coating or other permanent separation materials on concealed panel surfaces where panels would otherwise be in direct contact with substrate materials that are non-compatible or could result in corrosion or deterioration of either material or finishes.

C. Fabricate panel joints with captive gaskets or separator strips, which provide a tight seal and prevent metal to metal contact in a manner that will minimize noise from movements within panel system.

D. Roll Forming: Field forming of panels is not acceptable.

PART 3 - EXECUTION

3.1 GENERAL

A. Installer shall examine all substrates and verify that they are acceptable, which will be acknowledged and accepted by his beginning work. Installer shall verify that all penetrations, expansion joints, blocking, etc., are securely anchored into place, and that substrate is clean and free of all debris or other substance detrimental to the roofing work.

1. Notify the Contractor in writing of conditions requiring corrections, for proper completion of the Work. Do not proceed until unsatisfactory conditions have been satisfactorily completed.

B. The use of square head nails, staples, and pneumatic or electric nail guns are strictly prohibited.

3.2 PANEL SUPPORTS AND ANCHORAGE

A. When installed by the roofing contractor, all girts, purlin, and other secondary structural panel support members and anchorage (if any) shall be installed in accordance with AISC Manual of Steel Construction "Code of Standard Practice." When installed by others, compliance shall be field verified prior to proceeding with installation.

3.3 PANEL INSTALLATION

A. General: Comply with manufacturer's written instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the work securely in place, with provisions for thermal and structural movement and insulation system.

1. Field cutting of exterior panels by torch is not permitted.
2. Install panels with concealed fasteners.
3. Install insulation support system, insulation, thermal spacer blocks, and other internal components as the work progresses.
4. Use only non-magnetic stainless steel roofing nails and fasteners.

B. Accessories: Install components required for a complete roof panel system, including in part, trim, copings, fascias, stops, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items.

1. Provide and install counterflashing to match roofing over flashing at vent stacks, flues, curbs, and other penetrations, except those indicated to be field painted.

C. Joint Seals: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of panel systems and accessories. Provide types of gaskets, sealants, and fillers indicated or, if not otherwise indicated, types recommended by panel manufacturer.

1. Flash and seal roof panels at eave and rake with rubber, neoprene, or other closures to exclude weather.

2. Counter-flash over otherwise exposed flashings with metal and finish to match adjacent roof metal.
3. Refer to other sections of these specifications for product and installation requirements applicable to indicated joint sealers.

D. Joint Sealers: Refer to other sections of these specifications for post installation requirements on joint sealers; not work of this section.

E. Lap Seams: Provide sealant tape at lapped joints of ribbed or fluted roof sheets and between roof sheets and protruding equipment, vents, and accessories.

F. Standing Seam Roof Panel Systems: Fasten roof panels to supports with concealed clip in accordance with the manufacturer's current written instructions and recommendations, and as required to meet site wind load conditions.

1. Install clips at each support with self-drilling/self-tapping fasteners.
2. At end laps of panels, install tape caulk between panels.
3. Install factory-caulked cleats at standing-seam joints.
4. Seaming: Complete seaming of panel joints by operation of portable power-driven equipment of type recommended by panel manufacturer to provide a weather-tight joint.

G. Apply a continuous ribbon of sealant tape to clean, dry surface of the weather side of fastenings on end laps, and on side laps of corrugated nesting type, ribbed, or fluted panels and elsewhere as needed to make roof sheets weatherproof to driving rains.

H. Installation Tolerances: Shim and align panel units within installed tolerance of 1/4-inch in 20' 0" on level/plumb/slope and location/line as indicated, and within 1/8 inch offset of adjoining faces and of alignment of matching profiles.

I. Roofer shall install curbs supplied by other trades for roof mounted equipment and other items, and cover with metal to match roofing.

3.4 CLEANING AND PROTECTION

A. Damaged Units: Replace panels and other components of the work that have been damaged or have deteriorated beyond successful repair by means of finish touch up or similar minor repair procedures, as determined solely by the Engineer.

