

DOCUMENT 00 90 10

ADDENDUM No. 3

PART 1 GENERAL

1.0 DOCUMENT INCLUDES

- A. Changes to Bid Documents
- B. Changes to Specifications
- C. Changes to Plan Set
- D. Clarifications and Responses to Questions

1.1 CONSTRUCTION CONTRACT

- A. The Construction Contract is known as: *Mountain Green BNR Wastewater Treatment Plant*
- B. Date of this Addendum: 2/3/2023.
- C. All other provisions in the contract to remain in full force and effect.

PART 2 CHANGES TO BID DOCUMENTS

- 2.0** No changes.

PART 3 CHANGES TO SPECIFICATIONS

- 3.0** Addition of Architectural Specifications.

PART 4 CHANGES TO PLAN SET

4.0 Civil Drawings

- 1) CS-103
 - i. Removed note #2 to calling out power pole removal. Power pole should remain.
- 2) CU-101, CU-102, CU-103
 - i. Changed RAS line note to callout as C-900, note #3.

4.1 Electrical Drawings

- 1) E-201, E-202, E-206, E-307, E-402, E-403
- 2) I-902, I-003, I-004, I-005
 - i. Revised print error on tables.

PART 5 ITEMS OF DISCUSSION

The following is a response to questions received from contractors and suppliers.

5.0 Clarifications and Response to Comments

- 1) Question: The plans don't show gutter but it is mentioned in the spec. Is it intended ?
Response: No gutter intended.
- 2) Question: The RAS line from the clarifier to the headworks building is shown as SDR35 and labeled a gravity line. This is a pumped line should the pipe type be changed to a pressure pipe?
Response: This line should be C900, see revised Civil Sheets attached.
- 3) Question: Can you provide the Geotech for the project?
Response: Yes, see Geotech report attached.
- 4) Question: Should site landscape restoration consist of just hydroseeding or is there a more detailed landscape plan?
Response: Return to existing condition, native seed mix.
- 5) Question: The table of contents in the technical specifications has additional specification provided for the architectural, but the specifications are missing from the document. Can these be provided?
Response: Please see architectural specifications attached.
- 6) Question: Is contractor responsible for sludge removal from Cell No.2?
Response: No, District will remove the sludge from Cell No.2.
- 7) Question: Can contractor perform a test pier to observe dewatering characteristics?
Response: Yes, contractor may perform a test pier. Please coordinate with engineer.
- 8) Question: Is the generator and transfer switches owner supplied?
Response: No, Please see attached sheet E-201 for revision. Generator and transfer switches contractor supplied.
- 9) Question: Do all contractors need to provide filled out bid form for all schedule of values?
Response: The two lowest lump sum bids selected will be granted 48 hours from the bid opening to provide a filled out bid form.
- 10) Question: Sheet CL-301 shows a note mentioning post-tensioning. Is the clarifier intended to be post-tensioned?
Response: The clarifier shown in the drawings is conventional reinforced. However, a post tensioned clarifier alternate would be accepted.
- 11) Question: Is temporary power available?
Response: Temporary power to be coordinated by Contractor with Rocky Mountain Power and metered. It is anticipated that temporary power can be pulled off of the existing power pole near the existing blower building.

12) Question: Is contractor water available?

Response: Contractor to coordinate with local water utility for a metered connection to an existing hydrant.

13) Question: What are the dewatering requirements?

Response: It is not known what the dewatering requirements will be, however there is a lift station being constructed in the vicinity requiring dewatering. The pump being used is a Mody G554T, 10HP, 3ph-60Hz-480V. See attached quote and pump specification. This information is for reference only and to be used at the contractor's discretion.

14) Question: Concerning drawing(s) I902, I003, I004 & I005. I believe these drawings have instrumentation information that will be critical for an accurate proposal. They are not legible. Could drawings that are legible be provided?

Response: Please see attached revised drawings.

15) Question: Concerning drawing E209. It is assumed that the E.C. is to provide the metering switchboard, POB switchboard and the HB switchboard. Is the E.C. to provide the MCC also? Is there a responsibility matrix that could be viewed that would clearly explain what equipment is to be provided by the E.C. or by others with the E.C. installing the 'others' provided equipment?

Response: The Metering Switchboard, POB Switchboard, HB Switchboard and MCC-HB are all listed in the Electrical Equipment Schedule on E210 and are to be supplied by the E.C. Equipment Control Panels are to be provided by the suppliers and installed by E.C. There is no equipment matrix at this time.

16) Question: There's a considerable amount of underground conduit installs to make on this project. Is any duct bank required for any of it?

Response: No duct bank requirements have been specified at this time.

17) Question: Concerning drawing E307. Is the scale of 1" = 60' correct? Or is it closer to 3/16" = 1'? Also are Clarifier # 1 and Clarifier # 2 identical take off related to that drawing, so this drawing x 2?

Response: It looks like that should have been 1" = 60" or 5', NOT 60'. The drawing is shown as a typical, so the same information for Clarifier #1 and Clarifier #2.

18) Question: Concerning drawing E403, it shows conduit # P2001 going to the plant ops' building, should that conduit number be P1006?

Response: That is correct. This should be conduit P-1006

19) Question: Concerning drawing(s) E402 it shows local disconnects for three RAS pumps. However, on one line drawing E203 it does not show a disconnect. Do the RAS pumps require the local disconnect?

Response: The RAS Pump disconnect switches were deleted, but not removed from Sheet E402. The disconnects and conduits P2022A, P2023A and P2024A can be removed.

20) Question: Concerning one line drawing E202. Shows filter control panel(s). Where in the field or electrical rooms are these panels located?

Response: The 'Filter Control Panel' refers to the Disc Filter control panels DCP-1 and DCP-2 located on Sheet E405.

21) Concerning schedule of values for bid form on page 20 of the specifications, item # 8 calls to remove and dispose of power pole. The info that I find on the drawings is on E-304, keyed note # 3 calling to coordinate with the utility to remove the existing overhead transformer. Can the power pole removal be clarified?

Response: Work on power pole needs to be coordinated with Rocky Mountain Power. It is assumed that RMP will remove the existing transformers and install a riser for new transformer feeder.

22) Concerning schedule of values, item # 11, remove and dispose of conduit. Does this pertain to the re-location of grinder controls conduits and interception and re-routing of the existing conduits as shown on drawing E-304? It's assumed that the existing conduits need to be intercepted, the old conductors removed, and new conductors re-installed in the existing underground conduits. Is this correct?

Response: The assumption is correct for the existing grinder controls. The existing conduits should be intercepted and rerouted as possible for use with new conductors to equipment as shown in drawings.

23) Question: With the Generator being provided by the 'Owner' per specifications, does the E.C have the responsibility to provide a crane and concrete generator pad for setting this? If so, are there any minimum specifications that are required for the generator pad? Also, is it the E.C.'s responsibility to fill the generator with fuel and top it off after testing, assuming it's diesel. Is this Diesel or Natural Gas?

Response: Generator is to be supplied by Contractor per Specification 16817SP. Key Note #5 on Drawing E201 had been corrected. Generator pad details to follow.

Enclosure:

- 1) Pre-bid Agenda and sign-in sheet
- 2) Architectural Specifications
- 3) Revised Civil Drawings
- 4) Revised Electrical Drawings
- 5) Geotechnical Report
- 6) Pump Example

Pre-Bid Agenda
Mountain Green BNR Wastewater Treatment
1/30/2023

Introduction: Jeremy Sorensen – Mountain Green Sewer Improvement District WWTP Manager

EJCDC Contract Documents: Daniel Diaz – Sunrise Engineering Project Manager

Mandatory Pre-Bid: 3:00 p.m. 1/30/2023

Bid Opening: 2/21/2023 @ 3:00 pm Deliver Bid to Mountain Green Sewer Improvement District office at 5455 W Old Highway RD, Morgan, UT 84050.

Bid Contact: Daniel Diaz
Office: 801-838-8315
Cell: 813-909-3750
Email: ddiaz@sunrise-eng.com

Follow all phone calls of requests for information with an email to Daniel Diaz. No requests for information after February 14th, 2022 at 5:00 p.m..

All Addenda will be issued within 48 hours of the Bid Opening.

Time of Completion for the project:

Engineer has established that the work will be complete within 730 days after the date when the Contract Times commence to run and Notice to Proceed has been signed. Entire project must be completed by December of 2025.

Substantial Completion: Substantial completion on this project is deemed to be an operational wastewater treatment plant. This includes successful start-up and operation of the plant. Asphalt, landscaping, and any incidental items may be completed after substantial completion, however final payment will not be awarded until punch list completion.

Liquidated Damages: \$500 per calendar day

Scope of Work: Daniel Diaz - Sunrise Engineering

Brief Summary

- Draining of existing cell #2.
- Construction of 6,500 SF Operations Building (Smooth Face CMU).
- Construction of 5,000 SF Headworks Building (Smooth Face CMU).
- Installation of Biological Nutrient Removal Basin Equipment.
- Construction of (2) Clarifiers.
- Construction of a Large Digester Split Into (2) Sides.
- Electrical, Mechanical HVAC, and Plumbing.

- Chemical feed system: Two dual pump skid (4 pumps total), 1/2" tubing, 1/2" sch 80 PVC, 3" conduit, Pressure Gauges,
- Construction of Yard Piping including 6"-24" HDPE and Ductile Iron Lines, Sewer, Chemical Lines, Backwash Piping, Sludge Piping, Return Waste Water Lines, and Electrical System Upgrades including on-site back-up generator.
- Site Construction including import structural fill, asphalt paving, and landscaping.
- Installation of Mechanical Dewatering System (Screw Press).

Scheduling:

The existing treatment plant is a seasonal plant which will need to remain in service during construction. Mobilization, dewatering and draining of Cell No. 2 may begin immediately upon Notice to Proceed.

Phase I

- Mobilization
- Begin site dewatering as needed
- Draining Cell No. 2
 - Shut off all flow to Cell No. 2
 - Use existing level control structure, lay new pipe connecting Cell No. 1 and Cell No. 3 to continue plant operations
 - Pump out Cell No. 2 to Cell No. 1 using temporary pipes and pump
 - Do not exceed pump rates so as not to exceed plant operational limit
 - Pump rate not to exceed: 150 GPM
- Start work on other structures while Cell No. 2 dries

Phase II

- Dry and remove necessary material from Cell No. 2
- Any other construction may be started

Phase III

- Install baffle wall (Floating Baffle) and basin liner in Cell No. 2
- Install BNR equipment in Cell No. 2
- Any other construction and equipment installation

Measurement & Payment:

The project is a Lump Sum project a schedule of values has been provided in the contract documents to assist the OWNER in the evaluation of the low BID and provide a summary of costs equaling the total Lump Sum Bid Amount for the purpose of determining the responsiveness of the Bidder and provide baseline date for negotiating redesign if necessary to fit the budget, negotiating possible change orders that may occur during construction, and to assist in determining the amount of partial (monthly) pay requests as the work is completed.

Brief Overview of Plans and 3d Model: Daniel Diaz – Jared Anderson, Sunrise

PDF links: For existing site plan & demolition plan.

Brief overview of BNR and Planset

Site Visit: To answer questions and allow the Contractors to investigate the conditions.
ENSURE COMPLIANCE WITH FEDERAL AND/OR STATE REGULATIONS:

- MBE/EEO
- Wage Rates
- Buy America (Not Required)
- American Iron and Steel
- Safety, OSHA
- Refer to Preconstruction Conference Report and Agenda.

M E M O R A N D U M

TO: Communities and Bidders
Utah Water Quality Project Assistance Program

FROM: Utah Division of Water Quality (DWQ)

SUBJECT: MBE/WBE Pre-Bid Information

DATE: 1/30/2023

1. Minority Business Enterprise (MBE) and Women's Business Enterprise (WBE) requirements

Minority Business Enterprise (MBE) and Women's Business Enterprise (WBE) policies are required by the Federal Government for all projects directly funded by the EPA Capitalization Grant to promote the use of Minority Business Enterprises and Women's Business Enterprises on Federally funded projects. Communities are required to include MBE/WBE requirements in bidding documents and Contractors are required to make a good faith effort, supported by documentation, to include Minority Business Enterprises and Women's Business Enterprises as subcontractors or suppliers on the project.

You can document your efforts to contact MBE/WBEs by submitting copies of advertisements in journals and newspapers, telephone logs, and direct correspondence, etc. The DWQ will be reviewing your documents and will be checking the validity of contracts that you have with MBEs and WBEs, so it is in your best interest to solicit MBEs and WBEs prior to bid opening so that the costs of your efforts can be included in your bid and the MBE/WBE requirements can be satisfied.

Agencies which should be contacted for lists of bona fide MBEs and WBEs follow:

Utah Department of Transportation
Office of Civil Rights
4501 South 2700 West
PO Box 141520
Salt Lake City, UT 84114-1520
Phone: 965-4356

Utah Transit Authority
Office of Civil Rights
3600 South 700 West
Salt Lake City, UT 84119
Phone: 262-5626 ext. 2310

Salt Lake City Department of Airports
AMF Box 22084
Terminal No. 1, Engineering Division
776 Terminal Drive
Salt Lake City, UT 84116
Phone: 575-2945

U.S. Small Business Administration
Minority Economic Development Division
Federal Building, Room 2231
125 South State
Salt Lake City, UT 84138
Phone: 524-3210

2. Equal Employment Opportunity/Affirmative Action

Federal guidelines covering EEO/AA are a part of the contract. Insure that you are in compliance with these regulations. A copy of the regulations is published in the specifications. The red and blue printed bilingual EEO poster must be posted on the construction site.

3. Project Scheduling and Outlays

In order to comply with Federal requirements, projected outlays must be submitted and reported by the EPA and the DWQ to the Office of Management and Budget. Because of this requirement, it is necessary that your project is carefully planned and expenditures projected so that payment schedules can be developed by the owner and submitted to the DWQ. Critical path scheduling, or bar charts with projected outlays listed are acceptable forms of scheduling.

4. Peculiar Physical Aspects of the Project

The DWQ will be monitoring the project throughout the duration of construction and will be assisting the community (owner) in its administrative activities. If you have any questions concerning this or any other matter, please do not hesitate to contact our office at 538-6146

Pre-Bid Meeting Attendance Sheet Mountain Green WWTP

Date: 1/30/2023

Name	Company	Email	Phone Number
Bill Coutts	MGSID		8196768496
Lin Bell	Rain For Rent	lbell@rainforrent.com	8015411661
Mark Anderson	Alder Construction	manderson@alderconstruction.com	8012668856
Val Morris	Morris Electric	vmorris@morrisele.com	8018361617
Kyle Frandsen	Xylem	Kyle.frandsen@xylem.com	8015983765
George Smith	Ralph L Wadsworth Co	gsmith@wadsco.com	8016171762
Brandon Karnath	COP Construction	utbid@copconstruction.com	4066002167
Greg Wheelwright	Brahma	greg.wheelwright@bgi.email	8015215200
Tony Curtis	Brahma	Tony.curtis@bgi.email	4806219769
Justin Alvey	Brahma	justin.alvey@bgi.email	8013815028
Kent Isaacson	Brush Brothers	kent@brushbrotherspaint.com	8019700487
Burk Montgomery	Skyline Electric	burk.montgomery@skyline.us	3854275405
Burke Lyon	GBI	BurkeL@mygbi.com	8014971561
Chase Strong	Strong Excavation	Biols@strongexcavation.com	8019107034
Brad Miller	FX Construction	brad@fxconstruction.com	8019700149
Michael Clax	Jrock Construction	Michaelc@jrockconstruction.com	8015177610
Jared Dixon	Spindler Construction	Jared@spindlercorp.com	4357530722
David Lancaster	Vancon	bid@wedigutah.com	3852246738
Steve Barnes	Winward Electric	steveb@winwardelectric.com	8017106582
David Bergon	SXS Electric	dave@sseutah.com	3857706409
Ryan Linford	Probuild	ryan@probuild.com	8013813110
Boyd Bindrup	CTI Electric	bbindrup@ctiut.com	8014301404
Tyler Stevenson	Rain For Rent	Tstevenson@Rainforrent.com	3853381059
Kyler Eyley	Geary Electric	trever@gearyelectricco.com	4357608816
Stephen Alston	Hobas Pipe	salston@hobaspipe.com	8018882772
Nick Jex	Artistic Roofing	Nickj@artisticroofingutah.com	8018140931
Dave Haller	Jrock Concrete	Daveh@jrockconstruction.com	8014722488

Brian Bichler	Energy Management (Generac Generators)	bbichler@goemc.com	8015143653
Brad Cherrington	Clean Flow SWPPP	Bradfrswppp@gmail.com	8014198423
Dan Taylor	MGC Contractors	dtaylor@mgccontractors.com	8013727646
Casey Homs	Geneva Rock	charris@genevarock.com	4359940619

SECTION 04 0501**COMMON MASONRY REQUIREMENTS****PART 1 GENERAL****1.01 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Common requirements and procedures for Masonry including:
 - a. References.
 - b. Definitions.
 - c. Pre-Installation Conferences held jointly with masonry sections.
 - d. Joint backing for masonry control joints and masonry expansion joints.
 - e. Testing and Inspection for providing specific testing and inspections and Field Tests and Inspections administrative requirements for masonry.
 - 2. Section 07 9213: 'Elastomeric Joint Sealants' used with masonry joints.
 - 3. Sections Under 04 0000 Heading: 'Masonry':
 - a. Pre-installation conference held jointly with other masonry related sections including:
 - 1) Section 04 0513: 'Cement and Lime Masonry Mortaring'.
 - 2) Section 04 0516: 'Masonry Grouting'.
 - 3) Section 04 2223: 'Architectural Concrete Unit Masonry'.

1.02 REFERENCES

- A. Definitions:
 - 1. Cold Weather: as referred to in this Section, is four (4) hours with ambient temperature below 40 deg F (4.4 deg C) in twenty-four (24) hour period.
 - 2. Efflorescence: Deposit or encrustation of soluble salts, generally white and most commonly consisting of calcium sulfate that may form on surface of stone, brick, concrete, or mortar when moisture moves through and evaporates on masonry. Often caused by free alkalies leached from mortar, grout, adjacent concrete, or in clays. Test for efflorescence is described in ASTM C67 and CAN/CSA A82.
 - 3. Flashing:
 - a. Cavity Wall Flashing: Same as flexible flashing.
 - b. Flashing: Thin impervious material placed in mortar joints and through air spaces in masonry to prevent water penetration and/or provide water drainage.
 - c. Flexible Flashing: Water-proof material typically used in cavity wall construction to contain and assist in proper water drainage that may penetrate wall system veneer. Other materials may be required to constitute the system.
 - d. Foundation Flashing: Same as flexible flashing.
 - e. Head And Sill Flashing: Same as flexible flashing.
 - f. Through-Wall Flashing: Generally considered same as flexible flashing.
 - g. Hot Weather: as referred to in this Section, is ambient air temperature above 100 deg F (38 deg C) or ambient air temperature above 90 deg F (32 deg C) with wind velocity 8 mph (13 kph) or greater.
 - 4. Masonry Joints:
 - a. Masonry Control Joint: Determines location of movement in concrete masonry walls that is due to volume changes resulting from shrinkage. Vertical control joint is vertical gap through concrete masonry wythe and filled with

inelastic materials. Joint backing with sealant is used on exterior side of control joint to prevent water and air penetration. Concrete masonry generally shrinks over time.

- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM D2000-18, 'Standard Classification for Rubber Products in Automotive Applications'.
 - b. ASTM D2240-15, 'Standard Test Method for Rubber Property-Durometer Hardness'.
 - c. ASTM D2287-12, 'Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds'.
 - 2. International Building Code (IBC) (2018 or latest approved edition):
 - a. Chapter 17, 'Special Inspections And Tests':
 - 1) Section 1704, 'Special Inspections And Tests, Contractor Responsibility And Structural Observations'.
 - 2) Section 1705, 'Required Special Inspection And Tests':
 - (a) Section 1705.2, 'Steel Construction'.
 - b. Chapter 21, 'Masonry' for materials, design, construction and quality of masonry.
 - 3. The Masonry Society (TMS):
 - a. TMS 402/602-16, 'Building Code Requirements and Specification for Masonry Structures'.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate work with other trades with items to be built into masonry such as electrical switches and plumbing faucets.
- B. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conferences:
 - a. Conduct conference at Project site.
 - b. Schedule pre-installation conference during construction of mockup panel.
 - 2. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review storage and handling requirements.
 - b. Review cold and hot weather procedure requirements.
 - c. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections.
 - 1) Review requirements and frequency of testing and inspections.
 - 2) Review specific testing and inspections and field test requirements as specified in Unit Masonry Sections.
- C. Scheduling:
 - 1. Concrete Unit Masonry:
 - a. Structural Mortar and Grout:
 - 1) Notify Testing Agency and Architect twenty-four (24) hours minimum before placing masonry units, reinforcing, mortar and/or grout.

1.04 SUBMITTALS

- A. Action Submittals:

1. Product Data: As specified in each masonry section.
2. Samples: As specified in each masonry section.

1.05 QUALITY ASSURANCE

- A. Testing And Inspection:
 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 2. Owner will provide Testing and Inspection for structural masonry (prisms, units, mortar, and grout):
 - a. Owner will employ testing agencies to perform testing and inspection for structural masonry as specified in Field Quality Control in Part 3 of this specification:
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
 - 2) See Section 01 1200: 'Multiple Contract Summary'.
- B. Scheduling:
 1. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing mortar.
 2. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing grout.
- C. Mockups:
 1. Masonry Sample Panel:
 - a. Sample panel 4 feet (1.20 m) long by 3 feet (900 mm) high of proposed color range, texture, bond, mortar, and workmanship. Include mock-up framing and sheathing to show wall construction to be used on Project, including:
 - 1) Anchor and tie systems.
 - 2) Flexible flashing and required components at foundation.
 - 3) Seismic reinforcing.
 - b. Sample panel(s) shall be constructed using 'production run' material to be used on Project unless otherwise approved in writing by Architect and/or Owner.
 - c. Sample panel(s) to be used as standard of comparison for masonry work built of same material.
 - d. Sample panel(s) shall remain at jobsite until all masonry is completed.
 - e. Do not start work until Architect has accepted sample panel(s).
 - f. At Architect's direction, demolish mock-ups and remove debris.

1.06 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
 1. Check, carefully unload, and deliver material to site in such manner as to avoid soiling, damaging, or chipping.
 2. Do not use damaged masonry units, damaged components of structure, or damaged packaged materials.
 3. Masonry Accessories: Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
 1. Aggregate:

- a. Store different aggregates separately.
- b. Store on high ground, or ideally, off ground to prevent contamination from dirt, organic materials and ground water, any of which may contribute to efflorescence and may be deleterious to mortar performance.
- c. Store under protective cover to avoid saturation and freezing in cold weather.
- 2. Cementitious material:
 - a. Store in such manner as to prevent deterioration or intrusion of foreign material or moisture.
 - b. Do not use cementitious materials that have become contaminated.
 - c. Protect from precipitation and groundwater.
 - 1) Store materials on elevated platforms, under cover, and in dry location.
 - 2) Do not use cementitious materials that have become damp or has become unsuitable for good construction.
- 3. Masonry accessories:
 - a. Store masonry accessories clear of ground, including metal items, to prevent corrosion and contamination by dirt and ground water which may contain soluble salts and other matter which may contribute to efflorescence and staining.
 - b. Plastic and asphalt coated flashing material should not be stored in areas exposed to sunlight. During installation, flashing must be pliable so that no cracks occur at corners or bends.
 - c. Protect from damage until installation.
- 4. Masonry units:
 - a. Store materials protected from exposure to harmful weather conditions as directed by manufacturer.
 - b. Store material on planks clear of ground which may contain soluble salts and protect from damage, dirt, or disfigurement.
 - c. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof membrane, securely tied. If units become wet, do not install until they are dry.
- 5. Masonry Reinforcement:
 - a. Protect reinforcement, ties, and metal accessories from permanent distortions, elements and store off ground.

1.07 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Mortar:
 - a. Ideal mortar temperature is 70 deg F $\pm$ 10 deg F (21 deg C $\pm$ 6 deg C). Mixing temperature should be maintained within 10 deg F (6 deg C).
 - 2. Cold Weather Requirements. Implement approved cold weather procedures and comply with requirements contained in TMS 402/602 including but not limited to following:
 - a. Preparation requirements (prior to conducting masonry work):
 - 1) Do not lay masonry units having either temperature below 20 deg F (minus 7 deg C) or containing frozen moisture, visible ice, or snow on their surface.
 - 2) Do not use frozen materials or materials mixed or coated with ice or frost. Keep materials free of ice and snow. Do not lay masonry on frozen material. Remove and replace unit masonry damaged by frost or by freezing conditions.

- 3) Remove visible ice and snow from top surface of existing foundations and masonry to receive new construction. Heat these surfaces above freezing, using methods that do not result in damage.
 - 4) Preparation of mortar.
 - b. Construction requirements (work in progress and based on ambient air temperature):
 - 1) Do not heat water or aggregates used in mortar or grout above 140 deg F (60 deg C). Comply with cold weather requirements for ambient air temperatures prior to conducting masonry work in accordance with TMS 402/602.
3. Hot Weather Requirements. Implement approved hot weather procedures and comply with requirements contained in TMS 402/602 including but limited to following:
 - a. Preparation (prior to conducting masonry work). Comply hot weather procedures when:
 - 1) Ambient air temperature exceeds 100 deg F (37.8 deg C), or exceeds 90 deg F (32.2 deg C) with wind velocity greater than 8 mph (12.9 kph).
 - 2) Ambient temperature exceeds 115 deg F (46.1 deg C), or exceeds 105 deg F (40.6 deg C) with wind velocity greater than 8 mph (12.9 kph).
 - b. Construction requirements (work in progress). Comply hot weather procedures when prior to conducting masonry work in accordance with TMS 402/602.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Masonry Control Joints:
 1. Description:
 - a. Extruded rubber or PVC.
 - b. Joint backing (backer rod).
 - c. Elastomeric joint sealant.
 2. Design Criteria:
 - a. Extruded Rubber:
 - 1) Meet requirements of ASTM D2000 2AA-805.
 - b. PVC:
 - 1) Meet requirements of ASTM D2287 (Type PVC 654-4) with durometer hardness of 85 (+ or -5) when tested in accordance with ASTM D2240.
 - c. Acceptable Products:
 - 1) RS standard rubber control joint by Hohmann & Barnard.
 - 2) VS standard PVC control joint by Hohmann & Barnard.
 - 3) Equal as approved by the Architect prior to installation.
 - (a) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (b) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Unit Masonry:

- a. Tests and Inspections are required as specified in Structural Drawings.

END OF SECTION

SECTION 04 0513**CEMENT AND LIME MASONRY MORTAR****PART 1 GENERAL****1.01 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of masonry mortar used on Project.
- B. Related Requirements:
 - 1. Section 04 0501: 'Common Masonry Requirements'.

1.02 REFERENCES

- A. Definitions:
 - 1. See Section 04 0501: 'Common Masonry Requirements' for common masonry definitions.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C144-18, 'Standard Specification for Aggregate for Masonry Mortar'.
 - b. ASTM C150/C150M-18, 'Standard Specification for Portland Cement'.
 - c. ASTM C207-18, 'Standard Specification for Hydrated Lime for Masonry Purposes'.
 - d. ASTM C270-14a, 'Standard Specification for Mortar for Unit Masonry'.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference.

1.04 SUBMITTALS

- A. Informational Submittals:
 - 1. Source Quality Control Submittals:
 - a. If pre-mixed wet mortar or pre-blended dry mortar mix are to be used, provide certification from Manufacturer or Supplier verifying that mixes meet specification requirements.
 - b. If site mixed / blended mortar is to be used, provide written description of proposed method of measuring and mixing of materials.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual:
 - a. Record Documentation:
 - 1) Testing and Inspection Reports:
 - (a) Testing Agency Inspecting Reports.

1.05 QUALITY ASSURANCE

- A. Testing And Inspection:
 - 1. As specified in Section 04 0501: 'Common Masonry Requirements'.

1.06 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
 - 1. As specified in Section 04 0501: 'Common Masonry Requirements'.
- B. Storage And Handling Requirements:
 - 1. Cementitious material:

- a. As specified in Section 04 0501: 'Common Masonry Requirements'.

PART 2 PRODUCTS**2.01 SYSTEM**

- A. Design Criteria:
 - 1. Mixing:
 - a. Meet either proportion or property specifications of ASTM C270 for masonry mortar as per Table 3 'Proportion Specifications' and Table 4 'Physical Requirements for Masonry Cement Mortars'.
 - b. Conform with requirements of ASTM C780 and ASTM C1586.
 - c. Machine mixing should be used whenever possible.
 - 2. Mortar Minimum Compressive Strength at twenty-eight (28) days:
 - a. Type S: 1800 psi (12.4 MPa).
 - 1) Concrete Unit Masonry (CMU):
- B. Materials:
 - 1. Portland Cement:
 - a. Meet requirements of ASTM C150/C150M and ASTM C270.
 - 2. Hydrated Lime:
 - a. Meet requirements of ASTM C207 for hydrated lime.
 - 3. Aggregate:
 - a. Meet requirements of ASTM C144 and ASTM C270.
 - 4. Water:
 - a. Clean and free of acids, alkalis, and organic materials.
 - 5. Admixtures:
 - a. Use no admixtures, except for color pigments specified below, without Architect's written permission. Use of any admixture to meet cold weather requirements and admixtures that increase air entrainment are expressly forbidden under all circumstances.
- C. Mixes:
 - 1. General:
 - a. Heat water and sand to 140 deg F (60 deg C) maximum if temperature is below 40 deg F (4.4 deg C).
 - 2. Unit Masonry for mortar as specified in each Masonry specification section:
 - a. Proportions of ingredients in compliance with proportion specification of ASTM 270 using Portland cement.

PART 3 EXECUTION**3.01 FIELD QUALITY CONTROL**

- A. Field Tests And Inspections:
 - 1. Field tests and inspection as specified in 04 0501: 'Common Masonry Requirements'.
 - 2. Sampling and testing of mortar is not required.

END OF SECTION

SECTION 04 0516**MASONRY GROUTING****PART 1 GENERAL****1.01 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of masonry grout used on Project.
- B. Related Requirements:
 - 1. Section 04 0501: 'Common Masonry Requirements'.

1.02 REFERENCES

- A. Definitions:
 - 1. See Section 04 0501 for common masonry definitions.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C143/C143M-15a, 'Standard Test Method for Slump of Hydraulic-Cement Concrete'.
 - b. ASTM C404-18, 'Standard Specification for Aggregates for Masonry Grout'.
 - c. ASTM C476-18, 'Standard Specification for Grout for Masonry'.
 - d. ASTM C1019-18, 'Standard Test Method for Sampling and Testing Grout'.
 - 2. The Masonry Society (TMS):
 - a. TMS 402/602-16, 'Building Code Requirements and Specification for Masonry Structures'.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference.

1.04 SUBMITTALS

- A. Informational Submittals:
 - 1. Source Quality Control Submittals:
 - a. If pre-blended dry grout is to be used, provide certification from Manufacturer or Supplier verifying that mixes meet specification requirements.
 - b. If grout is to be mixed in field, provide written description of proposed procedure for measuring and mixing of materials.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual:
 - a. Record Documentation:
 - 1) Testing and Inspection Reports:
 - (a) Testing Agency Inspecting Reports.

1.05 QUALITY ASSURANCE

- A. Testing And Inspection:
 - 1. As specified in Section 04 0501.

1.06 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
 - 1. As specified in Section 04 0501.
- B. Storage And Handling Requirements:

1. Cementitious material:
 - a. As specified in Section 04 0501.

PART 2 PRODUCTS**2.01 SYSTEM**

- A. Design Criteria:
 1. Provide grout that conforms to requirements of ASTM C476 and TMS 402/602.
- B. Materials:
 1. Proportions of Ingredients:
 - a. Grout proportions shall be determined by one of following methods:
 - 1) As per ASTM C476 Table 1: 'Grout proportions by Volume' for fine and coarse grout.
 - 2) Specified Compressive Strength: Proportions established by twenty-eight (28) day compressive strength tests in accordance with Test Method ASTM C1019 that obtain specified compressive strength:
 - (a) Grout shall be mixed to slump of 8 to 11 inches (200 to 280 mm) as determined by Test Method ASTM C143/C143M.
 - (b) Grout shall have minimum compressive strength as specified in the Structural Drawings at 28 days.
 2. Production Methods: Grout shall be produced using one of following procedures:
 - a. Materials mixed at job site:
 - 1) Individual cementitious materials and aggregates stored at job site shall be mixed in mechanical mixer for minimum of five (5) minutes with sufficient water to achieve desired consistency.
 - 2) Individual dry ingredients transported to job site in suitable compartments shall be mixed with water at job site using continuous volumetric proportioning equipment to achieve desired consistency. Mix with auger of appropriate length to provide adequate mixing.
 - b. Mixed materials transported to job site:
 - 1) Factory dry-blended cementitious materials and aggregates delivered to job site shall be mixed in mechanical mixer for minimum of five (5) minutes with sufficient water to achieve desired consistency.
 - 2) Wet-mixed grout shall arrive at job site in ready-mixed condition. Slump shall be adjusted as necessary, and grout shall be re-mixed at mixing speed for at least one minutes before discharging to achieve desired consistency.
 - c. Grout may be hand mixed on small jobs with written approval of mixing procedure by Architect.
 3. Portland Cement:
 - a. Meet requirements of ASTM C94/C94M, ASTM C150/C150M and ASTM C476.
 4. Aggregate:
 - a. Meet requirements of ASTM C144, ASTM C404, and ASTM C476.
 5. Water: Clean and potable free of acids, alkalis, and organic materials.
 6. Admixtures:
 - a. No additives are allowed which will increase air entrainment. Other additives may be used as approved in writing by Architect before use.
 7. Antifreeze Compounds:
 - a. No antifreeze liquids, salts or other substances shall be used in grout to lower freezing point.

PART 3 EXECUTION**3.01 FIELD QUALITY CONTROL**

- A. Field Tests And Inspections:
 - 1. Field tests and inspection as specified in 04 0501: 'Common Masonry Requirements'.

END OF SECTION

1.04 SUBMITTALS

- A. Informational Submittals:
 - 1. Certificates:
 - a. Prior to construction, certificates for materials used in masonry construction indicating compliance with contract documents are to be submitted. This is "Unit Strength Method" approach.
 - 2. Source Quality Control Submittals:
 - a. Manufacturer's certification that units meet compressive strength specified requirements.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual:
 - a. Record Documentation:
 - 1) Testing and Inspection Reports:
 - (a) Testing Agency Testing and Inspecting Reports.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer:
 - a. Minimum of five (5) years' experience on successfully completed projects of similar nature.
- B. Testing And Inspection:
 - 1. As specified in the Structural Drawings.

1.06 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
 - 1. As specified in Section 04 0501: 'Common Masonry Requirements'.
- B. Storage And Handling Requirements:
 - 1. Aggregate, Cementitious Material, Masonry Accessories, Masonry Units, and Reinforcement:
 - a. As specified in Section 04 0501: 'Common Masonry Requirements'.

1.07 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Cold Weather and Hot Weather Limitations:
 - a. As specified in Section 04 0501: 'Common Masonry Requirements'.

PART 2 PRODUCTS**2.01 SYSTEM**

- A. Design Criteria:
 - 1. Minimum Compressive Strength as noted in the Structural Drawings.
- B. Materials:
 - 1. Mortar: as noted in the Structural Drawings.
 - 2. Concrete Masonry Units:
 - a. Color:
 - 1) Interior walls shall be natural color.
 - 2) Exterior walls shall be colored.
 - 3) Colors shall be as selected by the Architect from the manufacturer's available colors (excluding specialty or high-cost colors).

- b. Finish:
 - 1) Interior and exterior walls shall have standard finished surfaces.
- c. Design Criteria:
 - 1) Meet requirements of ASTM C90, lightweight classification:
 - (a) 85 lbs per cu ft (1 362 kg per cu meter) minimum weight classification.
 - (b) Lightweight aggregates conforming to ASTM C331/C331M.
 - (c) Do not use re-crushed masonry units as aggregate.
 - 2) Outside Corners: Square-edged, except where bull nose is indicated on Contract Drawings.
 - 3) Use special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, etc, as required.
 - 4) Uniform color and textures with unbroken edges. Smooth face, except where shown otherwise on Contract Drawings.

2.02 ACCESSORIES

- A. Construction Cleaning Compounds:
 - 1. Acceptable Products:
 - a. 202 or 202V by Diedrich Technologies, Oak Creek, WI
www.diedrichtechnologies.com.
 - b. Surekleen No. 600 or Vana-Trol by ProSoCo Inc, Kansas City, KS
www.prosoco.com.
 - c. Equal as approved by the Architect prior to installation.
 - 1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - 2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification Of Conditions:
 - 1. Verify substrates have been properly prepared.
 - 2. Verify built-in items are in proper location, and ready for roughing into masonry.
 - 3. Notify Architect of any unsatisfactory preparation before proceeding.
 - a. Do not install masonry over unsuitable conditions.
 - b. Commencement of Work by installer is considered acceptance of substrate.

3.02 PREPARATION

- A. Coordinate placement of reinforcement, anchors and accessories, flashings and weep holes and other moisture control products specified in other sections.
- B. Prior to placing masonry:
 - 1. Clean reinforcement by removing mud, oil, or other materials that will adversely affect or reduce bond at time mortar or grout is placed.
 - 2. Remove laitance, loose aggregate, and anything else that would prevent mortar from bonding to foundation.
- C. Wetting Masonry Units:
 - 1. Concrete masonry:
 - a. Do not wet concrete masonry units before laying. Wet cutting is permitted.
- D. Reinforcement:

SECTION 06 4100**ARCHITECTURAL WOOD CASEWORK****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Specially fabricated cabinet units.
- B. Countertops - excluding Laboratory Countertops.
- C. Hardware.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 12 3653 - Laboratory Countertops.

1.03 REFERENCE STANDARDS

- A. ANSI/BHMA A156.11 - Cabinet Locks 2019.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.
- C. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source 2021.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014, with Errata (2018).
- E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- F. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2016.
- G. KCMA A161.1 - Performance and Construction Standard for Kitchen and Vanity Cabinets 2017.
- H. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.
- J. WDMA I.S. 6A - Interior Architectural Wood Stile and Rail Doors 2013.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the efforts of the various trades affected by the Work of this Section.
 - 2. Coordinate completion of 2x6 (50mm x 100mm) wall blocking for custom casework.
 - 3. Coordinate completion of custom casework.

1.05 SUBMITTALS

- A. Certificates:
 - 1. Provide Manufacturer's certification of compliance to ANSI/NEMA LD 3.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
 - a. Include plan and elevation views, materials used, standing and running trim profiles, assembly methods, joint details, fastening methods, accessories, and hardware.

2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
3. Fabricator First Submittal:
 - a. Provide 1/4 inch (or larger) scale building layout and/or description of required room walls required for field dimension for Field Quality Control Submittal. Provide submittal before rough framing is completed.
4. Fabricator Second Submittal:
 - a. Provide shop drawings for cabinet and casework that are included for project showing details, casework locations and layout and required dimensions based on Field Quality Control Submittals for compliance to Contract Drawings for approval to Project Architect.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
- F. Closeout Submittals:
 1. Record Documentation:
 - a. Manufacturer's literature for plastic laminate.
 - b. Color selections.

1.06 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 1. Fire-Test-Response Characteristics: Provide plastic laminate with surface burning characteristics as determined by testing identical products by qualified testing agency.
 - a. Surface-Burning Characteristics:
 2. Plastic Laminate shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
 - a. Class A (Flame spread index 0-25; Smoke-developed index 0-450).
 - b. Flash point: None.
- B. Mockups:
 1. Before fabrication of complete casework package, submit section or sections of cabinetry containing typical drawer, shelving, cabinet door panel, and hardware.
 2. Match Owner provided selected sample finish specified in Section 09 9324.
 3. Mockups may be installed in Project after approval.
- C. Fabricator Qualifications
 1. Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 2. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
 3. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
 4. Firm experience in supplying products indicated for this Project.
 5. Firm with sufficient production capacity to produce required units.
 6. Firm will comply with specifications and Contract Documents for this Project.
 7. Minimum five (5) years experience in Woodwork installations.

8. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and installation procedures required for this project before bidding.
9. Upon request by Architect or Owner, submit documentation.

1.07 MOCK-UP

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.
- B. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.
- B. Delivery And Acceptance Requirements:
 1. Fabricator Responsibility:
 - a. Assemble architectural woodwork at Architectural Woodwork Fabricator's plant and deliver ready for erection insofar as possible.
 - b. Protect architectural woodwork from moisture and damage while in transit to job site.
 2. General Contractor Responsibility:
 - a. Report damaged materials received within two (2) days from delivery at project site.
- C. Storage And Handling Requirements:
 1. General Contractor Responsibility:
 - a. Unload and store in place where it will be protected from moisture and damage and convenient to use.

1.09 WARRANTY

- A. Manufacturer Extended Warranty:
 1. Approved Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for a period of five (5) years from date of substantial completion.

PART 2 PART 2 PRODUCTS**2.01 LAMINATE MATERIALS**

- A. Regulatory Agency Sustainability Approvals:
 1. Fire-Test-Response Characteristics: Provide plastic laminate with surface burning characteristics as determined by testing identical products by qualified testing agency.
 - a. Surface-Burning Characteristics:
 - 1) Plastic Laminate shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
 - (a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
 - (b) Flash point: None.
- B. Manufacturers:
 1. Formica Corporation: www.formica.com/#sle.
 2. Panolam Industries International, Inc; Nevamar Standard HPL: www.panolam.com/#sle.
 3. Wilsonart LLC: www.wilsonart.com/#sle.
 4. Pionite Decorative Surfaces, Auburn, ME www.pionite.com

5. Equal as approved by the Architect prior to installation.
 - a. Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - b. Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- C. Color as selected by the Architect from the manufacturer's standard colors.

2.02 CABINETS AND COMPONENTS

- A. Design Criteria:
 1. General:
 - a. Except as noted otherwise, fabricate the work of this section according to AWS - 'Custom Grade' is the minimum acceptable standard.
 - b. Casework Construction Type:
 - 1) Type B: Face-frame construction where front edge of cabinet body components are overlaid with frame.
 - c. Door interface style:
 - 1) Type B Construction: Flush Overlay.
 2. Cabinet Components:
 - a. Use plastic laminate facing on panel product, except on following surfaces, where Kortron or Melamine shall be used.
 - 1) Cabinet interiors and shelving faces behind cabinet doors in all rooms.
 - 2) Cabinet interiors and shelving faces always open to view.
 - 3) Cabinet exteriors permanently concealed.
 - 4) Drawer sides, backs, bottoms, and subfronts.
 - b. Shelves:
 - 1) Panel product.
 - 2) Thickness:
 - (a) 30 Inch (750 mm) Span And Less: 3/4 inch (19 mm) thick.
 - (b) Spans Over 30 Inches (750 mm) To 42 Inches (1 050 mm): One inch (25 mm) thick.
 - (c) Spans Over 42 inches (1 050 mm): One inch (25 mm) thick and provide Hafele or equal center supports.
 - c. Backs: 1/4 inch (6 mm) thick panel product.
 - d. Doors: 3/4 inch (19 mm) thick panel product.
 - e. Drawer Sides, Backs, And Subfronts: 1/2 inch (12.7 mm) thick minimum panel product.
 - f. Drawer Bottoms: 1/4 inch (6 mm) thick panel product.
 - g. Separate Drawer Front:
 - 1) 3/4 inch (19 mm) panel product.
 - h. Ends, Divisions, Bottoms, Tops: 3/4 inch (19 mm) thick panel product.
 3. Panel Product:
 - a. Glues (adhesives) used in manufacture and fabrication of panel products shall be Type I or II.
 - b. Moisture content shall be six (6) percent maximum at fabrication. No opening of joints due to shrinkage is acceptable.
 - c. Cores:
 - 1) Cabinet Doors: Medium density fiberboard (MDF) with minimum density of 48 lbs per cu ft.

- 2) All Other: Industrial grade particle board with minimum density of 45 lbs per cu ft.
- d. Edgings:
 - 1) Cabinet Doors And Drawer Fronts, Shelves and Exposed Panel Product Edges:
 - (a) Hot-glued, 3 mm thick, PVC edge-banding to match the plastic laminate of the panel face.
 - 2) Semi-Exposed Panel Product Edges:
 - (a) Hot-glued, 3 mm thick, PVC edge-banding.
- B. Fabrication:
 - 1. Drawers:
 - a. Fabricate with separate, screw-attached drawer front.
 - b. Joints shall be dowel and pressure-glued, or lock shoulder, glued, and pin nailed.
 - c. Set bottoms into sides, backs, and subfront with 1/4 inch (6 mm) deep groove with 3/8 inch (9.5 mm) minimum standing shoulder.
 - d. Every drawer shall have specified drawer guides and pull installed. Install drawer guides with 'Euroscrews', and pulls with through-bolts passing through both front and sub-front.
 - 2. Cabinet Doors:
 - a. Hinges: Install hinges using plastic insertion dowels for hinges and 'Euroscrews' for baseplates.
 - b. Every cabinet door shall have specified pull installed.

2.03 COUNTERTOPS

- A. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated and self-edge banded.
- B. Design Criteria:
 - 1. Countertops:
 - a. Post-formed front edge and backsplash, except where detailed otherwise, with plastic laminate meeting requirements of ANSI/NEMA LD 3: PF 42.
 - 1) Vertical Applications: GP 28.
 - 2) Horizontal (other than countertops): GP 38.
 - b. No raised lip on front edge.
 - 2. Balancing Material: BK 20.
 - 3. AWS Quality Grade: Premium.
- C. Assemblies:
 - 1. Countertops shall meet requirements of KCMA A161.1.
 - 2. Adhesives for other than post-formed types shall be spray grade, high heat resistant, neoprene contact adhesive.
- D. Color as selected by the Architect from the manufacturer's standard colors.

2.04 LABORATORY COUNTERTOPS

- A. As specified in Section 12 3653 Laboratory Countertops.

2.05 ACCESSORIES

- A. Manufacturer Contact List for Accessories:
 - 1. Accuride, Santa Fe Springs, CA www.accuride.com.
 - 2. Anybumper, Amite, LA www.Anybumper.com.

3. Blum Inc, Stanley, NC www.blum.com.
4. CompX National, Mauldin, SC www.nclnet.com.
5. Flynn & Enslow, San Francisco, CA www.flynnenslow.com.
6. Glynn Johnson, Chicago, IL www.glynn-johnson.com.
7. Grass America Inc, Kernerville, NC www.grassusa.com.
8. Hafele America Co., Archdale, NC hafele.com.
9. Ives, Indianapolis, IN www.iveshardware.com.
10. Knap & Vogt, Grand Rapids, MI www.knapandvogt.com or Knap & Vogt Canada, Mississauga, ON (905) 676-8972.
11. Salice America Inc, Charlotte, NC www.saliceamerica.com.
12. Stanley, New Britain, CT www.stanleyhardware.com.
13. TWP Inc., Berkley, CA www.twpinc.com.
14. Wire Cloth Manufacturers, Inc., Mine Hill, NJ www.wireclothman.com.