B. Cleaning: Remove temporary protective coverings and strippable films (if any) as soon as each panel is installed. Upon completion of panel installation, clean finished surfaces as recommended by panel manufacturer, and maintain in a clean condition during construction.

END OF SECTION 07 41 13

Appendix F

SECTION 09 51 13 – ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Acoustical panels and exposed suspension systems for ceilings.

B. Extent of each type acoustical ceiling is shown and scheduled on drawings.

C. Related work specified elsewhere includes:

1. Division 6 Section – Rough Carpentry. (concealed P.T. wood blocking and grounds)
2. Division 7 Section – Joint Sealants.
3. Division 9 Section – Gypsum Board Assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance, unless otherwise indicated.

B. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

C. Surface-Burning Characteristics: Complying with ASTM E 1264 for Class A materials and tested per ASTM E 84; testing performed by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less,
2. Smoke-Developed Index: 50 or less.

D. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

1.4 SUBMITTALS

A. Product Data: Manufacturer's product specifications and installation instructions for each acoustical ceiling material required, and for each suspension system, including certified laboratory test reports and other data as required to show compliance with these specifications.

1. Include manufacturer's seismic installation details.
2. Include manufacturer's recommendations for cleaning and refinishing acoustical units, including precautions against materials and methods, which may be detrimental to finishes and acoustical performance.

B. Shop Drawings: Show layout of ceiling including locations of light fixtures, grilles, diffusers and sprinkler heads.

1. Indicate hanger spacings, clip anchors or inserts, fastening details, splicing methods for main and cross runners.
2. Include details for ceiling level changes, support methods for light fixture, diffusers, grilles and similar items.

C. Samples:

1. Set of 6-inch by 4-inch square samples for each acoustical unit required, showing full range of exposed color and texture to be expected in completed work.
2. Set of 12-inch length samples of each exposed runner and molding.

D. Qualification Data: Submit for qualified installer to demonstrate their capabilities and experience; include documentation indicating compliance with specified qualification requirements. (Submit for Architect's information only.)

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling. (Submit for Architect's information only.)

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Firm with not less than three (3) years of successful experience in installation of acoustical ceilings similar to requirements for this project and which is acceptable to manufacturer of acoustical units, as shown by current written statement from manufacturer.

B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install a minimum 12-ft by 12-ft. area of each ceiling type specified, in spaces designated by Architect.
2. Notify Architect when spaces are ready for observation and review. Obtain Architect's approval of mockups before starting installation.

3. Approved mock up shall serve as a standard of quality for ceiling installations. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Pre installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

A. Space Enclosure: Do not install interior acoustical ceiling until space is enclosed and weatherproof, wet work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

B. Coordination:

1. Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by or penetrating through, ceilings, including light fixtures, HVAC equipment, food service exhaust hoods, fire suppression system components (if any), conveyor systems and partition system (if any).
2. Schedule installation to occur after other work which can generate dust is completed. Schedule acoustical material installation to minimize need for removal and replacement to accommodate work of other trades.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver maintenance materials to Owner.

1. Acoustical Ceiling Units: Furnish quantity of full size units equal to two percent (2.0%) of amount installed.
2. Exposed Suspension Components: Furnish quantity of each exposed component required for actual installation equal to two percent (2.0%) of amount installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL CEILING PANELS

A. Basis of Design: Product as scheduled on drawings.

1. Acoustical ceiling panels of similar design, material, construction and of matching color, pattern and texture by other acceptable manufacturers may be submitted for Architect's acceptance.
2. Acceptance is subject to compliance with specified requirements as evidenced by submittal of manufacturer's product data, test reports and samples.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

C. Panel Type: ASTM E 1264, Type IV, Form 2, Pattern E; water felted mineral fiber, membrane-faced overlay panels with painted finish.

1. Size: 24 by 24 inches (2-ft. by 2-ft.), unless otherwise indicated on Drawings.
2. Thickness: 7/8 inch.
3. Edges: Rabbeted and beveled (Beveled Tegular).
4. Noise Reduction Coefficient (NRC): 0.80, minimum.
5. Ceiling Attenuation Class (CAC): 35, minimum.
6. Light Reflectance: 0.86.
7. Surface Finish: Factory applied latex paint finish, white color.