2.06 HARDWARE

- A. Cabinet Hardware:
 1. Cabinet And Drawer Pulls:
 - a. Satin Chromium Plated brass / bronze core bow handles, 4 inches (100 mm) long minimum.
 - b. Acceptable Products:
 - 1) 4484 by Stanley.
 2. Cabinet Adjustable Shelf Supports:
 - a. Either of following systems are acceptable, at Fabricator's option:
 - 1) 32mm System: Casework Fabricator's standard.
 - 2) Traditional System:
 - (a) Quality Standards: 255 and 256 by Knap & Vogt.
- B. Cabinet Door Bumpers:
 1. Description:
 - a. Polyurethane bumper to protect gypsum board from cabinet handle damage where cabinet handles hit gypsum wallboard surface.
 2. Design Criteria:
 - a. Clear.
 - b. Peel adhesion.
 - c. Size: 3/8 inch (9.5 mm diameter x 1/8 inch (3 mm) thick.
 3. Acceptable Products:
 - a. WS-34 Cylindrical Soft Durometer Cabinet Bumper by Anybumper.
- C. Install plastic grommets in cable access holes in countertops located as located on Contract Documents.
- D. Countertop Support Brackets:
 1. Required at all countertops without cabinet bodies supporting them spanning over 4'-0".
 2. Acceptable products: Futaba heavy duty wall-mounted workstation bracket Series 72531.
 - a. 24 x 24 size for standard depth countertops.

PART 3 PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.

- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- F. Secure cabinets to floor using appropriate angles and anchorages.
- G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 2119**FOAMED-IN-PLACE INSULATION****PART 1 GENERAL****1.01 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install foamed-in-place insulation exterior CMU walls as described in Contract Documents.

1.02 REFERENCES

- A. Definitions:
 - 1. Flame Spread: The propagation of flame over a surface.
 - 2. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.
 - 3. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C177-19, 'Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus'.
 - b. ASTM C518-17, 'Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus'.
 - c. ASTM C1363-11, 'Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus'.
 - d. ASTM D1621-16, 'Standard Test Method for Compressive Properties Of Rigid Cellular Plastics'.
 - e. ASTM D1622/D1622M-14, 'Standard Test Method for Apparent Density of Rigid Cellular Plastics'.
 - f. ASTM D2842-12, 'Standard Test Method for Water Absorption of Rigid Cellular Plastics'.
 - g. ASTM E84-18b, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
 - h. ASTM E119-18c, 'Standard Test Methods for Fire Tests of Building Construction and Materials'.
 - i. ASTM E413-16, 'Classification for Rating Sound Insulation'.
 - 2. Underwriters Laboratories, Inc.:
 - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (11th Edition - 2018).

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference:
 - a. Insulation Manufacturer's Representative and Insulation Installer's Foreman responsible for installation of insulation to be in attendance
 - b. Schedule pre-installation conference one (1) week prior to foamed-in place installation.
 - 2. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review scheduling requirements.

- b. Review coordination with other Work requirements.
- c. Review submittal requirements.
- d. Review cleaning requirements.
- e. Review protection requirements.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature.
- B. Informational Submittals:
 - 1. Tests And Evaluation Reports:
 - a. Provide copies of certified test reports showing compliance with specified performance values, including R-values, fire performance and sound abatement characteristics.
 - b. Provide Material Safety Data Sheet complying with OSHA Hazard Communication Standard, 29 CFR 1910 1200.
 - 2. Manufacturer Instructions:
 - a. Published installation instructions.
 - 3. Qualification Statements:
 - a. Installer:
 - 1) Manufacturer's certification that installer is trained and authorized by Manufacturer.

1.05 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. System shall be recognized for intended use by applicable building codes.
 - 2. Surface-Burning Characteristics:
 - a. Foamed-In-Place Insulation shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
 - 1) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
 - 2) Flash point: None.
- B. Qualifications:
 - 1. Installer:
 - a. Installer shall be trained and certified by Manufacturer to install system.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
 - 1. Store and Handle product according to Manufacturer recommendations.

1.07 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Follow Manufacturer's requirements.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Acceptable Manufacturers:

1. Tripolymer Foam Insulation by C. P. Chemical Co Inc, White Plains, NY www.tripolymer.com.
 2. Polymaster Insulating Foams, Knoxville, TN www.polymaster.com.
 3. Core-Fill 500 by Tailored Chemical Products Inc, Hickory, NC www.core-fill500.com.
 4. Thermco Foam Insulation by Thermal Corporation of America, Mount Pleasant, IA www.thermcofoam.com.
 5. Equal as approved by the Architect prior to installation.
 - a. Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - b. Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- B. Material:
1. Description:
 - a. Acoustical insulating material designed for use in cavity, concrete block or frame walls.
 2. Design Criteria:
 - a. Minimum four (4) hour fire resistance wall rating as per ASTM E119 for concrete masonry units when used in standard two (2) hour rated CMU's.
 - b. Thermal Values: 'R' Value of 4.7 / inch (25 mm) at 35 deg F (1.7 deg C) as per ASTM C177 or ASTM C518.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification Of Conditions:
1. Verify that all work within wall voids is complete prior to installation.
 2. Verify that spaces to receive insulation are clear of mortar and other restrictions and those spaces do not contain water. Walls to be insulated must be free of moisture both inside and outside of CMU. Insulation is not to be injected into wet walls.

3.02 PREPARATION

- A. Allow masonry mortar to set prior to installing insulation.

3.03 INSTALLATION

- A. Interface With Other Work: Do not install foam until other work to be installed in insulated spaces is completed.
- B. General:
1. Install foamed-in-place insulation from interior prior to installation of interior finish work and after all masonry and structural concrete work is in place. Comply with manufacturer's installation instructions.
 2. Fill all open cells and voids (ungrouted) in exterior CMU walls.
- C. Installation Method:
1. Install foam insulation in CMU cores to uniform density using pressure fill method or top fill method. Completely fill all spaces, crevices and voids.
 2. If pressure fill method is used, fill and point drill holes in masonry units with mortar after installation. Patch and finish fill holes after installation of foam. Match existing surfaces.

- D. Ambient Conditions: Do not install foam insulation when product temperature is below Manufacturer's recommendation.

3.04 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. Sampling: Verify insulation density by random sampling:
 - a. Use verification method recommended by Manufacturer.
 - b. Correct any foam installation found to be non-compliant with Manufacturer's requirements.

3.05 PROTECTION

- A. After foam is installed and cured, protect walls from excessive moisture for seventy-two (72) hours minimum. Do not paint walls for seventy-two (72) hours minimum after installation of foam or as recommended by Manufacturer.

END OF SECTION

SECTION 07 2200**ROOF AND DECK INSULATION****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Rigid Polyiso Roof Insulation
- B. Vented Insulation Panels
 - 1. Rigid polyiso roof insulation
 - 2. Ventilation spacers
 - 3. Faced with oriented strand board or waferboard on one major surface of the core foam.
- C. Accessories
 - 1. Insulation Fasteners

1.02 RELATED SECTIONS

- A. 07 4113 Metal Roof Panels

1.03 REFERENCES

- A. ASTM C1289: Standard Specification for Faced Rigid Cellular Polyisocyanurate Insulation Board.
- B. ASTM E108: Standard Test Methods for Fire Tests of Roof Coverings.
- C. ASTM E119: Standard Test Methods for Fire Tests of Building Construction and Materials.
- D. FM 4450: Approval Standard – Class I Insulated Steel Roof Decks
- E. FM 4470: Approval Standard – Class I Roof Covers.
- F. LTTR: Long Term Thermal Resistance predicated by CAN/ULC-S770-09.
- G. UL 263: Fire Tests of Building Construction and Materials.
- H. UL 790: Standard Test Methods for Fire Tests of Roof Coverings.
- I. UL 1256: Fire Test Methods for Fire Tests of Roof Coverings.
- J. ASTM E2114: Standard Terminology for Sustainability Relative to the Performance of Buildings.
- K. ASTM E2129: Standard Practice for Data Collection for Sustainability Assessment of Building Products.

1.04 DEFINITIONS

- A. LTTR (Long Term Thermal Resistance): Defined as using techniques from ASTM C1303 or CAN/ULC-S770-09, the predicated R-Value that has been shown to be equivalent to the average performance of a permeably faced foam insulation product over 15 years. LTTR applies to ALL foam insulation products with blowing agents other than air, such as Polyiso, extruded polystyrene and polyurethane. The new method is based on consensus standards in the US and Canada.

1.05 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's Specifications.
 - 2. Installation instructions for insulation board and fasteners.
 - 3. Product Data as per ASTM E2129: Standard Practice for Data Collection for Sustainability Assessment of Building Products.

- B. Samples:
 - 1. Submit minimum 6 inch by 6 inch (152 millimeters by 152 millimeters) of each board type required.
 - 2. Submit samples of each fastener type required.
- C. Shop Drawings:
 - 1. Roof plan showing layout of boards and fastening patterns.
- D. Certificates:
 - 1. System Manufacturer's or Insulation Manufacturer's Certification that the insulation meets Zero ODP (Ozone Depletion Potential) and Zero GWP (Global Warming Potential) specification requirements.
- E. Thermal Warranty:
 - 1. Submit sample warranty indicating conditions and limitations.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this section with minimum twenty five years documented experience.
- B. Installer Qualifications: Company specializing in the installation of products specified in this section with minimum 5 years documented experience in installing products of the same type and scope as specified.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship is approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.
- D. Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, substrate conditions and insulation manufacturer's installation instructions.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with general requirements specified in sections 01 65 00 and 01 66 00.
- B. Deliver product in packages labeled with material name, thermal value and product code.
- C. When stored outdoors or on the jobsite, the insulation should be stacked on pallets at least three inches above ground level and completely covered with a waterproof covering such as a tarpaulin. The temporary factory-applied packaging should be slit or removed to prevent accumulation of condensation. Insulation which has become wet or damaged should be removed and replaced with solid, dry insulation.

1.08 SEQUENCING

- A. Ensure that information required for installation of products in this section is furnished to affected trades in time to prevent interruption of construction progress.
- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
- C. Coordinate installation with roofing manufacturer's installation instructions.

1.09 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Acceptable Manufacturer:
 - 1. Atlas Roofing Corporation
 - a. Address: 2000 Riveredge Parkway Suite 800 Atlanta, GA 30328
 - b. Phone: 800-388-6134
 - c. Fax: 770-952-3170
 - d. Web: www.atlasroofing.com
 - 2. Hunter
 - a. Address: 15 Franklin Street Portland, ME 04101
 - b. Phone: 888-746-1114
 - c. Fax: 877-775-1769
 - d. Web: www.hunterpanels.com
 - 3. Equal as approved by the Architect prior to installation.
 - a. Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - b. Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.

2.02 MATERIALS

- A. Nailable Cross Ventilated Roof Insulation: Thermally efficient cross ventilated non-structural composite insulation. Consisting of closed-cell polyisocyanurate (polyiso) roof insulation board and Oriented Strand Board (OSB) separated with and bonded to individual vent spacer strips.
 - 1. Design criteria:
 - a. ASTM C1289, Type V.
 - b. UL Standard 1256 Classification: Construction No. 120, 123 & 458.
 - c. UL Standard 790 (ASTM E108): For use with Class A, B or C Shingles, Metal or Tile Roof Coverings.
 - d. UL Standard 263 (ASTM E119): Fire Resistance Classification.
 - e. FM Standard 4450 & 4470 Approved (1-90, 1-105): Approved for Class 1 Insulated Roof Deck Construction. Refer to FM Approvals® RoofNav for Specific Systems Details.
 - f. IBC Chapter 26 & National Building Code: Sections on Foam Insulation.
 - g. Title 25 Foam Flammability Criteria (T 1231).
 - h. APA/TECO Rated OSB Nailing Surface.
 - i. Dimensional Stability (ASTM D2126): less than 2 percent.
 - j. Compressive Strength (ASTM D1621): 20 pounds per square inch (140 kPa) or 25 pounds per square inch (172 kPa).
 - k. Water Absorption (ASTM C209): less than 1.0 percent.
 - l. Water Absorption (ASTM D2842): less than 3.5 percent.
 - m. Water Vapor Transmission (ASTM E96): less than 1.0 perm (57.5ng/(Pa•s•m²))
 - n. Product Density (ASTM D1622): Nominal 2.0 pounds per cubic foot (32.04 kg/m³).

- o. Flame Spread (ASTM E84 10 minimum): 40-60.
 - p. Smoke Development (ASTM E84 10 minimum): 50-170.
 - q. Tensile Strength (ASTM D1623): greater than 730 pounds per square foot (35 kPa).
 - r. Service Temperature: -100°F to +250°F.
- 2. Panel Area:
 - a. 4 feet x 8 feet (1220 millimeters x 2440 millimeters)
- 3. Panel Composition:
 - a. 1.5 inch Air Space Composite Panel Thickness:
 - 1) 5/8 inch OSB.
 - 2) 1.5 inch thick EPS or wood vent spacer strip.
 - 3) 2" closed-cell polyisocyanurate layer.
 - b. 3.5 inch panel: LTTR - 9.0
 - c. Vent Strip for Air Space:
 - 1) 1.5 inch x 4.0 inch
 - (a) Spaced maximum 24" each direction.
 - (b) NFA = 17.0 square in per linear foot.
 - (c) Compressive: 6000 pounds per square foot compressive resistance
 - (d) Moisture, Mold and Rot Resistant
 - (e) See Structural Sheets for fastening pattern.
 - d. Sheathing:
 - 1) OSB
 - (a) 5/8 inch (16 millimeters): R - 0.78
 - (b) Available Certifications: FSC, Fire-Treated & Preservative-Treated
- B. Rigid insulation:
 - 1. Rigid insulation type and composition shall match the insulation in the Nailable Cross Ventilated Roof Insulation.
 - 2. Total required rigid insulation thickness is 5" minimum, including the Nailable Cross Ventilated Roof Insulation.
 - 3. Thicknesses of the rigid insulation can be varied based upon the Contractor's preference for installation and assembly. Any combination of thickness for the Nailable Cross Ventilated Roof Insulation and the rigid insulation is acceptable to achieve the minimum thickness noted above.

2.03 ACCESSORIES

- A. Engineered fastener for nailable insulation to an approved substrate.
 - 1. Material: Case hardened and Tempered Carbon Steel
 - 2. Head Style/Drive: Pancake Head with T-30 Internal Drive
 - 3. Head Diameter: 0.635 inch
 - 4. Shank Diameter: 0.190 inch
 - 5. Thread Length: 2.750 inch
 - 6. Point: #2 (0.135 inch diameter) Drill Point
 - 7. Coating: Epoxy E-Coat (Black)
 - 8. Overall Length: As required to ensure 1" minimum total embedment into roof deck.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine roof deck for suitability to receive insulation.

- B. Verify that substrate is dry, clean and free of foreign material that will damage insulation or impede installation.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Verify that roof drains, scuppers, roof curbs, nailers, equipment supports, vents and other roof accessories are secured properly and installed in conformance with Contract Documents.
- E. Verify that deck is structurally sound to support installers, materials and equipment without damaging or deforming work.
- F. Start of installation indicates installer accepts conditions of existing deck surfaces.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Verify the manufacturer's roof edge details for accuracy to fit the assembly

3.03 INSTALLATION

- A. Install in accordance with manufacturer's installation instructions.
- B. Install specified insulation using approved mechanical fasteners, hot asphalt or adhesives in accordance with manufacturer's latest written instructions and as required by governing codes and Owner's insurance carrier.
- C. Install with end joints staggered to avoid having insulation joints coinciding with joints in deck and / or joints in the insulation layers directly above or below. In multi-layer installations, stagger joints in top and bottom layers.

3.04 PROTECTION

- A. Remove trash and construction debris from insulation surface prior to application of roofing.
- B. Do not leave installed insulation exposed to weather. Cover and waterproof completed roof system immediately after installation.
 - 1. Temporarily seal exposed insulation edges at the end of each day.
 - 2. Remove and replace installed insulation that has become wet or damaged with new insulation.
- C. Protect installed insulation and roof cover from traffic by use of protective covering materials during and after installation.

END OF SECTION

SECTION 07 2500**WEATHER BARRIERS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Roof Vapor Barrier.

1.02 SUBMITTALS

- A. Product Data: Provide data on material characteristics and performance criteria.
- B. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.
- C. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

1.03 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Evaluated Materials Program (EAP); www.airbarrier.org/#sle: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.

1.04 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS**2.01 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)**

- A. Air Barrier Sheet, Mechanically Fastened:
 - 1. Approved Products.
 - a. Certainteed Smart Membrain.
 - 2. Materials:
 - a. Air Retarder:
 - 1) Vapor permeable.
 - 2) Meet requirements of ASTM E1677, Type I.
 - b. Sealing Tape:
 - 1) Acceptable Products:
 - (a) As recommended in writing by Air barrierManufacturer.
 - c. Fasteners:
 - 1) Approved Products.
 - (a) Metal Framing: Corrosion resistant, self-tapping screws and plastic washers or Tyvek Wrap Caps. Screws to be 3/4 inch (19 mm) long minimum and washers one inch (25 mm) diameter.

2.02 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Air Barriers: Install continuous air tight barrier over surfaces indicated beneath roof insulation, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- D. Mechanically Fastened Sheets - On Exterior:
 - 1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
 - 2. Overlap seams as recommended by manufacturer but at least 6 inches.
 - 3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
 - 4. Attach to framed construction with fasteners extending through sheathing into framing. Space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.
 - 5. Attach to masonry construction using mechanical fasteners spaced at 12 to 18 inches on center vertically and maximum 24 inches on center horizontally.
 - 6. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
 - 7. Install water-resistive barrier over jamb flashings.
 - 8. Install air barrier and vapor retarder underneath the jamb flashings.
 - 9. Install head flashings under weather barrier.
 - 10. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.
 - 11. Fasteners:
 - a. Fasteners as approved by Manufacturer:
 - 1) Following recommendations for type, size, spacing and installation methods.
 - 2) To resist wind forces, fastened to supporting structure and supported by gypsum wallboard on one side and insulation on other.
 - 12. Seal penetrations through vapor retarder immediately before installation of gypsum board.
- E. Openings and Penetrations in Exterior Weather Barriers:
 - 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
 - 2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
 - 3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.

4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

- A. Vapor retarder is to be airtight and free from holes, tears, and punctures.
 1. Immediately before installation of gypsum board, inspect vapor retarder for holes, tears, and punctures and repair damaged areas.
 2. Immediately before completion of Project, inspect exposed vapor retarder for holes, tears, and punctures and repair damaged areas.
- B. Do not cover installed weather barriers until required inspections have been completed.
- C. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 4113**METAL ROOF PANELS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Snap joint-seamed, standing seam metal roof panels, with related metal trim and accessories.

1.02 RELATED REQUIREMENTS

- A. Division 05 Section "Structural Steel Framing" for structural steel framing supporting metal panels.
- B. Division 05 Section "Steel Decking" for continuous metal decking supporting metal panels.
- C. Division 05 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal panels.
- D. Division 05 Section "Cold-Formed Metal Trusses" for cold-formed metal trusses supporting metal panels.
- E. Division 07 Section Roof and Deck Insulation for thermal insulation installed under metal panels.
- F. Division 07 Section "Air Barriers" for air barriers within roof assembly and adjacent to roof assembly.
- G. Division 07 Section "Sheet Metal Flashing and Trim" for formed sheet metal copings, flashings, reglets, and roof drainage items in addition to items specified in this Section.
- H. Division 07 Section "Joint Sealants" for field-applied joint sealants.
- I. Division 07 "Snow Guards" for snow guard requirements.

1.03 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org:
 - 1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
 - 2. AAMA 809.2 - Voluntary Specification Non-Drying Sealants.
- B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM): www.astm.org:
 - 1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - 3. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 4. ASTM A 980 - Standard Specification for Steel, Sheet, Carbon, Ultra High Strength Cold Rolled.
 - 5. ASTM C 645 - Specification for Nonstructural Steel Framing Members.
 - 6. ASTM C 920 - Specification for Elastomeric Joint Sealants.

7. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
 8. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
 9. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
 10. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
 11. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- D. Cool Roof Rating Council (CRRC): www.coolroofs.org/productratingprogram.html:
1. CRRC-1-2008 - CRRC Product Rating Program.
- E. International Accreditation Service (IAS):
1. IAS AC 472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems, Part B.
- F. Underwriters Laboratories, Inc. (UL): www.ul.com:
1. UL 580 - Tests for Uplift Resistance of Roof Assemblies
- G. US Environmental Protection Agency: www.energystar.gov/index.cfm:
1. Energy Star Reflective Roof Products.
- H. US Green Building Council (USGBC): www.usgbc.org:
1. LEED - Leadership in Energy and Environmental Design (LEED) Green Building Rating Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Prior to installation of roofing, conduct preinstallation meeting at site attended by the Architect, Contractor's Superintendent, manufacturer's technical representative, and roofing installer.
1. Coordinate building framing in relation to metal roof panel system.
 2. Coordinate openings and penetrations of metal roof panel system.
 3. Coordinate work of Division 07 Sections "Roof Specialties" and "Roof Accessories" and openings and penetrations and manufacturer's accessories with installation of metal roof panels.

1.05 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal roof panel assembly and accessories from a single manufacturer providing fixed-base roll forming, and accredited under IAS AC 472 Part B.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum five years experience in manufacture of similar products in successful use in similar applications.
1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of five installations not less than five years old, with Owner and Architect contact information.

- e. Sample warranty.
 - f. IAS AC 472 certificate.
- 2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
- 3. Approved manufacturers must meet separate requirements of Submittals Article.
- C. Installer Qualifications: Experienced Installer certified by metal roof panel manufacturer with minimum of five years experience with successfully completed projects of a similar nature and scope.
 - 1. Installer's Field Supervisor: Experienced mechanic certified by metal panel manufacturer supervising work on site whenever work is underway.

1.06 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products.
- B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot showing edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, roof accessories, and special details. Make distinctions between factory and field assembled work.
 - 1. Indicate points of supporting structure that must coordinate with metal panel system installation.
 - 2. Include data indicating compliance with performance requirements.
 - 3. Include structural data indicating compliance with requirements of authorities having jurisdiction.
- C. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification: Provide 12-inch- (305 mm-) long section of each metal panel profile. Provide color chip verifying color selection.

1.07 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicating compliance of products with requirements, witnessed by a professional engineer.
- B. Qualification Information: For Installer firm and Installer's field supervisor.
- C. IAS Accreditation Certificate: Indicating that manufacturer is accredited under provisions of IAS AC 472.
- D. Manufacturer's Warranty: Sample copy of manufacturer's standard warranty.

1.08 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer's Warranty: Executed copy of manufacturer's standard warranty.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping.
 - 1. Deliver, unload, store, and erect metal panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
 - 2. Store in accordance with Manufacturer's written instructions. Provide wood collars for stacking and handling in the field.

1.10 COORDINATION

- A. Coordinate sizes, profiles, and locations of roof curbs and other roof-mounted equipment and roof penetrations, based upon sizes of actual selected equipment.

1.11 WARRANTY

- A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within one year from date of Substantial Completion.
- B. Special Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within 25 years from date of Substantial Completion, including:
 - 1. Fluoropolymer Two- Coat System:
 - a. Color fading in excess of 5 Hunter units per ASTM D 2244.
 - b. Chalking in excess of No. 8 rating per ASTM D 4214.
 - c. Failure of adhesion, peeling, checking, or cracking.

PART 2 PRODUCTS**2.01 MANUFACTURER**

- A. Approved manufacturer and quality standard:
MBCI Metal Roof and Wall Systems, Division of NCI Group, Inc.
Houston TX
Tel: (877) 713-6224
Email: info@mbci.com
Web: www.mbc.com.
- B. Vapor barrier (under roof insulation):
 - 1. Certainteed

2.02 PERFORMANCE REQUIREMENTS

- A. General: Provide metal roof panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.
- B. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated:
 - 1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on the Drawings.
 - a. Wind Uplift Testing: Certify capacity of metal panels by actual testing of proposed assembly per ASTM E 1592.
 - 2. Snow Loads: as indicated on the Drawings.
 - 3. Deflection Limits: as indicated on the Drawings.
 - 4. Seismic Performance: as indicated on the Drawings.
- C. Wind Uplift Resistance: as indicated on the Drawings.
- D. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.
- E. Self-Adhering, High-Temperature Underlayment:
 - 1. Cold-applied sheet underlayment minimum 30 mils (0.76 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-

modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer for substrate.

2. Approved products: Carlisle WIP 300 HT secondary underlayment across the entire roof.
- F. Felt Underlayment: Laminated polypropylene and polyethylene sheet, tear-resistant, UV resistant, manufactured with textured surface for slip resistance, meeting performance requirements of ASTM D 226.