D. Suspension System: Grid profile size as indicated on Drawings for scheduled ceiling panel. Provide grid module matching ceiling panel size.

2.2 METAL SUSPENSION SYSTEMS

A. Acceptable Manufacturers; subject to compliance with specified requirements:

1. Armstrong World Industries, Inc.
2. CertainTeed Corporation.
3. USG Interiors, Inc.

B. Narrow Profile Exposed Grid System: Narrow-face, capped, double-web, galvanized steel suspension system.

1. Structural Classification: Intermediate duty system in accord with ASTM C635.
2. Main and Cross Runners: Roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653, not less than G30 coating designation; with prefinished metal caps on flanges.
3. End Condition of Cross Runners: Override (stepped) type.
4. Face Design: Flat, flush.
5. Cap Material: Galvanized cold-rolled steel.
6. Cap Face Size: 9/16 inch width.

7. Cap Finish: Factory applied low gloss paint finish; white color.

C. Standard Exposed Grid System: Wide-face, capped, double-web, galvanized steel suspension system.

1. Structural Classification: Intermediate duty system in accord with ASTM C635.
2. Main and Cross Runners: Roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653, not less than G30 coating designation; with prefinished metal caps on flanges.
3. End Condition of Cross Runners: Override (stepped) type.
4. Face Design: Flat, flush.
5. Cap Material: Galvanized cold-rolled steel.
6. Cap Face Size: 15/16 inch width.
7. Cap Finish: Factory applied low gloss paint finish; white color.

D. Finishes and Colors: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

2.3 SUSPENSION SYSTEM ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Cast-in-place or Postinstalled expansion anchors.
b. Corrosion Protection: Either type as specified.

1) Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
2) Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

B. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 12 gauge (0.106 inch) diameter wire.

C. Hanger Rods and Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint; sized to support design loads.

D. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04 inch thick, galvanized-steel sheet complying with ASTM A 653, G90 coating designation; with bolted connections and 5/16 inch diameter bolts.

E. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches on center on all cross tees.

F. Edge Moldings and Trim: Roll-formed, sheet-metal type in profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners: Cadmium plated, type recommended by suspension system manufacturer, but for not less than 1/2 inch penetration of substrate.

B. Acoustical Sealants:

1. Acceptable Products: Subject to compliance with requirements, provide one of the following:

a. Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
b. Pecora Corporation; AIS-919.
c. Specified Technologies, Inc.; SpecSeal Smoke N' Sound Acoustical Caulk.
d. Tremco, Inc.; Acoustical Sealant.
e. USG Corporation; Sheetrock Acoustical Sealant.

2. Characteristics: Manufacturer's non-hardening, non-bleeding, nonstaining, gunnable, synthetic rubber or acrylic latex compound complying with ASTM C834.

a. Acoustical Performance: Effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
b. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings. Furnish concrete inserts, hanger clips and similar devices to other trades for installation well in advance of time needed for coordination of other work.

B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

C. Where suspended acoustical ceilings are indicated to be hung below drywall sub ceilings, install sub-ceiling hanger clips at locations for hanger wire attachment. Attach clips screw fastened through gypsum board into support framing spaced at grid locations required for securing suspension system hangers wires.

3.3 INSTALLATION

A. Install acoustical panel ceilings to comply with ASTM C 636 and design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts,

eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post installed mechanical anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches on center along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post installed anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches on center and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Arrange acoustical units and orient directionally patterned units, (if any) in a manner shown by reflected ceiling plans.
2. Install panels with pattern running in one direction, as indicated, or if not indicated, as directed by Architect.
3. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
4. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.

5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
6. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and in spaces as recommended by panel manufacturer's written instructions, unless otherwise indicated.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

Appendix G

SECTION 46 61 23 - DISC CLOTH TERTIARY FILTRATION

PART 1 - GENERAL

1.1 SUMMARY

A. Scope of Work:

1. Modification of Two (2) existing Disc cloth filters. Add additional 4 Discs in each existing Disc cloth filter, add necessary backwash nozzles for the new discs, replace the backwash pump and a new motor starter to accommodate the larger backwash pump in the existing control panel.

B. Related Requirements:

1. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for electrical connections to equipment specified by this Section.

1.2 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with Work of other Sections.

1.3 SCHEDULING

A. Section 01 31 00 – Project Management and Coordination: Requirements for scheduling.

1.4 SUBMITTALS

A. Manufacturer shall provide, at a minimum, the following information in accordance with Section 01 33 00 Submittals.

1. Product Data/Information
2. Calculations verifying the effective filtration surface area.
3. Hydraulic profile through the filter showing influent and effluent weir lengths, elevations, and nappe at design and peak flow.
4. Shop Drawings
5. Maintenance Instructions
6. Installation Instructions
7. Wiring Diagrams
8. Parts List
9. Qualification Data
10. Sample Warranty

B. Manufacturer shall provide Operations and Maintenance Data.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.

B. Tools: Furnish special tools and other devices required for Owner to maintain equipment.

1.6 QUALITY ASSURANCE

A. Applicable Standards:

1. ASTM -American Society for Testing and Materials
2. AISI -American Iron and Steel Institute
3. AGMA -American Gear Manufacturer's Association
4. NEMA- National Electrical Manufacturer’s Association
5. NEC -National Electric Code

B. To assure unity of responsibility, the additional 4 Discs in each existing Disc cloth filter, the necessary backwash nozzles for the new discs, the replacement of the backwash pump and a new motor starter to accomodate the larger backwash pump in the existing control panel shall be furnished and or coordinated by a single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store and protect materials according to manufacturer instructions.

1.8 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.

B. The Manufacturer shall provide a written warranty against defects in materials and workmanship. Manufacturer shall warrant the goods provided by the Manufacturer to be free from defects in materials and workmanship under normal conditions and use for a period of one (1) year from the date the goods are put into service, or eighteen (18) months from shipment of equipment, whichever first shall occur. This warranty shall not apply to any goods or parts which have been altered, applied, operated or installed contrary to the Manufacturer’s instructions or subject to misuse, chemical attack/degradation, negligence or accident.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Veolia Water Technologies, Inc (Kruger)

2.2 PERFORMANCE REQUIREMENTS:

Design Average Flow per unit, MGD	1.0
Peak Hour Flow per unit, MGD	2.0
Maximum Influent TSS, mg/L	20 mg/L
Effluent TSS, mg/L	<5
Filter Opening, µ	10
Filter Cloth Material	Polyester (woven)
Number of Filter Elements (Existing)	4 Disc / 2×64 panels
Number of Filter Elements (Additional added)	4 Disc / 2×64 panels
Filter Disc Diameter, m	2.1
Total Filter Area, ft^2	194×2
Filter Submergence, %	60
Filter Rotational Speed, RPM	2.8
Material of Construction (Disc)	AISI 304 stainless
Drive Motor (Existing)	1.5 hp, 460v, 3 phase
Drive Motor Service Factor	1.3
Drive Assembly (Existing)	Helical wormgear with riveted chain and sprocket
Number of Backwash Nozzles (per Disc)	12
Backwash Pressure, psi	110
Backwash Flowrate, GPM	60
Backwash Pump	7.5 hp, 460v, 3 phase

2.3 Filter System General Design Information:

A. The automatic backwash filter system shall be suitable for filtering domestic wastewater after secondary treatment and clarification. Each filter shall be designed to operate on a continuous basis and shall be designed to operate while receiving varying flows.

B. The proposed disc filtration system shall not exceed a hydraulic loading rate of 5.96 gpm/sf at peak flow.

2.4 MATERIALS AND EQUIPMENT

A. All fabricated metal shall be minimum grade AISI 304 stainless steel unless otherwise stated in this specification. Filter panels shall be polyester filter cloth mounted on AISI 304 stainless steel frames with integrated rubber seals. Filter disc segments shall be 304 stainless steel.