2.03 METAL ROOF PANELS

- A. Mechanically-seamed, Concealed Fastener, Metal Roof Panels: Structural metal roof panel consisting of formed metal sheet with vertical ribs at panel edges, installed by lapping and mechanically interlocking edges of adjacent panels, and attaching panels to supports using concealed clips and fasteners in a weathertight installation.
 1. Approved products: MBCI, LokSeam, www.mbc.com/lokseam.html.
 - a. Nominal Coated Thickness: 24 gage.
 - b. Panel Surface: Smooth with striations in pan.
 - c. Exterior Finish: Modified silicone-polyester two-coat system.
 - d. Color: As selected by the Architect from manufacturer's standard colors.
 2. Panel Width: 16 inches (406 mm).
 3. Panel Seam Height: 1.75 inch (44.4 mm).
 4. Joint Type: Snap joint-seamed.

2.04 METAL ROOF PANEL ACCESSORIES

- A. General: Provide complete metal roof panel assembly incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings, in manufacturer's standard profiles. Provide required fasteners, closure strips, thermal spacers, splice plates, support plates, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet.
- C. Panel Clips: ASTM C 645, with ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.
- D. Panel Fasteners: Self-tapping screws and other acceptable corrosion-resistant fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.
- E. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:
 1. Factory-Applied Seam Sealant: Manufacturer's standard hot-melt type.
 2. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.
 3. Concealed Joint Sealant: Non-curing butyl, AAMA 809.2.
- F. Steel Sheet Miscellaneous Framing Components: ASTM C 645, with ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized zinc coating.
- G. Roof Accessories: Approved by metal roof panel manufacturer. Refer to Section 07 7200 "Roof Accessories" for requirements for curbs, equipment supports, roof hatches, heat and smoke vents, ventilators, and preformed flashing sleeves.
- H. Snow Guards: Install snow guards at all eave locations. Refer to Section 07 7253 "Snow Guards".

- I. Roof vapor barrier: Install below roof insulation according to manufacturer's instructions.
 1. Approved products:
 - a. Certainteed Smart Membrain.

2.05 FABRICATION

- A. General: Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Fabricate metal panel joints configured to accept factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.
- C. Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate and finish.

2.06 FINISHES

- A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- B. Modified Silicone-Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat, meeting solar reflectance index requirements.
 1. Basis of Design: MBCI, Signature 200.
- C. Interior Finish: **0.5 mil total dry film thickness consisting of primer coat and wash coat of** manufacturer's standard light-colored acrylic or polyester backer finish.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Examine metal panel system substrate and supports with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panel installation.
 1. Inspect metal panel support substrate to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable supports at recommended spacing to match installation requirements of metal panels.
 2. Panel Support Tolerances: Confirm that panel supports are within tolerances acceptable to metal panel system manufacturer but not greater than the following:
 - a. **1/4 inch (6 mm)** in **20 foot (6.1 m)** in any direction.
 - b. **3/8 inch (9 mm)** over any single roof plane.
- B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal roof panel system installation.

3.02 PREPARATION

- A. **Miscellaneous Supports:** Install subframing, girts, furring, and other miscellaneous panel support members according to ASTM C 754 and manufacturer's written instructions.
- B. Self-Adhering Sheet Underlayment: Apply in accordance with underlayment manufacturer's written instructions; apply primer if required.
 1. Apply over the entire roof surface.

- C. Felt Underlayment: Apply at locations indicated below, in accordance with underlayment manufacturer's written instructions.
 - 1. Apply over the entire roof surface.
- D. Flashings: Provide flashings as required to complete metal roof panel system. Install in accordance with Section 07 6200 "Sheet Metal Flashing and Trim" and approved shop drawings.

3.03 METAL PANEL INSTALLATION

- A. Snap-Joint-Seamed, Standing Seam Metal Roof Panels: Install weathertight metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install metal roof panels in orientation, sizes, and locations indicated, free of waves, warps, buckles, fastening stresses, and distortions. Anchor panels and other components securely in place. Provide for thermal and structural movement.
- B. Attach panels to supports using clips, screws, fasteners, and sealants recommended by manufacturer and indicated on approved shop drawings.
 - 1. Fasten metal panels to supports with concealed clips at each location indicated on approved shop drawings, with spacing and fasteners recommended by manufacturer.
 - 2. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 - 3. Provide weatherproof jacks for pipe and conduit penetrating metal panels of types recommended by manufacturer.
 - 4. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.

3.04 ACCESSORY INSTALLATION

- A. General: Install metal panel trim, flashing, and accessories using recommended fasteners and joint sealers, with positive anchorage to building, and with weather tight mounting. Provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.
 - 2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
 - 3. Provide concealed fasteners except where noted on approved shop drawings.
 - 4. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.
- B. Joint Sealers: Install joint sealers where indicated and where required for weathertight performance of metal panel assemblies, in accordance with manufacturer's written instructions.
 - 1. Prepare joints and apply sealants per requirements of Division 07 Section "[Joint Sealants](#)."

3.05 CLEANING AND PROTECTION

- A. Remove temporary protective films immediately in accordance with metal roof panel manufacturer's instructions. Clean finished surfaces as recommended by metal roof panel manufacturer.

- B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.
- C. Do not permit traffic over finished roof surface.

END OF SECTION

SECTION 07 6200**SHEET METAL FLASHING AND TRIM****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, sheet metal roofing, exterior penetrations, fascia and soffit, and other items indicated in Schedule.
- B. Sealants for joints within sheet metal fabrications.

1.02 DEFINITIONS

- A. Base Flashing: That portion of flashing attached to or resting on roof deck to direct flow of water onto the roof covering.
- B. Cap Flashing: Material used to cover top edge of base flashings or other flashings to prevent water seepage behind base flashing. Cap flashing overlaps base flashing.
- C. Collar: Pre-formed flange placed over vent pipe to seal roof around vent pipe opening. Also called vent sleeve.
- D. Drip Edge: Non-corrosive, non-staining material used along eaves and rakes to allow water runoff to drip clear of underlying building.
- E. Flange: Metal pan extending up and down roof slope around flashing pieces. Usually at plumbing vents.
- F. Flashing: Components used to prevent seepage of water into a building around any intersection or projection in a roof such as vent pipes, adjoining walls, and valleys.
- G. Metal Flashing: Roof components made from sheet metal that are used to terminate roofing membrane or other material alongside roof perimeters as well as at roof penetrations.
- H. Penetration: Any object that pierces surface of roof.
- I. Pipe Boot: Prefabricated flashing piece used to flash around circular pipe penetrations. Also known as a Roof Jack.
- J. Roof Jack: Term used to describe a Pipe Boot or Flashing Collar.
- K. Valley: Internal angle formed by intersection of two sloping roof planes to provide water runoff.
- L. Vent: Any outlet for air that protrudes through roof deck such as pipe or stack. Any device installed on roof, gable or soffit for purpose of ventilating underside of roof deck.
- M. Vent Sleeve: See collar.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2017a.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process 2021a.

- D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Galvanized Sheet Metal Flashing and Trim Manufacturers:
 - 1. Acceptable Manufacturers Of Metal:
 - a. CMG - Coated Metals Group, Denver, CO www.cmgmetals.com.
 - b. Drexel Metals, LLC, Ivyland, PA www.drexmet.com.
 - c. Fabral, Lancaster, PA www.fabral.com.
 - d. Firestone Metal Products, Anoka, MN www.unaclad.com.
 - e. MBCI, Houston, TX www.mbc.com.
 - f. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
 - g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
 - h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
 - i. Ryerson, Chicago, IL www.ryerson.com.

2.02 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gauge, (0.0239 inch) thick base metal.
 - 1. 16 ga (1.262 mm) for metal protective cover.
 - 2. 22 ga (0.792 mm) for hold-down clips.
 - 3. 24 ga (0.635 mm) for all other.
- B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; shop pre-coated with PVDF coating.
 - 1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: As selected by Architect from manufacturer's standard colors.
 - 3. Thickness:
 - a. 16 ga (1.262 mm) for metal protective cover.
 - b. 22 ga (0.792 mm) for hold-down clips.
 - c. 24 ga (0.635 mm) for all other.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

2.04 FACTORY FABRICATED ITEMS

- A. Galvanized Reglets:
 - 1. Acceptable Products:
 - a. Fry Springlock Reglets by Fry Reglet Corp, Alhambra, CA www.fryreglet.com.
- B. Stainless Steel Reglets:
 - 1. Acceptable Products:
 - a. Fry Springlock Reglets by Fry Reglet Corp, Alhambra, CA www.fryreglet.com.
- C. Steel Roof Flashing:
 - 1. Including Formed Valley Metal, Pipe flashing for vent piping and flues, Roof jacks, Saddles and curb flashings, Miscellaneous flashing.
 - 2. Formed Valley Metal And Drip Edge:
 - a. Material: Aluminum: 0.032 inch thick minimum or Steel: Minimum 24 ga, hot-dipped galvanized to meet requirements of ASTM A653/A653M, 1.25 oz/sq ft. or galvalume meeting requirements of ASTM A792/A792M AZ50, 50 ksi.
- D. Step Flashing:
 - 1. Step flashing required for steep slope for roof to wall flashing.
 - a. 24 ga pre-finished galvanized steel meeting requirements for sheet metal specified in materials above.
 - b. Size: 5 inch x 5 inch by 8 inch or 12 inches length.
- E. Steel Fascia:
 - 1. Materials:
 - a. Minimum 24 ga (0.635 mm), hot-dipped galvanized to meet requirements of ASTM A653/A653M, 1.25 oz/sq ft or galvalume meeting requirements of ASTM A792/A792M AZ50, 50 ksi and complete with accessories recommended by Manufacturer for proper installation.
 - 2. Finishes:
 - a. Face coating Polyvinylidene Fluoride (PVF2) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF2 in resin portion of formula. Thermocured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
 - b. Color as selected by Architect from Manufacturer's standard colors.
 - 3. Fabrication: Fascia may either be shop-fabricated using metal from a specified manufacturer, or a factory-fabricated standard system from a specified manufacturer.
- F. Steel Soffit Panels:
 - 1. Performance:
 - a. Design Criteria:
 - 1) Flush panel design.
 - (a) Panels shall be interlocked full length of panel.
 - 2) Acceptable Products:
 - (a) Pac-Clad Flush Wide Vent
 - (b) 7 inch wide
 - 3) Perforation a required option where indicated. Perforated full width of panel with holes designed so one dimension does not exceed 1/8 inch.

2. Materials:
 - a. 24 ga galvanized steel meeting requirements of ASTM A653/A653M, G 90.
 - b. 24 ga minimum 50 ksi galvalume steel meeting requirements of ASTM A792/A792M AZ-55.
 3. Fabrication:
 - a. Panels shall be uniformly dimensioned, roll formed to lengths to avoid trimming.
 - b. Panel system shall be anchored as recommended by Manufacturer.
 - c. Panels shall be continuous.
 4. Finish:
 5. Polyvinylidene Fluoride (PVF2) Resin-base (Kynar 500 or Hylar 5000) finish for coil coating components containing 70 percent minimum PVF2 in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
 6. Color as selected by Architect from Manufacturer's standard colors.
- G. Steel Soffit Vent Panel:
1. Materials:
 - a. 24 ga, prefinished steel.
 2. Acceptable Products:
 - a. Metal-Era Eco-Perf Vented Screen
 - 1) 54% NFA
- H. Roof Jacks For Metal Flues: Factory-made galvanized steel.
- I. Pipe Flashing For Concentric Piping Flashing Retrofitting:
1. Description:
 - a. Black EPDM Pipe flashing for existing Concentric Piping for reroofing existing roofs (cutting Concentric Roof Termination cap off and replacing is not permitted).
 - b. Weather resistance to withstand ultra violet light and ozone.
 - c. Malleable base to conform to different roof pitches.
 - d. Pipe size: 1/2 inch to 4 inch.
 - 1) On-site customization.
 - e. Fasteners included.
 2. Acceptable Products:
 - a. Aztec RF101BP.
- J. Pipe Flashing For Plumbing Vent Lines metal flues, and HVAC Air Piping: Ultra-pure high consistency molded one hundred (100) percent silicone rubber pipe boot that prevents cracking and splitting for life of roof.
1. Product:
 - a. Ultimate Pipe Flashing by Lifetime Tool & Building Products, LLC. Winchester, VA. www.lifetime tool.com 877.904.1002.

2.05 ACCESSORIES

- A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers of strength and type consistent with function.
- B. Concealed Sealants: Non-curing butyl sealant.

- C. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- D. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Install with small, watertight seams.
- B. Slope to provide positive drainage.
- C. Provide sufficient hold down clips to insure true alignment and security against wind.
- D. Provide 4 inch (100 mm) minimum overlap.
- E. Allow sufficient tolerance for expansion and contraction.
- F. Insulate work to prevent electrolytic action.
- G. Conceal fasteners where possible. Paint heads of exposed fasteners to match background.
- H. Isolate from dissimilar metals to prevent electrolytic action.
- I. Flashings and boots at roof penetrations:
 - 1. Coordinate installation of roofing to locate ribs of roof panels away from roof penetrations wherever possible.

3.04 CLEANING

- A. Leave metals clean and free of defects, stains, and damaged finish.

END OF SECTION

SECTION 07 7253**SNOW GUARDS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Bar-type, clamp-on pre-finished metal snow guards.

1.02 RELATED REQUIREMENTS

- A. Section 07 4113 – Metal Roof Panels.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 1. Include independent testing agency test reports for snow guard attachment shear strength.
- B. Shop Drawings: Include roof plans showing layouts and attachment details of snow guards.
 - 1. Include calculation of number and location of snow guards based upon Performance Requirements in Part 2.
- C. Samples: Submit manufacturer's sample of snow guards.

1.04 INFORMATIONAL SUBMITTALS

- A. Warranty Documentation: Submit sample copy of manufacturer's standard warranty.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain snow guards from a single source from single manufacturer.
- B. Manufacturer Qualifications: Company specializing in manufacturing of specified products with minimum five years' experience.

1.06 FIELD CONDITIONS

- A. Weather Limitations: Do not install snow guards under ambient conditions outside manufacturer's limits.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Approved products and manufacturers:
 - 1. TRA Snow & Sun C227 Clamp-on Snow Retention with two bars.
 - a. Prefinished / powder coated. Color as selected by the Architect from the Manufacturer's standard available colors.

2.02 PERFORMANCE REQUIREMENTS

- A. Layout and location of snow guards shall be designed by the Manufacturer's engineer for the snow load appropriate for the location of the project.
 - 1. Contractor shall pay any required costs for engineering the snow guard layout.
- B. Snow guards shall clamp on ribs of the metal roof panels and shall be installed with no penetrations through the roof panels.
- C. Snow guards shall be compatible with the metal roof panel system specified in Section 07 4113.

2.03 ACCESSORIES

- A. Mechanical Fasteners: as recommended by the Manufacturer and complying with the Manufacturer's engineered system and layout.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Examine sloped roofing areas to receive snow guards. Verify surfaces to receive snow guards are secured, clean, dry, and rigid.
- B. Notify Architect of conditions that would adversely affect installation or subsequent use.
- C. Proceed with installation of snow guards once unacceptable conditions are corrected.

3.02 INSTALLATION

- A. Install snow guards in accordance with snow guard Manufacturer's design and written instructions at locations indicated on approved shop drawings.
- B. Securely attach snow guards using mechanical fastening to clamp at the seams in accordance with manufacturer's written instructions.
- C. Remove and replace damaged snow guards with new material.

3.03 PROTECTION

- A. Protect installed snow guards to ensure that, except for normal weathering, snow guards will be without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 07 9200**JOINT SEALANTS****PART 1 GENERAL****1.01 SUMMARY**

- A. Includes but Not Limited to:
 - 1. Furnish and install sealants not specified to be furnished and installed under other Sections.
 - 2. Quality of sealants to be used on Project not specified elsewhere, including submittal, material, and installation requirements.
- B. Related Requirements:
 - a. Removing existing sealants specified in Sections where work required.
 - b. Furnishing and installing of sealants is specified in Sections specifying work to receive new sealants.
 - c. Section 07 2400: Sealants for EIF Systems.
- 2. Products Furnished But not Installed Under This Section:
 - a. Interior Ceramic Tile Joint Sealants:
- C. Related Requirements:
 - a. Section 09 3000: 'Tiling'.

1.02 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C920-14a, 'Standard Specification for Elastomeric Joint Sealants'.
 - b. ASTM C1193-16, 'Standard Guide for Use of Joint Sealants'.
 - c. ASTM C1330-02(2013), 'Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants'.
 - d. ASTM C1481-12(2017) 'Standard Guide for Use of Joint Sealants with Exterior Insulation & Finish Systems (EIFS)'.
 - e. ASTM D5893/D5893M-16, 'Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements'.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- C. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.
- D. ASTM C1481 - Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EIFS) 2012.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.
- F. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

- H. ASTM C834 - Standard Specification for Latex Sealants 2017.
- I. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2019.
- J. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling:
 - 1. Schedule work so waterproofing, water repellents and preservative finishes are installed after sealants, unless sealant manufacturer approves otherwise in writing.
 - 2. Ensure sealants are cured before covering with other materials.

1.05 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - b. Manufacturer's literature for each Product.
 - c. Schedule showing joints requiring sealants. Show also backing and primer to be used.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Manufacturer's Certificate:
 - 1) Certify products are suitable for intended use and products meet or exceed specified requirements.
 - 2) Certificate from Manufacturer indicating date of manufacture.
 - 2. Manufacturers' Instructions:
 - a. Manufacturer's installation recommendations for each Product.
 - b. Manufacturer's installation for completing sealant intersections when different materials are joined.
 - c. Manufacturer's installation for removing existing sealants and preparing joints for new sealant.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.
 - 2. Applicator Qualifications:
 - a. Company specializing in performing work of this section.
 - b. Provide if requested, reference of projects with minimum three (3) years documented experience, minimum three (3) successfully completed projects of similar scope and complexity, and approved by manufacturer.
 - c. Designate one (1) individual as project foreman who shall be on site at all times during installation.
- B. Preconstruction Testing:
 - 1. Pre-construction testing is not required when sealant manufacturer can furnish data acceptable to Architect based on previous testing for materials matching those of the Work.
- C. Mockups:
 - 1. Provide mockups including sealant and joint accessories to illustrate installation quality and color if requested by Architect or Project Manager.

- a. Incorporate accepted mockup as part of Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Deliver and keep in original containers until ready for use.
 - 2. Inspect for damage or deteriorated materials.
- B. Storage and Handling Requirements:
 - 1. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).
 - 2. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
 - 3. Store in a cool dry location, but never under 40 deg F (4 deg C) or subjected to sustained temperatures exceeding 80 deg F (27 deg C) or as per Manufacturer's written recommendations.
 - 4. Do not use sealants that have exceeded shelf life of product.

1.08 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Do not install sealant during inclement weather or when such conditions are expected. Allow wet surfaces to dry.
 - 2. Follow Manufacturer's temperature recommendations for installing sealants.
 - 3. Ambient Conditions:
 - a. Do not apply caulking at temperatures below 40 deg F (4 deg C).

1.09 WARRANTY

- A. Manufacturer Warranty:
 - 1. Signed warranties against adhesive and cohesive failure of sealant and against infiltration of water and air through sealed joint for period of three (3) years from date of Substantial Completion.
 - a. Manufacturer's standard warranty covering sealant materials.
 - b. Applicator's standard warranty covering workmanship.

PART 2 PART 2 PRODUCTS**2.01 SYSTEMS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Dow Corning Corp., Midland, MI www.dowcorning.com.
 - b. Franklin International, Inc. Columbus, OH www.titebond.com.
 - c. GE Sealants & Adhesives (see Momentive Performance Materials Inc.).
 - d. Laticrete International Inc., Bethany, CT www.laticrete.com.
 - e. Momentive Performance Materials Inc. (formally GE Sealants & Adhesives), Huntersville, NC www.ge.com/silicones.
 - f. Sherwin-Williams, Cleveland, OH www.sherwin-williams.com.
 - g. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com or Sika Canada Inc, Pointe Claire, QC www.sika.ca.
 - h. Tremco, Beachwood, OH www.tremcosealants.com or Tremco Ltd, Toronto, ON (800) 363-3213.
- B. Materials:
 - 1. Design Criteria:
 - a. Compliance: Meet or exceed requirements of these standards:

- 1) ASTM C920: Elastomeric joint sealant performance standard.
 - 2) ASTM D5893/D5893M: Silicone Joint Sealant for Concrete Pavements.
 - b. Comply with Manufacturer's ambient condition requirements.
 - c. Sealants must meet Manufacturer's shelf-life requirements.
 - d. Sealants must adhere to and be compatible with specified substrates.
 - e. Sealants shall be stable when exposed to UV, joint movements, and environment prevailing at project location.
 - f. Primers (Concrete, stone, masonry, and other nonporous surfaces typically do not require a primer. Aluminum and other nonporous surfaces except glass require use of a primer. Installer Option to use Adhesion Test to determine if primer is required or use primer called out in related sections):
 - 1) Adhesion Test:
 - (a) Apply silicone sealant to small area and perform adhesion test to determine if primer is required to achieve adequate adhesion. If necessary, apply primer at rate and in accordance with Manufacturer's instructions. See 'Field Quality Control' in Part 3 of this specification for Adhesive Test.
 - 2) If Primer required, shall not stain and shall be compatible with substrates.
 - 3) Allow primer to dry before applying sealant.
2. Sealants At Exterior Building Elements:
- a. Description:
 - 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
 - (a) Entrance thresholds.
 - (b) Columns.
 - (c) Connections.
 - (d) Door frames.
 - (e) At joints between different exterior materials.
 - (f) Joints and cracks around windows.
 - (g) Louvers.
 - (h) Masonry.
 - (i) Parapet caps.
 - (j) Wall penetrations.
 - (k) Other joints necessary to seal off building from outside air and moisture.
 - b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - (a) ASTM C920: Type S, Grade NS, Class 50 Use NT, M, G, A.
 - 2) Limitations:
 - (a) Do not use below-grade applications.
 - (b) Do not use on surfaces that are continuously immersed or in contact with water.
 - (c) Do not use on wet, damp, frozen or contaminated surfaces.
 - (d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
 - 3) Color:
 - (a) Architect to select from Manufacturer's standard colors.
 - (b) Match building elements instead of window frame color. Avoid whites to reduce dirt visibility.

- c. Approved Products:
 - 1) Dow Corning:
 - (a) Primer: 1200 Prime Coat.
 - (b) Sealant: 791 Silicone Weatherproofing Sealant.
 - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
 - (a) Primer: SS4044 Primer.
 - (b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.
 - 3) Tremco:
 - (a) Primer:
 - (1) Metal surface: No. 20 primer.
 - (2) Porous surfaces: No. 23 primer.
 - (b) Sealant: Spectrum 1 Silicone Sealant.
 - 4) Equal as approved by the Architect prior to installation.
 - (a) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (b) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- 3. Sealants At Exterior Sheet Metal And Miscellaneous:
 - a. Description:
 - 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
 - (a) Flashings.
 - (b) Gutters.
 - (c) Penetrations in soffits and fascias.
 - (d) Roof vents and flues.
 - (e) Lightning protection components.
 - b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - (a) ASTM C920: Type S Grade NS, Class 25 (min) Use NT, M, G, A and O.
 - 2) Limitations:
 - (a) Do not use below-grade applications.
 - (b) Do not use on surfaces that are continuously immersed or in contact with water.
 - (c) Do not use on wet, damp, frozen or contaminated surfaces.
 - (d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
 - c. Approved Products:
 - 1) Dow Corning: 790 Silicone Building Sealant.
 - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2350 Silicone Elastomeric Sealant.
 - 3) Tremco: Tremsil 600 Silicone Sealant.
 - 4) Equal as approved by the Architect prior to installation.
 - (a) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.