B. The valves, equipment, materials of construction and controls specified under this section supersede valves, equipment, materials of construction and controls specified elsewhere in the contract documents. Purchased components such as gear reducers, pumps, motors, valves, and actuators shall be provided as per filter manufacturer's standard designs and with standard recommended manufacturer's paint.

2.5 DISC ASSEMBLY

A. The filter shall be composed of modular and removable discs. Each disc shall consist of disc segments that can be easily mounted or dismounted as required. The segments of one disc will be bolted to each other, and the completed disc assembly will be secured to the center drum with stainless steel F clips and hardware.

B. Filter panels (filter media) shall be mounted on the sides of the disc segments. The filter panels shall consist of stainless steel frames with PET monofilament filter fabric attached to the frames. Each panel shall be equipped with a gasket that is fitted to and provided integral to the media frame to provide a watertight seal between the filter panels and disc segments. The panels will be held in place by a locking frame and one bolt per panel for easy exchange.

C. Nominal media pore size shall not exceed 10 microns.

2.6 BACKWASH CLEANING SYSTEM

A. The Discfilter shall be equipped with a single oscillating back-washing system with non-motorized moving spray headers for efficient cleaning of the filter cloth and for reduction of the consumption of backwash water. All panels shall receive 110 psi pressure backwash spray.

B. The backwash system shall be comprised of stainless steel backwash spray headers installed between the discs. The spray headers shall oscillate in an upward and downward motion during drum rotation. The spray header oscillation shall be operated by a cam system that is connected to the drum drive. Each header shall have flat pattern spray nozzles for each disc side. The spray nozzles shall consist of nozzle tips, mounting cap for quick removal, nozzle body and seals. The replacement of spray nozzles must be possible from outside the filter tank. A swivel joint shall allow the spray header manifold to rotate out for nozzle access without disassembly of the manifold or headers.

C. Each filter shall have one externally mounted low-pressure Grundfos centrifugal pump for the backwash system. The backwash pump shall be of the vertical multi-stage design with the motor mounted directly to the top of the pump. The motor shall be supplied by Grundfos integral with the pump. The motor shall be standard efficiency rated for 460V, 3 phase, 60 HZ operation. Filtered water shall be discharged from the pump to the backwash header piping constructed of stainless steel.

2.7 CONTROL PANEL MODIFICATION

A. The existing motor starter located in the Disc Filter Control Panel to manage the start/stop of the Backwash Pump motor will be replaced with a new motor starter as per this specification. The motor starter will be sized appropriately to match the requirements of the Backwash Pump

motor. The motor starter will be an IEC starter rated between 0.1 and 50 Amps @ 460VAC 3 phase, with rotary handle operator, visible trip indication, protection by overload, short circuit, undervoltage and shunt. The motor starter will be equipped with auxiliary contacts for monitoring and control. The IEC motor starter shall be Square D TeSys or approved equal.

2.8 DISCFILTER SPARE PARTS

A. The following spare parts will be supplied: 5 Backwash Spray Nozzles, 2 Filter Panels. Parts inventory shall be based in the United States.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor shall install the disc filter system per the Equipment Manufacturer's directions and the drawings. The Contractor will provide all required supports and anchoring required to install the disc filter unit. The plumbing and electrical connections shall be provided as detailed on the drawings and specifications. The Equipment Manufacturer will provide adequate crating and protection of the disc filter panel screen for shipment to the project site. Installation instructions will be provided that specifically outline installation of this drum screen. Lifting instructions will be provided to assist the Contractor in placing the unit into the concrete scree n sump.

3.2 FIELD SERVICES

A. The Equipment Manufacturer shall furnish the services of a factory-trained representative based in the United States and employed by the manufacturer, for a minimum of two (2) working days and one (1) trip. This trip shall consist of inspection and check-out (dry/wet/electrical) and for start-up.. The Contractor will provide to the Equipment Manufacturer a minimum prior notice of three (3) weeks in order to schedule these services.