- (b) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- 4. Sealants At Expansion Joints in Exterior Concrete (Aprons, Entryway Slabs, Mowstrips, Retaining Walls, Sidewalks):
 - a. Expansion Joints:
 - 1) Design Criteria:
 - (a) Meet following standards for Sealant:
 - (1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.
 - 2) Sealant required at expansion for following areas:
 - (a) Between entryway slabs and building foundations.
 - (b) Between sidewalks and building foundations.
 - (c) Miscellaneous vertical applications.
 - 3) Sealant NOT required at expansion joints for following areas:
 - (a) Within aprons and where aprons abut building foundations and sidewalks.
 - (b) Within mowstrips and where mowstrips abut building foundations and sidewalks.
 - (c) Within sidewalks.
 - 4) Approved Products:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 790 Silicone Building Sealant.
 - (b) Sika:
 - (1) Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
 - (c) Equal as approved by the Architect prior to installation.
 - (1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
 - b. Penetrations thru Concrete Walls:
 - 1) Design Criteria:
 - (a) Meet following standards for Sealant:
 - (1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.
 - 2) Approved Products:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 790 Silicone Building Sealant.
 - (b) Sika:
 - (1) Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
 - (c) Equal as approved by the Architect prior to installation.

- (1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
5. Sealants At Control Joints in Exterior Concrete (Aprons, Entryway Slabs, Mowstrips, Retaining Walls, Sidewalks):
 - a. Control Joints:
 - 1) Design Criteria:
 - (a) Meet following standards for Sealant:
 - (1) ASTM C920, Type S, Grade P, Class 100/50; Use T, M, G, A, O.
 - 2) Sealant required at control joints in following areas:
 - (a) Retaining walls.
 - (b) Miscellaneous vertical applications.
 - 3) Sealant is NOT required at control joints, unless needed to protect moisture sensitive soils or by Contract Drawings, in following areas:
 - (a) Within aprons.
 - (b) Within mowstrips.
 - (c) Within sidewalks.
 - (d) Within entryway slabs.
 - 4) Approved Products:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 890-SL Silicone Building Sealant.
 - (b) Sika:
 - (1) Primer: Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 SL Self-leveling Silicone Sealant.
 - (c) Equal as approved by the Architect prior to installation.
 - (1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
6. Sealants At Exterior Concrete Waterways - Flat Drainage Structures (Waterways):
 - a. Expansion Joints and Control Joints:
 - 1) Description:
 - (a) One component (part) self-leveling silicon material that cures to ultra-low modulus silicone rubber upon exposure to atmospheric moisture.
 - (b) Cured silicone rubber remains flexible over entire temperature range expected in pavement applications.
 - 2) Design Criteria:
 - (a) Sealant is required at following areas:
 - (1) Within flat drainage structures and at joints between flat drainage structures and other concrete elements.
 - (b) Meet following standards for Sealant: Self-leveling: ASTM D-5893; ASTM C920, Type S, Grade P, Class 100/50; Use T, M, G, A, O.

- 3) Approved Products:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 890-SL Silicone Building Sealant.
 - (b) Sika:
 - (1) Primer: Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 SL Self-leveling Silicone Sealant.
 - (c) Equal as approved by the Architect prior to installation.
 - (1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- 7. Sealants At Curbs And Gutters:
 - a. Expansion Joints and Control Joints:
 - 1) Description:
 - (a) Effective for sealing transverse contraction and expansion joints, longitudinal, center line and shoulder joints in Portland cement concrete.
 - (b) One component (part) non-sag silicone material that cures to low modulus, silicone rubber upon exposure to atmospheric moisture. May be applied over wide temperature range.
 - 2) Design Criteria:
 - (a) Expansion joint sealant is required in following areas:
 - (1) Within curbs and gutters at approved layout locations.
 - (b) Meet following standards for Sealant: Non-sag: ASTM C920: Type S, Grade NS, Class 100/50, Use T, NT.
 - 3) Approved Products:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 888 Silicone Joint Sealant.
 - (b) Sika:
 - (1) Primer: Primer: Sikasil Primer-2100.
 - (2) Sikasil-728 NS Non-Sag Silicone Sealant.
 - (c) Equal as approved by the Architect prior to installation.
 - (1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- 8. Sealants At Concrete Paving:
 - a. Expansion Joints and Control Joints (as required in Section 32 1313):
 - 1) Description:
 - (a) One component (part) self-leveling silicon material that cures to ultra-low modulus silicone rubber upon exposure to atmospheric moisture.

- (b) Cured silicone rubber remains flexible over entire temperature range expected in pavement applications.
- 2) Design Criteria:
 - (a) Sealant is required at approved layout locations.
 - (b) Meet following standards for Sealant: Self-leveling: ASTM C920, Type S, Grade P, Class 100/50; Use T.
- 3) Approved Products:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 890-SL Silicone Building Sealant.
 - (b) Sika:
 - (1) Primer: Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 SL Self-leveling Silicone Sealant.
 - (c) Equal as approved by the Architect prior to installation.
 - (1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- 9. Sealants At Precast Concrete Cap and Joint Covers:
 - a. Description:
 - 1) Soft lead strip, when set and bedded in sealant, form cap which assures permanent elastic seal for any masonry joint as specified in Section 03 4500.
 - b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - (a) ASTM C920: Type S, Grade NS, Class 50 Use A, G, M.
 - (b) Strips should be of sufficient size to cover the joint width, plus percentage allowance for anticipated joint movement, plus 1/4 inch (6.4 mm).
 - c. Approved Products:
 - 1) Dow Corning:
 - (a) Primer: 1200 Prime Coat.
 - (b) Sealant: 791 Silicone Weatherproofing Sealant.
 - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
 - (a) Primer: SS4044 Primer.
 - (b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.
 - 3) Sika:
 - (a) Primer: Sikasil Primer-2100.
 - (b) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
 - 4) Tremco:
 - (a) Primer:
 - (1) Metal surface: No. 20 primer.
 - (2) Porous surfaces: No. 23 primer.
 - (b) Sealant: Spectrum 1 Silicone Sealant.
 - 5) Equal as approved by the Architect prior to installation.

- (a) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (b) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- 10. General Interior Sealants:
 - a. General:
 - 1) Inside jambs and heads of exterior door frames.
 - 2) Both sides of interior door frames.
 - 3) Inside perimeters of windows.
 - 4) Miscellaneous gaps between substrates.
 - b. Design Criteria:
 - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
 - 2) 100 percent silicone sealant.
 - c. VOC Content of Interior Sealants:
 - 1) Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - (a) Architectural Sealants: 250 g/L.
 - (b) Sealant Primers for Nonporous Substrates: 250 g/L.
 - (c) Sealant Primers for Porous Substrates: 775 g/L.
 - d. Paintable Sealant:
 - 1) Approved Product:
 - (a) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS7000 Paintable Silicone Sealant.
 - (b) Equal as approved by the Architect prior to installation.
 - (1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- 11. Sealants For Interior Joints:
 - a. General:
 - 1) Countertops and backsplash to wall.
 - 2) Sinks and lavatories to countertops.
 - 3) Joints between plumbing fixtures and other substrates.
 - b. Interior Ceramic Tile Joints are furnished in Section 07 9200 and installed in Section 09 3000 - Tiling including the following:
 - 1) Ceramic tile inside corners.
 - 2) Ceramic tile and paver tile joints.
 - 3) Termination joints in font.
 - 4) Termination joints in showers and font.
 - c. Description:
 - 1) One-part acetoxycure silicone sealant with fungicides to resist mold and mildew.
 - d. Design Criteria:
 - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.

- 2) 100 percent silicone sealant.
 - e. VOC Content of Interior Sealants:
 - 1) Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - (a) Architectural Sealants: 250 g/L.
 - (b) Sealant Primers for Nonporous Substrates: 250 g/L.
 - (c) Sealant Primers for Porous Substrates: 775 g/L.
 - f. Color: As selected by Architect from Manufacturer's standard colors.
 - g. Approved Products:
 - 1) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
 - 2) Laticrete: Latasil Tile and Stone Silicone Sealant.
 - 3) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS1700 Sanitary Silicone Sealant.
 - 4) Tremco: Tremsil 200 Silicone Sealant.
 - 5) Equal as approved by the Architect prior to installation.
 - (a) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (b) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- C. Acoustical Joint Sealants:
- 1. Design Criteria:
 - a. Meet requirements of ASTM C834.
 - b. Meet Class A flame spread rating.
 - 2. Approved Products:
 - a. OSI Pro-Series SC-175 Draft & Acoustical Sound Sealant by OSI Sealants Inc, Mentor, OH www.osisealants.com.
 - b. QuietZone Acoustic Caulk by Owens Corning, Toledo, OH www.owenscorning.com.
 - c. Acoustical Sealant by Tremco, Beachwood, OH www.tremcosealants.com or Toronto, ON (800) 363-3213.
 - d. Acoustical Sound Sealant by Titebond.
 - e. Acoustical Sealant by U S Gypsum, Chicago, IL www.usg.com.
 - f. Equal as approved by the Architect prior to installation.
 - 1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - 2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.

2.02 ACCESSORIES

- A. Bond Breaker Tape:
 - 1. Pressure sensitive tape as by Sealant Manufacturer to suit application.
 - 2. Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.
- B. Joint Backing:
 - 1. Comply with ASTM C1330.

2. Flexible closed cell, non-gassing polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.
3. Oversized 25 to 50 percent larger than joint width.
- C. Joint Cleaner:
 1. Non-corrosive and non-staining type as recommended by Sealant Manufacturer, compatible with joint forming materials.
- D. Masking Tape:
 1. Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verification Of Conditions:
 1. Examine substrate surfaces and joint openings are ready to receive Work.
 - a. Verify each sealant is compatible for use with joint substrates.
 - b. Verify joint surfaces are clean and dry.
 - c. Ensure concrete surfaces are fully cured.
 2. Sealants provided shall meet Manufacturer's shelf-life requirements.
 3. Notify Architect of unsuitable conditions in writing.
 - a. Do not proceed until unsatisfactory conditions are corrected.
 4. Commencement of Work by installer is considered acceptance of substrate.

3.02 PREPARATION

- A. Surface Preparation:
 1. Surfaces shall be clean, dry, free of dust, oil, grease, dew, frost or incompatible sealers, paints or coatings that may interfere with adhesion. Prepare substrates in accordance with Manufacturer's instructions:
 - a. Porous surfaces: Clean by mechanical methods to expose sound surface free of contamination and laitance followed by blasting with oil-free compressed air.
 - b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193. Allow solvent to evaporate prior to sealant application.
 - c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
 - d. Primers:
 - 1) Primers enhance adhesion ability.
 - 2) Use of primers is not a substitution for poor joint preparation.
 - 3) Primers should be used always in horizontal application where there is ponding water.
 2. Field test joints in inconspicuous location.
 - a. Verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.
 - b. When test indicates sealant adhesion failure, modify joint preparation primer, or both and retest until joint passes sealant adhesion test.
 3. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.
- B. Joints:
 1. Prepare joints in accordance with ASTM C1193.

- a. Clean joint surfaces of contaminants capable of affecting sealant bond to joint surface using Manufacturer's recommended instructions for joint preparation methods.
 - b. Remove dirt, dust, oils, wax, paints, and contamination capable of affecting primer and sealant bond.
 - c. Clean concrete joint surfaces to remove curing agents and form release agents.
- C. Protection:
1. Protect elements surrounding the Work of this section from damage or disfiguration.

3.03 APPLICATION

- A. General:
1. Apply silicone sealant in accordance with Manufacturer's instructions.
 2. Do not use damaged or deteriorated materials.
 3. Install primer and sealants in accordance with ASTM C1193 and Manufacturer's instructions.
 4. Apply primer where required for sealant adhesion.
 5. Install sealants immediately after joint preparation.
 6. Do not use silicone sealant in the following conditions:
 - a. Apply caulking/sealant at temperatures below 40 deg F (4 deg C).
 - b. Below-grade applications.
 - c. Brass and copper surfaces.
 - d. Materials bleeding oils, plasticizers, and solvents.
 - e. Structural glazing and adhesive.
 - f. Surfaces to be immersed in water for prolonged time.
- B. Joint Backing:
1. Install joint backing to maintain sealant joint ratios recommended by Manufacturer.
 2. Install without gaps, twisting, stretching, or puncturing backing material. Use gage to ensure uniform depth to achieve correct profile, coverage, and performance.
 3. Rod for open joints shall be at least 1-1/2 times width of open joint and of thickness to give solid backing. Backing shall fill up joint so depth of sealant bite is no more than 3/8 inch (9.5 mm) deep.
- C. Bond Breaker:
1. Install bond breaker where joint backing is not used or where backing is not feasible.
 - a. Apply bond-breaker tape in shallow joints as recommended by Sealant Manufacturer.
- D. Sealant:
1. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint. Apply sealants in vertical joints from bottom to top.
 2. Fill joint opening to full and proper configuration.
 3. Apply in continuous operation.
 4. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface. Tool joints in opposite

direction from application direction, i.e., in vertical joints, from the top down. Do not 'wet tool' sealants.

5. Depth of sealant bite shall be 1/4 inch (6 mm) minimum and 1/2 inch (12.7 mm) maximum, but never more than one half or less than one fourth joint width.
- E. Install at perimeter joints and mechanical and electrical penetrations in sound insulated rooms. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint.
- F. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface.
- G. Caulk gaps between painted or coated substrates and unfinished or pre-finished substrates. Caulk gaps larger than 3/16 inch (5 mm) between painted or coated substrates.

3.04 TOLERANCES

- A. Provide joint tolerances in accordance with Manufacturer's printed instructions.

3.05 FIELD QUALITY CONTROL

- A. Inspection:
 1. Examine sealant joints to verify compliance with Contract Document requirements.
- B. Non-Conforming Work. Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
 1. Sealant material found to be contaminated or damaged or inadequate preparation of substrate results in deficiencies in joint sealant adhesion is considered defective or not complying with Contract Document requirements.
 2. Correct any work found defective or not-complying with Contract Document requirements at no additional cost to Owner.
- C. Adhesion Test (Installer Option to use adhesion test to determine if primer is required).
 1. Perform adhesion tests in accordance with Manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant joint Hand-Pull Tab:
 - a. Perform five (5) tests for first 1,000 linear feet (300 meters) of applied silicone sealant and one (1) test for each 1,000 linear feet (300 meters) seal thereafter or perform one (1) test per floor per building elevation minimum.
 - b. For sealants applied between dissimilar materials, test both sides of joints.
 2. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
 3. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

3.06 CLEANING

- A. Remove sealant from adjacent surfaces in accordance with Sealant Manufacturer and Substrate Manufacturer recommendations as work progresses.
- B. Remove masking tape and excess sealant.
- C. Clean adjacent materials, which have been soiled, immediately (before setting) as recommended by Manufacturer.
- D. Waste Management: Dispose of products in accordance with manufacturer's recommendation.

END OF SECTION

SECTION 08 1113**HOLLOW METAL DOORS AND FRAMES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for windows.
- C. Thermally insulated hollow metal doors with frames.
- D. Sound-rated hollow metal doors and frames.
- E. Commercial security hollow metal doors and frames.
- F. Accessories, including glazing, louvers, and matching panels.

1.02 DEFINITIONS

- A. Fire-rated: Fire-retardant particleboard with an Underwriters' Laboratory (UL) stamp for Class 1 fire rating (Flame Spread 20, Smoke Developed 25). Fire-rated doors are available with particleboard and mineral cores for ratings up to 1-1/2 hours.
- B. Fire-rated Door: A door made of fire-resistant material that can be closed to prevent the spread of fire and can be rated as resisting fire for 20 minutes (1/3 hour), 30 minutes (1/2 hour), 45 minutes (3/4 hour) (C), 1 hour (B), or 1-1/2 hours (B). The door must be tested and carry an identifying label from a qualified testing and inspection agency.

1.03 REFERENCE STANDARDS

- A. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2011.
- B. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames 2003 (R2009).
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2011.
- E. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames 2012.
- F. ASTM A568/A568M - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements For 2019a.
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- H. ASTM C1036 - Standard Specification for Flat Glass 2021.
- I. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
- K. NAAMM HMMA 810 - Hollow Metal Doors 2009.
- L. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2007.
- M. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames 2018.

- N. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.
- O. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2019.
- P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- Q. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2013.
- R. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- B. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- C. Copy of SDI A250.11.

1.05 QUALITY ASSURANCE

- A. Maintain at project site copies of reference standards relating to installation of products specified.
- B. Pre-Installation Conference.
 - 1. Participate in pre-installation conference.
 - 2. In addition to agenda items specified in Section 01 3100, review following:
 - a. Schedule conference after hardware has been delivered to site and organized into hardware groups by door, but before installation of hardware.
 - b. Check for appropriate blocking and for correct hardware models and fasteners for substrates.
 - c. Review submittals and set of Manufacturer's installation, adjustment, and maintenance instructions submitted under Section 08 7101.
 - d. Review use of crowbar or other prying devices are not permitted to be used to set door frame into wall opening.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
 - 1. Any current member of Steel Door Institute.

2.02 PERFORMANCE REQUIREMENTS

- A. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Doors:
 - 1. Meet one of following requirements:
 - a. Meet requirements of Steel Door Institute ANSI / SDI A250.8.
 - b. Commercial grade steel meeting requirements of ASTM A568/A568M, Class 1:
 - 1) Grade II for interior doors, Grade III for exterior doors.
 - 2) Model 1 Full Flush or Model 2 Seamless designs at Manufacturer's option.
 - 3) Type F and G as required.
 - 4) Finish:
 - (a) Interior doors primed or galvanized as per ASTM A653/A653M.
 - (b) Exterior doors galvanized and primed as per ASTM A653/A653M.
- B. Exterior Doors: Thermally insulated.
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush or 2 - Seamless.
 - d. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
 - 2. Door Core Material: Polystyrene 1 lbs/cu ft minimum density.
 - a. Foam Plastic Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
 - 3. Door Thermal Resistance: R-Value of 6.0 minimum, for installed thickness of polystyrene.
 - 4. Door Face Sheets: Flush.
 - 5. Door Finish: Factory primed and field finished.
- C. Interior Doors, Non-Fire-Rated:
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 1 - Standard-duty.
 - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
- D. Fabrication:
 - 1. General:
 - a. Mortise and reinforce doors for hinges and locks.
 - b. Reinforce doors for closers and other surface applied hardware.
 - c. Drill and tap on job.
 - d. Seams along vertical edges of door need not be filled.
 - e. Do not extend hinge cut out full width of door unless fill strip is inserted, weld filled, and ground smooth so no seam appears on back face plate.
 - f. Double doors shall have overlapping rolled steel astragal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door or window in accordance with applicable frame requirements.
- B. Exterior Door Frames and Window Frames: Full profile/continuously welded type. Cold rolled furniture steel.

1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
 2. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
 3. Frame Finish: Factory primed and field finished.
 4. Provide labeled frame to match fire rating of door.
 5. Anchors: 16 US ga (1.6 mm) minimum meeting UL or other code acceptable requirements for door rating involved.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type. Cold rolled furniture steel.
1. Prime surfaces with rust inhibiting primer.
 2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
 3. Frame Finish: Factory primed and field finished.
 4. Provide labeled frame to match fire rating of door.
 5. Anchors: 16 US ga (1.6 mm) minimum meeting UL or other code acceptable requirements for door rating involved.
- D. Mullions for Pairs of Doors: Fixed, with profile similar to jambs.
- E. Transom Bars: Fixed, of profile same as jamb and head.
- F. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
- G. Fabrication:
1. General Requirements:
 - a. Provide temporary spreader on each welded frame.
 - b. Provide Manufacturer's gauge label for each item.
 - c. Make breaks, arrises, and angles uniform, straight, and true. Accurately fit corners.
 2. Frame width dimension:
 - a. Fabricate frame 1/8 inch wider than finished wall thickness as described in Contract Documents.
 3. Provide mortar guards at strikes and hinges.
 4. Anchors:
 - a. Provide three jamb anchors minimum for each jamb. On hinge side, install one anchor at each hinge location. On strike side, install one anchor at strike level and anchors at same level as top and bottom hinges. Tack weld anchors on frames intended for installation in framed walls.
 - b. Frames installed before walls are constructed shall be provided with extended base anchors in addition to other specified anchors.
 - c. Anchor types and configurations shall meet wall conditions.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.06 ACCESSORIES

- A. Factory Glazing at Non-Rated Openings Narrow Light: Clear sheet glass, tempered glazing meeting requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality Q3, 1/4-inch thick, factory installed.

2.07 SOURCE QUALITY CONTROL

- A. Tests:
 - 1. Verification of Performance:
 - a. Label each door as conforming to above required standards.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install prefinished frames after painting and wall finishes are complete.
- C. Coordinate frame anchor placement with wall construction.
- D. Set frame in location and level head.
 - 1. Use of crowbar or other prying device to set door frame into wall opening will damage door frames and are not permitted to be used.
- E. Equalize with adjustable floor anchor.
- F. Set spreaders and fasten jambs to floor and wall.
 - 1. Wood spreaders shall be square, fabricated from lumber one inch minimum thick, be same length as door opening at header, and same depth as frame.
 - 2. Cut notches for frame stops.
 - 3. Do not remove spreaders until frames are permanently anchored in wall.
 - 4. Use one spreader at base of frame and another at strike level.
 - 5. Do not use temporary spreaders welded to base of jambs during installation of frame.
- G. Fill gap between frame and framing with urethane foam or tightly-packed fiberglass insulation. If urethane foam is used, foam interior of frames before installing frame. Trim excess before installation of frame.
- H. Caulking:
 - 1. Caulk around both sides of frames of windows.
 - 2. Caulk around both sides of frames of doors receiving acoustical seals with specified sealant.
 - 3. Caulk around both sides of frames installed in exposed masonry walls with specified sealant.
- I. Install door hardware as specified in Section 08 7100.
 - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.
- J. Comply with glazing installation requirements of Section 08 8000.
- K. Coordinate installation of electrical connections to electrical hardware items.

- L. Touch up damaged factory finishes.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.
- C. Site Tolerances:
 - 1. Squareness: 1/16 inch from top edge to opposite top edge.
 - 2. Plumbness: 1/16 inch from top of jamb to bottom of jamb.
 - 3. Alignment: 1/16 inch from plane of left side face of jamb to right side face of jamb.
 - 4. Twist: 1/16 inch across throat of jamb plane measured across each face to plane of opposite jamb throat.
 - 5. Finished Clearance Between Door And Frame:
 - a. 1/16 inch at head and hinge jamb plus 1/16 inch maximum 2) 1/8 inch at strike jamb plus or minus 1/16 inch maximum.
 - b. 1/2 inch to top of finished floor surface or 1/4 inch to top of threshold, plus or minus 1/16 inch maximum.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Adjust sound control doors so that seals are fully engaged when door is closed.
- C. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.
- D. When Project is completed, doors shall not bind, stick, or be mounted so as to cause future hardware difficulties.
- E. Do not impair utility or structural strength of door in fitting of door, applying hardware, or cutting and altering door louvers, panels, or other special details.

3.06 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. Arrange to have keys brought to Project site and, in meeting attended by local representatives and Architect, test every new key and locking mechanism.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
 - 1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.
 - 2. Door frames:
 - a. Door frames damaged by use of crowbar or other prying devices to set door frames shall be repaired or replaced at no additional cost to Owner.

3.07 CLOSEOUT ACTIVITIES

- A. Instruction of Owner:
 - 1. Using Owner's Operations And Maintenance Manual, explain keying systems at same time keys and locking mechanisms are tested.
- B. Key Delivery:

1. Immediately before Final Acceptance Meeting, turn change keys over to Owner properly organized, tagged, and placed in new or existing key cabinet.

3.08 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 3323**OVERHEAD COILING DOORS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Insulated rolling service doors.

1.02 RELATED SECTIONS

- A. Division 05: Metal Fabrications: Support framing and framed opening.
- B. Division 09: Painting: Field applied finish.
- C. Division 26: Electrical requirements.

1.03 REFERENCES

- A. ANSI/DASMA 108 - American National Standards Institute Standard Method For Testing Sectional Garage Doors And Rolling Doors: Determination Of Structural Performance Under Uniform Static Air Pressure Difference.
- B. NFRC 102 - Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.
- C. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.
- D. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- E. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- F. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- G. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- H. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- J. NEMA MG 1 - Motors and Generators.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

- A. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.05 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Details of construction and fabrication.
 - 4. Installation instructions.

- B. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- F. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- C. Store materials in a dry, warm, ventilated weathertight location.

1.08 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 COORDINATION

- A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

- A. Warranty: Manufacturer's limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for 3 years or 20,000 cycles, whichever occurs first.
- B. PowderGuard Finish
 - 1. PowderGuard Zinc Base Coat applied to guides, bottom bar, headplates plus PowderGuard Premium applied to curtain and top coat for guides, bottom bar, headplates: Manufacturer's limited Zinc Finish warranty for 4 years.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Approved Manufacturer:
 - 1. Overhead Door Corporation
2501 S. State Hwy. 121, Suite 200
Lewisville, TX 75067.
Toll Free: (800) 275-3290

Phone: (469) 549-7100
Fax: (972) 906-1499
Web Site: www.overheaddoor.com
E-mail: info@overheaddoor.com.

2. Equal as approved by the Architect prior to installation.
 - a. Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - b. Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.

2.02 INSULATED ROLLING SERVICE DOORS

- A. Stormtite Insulated Rolling Service Doors: Overhead Door Corporation Model 625.
 1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
 - a. Flat profile type F-265i for doors up to 40 feet (12.19 m) wide.
 - b. Front slat fabricated of:
 - 1) 22 gauge galvanized steel.
 - c. Back slat fabricated of:
 - 1) 24 gauge galvanized steel.
 - d. Slat cavity filled with CFC-free foamed-in-place, polyurethane insulation.
 - 1) R-Value: 7.7, U-Value: 0.13.
 - 2) Sound Rating: STC-21.
 2. Performance:
 - a. Through Curtain Sound Rating: Sound Rating: STC-28 (STC-30+ with HZ noise generator) as per ASTM E 90.
 - b. Installed System Sound Rating: STC-21 as per ASTM E 90.
 - c. U-factor: 0.91 NFRC test report, maximum U-factor of no higher than 1.00.
 - d. Air Infiltration: Meets ASHRAE 90.1 & IECC 2012/2015 C402.4.3 Air leakage <1.00 cfm/ft².
 3. Slats and Hood Finish:
 - a. Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.
 - 1) Powder Coat:
 - (a) PowderGuard Premium powder coat color as selected by the Architect.
 - 2) Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.
 - (a) PowderGuard Textured powder coat color as selected by the Architect.
 4. Weatherseals:
 - a. Vinyl bottom seal, exterior guide and internal hood seals.
 - b. Interior guide weatherseal.
 - c. Lintel weatherseal.
 5. Bottom Bar:
 - a. Two galvanized steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.
 6. Guides: Three structural steel angles.
 7. Brackets:

- a. Galvanized steel to support counterbalance, curtain and hood.
- 8. Finish; Bottom Bar, Guides, Headplate and Brackets:
 - a. PowderGuard Zinc base coat with PowderGuard Premium powder coat color as selected by the Architect.
- 9. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
- 10. Hood: Provide with internal hood baffle weatherseal.
 - a. 24 gauge galvanized steel with intermediate supports as required.
- 11. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
 - a. Sensing Edge Protection:
 - 1) Electric sensing edge.
 - b. Operator Controls:
 - 1) Push-button and key operated control stations with open, close, and stop buttons.
 - (a) Controls for interior locations: push button.
 - (b) Controls for exterior locations: key operator.
 - 2) Controls surface mounted.
 - c. Special Operation:
 - 1) Radio control operation.
 - d. Motor Voltage: 115/230 single phase, 60 Hz.
- 12. Wind Load Design:
 - a. Standard wind load shall be 20 PSF.
- 13. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.
- 14. Locking:
 - a. Interior slide bolt lock for electric operation with interlock switch.
- 15. Wall Mounting Condition:
 - a. Face-of-wall mounting.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify opening sizes, tolerances and conditions are acceptable.
- B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.
- F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 9200.
- G. Install perimeter trim and closures.
- H. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.04 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.05 CLEANING

- A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
- B. Remove labels and visible markings.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

3.06 PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION

SECTION 08 7100**DOOR HARDWARE****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Hardware for hollow metal doors.
- B. Electrically operated and controlled hardware.
- C. Lock cylinders for doors that hardware is specified in other sections.
- D. Thresholds.
- E. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealants for setting exterior door thresholds.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches 2017.
- C. BHMA A156.16 - American National Standard for Auxiliary Hardware 2018.
- D. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems 2018.
- E. DHI (H&S) - Sequence and Format for the Hardware Schedule 1996.
- F. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2019.
- G. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives 2019.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- C. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- D. Provide hardware templates to Sections 08 1213, 08 1313, and 08 1429 within fourteen (14) days after Architect approves hardware schedule.
- E. Supply necessary hardware installation templates to Section 06 2024 before pre-installation conference.
- F. Keying Requirements Meeting:
 - 1. Schedule meeting at project site prior to Contractor occupancy.
 - 2. Architect will schedule meeting at project site prior to Contractor occupancy.
 - 3. Owner will schedule meeting at project site prior to Contractor occupancy.
 - 4. Attendance Required:
 - a. Contractor.
 - b. Owner.
 - c. Architect.

- d. Installer's Architectural Hardware Consultant (AHC).
- e. Hardware Installer.
- f. Owner's Security Consultant.
5. Agenda:
 - a. Establish keying requirements.
 - b. Verify locksets and locking hardware are functionally correct for project requirements.
 - c. Verify that keying and programming complies with project requirements.
 - d. Establish keying submittal schedule and update requirements.
6. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
 - a. Access control requirements.
 - b. Key control system requirements.
 - c. Schematic diagram of preliminary key system.
 - d. Flow of traffic and extent of security required.
7. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
8. Deliver established keying requirements to manufacturers.

1.05 SUBMITTALS

- A. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
 1. Manufacturer's cut sheets.
 2. Two (2) copies of Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware. Include one (1) set in 'Operations And Maintenance Manual' and send one (1) set with hardware when delivered.
 3. Copy of hardware schedule.
 4. Written copy of keying system explanation.
- B. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 1. Submit hardware schedule indicating hardware to be supplied.
 2. Schedule shall indicate details such as proper type of strikeplates, spindle lengths, hand, backset, and bevel of locks, hand and degree opening of closer, length of kickplates, length of rods and flushbolts, type of door stop, and other necessary information necessary to determine exact hardware requirements.
 3. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 4. Comply with DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.
 - a. Submit in vertical format.
 5. List groups and suffixes in proper sequence.
 6. Provide complete description for each door listed.
 7. Provide manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
 8. Include account of abbreviations and symbols used in schedule.
- C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware.
 - b. Record Documentation:
 - 1) Manufacturers documentation:
 - (a) Manufacturer's literature and/or cut sheets.
 - (b) Include keying plan and bitting schedule.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Neatly and securely package hardware items by hardware group and identify for individual door with specified group number and set number used on Supplier's hardware schedule.
- B. Include fasteners and accessories necessary for installation and operation of finish hardware in same package.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Fasteners:
 1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
 - a. Aluminum fasteners are not permitted.
 - b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
 2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
 - a. Self-drilling (Tek) type screws are not permitted.
 3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
 4. Provide wall grip inserts for hollow wall construction.
 5. Provide spacers or sex bolts with sleeves for through bolting of hollow metal doors and frames.
 6. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated.

2.02 FINISHES

- A. Hardware Finishes:
 1. Finishes for brass or bronze hardware items shall be:
 - a. ANSI / BHMA Finish Code 626.
 - 1) Description: Satin Chromium Plated.
 - 2) Base Metal: Brass. Bronze.
 2. Finishes for flat goods items may be:
 - a. ANSI / BHMA Finish Code 630.
 - 1) Description: Satin Stainless Steel.
 - 2) Base Metal: Stainless Steel (300 Series).

3. Materials other than steel, brass, or bronze shall be finished to match appearance satin chromium plated, except flat goods which shall be satin stainless steel.

2.03 HINGES

- A. Manufacturer Contact List:
 1. Hager Companies, St Louis, MO www.hagerhinge.com.
 2. Ives, New Haven, CT www.iveshardware.com.
 3. McKinney, Scranton, PA www.mckinneyhinge.com.
 4. PBB, Ontario, CA www.pbbinc.com.
 5. Stanley (dormakaba Americas), Indianapolis IN www.stanleyhardwarefordoors.com/products/.
- B. Hinges:
 1. Doors:
 - a. Sizes:
 - 1) Non-Fire-Rated Doors:
 - (a) 1-3/4 inch 44.5 mm non-fire-rated wood doors in wood frames: 4 inches by 4 inches.
 - (b) 1-3/8 inch 35 mm wood or metal doors: 3-1/2 inches by 3-1/2 inches.
 - 2) Fire-Rated Doors:
 - (a) 1-3/4 inch fire-rated doors in metal frames:
 - (b) Standard: 4-1/2 inches by 4-1/2 inches.
 - (c) Wide Throw: 4-1/2 inches by width required.
 2. Use non-removable pins on exterior opening doors.
 3. Hinges on exterior doors shall be solid brass, plated to achieve specified finish.
 4. Approved Products.
 - a. Interior:
 - 1) Hager: BB 1279.
 - 2) Ives: 5BBI.
 - 3) McKinney: TA 2714.
 - 4) MacPro / McKinney: MPB79.
 - 5) PBB: BB81.
 - 6) Stanley: FBB 179.
 - b. Exterior:
 - 1) Hager: BB 1191.
 - 2) Ives: 5BBI.
 - 3) McKinney: TA 2314.
 - 4) PBB: BB21.
 - 5) Stanley: FBB 191.

2.04 SECURING DEVICES

- A. Definitions:
 1. Grade 2 Standard Duty Key-In Lever Cylindrical Lockset:
 - a. Performance Features:
 - 1) Exceeds 400,000 ANSI cycles.
 - 2) Single motion egress provides easy emergency exit.
 - 3) Full 1 inch (25 mm) throwbolt with saw resistant hardened steel roller pin.
 - 4) Anti-drill design deadbolt. Two (2) ball bearings inserted to prevent drill attacks.
 - 5) ADA-compliant thumbturn.

- B. Manufacturers:
 - 1. Manufacturer List:
 - a. Precision Hardware, Romulus, MI www.precisionhardware.com.
 - b. Rockwood, Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
 - c. Sargent, New Haven, CT www.sargentlock.com.
 - d. Schlage, Colorado Springs, CO www.schlage.com.
 - e. Von Duprin, Indianapolis, IN www.vonduprin.com.
 - f. Yale Commercial Locks, Lenoir City, TN www.yalecommercial.com.
- C. General:
 - 1. Backsets shall be 2-3/4 inches (70 mm).
- D. Flush Bolts:
 - 1. Rod length: 12 inch minimum.
 - 2. Acceptable Products:
 - a. Manual Flush Bolts (Upper flush bolts only) (Wood Doors):
 - 1) Hager 283D.
 - 2) Ives FB458.
 - 3) Rockwood 555.
- E. Locksets And Latchsets:
 - 1. Design Criteria:
 - a. Grade 1 Heavy Duty Key-In Lever Cylindrical Lockset:
 - 1) ANSI/BHMA A156.2 Series 4000 Grade 1.
 - 2) Meet UL 3 hour fire rating.
 - 3) Meet ADA Compliant ANSI A117.1 Accessibility Code.
 - 4) Door Lever:
 - (a) Meet California code for 1/2 inch (12.7 mm) or less return to door.
 - (b) Vandal-Resistant Lever.
 - 5) Deadlocking Latchbolt.
 - b. Grade 1 Heavy Duty Key-In Lever Cylindrical Locksets (Used only in Meetinghouse Module doors with CES Seminary and Institute additions):
 - 1) ANSI/BHMA A156.2 Series 4000 Grade 1.
 - 2) Meet UL 3 hour fire rating.
 - 3) Meet ADA Compliant ANSI A117.1 Accessibility Code.
 - 4) Door Lever:
 - (a) Meet California code for 1/2 inch (12.7 mm) or less return to door.
 - (b) Vandal-Resistant Lever.
 - 5) Deadlocking Latchbolt.
 - c. Grade 2 Standard Duty Key-In Lever Cylindrical Lockset:
 - 1) ANSI/BHMA A156.2 Series 4000 Grade 2.
 - 2) Meet UL 3 hour fire rating.
 - 3) Meet ADA Compliant ANSI A117.1 Accessibility Code.
 - 4) Door Lever:
 - (a) Meet California code for 1/2 inch (12.7 mm) or less return to door.
 - 2. Lever Operated:
 - a. Approved Products:
 - 1) Grade 1 Heavy Duty Key-In Lever Cylindrical Locksets (Used only in Meetinghouse Module doors with CES Seminary and Institute additions:

- (a) 9K Series Best Lock with 15D Lever by Stanley standard cylinders - (I/C cores may be used when authorized by AEC).
 - (b) 195 Series with American Lever by Marks USA.
 - (c) 10 Line Series with L Lever by Sargent.
 - (d) ND Series with Rhodes (RHO) Lever by Schlage.
 - (e) 5400LN Series with Augusta (AU) Lever by Yale.
 - 2) Grade 1 Heavy Duty Key-In Lever Cylindrical Locksets (Used only in Meetinghouse Module doors with CES Seminary and Institute additions):
 - (a) 9K Series Best Lock with 15D Lever by Stanley standard cylinders - (I/C cores may be used when authorized by AEC).
 - (b) 195 Series with American Lever by Marks USA.
 - (c) 10 Line Series with L Lever by Sargent.
 - (d) ND Series with Rhodes (RHO) Lever by Schlage.
 - (e) 5400LN Series with Augusta (AU) Lever by Yale.
 - 3) Grade 2 Standard Duty Key-In Lever Cylindrical Locksets:
 - (a) 7K Series Best Lock with 15D Lever by Stanley standard cylinders - (I/C cores may be used when authorized by AEC).
 - (b) 175 Series with American Lever by Marks USA.
 - (c) 7 Line Series with L Lever by Sargent.
 - (d) AL Series with Saturn (SAT) Lever by Schlage.
 - (e) 5300LN Series with Augusta (AU) Lever by Yale.
- F. Standard Cylinders:
 - 1. Provide cylinders for interior exit devices requiring cylinders.
- G. Exit Devices:
 - 1. Use operable lever trim.
 - 2. Provide labeled hardware where required by local code authority.
- H. Exit Devices:
 - 1. Use operable lever trim.
 - 2. Provide labeled hardware where required by local code authority.
 - 3. Approved Products.
 - a. Apex Series by Precision.
 - b. 80 Series by Sargent.
 - c. 99 or 98 Series by Von Duprin.
 - d. 7100 Series by Yale.
- I. Padlocks:
 - 1. Quality Standard: Abus 83 / 45 Series with cylinder to match locksets.

2.05 CLOSERS

- A. Approved Manufacturers.
 - 1. 8900 Series by Dorma Architectural Hardware, Reamstown, PA www.dorma.com/usa.
 - 2. 1461 Series by LCN Closers, Princeton, IL www.lcnclosers.com.
 - 3. 8501 Series by Norton Door Controls, Charlotte, NC www.nortondoorcontrols.com.
 - 4. 1431 Series by Sargent, New Haven, CT www.sargentlock.com.
 - 5. D-3550/D-3551 Series by Stanley (dormakaba Americas), Indianapolis IN www.stanleyhardwarefordoors.com/products/.
- B. Surface-Mounted Overhead Door Closers:

1. Closers provided under this Section shall be from same Manufacturer.
2. Provide parallel arms on closers unless door position in relation to adjacent wall requires otherwise. Provide covers.
3. Door Closers on doors that swing 180 degree as shown on Contract Documents:
 - a. Closers shall allow for 180 degree opening without engaging stop function.
 - b. Closers shall have following features:
 - 1) Adjustable sweep speed.
 - 2) Adjustable backcheck.
 - 3) Non-handed, non-sized.
 - 4) Hold open arm function (Friction Hold Open) (Non-Fire-Rated Corridors).
 - 5) Delayed action closing where noted on Door Schedule.
4. Door Closers on doors that swing 90 degree as shown on Contract Documents:
 - a. Closers shall allow for 100 degree opening with engaging stop function.
 - b. Closers shall have following features:
 - 1) Adjustable sweep speed.
 - 2) Adjustable backcheck.
 - 3) Non-handed, non-sized.
 - 4) Hold open arm function with thumb turn or handle control (Cush And Hold / Detent Hold-open) (Non-Fire- Rated Corridors).
 - 5) Delayed action closing where noted on Door Schedule.

2.06 STOPS

- A. Manufacturers:
 1. Manufacturer Contact List:
 - a. Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
 - b. Hager, St Louis, MO www.hagerhinge.com.
 - c. Ives, Wallingford, CT www.iveshardware.com.
 - d. Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
 - e. Sargent, New Haven, CT (800) 906-6606 or (203) 562-2151 www.sargentlock.com.
- B. Stops:
 1. Use wall type stops unless indicated otherwise on Door Schedule.
 2. Provide model appropriate for substrate. Wall stops may be either cast or wrought.
 3. Acceptable Products:
 - a. Interior Wall Exterior Wall Floor Mount Overhead.
 - b. Hager 236W 255W 243F
 - c. Ives WS407CCV WS447 FS438
 - d. Rockwood 409 474 / 475 440 / 441
 - e. Glynn Johnson GJ 90S
 - f. Sargent 590S Series

2.07 ACCESSORIES

- A. Manufacturers:
 1. Manufacturer Contact List:
 - a. Hager, St Louis, MO www.hagerhinge.com.
 - b. Ives, Wallingford, CT www.iveshardware.com.
 - c. NGP - National Guard Products, Memphis, TN www.ngpinc.com.
 - d. Pemko Manufacturing, Ventura, CA www.pemko.com.

- B. Acoustical Seals:
 - 1. Color as selected by Architect.
 - 2. Acceptable Products:
 - a. Door Bottom Shoe for Metal Door:
 - 1) 779S-A by Hager.
 - 2) 35EV by NGP.
 - 3) 217AV by Pemko.
- C. Smoke Gaskets:
 - 1. Color as selected by Architect.
 - 2. Acceptable Products:
 - a. 726 by Hager.
 - b. 5050 by NGP.
 - c. PK 55 by Pemko.
- D. Sweepstrip (metal door bottom):
 - 1. Clear anodized aluminum with black neoprene insert.
 - 2. Reduce infiltration of air, wind, dust, rain, and snow.
 - 3. Meet UL requirements.
 - 4. For use with saddle thresholds.
 - 5. Acceptable Products:
 - a. 750S CLR by Hager.
 - b. 198N A by NGP.
 - c. 321 CN by Pemko.
 - d. Equal as approved by the Architect prior to installation.
 - 1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - 2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- E. Thresholds:
 - 1. Acceptable Products:
 - a. Design Criteria:
 - 1) Meet handicap accessibility requirements (ADA):
 - b. Interior Doors at Acoustic Seals, Approved Products:
 - 1) Product as appropriate for flooring type:
 - (a) DBA series by Hager.
 - (b) DKB series by NPG.
 - (c) D series by Pemko.
 - c. Out swinging metal exterior doors:
 - 1) 8426 by NGP.
 - 2) 253 x 3 FG by Pemko.

2.08 WEATHERSTRIPPING AND GASKETING

- A. Weatherstripping:
 - 1. Acceptable Products:
 - a. Finish: clear anodized aluminum.
 - b. Perimeter:
 - 1) 800S by Hager.
 - 2) A625 A by NGP.
 - 3) 35041 CP by Pemko.

- c. Equal as approved by the Architect prior to installation.
 - 1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - 2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- d. Bottom (see Sweepstrip).

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that doors and frames are ready to receive this work; labeled, doors and frames are properly installed, and dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Do not install surface mounted items until application of finishes to substrate are fully completed.
- D. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
 - 1. Mounting heights in compliance with ADA Standards:
 - a. Locksets: 40-5/16 inch.
 - b. Push Plates/Pull Bars: 42 inch.
 - c. Deadlocks (Deadbolts): 48 inch.
 - d. Exit Devices: 40-5/16 inch.
 - e. Door Viewer: 43 inch; standard height 60 inch.
- E. Install smoke gaskets and acoustical seals in manner to give continuous air-tight fit.
 - 1. Install smoke gaskets as per Manufacturer's installation requirements:
 - a. Hinge Jamb: Install smoke gaskets on jamb face of door frame so door will compress smoke gasket.
 - b. Header and Strike Jamb: Install smoke gaskets on face of stop of door frame so door will compress smoke gasket.
 - 2. Install acoustical seal with seal under door.
- F. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.
 - 1. Refer to Section 07 9200 for additional requirements.

3.03 FIELD QUALITY CONTROL

- A. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.
- B. Owner's Instructions:
 - 1. Before Final Acceptance Meeting, send master keys to the Owner's designated representative.

3.04 ADJUSTING

- A. Adjust hardware for smooth operation.

- B. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.
- C. Adjust closers to provide maximum opening force as required by governing code authority and proper backcheck and sweep speed.

3.05 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.06 PROTECTION

- A. Do not permit adjacent work to damage hardware or finish.

END OF SECTION

SECTION 08 8000**GLAZING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds and accessories.

1.02 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015.
- C. ASTM C1036 - Standard Specification for Flat Glass 2016.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- E. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass 2014.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- G. ASTM C1281 - Standard Specification for Preformed Tape Sealants for Glazing Applications 2016.
- H. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass 2015.
- I. GANA (GM) - GANA Glazing Manual 2008.
- J. GANA (SM) - GANA Sealant Manual 2008.
- K. GANA (LGRM) - Laminated Glazing Reference Manual 2009.
- L. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use 1990 (2016).

1.03 SUBMITTALS

- A. Product Data on Insulating Glass Unit, Glazing Unit,: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- C. Samples: Submit two samples 12 by 12 inch in size of glass units.
- D. Installer's Qualification Statement.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000, for glazing installation methods. Maintain one copy on site.
- B. Installer Qualifications:

1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
 - a. Satisfactorily completed at least three (3) installations of similar size, scope, and complexity in each of past two (2) years and be approved by glass product Manufacturer before bidding.
 - b. Upon request, submit documentation.
- C. Certifications:
 1. Labels showing strength, grade, thickness, type, and quality are required on each piece of glass.
 2. Manufacturers/Fabricators certifying products furnished comply with project requirements.
 3. Insulating-Glass Certification Program: Indicate compliance with requirements of Insulating Glass Certification Council on applicable glazing products.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 1. Follow Manufacturer's instruction for receiving, handling, and protecting glass & glazing materials to prevent breakage scratching, damage to seals, or other visible damage.
 2. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Storage And Handling Requirements:
 1. Follow Manufacturer's instruction for storing and protecting glass & glazing materials.
 2. Store materials protected from exposure to harmful environmental conditions and at temperatures and humidity conditions recommended by Manufacturer.
 3. Protect edge damage to glass, and damage/deterioration to coating on glass.