END OF SECTION 46 61 23

Appendix H

BID FORM FOR CONSTRUCTION CONTRACT

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted to: Piedmont Water Company

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

2.01 The following documents are submitted with and made a condition of this Bid:

A. Required Bid security;

B. List of Proposed Subcontractors;

C. List of Proposed Suppliers;

D. Evidence of authority to do business in the State of Georgia;

E. Georgia Utility Contractor's license number as evidence of Bidder's State Contractor's License; and

F. Required Bidder Qualification Statement with supporting data.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Lump Sum Bids*

A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price:

1. Lump Sum Price (Single Lump Sum)

Lump Sum Bid Price	$
Owner's Contingency	$ 550,000
Total	$

2. Alternative Bid Equipment (Deductive or Additive to Total Above):

Influent Pumps (ABS)	$

ARTICLE 4—TIME OF COMPLETION

4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

4.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder's Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data

are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.

2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.

3. Bidder has not solicited or induced any individual or entity to refrain from bidding.

4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:

a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.

b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.

c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.

d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

_____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

Address for giving notices:

_____
_____

Bidder's Contact:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address:

_____
_____
_____

Bidder's Contractor License No.: (if applicable) _____

Appendix I

Carey Station WRF 0.5 MGD to 1.0 MGD Expansion
Or-Equal Equipment

No.	Equipment Name	Manufacturer or Local Rep	Associated Spec. Section(s)	Base of Design	Equipment Location	
1	Slide Gates and Weir Gates	Rodney Hunt (Local rep: Heyward)	40 05 59	1. Whipps, Inc. 2. Waterman Industries 3. Hydro Gate 4. Golden Harvest, Inc.	Headworks, VLR basins and Clarifier Splitter box	Approved as ""or-equal"
2	Slide Gates and Weir Gates	RW Gate (Local rep: Principle Environmental, Inc.)	Same as above	Same as above	Same as above	Approved as ""or-equal"
3	VFD	Amtech	26 29 23	A. Square D B. Eaton C. Allen-Bradley D. ABB	Influent Pumps, Blowers	**Amtech not approved as or-equal**
4	Submersible Pump	ABS (Local Rep: Hydra Service Inc.)	43 25 13	1. INFLUENT PUMPS a. Flygt. b. KSB. 2. SCUM PUMP a. ABS	Influent pump station	**Alternative Bid Equipment**
5	Submersible Pump	KSB (Local Rep: Pump and Process Equipment Inc.)	Same as above	Same as above	Same as above	Approved as ""or-equal"
6	Refrigerated Auto Sampler	Teledyne ISCO (Local Rep: Kazmier and Associates Inc.)	40 75 00	1. Hach	Headworks	Approved as ""or-equal"
7	FRP Weirs, FRP Scum Baffles, FRP Building, and FRP Parshall Flume	EDGENG	06600- FRP Weirs, FRP Scum Baffles 133100- FRP Building 407169- FRP Parshall Flume	A. The weir plates and scum baffles shall be manufactured by: 1. Warminster Fiberglass Company 2. NEFCO Inc. A. The fiberglass reinforced building enclosure shall be manufactured by: 1. TRACOM, Inc., Alpharetta, GA A. The equipment, parshall flume, shall be manufactured by: 1. Warminster Fiberglass Company 2. Tracom Fiberglass Products 3. Enduro Composities, Inc. 4. Strongwell 5. Virtual Polymer Compounds	Weirs and scum baffles at Clarifier No. 3 FRP building for chemical pumps Parshall Flume at Headworks	**Approved as or-equal for 06600- FRP Weirs, FRP Scum Baffles & 407169- FRP Parshall Flume, Not Approved as or-equal for 133100- FRP Building**
8	Ultrasonic Level Meters	Emerson Rosemount (Local Rep: Kazmier and Associates Inc.)	40 72 13	1. Siemens	Headworks, chemical tank	Approved as ""or-equal"