1.06 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

1.07 WARRANTY

- A. Insulating Glass Units: Provide a ten (10) year manufacturer warranty, signed by insulating-glass Manufacturer/Fabricator, agreeing to replace insulating-glass units to include coverage for seal failure, moisture, interpane dusting or misting, including providing products to replace failed units from date of installation.
- B. Laminated Glass: Provide a ten (10) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units from date of installation.
- C. Installer's Warranty:
 1. Form acceptable to Owner, signed by glass product Installer, agreeing to replace glass products that deteriorate, or that exhibit damage or deterioration of glass or glazing products due to faulty installation, for two (2) years from date of installation.
- D. Heat Soaked Tempered Glass: Provide a five (5) year manufacturer warranty to include coverage for spontaneous breakage of fully tempered glass caused by nickel sulfide (NiS) inclusions.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Manufacturer Contact List for Low E Glazing:
1. AGC Flat glass North America, Kingsport, TN www.us.agc.com.
 2. Carlex (subsidiary of Central Glass Co., Ltd., Nashville, TN www.carlex.com.
 3. Guardian Industries Corp., Auburn Hills, MI www.guardian.com.
 4. Oldcastle Building Envelope, Santa Monica, CA www.oldcastlebe.com
 5. Pilkington North America Inc., Toledo, OH www.pilkington.com.
 6. Vitro Architectural Glass (formerly PPG glass), Cheswick, PA www.ppgglass.com or PPG Canada Ltd, Glass Division, Toronto, ON (416) 789-3331.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Glass units for exterior fixed windows, monumental and vent sash window units shall have U Factor of 0.34 and SHGC of 0.33. Provide written Manufacturer's confirmation with glazing submittal.
- B. Exterior Window Glazing:
1. Glazing shall have following characteristics:
 - a. Insulated Glass: 1 inch (25 mm) units with 1/2 inch (13 mm) airspace and two (2) 1/4 inch (6 mm) lites.
 - b. Low-Emissivity (or Low E):
 - 1) Design Criteria:
 - (a) Clear.
 - (b) Meet requirements of ASTM C1036, Type I, Class I, Quality Q3.
 - (c) Location: Surface 2.
 - 2) Low-Emissivity (or Low E) Acceptable Product:
 - (a) Performance Standard:
 - (b) 70 percent Visible Light Transmission (VLT).
 - (c) 0.29 U-value winter.
 - (d) 0.27 U-value summer.
 - (e) 0.38 Solar Heat Gain Coefficient (SHGC).
 - (f) 0.44 Shading Coefficient.
 - (g) 11 percent Visible Light Reflectance.
 - (h) Quality Standard:
 - (i) Cardinal LoE³-366.
 - (j) Solarban 70 XL.
 - (k) Other low E glazing system standard with window manufacturer that meets or exceeds performance characteristics of specified glazing is acceptable as approved by Architect before bidding. See Section 01 6000.
 - 3) Acceptable Manufacturers:
 - (a) AGC.
 - (b) Guardian.
 - (c) Vitro Architectural Glass.
 - (d) Equal as approved by the Architect prior to installation.
 - (1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.

- (2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
 - c. Obscure:
 - 1) Design Criteria:
 - (a) Meet requirements of ASTM C1036, Type II, Class I, Form 3, Quality Q8, Pattern - #62.
 - d. Glazing in Windows within 24 inches (600 mm) of Exterior Doors:
 - 1) Design Criteria:
 - (a) Tempered.
 - (b) Meet requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality Q3.
- C. Exterior Door Glazing:
 - 1. Thickness: 1/4 inch (6 mm).
 - 2. Glazing shall have following characteristics:
 - a. Insulated Glass: 1 inch (25 mm) units with 1/2 inch (13 mm) airspace and two (2) 1/4 inch (6 mm) lites.
 - b. Low-Emissivity (or Low E):
 - 1) Design Criteria:
 - (a) Clear.
 - (b) Meet requirements of ASTM C1036, Type I, Class I, Quality Q3.
 - (c) Location: Surface 2.
 - 2) Low-Emissivity (or Low E) Acceptable Product:
 - (a) Performance Standard:
 - (b) 64 percent Visible Light Transmission (VLT).
 - (c) 0.28 U-value winter.
 - (d) 0.26 U-value summer.
 - (e) 0.27 Solar Heat Gain Coefficient (SHGC).
 - (f) 0.32 Shading Coefficient.
 - (g) 12 percent Visible Light Reflectance.
 - (h) Quality Standard:
 - (i) Cardinal LoE³-366.
 - (j) Solarban 70 XL.
 - (k) Equal as approved by the Architect prior to installation.
 - (1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
 - 3) Acceptable Manufacturers:
 - (a) AGC.
 - (b) Guardian.
 - (c) Vitro Architectural Glass.
 - (d) Equal as approved by the Architect prior to installation.
 - (1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.

- (2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- c. Obscure:
 - 1) Design Criteria:
 - (a) Meet requirements of ASTM C1036, Type II, Class I, Form 3, Quality Q8, Pattern - #62.
- d. Glazing Below Door Height:
 - 1) Design Criteria:
 - (a) Tempered.
 - (b) Meet requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality Q3.
- D. Fabrication:
 - 1. Except where glass exceeds 66 inches (1 675 mm) in width, cut clear glass so any wave will run horizontally when glazed.
 - 2. Sealed, Insulating Glazing Units:
 - a. Double pane, sealed insulating glass units. Install at exterior windows and exterior doors.
 - b. Unit Thickness: one inch (25 mm).
 - c. Insulated obscure units shall consist of one pane of specified obscure glass and one pane of standard glass.
 - d. Type Seal:
 - 1) Metal-to-glass bond and separated by 1/2 inch (12.7 mm) dehydrated air space.
 - 2) Use non-hardening sealants.
 - e. Approved Fabricators. See Section 01 6000
 - 1) Members of the Insulating Glass Manufacturers Alliance (IGMA).

2.03 ACCESSORIES

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Glazing Tape: Butyl-based elastomeric tape with integral resilient tube spacer, 10 to 15 Shore A durometer hardness, black color, coiled on release paper; widths required for specified installation, complying with ASTM C1281 and AAMA 800 for application
- C. 3M Sun Control Window Film Night Vision NV-25: -DI retail windows and vestibule windows only by Owner approval.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.

- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- C. Monitor and report installation procedures and unacceptable conditions.

3.05 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove non-permanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.

3.06 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 09 2116**GYPSUM BOARD ASSEMBLIES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Resilient sound isolation clips.
- E. Acoustic insulation.
- F. Gypsum sheathing.
- G. Cementitious backing board.
- H. Gypsum wallboard.
- I. Joint treatment and accessories.
- J. Textured finish system.

1.02 RELATED REQUIREMENTS

- A. Section 09 2216 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

- A. ASTM C11 - Standard Terminology Relating to Gypsum and Related Building Materials and Systems 2018b.
- B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017.
- C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members 2018.
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- E. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2020.
- F. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2019b.
- G. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2019.
- H. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness 2018.
- I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs 2018.
- J. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base 2019.
- K. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel 2018.
- L. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.

- M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
- N. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- O. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2020.
- P. ASTM E413 - Classification for Rating Sound Insulation 2016.
- Q. GA-214 - Recommended Levels of Finish - Gypsum Board, Glass Mat and Fiber-Reinforced Gypsum Panels 2015.
- R. GA-216 - Application and Finishing of Gypsum Panel Products 2016.
- S. GA-600 - Fire Resistance Design Manual 2015.
- T. GA-801 - Handling and Storage of Gypsum Panel Products: A Guide for Distributors, Retailers, and Contractors 2017.
- U. UL 263 - Standard for Fire Tests of Building Construction and Materials Current Edition, Including All Revisions.
- V. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.
 - 1. Schedule MANDATORY pre-installation conference immediately before installation of gypsum wallboard.
 - a. Finish requirements necessary for installation of finish materials over gypsum wallboard, and location and installation of tile backerboard.

1.05 SUBMITTALS

- A. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- D. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections. Also provide fire test results or assembly diagrams and numbers confirming products used will provide required fire ratings with installation configurations used.
- E. Samples: Submit two samples of predecorated gypsum board, 12 by 12 inches in size, illustrating finish color and texture.
 - 1. Light Orange Peel Texture:
 - a. Provide minimum of three (3) 24 inch (600 mm) square control samples on primed gypsum wallboard of 'light orange peel' texture to show possible variations.
 - 2. Light Skip Trowel Texture:

- a. Provide minimum of three (3) 24 inch (600 mm) square control samples on primed gypsum wallboard of 'light orange peel' texture to show possible variations.
- 3. Hawk and Trowel, Multi-Directional (lightly sanded) Texture:
 - a. Provide minimum of three (3) 24 inch (600 mm) square control samples on primed gypsum wallboard of 'multi-directional' texture (70/30, 80/20, and 90/10) to show possible variations.
- F. Field Samples:
 - 1. Before performing work of this Section, prepare control samples.
 - 2. Architect will inspect control sample at pre-installation conference following preparation of control sample. When sample is approved, work of this Section may proceed. Approved samples will be kept at site at all times work of this section is being performed.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- B. Follow recommendations of GA-801 Guide for Handling and Storage of Gypsum Panel Products unless local, state or federal laws or agency rules differing from the recommendations shall take precedence.
- C. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.
- D. Store material under roof and keep dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack gypsum board flat to prevent sagging.

1.07 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Comply with ASTM C840 or GA-216 requirements, whichever are more stringent:
 - a. Do not install interior products until installation areas are enclosed and conditioned.
 - 1) Temperature shall be 50 deg F (10 deg C) and 95 deg F (35 deg C) maximum day and night during entire joint operation and until execution of Certificate of Substantial Completion.
 - 2) Provide ventilation to eliminate excessive moisture.
 - 3) Avoid hot air drafts that will cause too rapid drying.
 - b. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

PART 2 PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. See PART 3 for finishing requirements.

2.02 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. American Gypsum Company: www.americangypsum.com/#sle.
 - 2. CertainTeed Corporation: www.certainteed.com/#sle.
 - 3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.

4. National Gypsum Company: www.nationalgypsum.com/#sle.
 5. PABCO Gypsum: www.pabco gypsum.com/#sle.
 6. USG Corporation: www.usg.com/#sle.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut, long edges tapered.
1. General:
 - a. Size:
 - 1) Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
 - b. Quality Standard:
 - 1) Core: Fire-resistant rated gypsum core.
 - 2) Complies with Type X requirements of ASTM C1396/C1396M (Section 5).
 - 3) Surface paper: Face paper suitable for painting.
 - 4) Long edges: Tapered edge.
 2. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
 5. Paper-Faced Products:
 - a. American Gypsum Company; LightRoc Gypsum Wallboard: www.americangypsum.com/#sle.
 - b. American Gypsum Company; FireBloc Type X Gypsum Wallboard: www.americangypsum.com/#sle.
 - c. CertainTeed Corporation; Type X Drywall: www.certainteed.com/#sle.
 - d. Georgia-Pacific Gypsum; ToughRock: www.gpgypsum.com/#sle.
 - e. Georgia-Pacific Gypsum; ToughRock Fireguard X: www.gpgypsum.com/#sle.
 - f. National Gypsum Company; Gold Bond BRAND Fire-Shield Gypsum Board: www.nationalgypsum.com/#sle.
- C. Impact Resistant Wallboard:
1. Type: Fire-resistance-rated Type X, UL or WH listed.
 2. Thickness: 5/8 inch.
 3. Edges: Tapered.
 4. Paper-Faced Products:
 - a. National Gypsum Company; Gold Bond Hi-Impact XP Gypsum Board: www.nationalgypsum.com/#sle.
 - b. USG; Fiberrock VHI (Very High Impact) Abuse-Resistant Board.
- D. Backing Board For Wet Areas: One of the following products:
1. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
 - a. Fire-Resistance-Rated Type: Type X core, thickness 5/8 inch.
 - b. Square edges.
 - c. Products:
 - 1) DensShield Fireguard Type X by Georgia Pacific.
 - 2) GlasRoc Tilebacker Type X by CertainTeed.

2.03 GYPSUM WALLBOARD ACCESSORIES

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Kinetics Noise Control, Dublin, OH www.kineticsnoise.com.
 - b. Magnum Products, Lenexa, KS www.levelcoat.com.
 - c. National Gypsum, Charlotte, NC www.nationalgypsum.com.
 - d. Soundproofing Co, San Marcos, CA www.soundproofing.org.
 - e. United States Gypsum Co, Chicago, IL www.usg.com.
 - f. Westpac Materials Inc, Orange, CA www.westpacmaterials.com.
 - g. Wm. Zinsser & Co, Somerset, NJ www.zinsser.com.
- B. Corner And Edge Trim:
 - 1. Metal, paper-faced metal, paper-faced plastic, or solid vinyl meeting requirements of ASTM C1047. Surfaces to receive bedding cement treated for maximum bonding.
- C. Control Joint:
 - 1. Bent zinc sheet with V-shaped slot, perforated flanges, covered with plastic tape meeting requirements of ASTM C1047.
- D. Furring Channels:
 - 1. Quality Standards:
 - a. Walls: Galvanized DWFC-25.
 - b. Ceilings: Galvanized DWFC-20.
 - 2. Accessories as required by Manufacturer's fire tests to provide necessary fire ratings.
- E. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant. Supplied and installed in accordance with ASTM Standards. Including but not limited to ASTM C919-19; do not use solvent-based non-curing butyl sealant.
- F. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
- G. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
 - 1. Expansion Joints:
 - a. Type: V-shaped metal with factory-installed protective tape.
- H. Joint Materials: Best grade or ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 2. Joint Reinforcing:
 - a. Paper reinforcing tape acceptable to Gypsum Board Manufacturer.
 - 3. Joint Compound: Drying type, vinyl-based, ready-mixed. Best grade or type recommended by Board Manufacturer and meeting requirements of ASTM C475/C475M.
 - a. Use Taping Compound for first coat to embed tape and accessories.
 - b. Use Taping Compound or All-Purpose Compound for subsequent coats except final coat.

- c. Use Finishing Compound for final coat and for skim coat.
- I. Finishing Compound: Surface coat and primer, takes the place of skim coating.
- J. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
 - 1. Products:
 - a. Sheetrock First Coat by USG.
 - b. Prep Coat by Westpac Materials.
 - c. Level Coat by Magnum Products.
 - d. Equal as approved by the Architect prior to installation.
 - 1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - 2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- K. Primer / Surfer On Surfaces To Receive Texturing:
 - 1. Acceptable Products:
 - a. Sheetrock First Coat by USG.
 - b. Prep Coat by Westpac Materials.
 - c. Level Coat by Magnum Products.
 - d. Equal as approved by the Architect prior to installation.
 - 1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - 2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- L. Textured Finish Materials: Latex-based compound; plain.
 - 1. Products:
 - a. ProForm Perfect Spray EM/HF by National Gypsum.
 - b. Sheetrock Wall & Ceiling Texture by US Gypsum.
- M. Fasteners:
 - 1. Bugle head screws meeting requirements of ASTM C1002:
 - a. Gypsum Board:
 - 1) Type W: For fastening gypsum board to wood members, of length to penetrate wood framing 5/8 inch (15.9 mm) minimum.
 - 2) Type S: For fastening gypsum board to steel framing and ceiling suspension members, of length to penetrate steel framing 3/8 inch (9.5 mm) minimum.
 - b. Glass Mat Gypsum Tile Backer:
 - 1) Wood Framing: 11 ga (0.1233 in) (3.1318 mm), galvanized with 7/16 inch (11 mm) head, hot dipped. Screws: Type W or Type S Hi-Lo, bugle head, rust resistant.
 - 2) Light-gauge metal framing: Type S Hi-Lo, bugle or wafer head, self-tapping, rust resistant. Hi-Lo screws.
 - 3) Heavy-gauge metal framing: Type S-12 Hi-Lo, bugle or wafer head, rust resistant.
- N. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

- O. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.
- P. Screws for Fastening Gypsum Sheathing: Bugle head screws as recommended by Sheathing Manufacturer and meeting requirements of ASTM C1002, corrosion resistant treated.

PART 3 PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.
- B. Examine gypsum board before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Notify Architect of unsuitable conditions in writing.
 - 1. Do not install board over unsuitable conditions.
- D. Commencement of Work by installer is considered acceptance of substrate.

3.02 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.
- C. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place one bead continuously on substrate before installation of perimeter framing members.
 - 2. Place continuous bead at perimeter of each layer of gypsum board.
 - 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.
- D. Acoustical Shielding: Install in accordance with manufacturer's instructions for application between studs and gypsum board.
- E. Installation shall comply with ASTM C919-19

3.03 BOARD INSTALLATION

- A. Interface With Other Work:
 - 1. Coordinate with Division 06 for location of backblocking for edges and ends of gypsum board and for blocking required for installation of equipment and building specialties.
 - 2. Do not install gypsum board until required blocking is in place.
- B. General: Install and finish as recommended in ASTM C840 or GA-216 unless specified otherwise in this Section.
- C. Mounting Accessories:
 - 1. Furring Channels: Apply with screws through flanges into each framing member.
- D. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- E. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.

- F. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- G. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- H. Interior Gypsum Board:
 - 1. General:
 - a. Install so trim and reinforcing tape are fully backed by gypsum board. No hollow spaces between pieces of gypsum board over 1/8 inch (3 mm) wide before taping are acceptable.
 - b. Rout out backside of gypsum board to accommodate items that extend beyond face of framing, but do not penetrate face of gypsum board, such as metal door frame mounting brackets, etc.
 - c. On walls over 108 inches (2 700 mm) high, apply board perpendicular to support.
 - d. Butt edges in moderate contact. Do not force in place. Shim to level.
 - e. Leave facings true with joint, finishing flush. Vertical work shall be plumb and ceiling surfaces level.
 - f. Scribe work closely:
 - 1) Keep joints as far from openings as possible.
 - 2) If joints occur near an opening, apply board so vertical joints are centered over openings.
 - 3) No vertical joints shall occur within 8 inches (200 mm) of external corners or openings.
 - g. Install board tight against support with joints even and true. Tighten loose screws.
 - h. Caulk perimeter joints in sound insulated rooms with specified acoustical sealant.
 - 2. Ceilings:
 - a. Apply ceilings first using minimum of two (2) men.
 - b. Use board of length to give minimum number of joints.
 - c. Apply board perpendicular to support.
 - d. Chapel and Cultural Hall:
 - 1) Single Layer Application:
 - (a) Stagger end joints:
 - (1) End and edge joints of board applied on ceilings shall occur over framing members or be back blocked with 2x4 (38 mm by 89 mm) blocking.
 - (2) Edge joints of board vertically applied on walls shall occur over framing members.
 - (3) 2x4 (38 mm by 89 mm) blocking is required at wall to ceiling transitions and at top of ceiling vault transitions.
- 3. Fastening:
 - a. Apply from center of board towards ends and edges.
 - b. Apply screws 3/8 inch (9.5 mm) minimum from ends and edges, one inch (25 mm) maximum from edges, and 1/2 inch (13 mm) maximum from ends.
 - c. Spacing:
 - 1) Ends: Screws not over 7 inches (175 mm) on center at edges where blocking or framing occurs.

- 2) Wood Framed Walls And Ceilings: Screws 7 inches (175 mm) on center in panel field.
- 3) Metal Framed Walls: Screws 12 inches (300 mm) on center in panel field.
- d. Set screw heads 1/32 inch (0.8 mm) below plane of board, but do not break face paper. If face is accidentally broken, apply additional screw 2 inches (50 mm) away.
- e. Screws on adjacent ends or edges shall be opposite each other.
- f. Drive screws with shank perpendicular to face of board.
4. Trim:
 - a. Corner Beads:
 - 1) Attach corner beads to outside corners.
 - (a) Attach metal corner bead with staples spaced 4 inches (100 mm) on center maximum and flat taped over edges of corner bead. Also, apply screw through edge of corner bead where wood trim will overlay corner bead.
 - (b) Set paper-faced trim in solid bed of taping compound.
 - b. Edge Trim: Apply where gypsum board abuts dissimilar material. Hold channel and 'L' trim back from exterior window and door frames 1/8 inch (3 mm) to allow for caulking.
- I. Glass Mat Gypsum Tile Backer:
 1. Apply glass mat gypsum tile backer to framing. Attach using specified fasteners spaced 6 inches (150 mm) on center on edges and into all framing members. Drive screws flush with surface of board.
 2. Shim board to be plumb and flat or level and flat, depending on location.
 3. Apply reinforcing only at joints where abutting different materials.
- J. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
 2. At exterior soffits, not more than 30 feet apart in both directions.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- D. Decorative Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.
- E. Moisture Guard Trim: Install on bottom edge of gypsum board according to manufacturer's instructions and in locations indicated on drawings.
- F. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations indicated on drawings. Provide vent area specified.

3.05 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.

- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
1. Gypsum Board Surfaces to Receive: Painted Texturing - Section 09 9413: 'Interior Textured Finishing':
 - a. GA-214 Level 4: 'All and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.
- D. Finishing:
1. General:
 - a. Tape and finish joints and corners throughout building as specified below to correspond with final finish material to be applied to gypsum board. When sanding, do not raise nap of gypsum board face paper or paper-faced trim.
 - b. First Coat:
 - 1) Apply tape over center of joint in complete, uniform bed of specified taping compound and wipe with a joint knife leaving a thin coating of joint compound. If metal corner bead is used, apply reinforcing tape over flange of metal corner bead and trim so half of tape width is on flange and half is on gypsum board.
 - 2) Completely fill gouges, dents, and fastener dimples.
 - 3) Allow to dry and sand lightly if necessary to eliminate high spots or excessive compound.
 - c. Second Coat:
 - 1) Apply coat of specified joint compound over embedded tape extending 3-1/2 inches (88 mm) on both sides of joint center. Use finishing compound only if applied coat is intended as final coat.
 - 2) Re-coat gouges, dents, and fastener dimples.
 - 3) Allow to dry and sand lightly to eliminate high spots or excessive compound.
 - d. Third Coat: Apply same as second coat except extend application 6 inches (150 mm) on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
 - e. Fourth Coat: Apply same as second coat except extend application 9 inches (425 mm) on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.

3.06 TEXTURE FINISH

- A. Apply finish texture coating in accordance with manufacturer's instructions and to match approved sample.
- B. Location:
1. Walls: Shall be textured with one of the following types, to be selected by the Architect:
 - a. Light Orange Peel Texture
 - b. Hawk and Trowel Texture
 - c. Holey Smooth Texture
 2. Ceilings:
 - a. Skip Trowel Texture
 - 1) Restroom ceilings.

- 2) Custodial ceilings.
 - b. Smooth Finish (no texture)
 - 1) Shower ceilings.
- C. Finishing:
- 1. Texture:
 - a. After gypsum board is taped, sanded, and primed, apply texture. Closely match samples accepted by Architect.
 - 1) After wall has been textured, apply priming and paint as specified in Section 09 9123.
 - 2. Smooth:
 - a. No applied texture is required. Apply priming and paint as specified in Section 09 9123.

3.07 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
- 1. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.08 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.09 CLEANING

- A. Remove from site debris resulting from work of this Section including taping compound spills.

END OF SECTION

SECTION 09 2216**NON-STRUCTURAL METAL FRAMING****PART 1 GENERAL****1.01 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install metal framing and furring systems and blocking as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 05 4010: 'Cold-Formed Load-Bearing Metal Framing'.
 - 2. Section 06 1100: 'Wood Framing' for wood blocking.
 - 3. Section 09 2226: 'Metal Suspension System' for furring on suspended ceilings.

1.02 REFERENCES

- A. Association Publications:
 - 1. Steel Framing Industry Association (SFIA):
 - a. SFIA 'Technical Guide for Cold-Formed Steel Framing Products', www.sfia.net.
 - 2. Steel Stud Manufacturers Association (SSMA):
 - a. 2015 IBC - SSMA 'Product Technical Guide'.
- B. Definitions:
 - 1. Non-Structural Member: Member in steel-framed system that is not part of the gravity load resisting system, lateral force resisting system or building envelope.
- C. Reference Standards:
 - 1. American Iron and Steel Institute (AISI):
 - a. AISI S220-15, 'North American Specification For The Design Of Cold-Formed Steel Framing – Nonstructural Members'.
 - 2. ASTM International:
 - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
 - b. ASTM A1003/A1003M-15, 'Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members'.
 - c. ASTM C645-18, 'Standard Specification for Nonstructural Steel Framing Members'.
 - d. ASTM C754-18, 'Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products'.
 - e. ASTM C1513-18, 'Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections'.
 - f. ASTM E119-18, 'Standard Test Methods for Fire Tests of Building Construction and Materials'.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Schedule pre-installation conference to be held after submittals have been reviewed and returned by Architect, but before beginning metal framing work.
 - 2. Review following:
 - a. Identify location of required blocking.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Show special components and installations not fully dimensioned or detailed in Manufacturer's Product data.
- B. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. ATI, ICC or other Approved Testing Agency (active member) Evaluation Report.
 - 2. Manufacturer Instructions:
 - a. Technical product data, installation instructions, and recommendations for each component of system.

1.05 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. ICC approved.

PART 2 PRODUCTS**2.01 SYSTEMS**

- A. Manufacturers:
 - 1. Type One Acceptable Manufacturers:
 - a. CEMCO, City of Industry, CA www.cemcosteel.com.
 - b. ClarkDietrich Building Systems, West Chester, OH www.clarkdietrich.com.
 - c. Any member of Steel Framing Industry Association (SFIA).
 - d. Any member of Steel Stud Manufacturer's Association (SSMA).
 - e. Equal as approved by the Architect prior to installation.
 - 1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - 2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- B. Materials:
 - 1. Framing:
 - a. General:
 - 1) **20 gauge** minimum, unless noted greater on Drawings, meeting requirements of ASTM C645.
 - 2) Steel Sheet Components: Comply with ASTM C645 requirements for metal unless otherwise indicated.
 - 3) Steel Coating Requirement: Comply with ASTM C645 roll-formed from hot dipped galvanized steel complying with ASTM A1003/A1003M and/or ASTM A653/A653M G40 (Z120) or equivalent corrosion resistant coating. A40 galvanized products are not acceptable.
 - (a) Coatings shall demonstrate equivalent corrosion resistance with evaluation report from approved testing agency.
 - b. Steel Studs and Runners: Cold-formed galvanized steel C-studs, as per ASTM C645 for conditions indicated.
 - c. Bridging, blocking, strapping, and other accessories shall be as described in Contract Documents or as required by Manufacturer's system.
 - d. Acceptable Products:

- 1) 362DS20P by CEMCO.
 - 2) ProSTUD 20 by ClarkDietrich Building Systems.
 - 3) 20 Ga 3-5/8 SS Series by Steeler Inc.
 - 4) Any member of Steel Framing Industry Association (SFIA).
 - 5) Any member of Steel Stud Manufacturer's Association (SSMA).
 - 6) Equal as approved by the Architect prior to installation.
 - (a) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (b) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
2. Furring Channels:
 - a. Hat Shaped Channels: ASTM C645; 25 gauge corrosion resistant steel in sizes shown on Drawings.
 - b. 'Z' Shaped Channels: 20 gauge minimum corrosion resistant steel in sizes shown on Drawings.
 - c. 'Z' Shaped Channels: 20 gauge minimum corrosion resistant steel in sizes shown on Drawings.
 3. Firestop Tracks:
 - a. Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 4. Headers and Jambs - Heavy-Duty Stud:
 - a. Shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with stiffened flanges.
- C. Fasteners:
1. Corrosion resistant coated, self-drilling, self-threading steel drill screws complying with ASTM C1513.

2.02 ACCESSORIES

- A. Sill Sealer: Closed-cell polyethylene foam, 1/4 inch (6 mm) thick by width of plate.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Interface With Other Work:
1. Coordinate with other Sections to provide blocking necessary for their work.
 2. Coordinate with other Sections for location of blocking required for installation of equipment and building specialties.
- B. Tolerances:
1. 1/4 inch (6 mm) in 20 feet (6 meters), non-cumulative in length of wall.
 2. 1/8 inch (3 mm) in 10 feet (3 meters) with 1/4 inch (6 mm) maximum in height of wall.
 3. Distances between parallel walls shall be 1/4 inch (6 mm) maximum along length and height of wall.
- C. Framing:
1. Installation Standard: ASTM C754.

2. Specifications of Stud Wall Manufacturer shall govern this work unless more stringent requirements are required by Contract Documents.
3. Install specified sill sealer under sill plates of exterior walls and of acoustically insulated interior walls.
4. Stiffen metal-framed walls with $\frac{3}{4}$ inch (19 mm) 1-1/2 inches (38 mm) cold formed channels placed horizontally approximately 48 inch (1 200 mm) on center and securely attach to each stud.
5. Similarly reinforce door and window openings at headers with reinforcing channel extending 18 inches (450 mm) minimum each side of opening.
6. Apply double framing members at openings. Wrap multiple, adjacent framing members with duct tape or otherwise secure to eliminate 'chattering'.
7. Use grommets at framing penetrations where unsecured items pass through.

END OF SECTION

SECTION 09 3000**TILING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Tile for wall applications.

1.02 REFERENCE STANDARDS

- A. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive 2009 (Revised).
- B. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar 1999 (Reaffirmed 2010).
- C. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy 1999 (Reaffirmed 2010).
- D. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework 2017.
- E. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units 2018.
- F. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive 2013 (Revised).
- G. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar 2012 (Revised).
- H. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation 2010 (Reaffirmed 2016).
- I. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation 2010 (Reaffirmed 2016).
- J. ANSI A118.11 - American National Standard Specifications for EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar 1999 (Reaffirmed 2010).
- K. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation 2014.
- L. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar 2012.
- M. ANSI A137.1 - American National Standard Specifications for Ceramic Tile 2019.
- N. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar 2018.
- O. ASTM C150/C150M - Standard Specification for Portland Cement 2020.
- P. ASTM C206 - Standard Specification for Finishing Hydrated Lime 2014.
- Q. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2018.
- R. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products 2018.

- S. ASTM C482 - Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement Paste 2020.
- T. ASTM C501 - Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser 1984 (Reapproved 2015).
- U. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation 2019.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.
- B. Review following:
 - 1. Review installation scheduling, coordination with related work, and placement of tile.
 - 2. Review Manufacturer's installation requirements, submittals, and Installers requirements to assure issuance of Manufacturer's system warranty.
 - 3. Review surface preparation.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, accessories, and setting details.
- C. Samples: Mount tile and apply grout on two plywood panels, minimum 24 x 24 inches in size illustrating pattern, color variations, and grout joint size variations.
 - 1. One sample of each type of trim piece to be used on Project.
- D. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- E. Source Quality Control Submittals:
 - 1. Provide Manufacturer documentation indicating proposed materials will satisfy requirements for Manufacturer's Warranty.
- F. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual:
 - a. Operations and Maintenance Data:
 - 1) Cleaning and maintenance instructions.
 - b. Warranty Documentation:
 - 1) Include copy of final, executed warranty.
 - c. Record Documentation:
 - 1) Manufacturers Documentation:
 - (a) Source Quality Control Submittal documentation showing materials will satisfy requirements for Manufacturer's Warranty.
 - (b) Manufacturer's cut sheets of materials used in installed system.
 - (c) Tile color and pattern selections.

1.05 QUALITY ASSURANCE

- A. Source Of Materials:
 - 1. Provide materials obtained from one (1) source for each type and color of tile, grout, and setting materials for Manufacturer's system warranty.
- B. Installer Qualifications:

1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 TILE

- A. Porcelain Tile quality and design standard:
 1. Daltile Archaia Province Gray, 12x24.
 2. The Architect shall select the tile after bidding in the same price category as the quality and design standard.
- B. Design Criteria:
 1. General:
 - a. Porcelain Tile:
 - 1) Tile shall be standard quality, solid color throughout, graded in accordance with ANSI A137.1:
 2. Capabilities:
 - a. Porcelain Tile:
 - 1) Water Absorption when tested in accordance with ASTM C373: 0.1 to 0.5 percent.
 - 2) Abrasive Wear Resistance when tested in accordance with ASTM C501: 275 minimum.
 - 3) Breaking Strength when tested in accordance with ASTM C648: 300 lbs minimum.
 - 4) Bond Strength when tested in accordance with ASTM C482: 200 psi minimum.
 - 5) Coefficient of Friction: 0.42 minimum as measured by DCOF (Dynamic Coefficient of Friction) AcuTest method and requirements as per ANSI A137.1.

2.02 SETTING MATERIALS

- A. Manufacturer's Contact List:
 1. Ardex Engineered Cements, Aliquippa, PA www.ArdexAmericas.com.
 - a. Contact Information: Don Richards (206) 979-0401
www.Don.richards@ArdexAmericas.com.
 2. Custom Building Products, Seal Beach, CA www.custombuildingproducts.com.
 - a. Contact Information: John Gallup (206) 718-6024 johng@cbpmail.net.
 3. Dal-Tile Corp., Div. of Mohawk Industries, Dallas, TX www.daltile.com.
 4. Interceramic Inc., Garland, TX www.interceramic.com.
 5. Laticrete International Inc., Bethany, CT www.laticrete.com.
 6. Mapei Americas Headquarters, Deerfield Beach, FL www.mapei.com.
 - a. Contact Information: Bart A. Wilde (801) 467-2060 www.bwilde@mapei.com.
 7. Merkrete, by Parex USA, Inc., Anaheim, CA www.merkrete.com.

- a. Contact Information: Andy Townes (505) 873-1181
andy.townes@parexusa.com.
- 8. Schluter Systems L.P., Plattsburgh, NY www.schluter.com.
- B. Materials:
 - 1. Mortar Bed:
 - a. Portland Cement: Meet requirements of ASTM C150/C150M, Type 1, designation shall appear on bag.
 - b. Hydrated Lime:
 - 1) Meet Requirements of one of following:
 - (a) ASTM C206.
 - (b) ASTM C207, Type S (designation shall appear on bag).
 - c. Sand: Clean, washed, well-graded, meeting requirements of ASTM C144 with gradation of 100 percent passing No. 8 sieve with not over five (5) percent passing No. 100 sieve.
 - d. Latex Additive; in lieu of all water:
 - 1) Design Criteria:
 - (a) Meet material specification requirements of ANSI A118.4 or ANSI A118.11.
 - (b) Meet ANSI installation specification requirements of ANSI A108.5.
 - (c) Expansion joints complies with TCA method EJ171.
 - 2) Acceptable Products:
 - (a) ARDEX: Ardex E 90 Mortar Admix.
 - (b) CUSTOM: Thin-Set Mortar Admix.
 - (c) LATICRETE: 4237 Latex Additive with 211 Powder.
 - (d) MAPEI: Planicrete AC.
 - (e) MERKRETE: 150 Latex Admixture.
 - 2. Metal Trim:
 - a. Provide Schluter edge strip at all exposed edges of wall tile.
 - 3. Joint Sealants:
 - a. Interior Tile Joints are furnished in Section 07 9213, including the following:
 - 1) Wall tile joints at inside corners.
 - 2) Termination joints in showers.
 - 4. Backer Board Joint Reinforcing: 2 inch (50 mm) wide glass fiber mesh tape.
 - 5. Tile Setting Products:
 - a. Use only products of same Manufacturer to validate warranty, unless otherwise acceptable to Tile Supplier.
 - b. Use only products that meet Mortar Manufacturer's twenty five (25) year system warranty requirements.
 - c. Latex/Polymer Modified Portland Cement Mortar For Walls:
 - 1) Design Criteria:
 - (a) Meet ANSI material specification requirements of ANSI A118.4, ANSI A118.11, or ANSI A118.15.
 - (b) Meet ANSI installation specification requirements of ANSI A108.4 or ISO material specification ISO13007 installation material specification and C2ES1P2 performance requirements for adhesive.
 - 2) Approved Products. See Section 01 6000:
 - (a) ARDEX: Ardex X77.

- (b) CUSTOM: Megalite Thin-Set Mortar or FlexBond Fortified Thin-Set Mortar.
 - (c) LATICRETE: 254 Platinum Thinset.
 - (d) MAPEI: Ultraflex 3.
 - (e) MERKRETE: 735 Premium Flex.
 - d. Wall Grout (Modified Polymer):
 - 1) Design Criteria:
 - (a) Meet ANSI material specification requirements of ANSI A118.6 or ANSI A118.7.
 - (b) Meet ANSI installation specification requirements of ANSI A108.10 or ISO material specification ISO13007 C2ES1P2.
 - 2) Color: as selected by the Architect from the manufacturer's standard colors.
 - 3) Approved Products:
 - (a) ARDEX: Ardex FH.
 - (b) CUSTOM: PolyBlend Non-Sanded Grout or Prism Color Consistent Grout.
 - (c) LATICRETE: 1600 Series Unsanded Dry Set Wall Grout with 1776 Grout Admix Plus additive.
 - (d) MAPEI: Keracolor-U Unsanded Polymer-Modified Grout.
 - (e) MERKRETE: Non-Sanded ColorGrout, latex modified.
- C. Mixes:
 - 1. Mortar Beds:
 - a. Wall Mix: One Part portland cement, 5-1/2 to 7 Parts damp sand, 1/2 Part hydrated lime optional.

PART 3 EXECUTION

3.01 INSTALLERS

- A. Acceptable Installers:
 - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.02 EXAMINATION

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- B. Notify Architect in writing if surfaces are not acceptable to install tile:
 - 1. Do not lay tile over unsuitable surface.
 - 2. Commencing installation constitutes acceptance of surfaces and approval of existing conditions.

3.03 PREPARATION

- A. Allow concrete to cure for twenty-eight (28) days minimum before application of mortar bed.
- B. Protect surrounding work from damage.
- C. Vacuum clean surfaces and damp clean.
- D. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

- E. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.
- F. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.04 INSTALLATION - GENERAL

- A. Interface with Other Work:
 - 1. Grounds, anchors, plugs, hangers, door frames, electrical, mechanical, and other work in or behind tile shall be installed before tile work is started.
- B. Special Techniques:
 - 1. Install in accordance with latest TCNA (HB) installation methods.
- C. Tolerances:
 - 1. Plane of Vertical Surfaces:
 - a. 1/8 inch in 8 feet (3 mm in 2.450 meters) from required plane shall be plumb and true with square corners.
- D. General:
 - 1. Install tile in pattern indicated:
 - a. Adjust to minimize tile cutting and to avoid tile less than half size.
 - b. Center and balance areas of tile if possible.
 - 2. Extend tile into recesses and under equipment and fixtures to form a complete covering without interruption:
 - 3. Maintain heights of tilework in full courses to nearest obtainable dimension where heights are given in feet and inches (meters and millimeters) and are not required to fill vertical spaces exactly.
 - 4. Install cut tile with cuts on outer edges of field:
 - a. Provide straight cuts that align with adjacent materials.
 - b. When possible, smooth cut edges of tile or use appropriate cutter or wet saw to produce smooth cuts.
 - c. Do not install tile with jagged or flaked edges.
 - 5. Terminate tile neatly at obstructions, edges, and corners, without disruption of pattern or joint alignment:
 - a. Fit tile closely where edges are to be covered by trim, escutcheons, or similar devices.
 - 6. Provide straight tile joints of uniform width, subject to variance in tolerance allowed in tile size:
 - a. Make joints smooth and even, without voids, cracks, or excess mortar or grout.
 - 7. Use a beating block and hammer or rubber mallet so faces and edges of individual tiles are flush and level with faces and edges of adjacent tiles, and to reduce lippage.
 - 8. Accessories in tilework shall be evenly spaced, properly centered with tile joints, and level, plumb, and true to correct projection.
 - 9. Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- E. Application of Mortar:
 - 1. Do not spread more mortar than can be covered within ten (10) to fifteen (15) minutes:
 - a. If 'skinning' occurs, remove mortar and spread fresh material.

- b. Spread mortar with notches running in one (1) direction, perpendicular to pressing, pushing and pulling of tile during placement.
 2. Install tile before mortar has started initial cure:
 - a. For thin set mortar application, use notch trowel that will achieve the recommended coverage of mortar after tiles have been installed.
 3. Place tile in fresh mortar, press, push and pull tile slightly to achieve as near 100 percent coverage and contact of tile with setting material and substrate as possible:
 - a. Average contact area shall be not less than eighty (80) percent except on shower installations where contact area shall be ninety-five (95) percent when not less than three (3) tiles or tile assemblies are removed for inspection. The eighty (80) percent or ninety-five (95) percent coverage shall be sufficiently distributed to give full support of the tile.
 - b. Support corners and edges with mortar leaving no hollow corners or edges.
 4. Install so there is 1/8 inch (3 mm) of mortar between tile and substrate after proper bedding:
 - a. Periodically remove sheets or individual tiles to assure proper bond coverage consistent with industry specifications.
 - b. If coverage is found to be insufficient, use a larger size notch trowel.
- F. Application of Grout:
 1. Firmly set tile before applying grout:
 - a. This requires forty-eight (48) hours minimum.
 2. Before grouting:
 - a. Remove all paper and glue from face of mounted tile.
 - b. Remove spacers or ropes before applying grouting:
 3. Mixing Grout:
 - a. Use clean buckets and mixing tools:
 - 1) Use sufficient pressure and flow grout in progressively to avoid air pockets and voids.
 - b. Machine mixing of grout is preferred to assure uniform blend. To prevent trapping air bubbles into prepared grout, use slow speed mixer.
 - c. Slake for fifteen (15) minutes.
 - d. Water or latex additives used for mixing with dry grout shall be measured accurately.
 4. Before grouting entire area, do a test area to assure there will be no permanent staining or discoloration of tile and to verify that excess grout can be easily removed from tile surface:
 - a. If necessary, pre-coat exposed surfaces of tile with a grout release recommended by Grout Manufacturer to facilitate removal of excess grout.
 5. Installing Grout:
 - a. Use caution, when grouting glazed ceramic tiles to prevent scratching or damaging surface of tile.
 - b. Dampen dry joints prior to grouting with sand-portland cement grout, standard sanded cement grout, standard unsanded cement grout, polymer modified sanded tile grout, and polymer modified unsanded tile grout. Do not leave puddles of water in joints before grouting.
 - c. Keep an adequate joint depth open for grouting. Force maximum amount of grout into joints.

- d. Apply grout to produce full, smooth grout joints of uniform width, and free of voids and gaps
 - 1) Fill joints of cushion edge tile to depth of cushion.
 - 2) Fill joints of square edge tile flush with surface.
 - e. Remove excess grout from surface of tile before it loses its plasticity or begins to set.
 - f. Finished grout shall be uniform in color, smooth, and without voids, pin holes, or low spots.
- G. Curing:
- 1. Keep installation at 65 to 85 deg F (18 to 30 deg C) during first eight (8) hours of cure. Shade area completely from sun during this period.
- H. Application of Joint Sealants:
- 1. Apply joint sealants after grout has cured:
 - a. This requires forty-eight (48) hours minimum.
 - 2. Before applying sealant:
 - a. Remove spacers or ropes before applying joint sealants.
 - b. Apply backer rod and joint sealants at expansion joints.

3.05 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
- 1. Correct any work found cracked, chipped, broken, unbounded and otherwise defective or not complying with contract document requirements at no additional cost to the Owner.

3.06 CLEANING

- A. Clean tile and grout surfaces.
- B. If one has been used, remove grout release and clean tile surfaces so they are free of grout residue and foreign matter:
- 1. If a grout haze or residue remains, use a suitable grout haze remover or cleaner.
 - 2. Flush surface with clean water before and after cleaning.

3.07 PROTECTION

- A. Close to traffic areas where tile is being set and other tile work being done:
- 1. Keep closed until tile is firmly set.
 - 2. Before, during, and after grouting, keep area clean, dry, and free from foreign materials and airflow that will interfere with setting and curing of grout.
- B. After cleaning, provide protective covering and maintain conditions protecting tile work from damage and deterioration:
- 1. Where tiled surfaces will be subject to equipment or wheel traffic or heavy construction traffic, cover protective covering with 1/4 inch (6 mm) hardboard, plywood, or similar material.

END OF SECTION

SECTION 09 5100**ACOUSTICAL CEILINGS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASHRAE Std 62.1-2013 - Ventilation for Acceptable Indoor Air Quality 2013.
- C. ASTM A568/A568M - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements For 2019a.
- D. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire 2019.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- F. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method 2017.
- G. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings 2017.
- H. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels 2013.
- I. ASTM D610 - Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces 2008 (Reapproved 2019).
- J. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2016.
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
- L. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2020.
- M. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions 2020.
- N. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests 2016.
- O. ASTM E1111/E1111M - Standard Test Method for Measuring the Interzone Attenuation of Open Office Components 2014.
- P. ASTM E1264 - Standard Classification for Acoustical Ceiling Products 2019.
- Q. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum 2016.
- R. ASTM E1477 - Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers 1998a (Reapproved 2017).

- S. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- T. NFPA 265 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls 2019.
- U. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference specified in Section 09 2900 to review finish requirements for gypsum wallboard ceilings.
 - 2. Schedule acoustical panel ceiling pre-installation conference after installation of gypsum wallboard but before beginning installation of panels.
 - 3. In addition to items specified in Section 01 3100, review following:
 - a. Verify that panels comes from same dye lot and has same dye lot code.
 - b. Review requirements of acceptable and non-acceptable panel.
- B. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- C. Do not install acoustical units until after interior wet work is dry.
- D. Coordination:
 - 1. Coordinate layout of suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and fire-suppression systems.
 - 2. All work above ceiling should be completed prior to installing suspended system. There should be no materials resting against or wrapped around suspension system, hanger wires or ties.

1.04 SUBMITTALS

- A. Product Data: Provide data on suspension system components and acoustical units.
- B. Samples: Submit two samples 6 by 6 inch in size illustrating material and finish of acoustical units.
- C. Minimum 8 inch (200 mm) long samples of exposed wall molding and suspension system, including main runner/tee and cross runner/tee with couplings.
- D. Manufacturer's certifications that products comply with specified requirements including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry approved independent laboratory classification of NRC, CAC, and AC.
- E. Certificates:
 - 1. Suspension Assemblies:
 - a. Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
 - b. Installer's certificates of training.
- F. If requested by Owner, provide copies of Quality Assurance requirements for 'Class A' flame spread rating and 'Room-Corner Test'.

- G. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- H. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Final, executed copy of Warranty.
 - b. Record Documentation:
 - 1) Manufacturers Documentation:
 - (a) Manufacturer's literature.
 - (b) Color and pattern selection.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Acoustical Units: Provide Owner with two (2) cartons of each pattern and color used on Project for future use.
 - a. Packaged with protective covering for storage and identified with appropriate labels.

1.05 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Regulatory Agency Sustainability Approvals:
 - 1. All system components conform to ASTM standards.
 - 2. Fire-Resistance Rating: UL approved metal suspension system.
- C. Acoustical Panel Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
 - 1)

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
 - 1. Store materials where protected from moisture, direct sunlight, surface contamination, and damage.
 - 2. Store in cool, dry location, out of direct sunlight and weather, and at temperatures between 32 deg F (0 deg C) and 86 deg F (30 deg C).
 - 3. Handle acoustical ceiling panels carefully to avoid chipping edges or damage. Use no soiled, scratched, or broken material in the Work.

1.07 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Building shall be enclosed, mechanical system operating with proper filters in place, and temperature and humidity conditions stabilized within limits under which Project will operate before, during, and after installation until Substantial Completion.
 - 2. Installation shall be at temperatures between 50 deg F (10 deg C) and 86 deg F (30 deg C) or as per Manufacturer recommendations.

- B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.08 WARRANTY

- A. Acoustical Ceiling Panels:
 - 1. Manufacturers warranty to be free from defects in material and factory workmanship.
 - 2. Manufacturer's warranty against sagging and warping.
 - 3. Manufacturer's warranty against mold/mildew and bacterial growth.
- B. Suspension Assemblies:
 - 1. Manufacturer warranty including repair or replacement of rusting as defined by ASTM D610 and defects in material or factory workmanship.

PART 2 PRODUCTS**2.01 REGULATORY AGENCY SUSTAINABILITY APPROVALS**

- A. Fire-Test-Response Characteristics:
 - 1. Surface-Burning Characteristics:
 - a. Ceiling panels shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
 - 1) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
 - 2) Flash point: None.
- B. All system components conform to ASTM standards.
- C. Fire-Resistance Rating: UL approved metal suspension system.
- D. Meet seismic bracing requirements of ASCE 7, ASTM C635/C635M and ASTM C636/C636M or equivalent governing standard for project site.
- E. Seismic Standard: Acoustical ceilings shall be designed and installed to withstand the effects of earthquake motions according to the following:
 - 1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E580/E580M.
 - 2. Cisca's Recommendations for Acoustical Ceilings: Comply with Cisca's 'Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings- Seismic Zones 0-2' (Apply to Seismic Categories A & B).
 - 3. Cisca's Guidelines for Systems Requiring Seismic Restraint: Comply with Cisca's 'Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies- Seismic Zones 3 & 4' (Apply to Seismic Categories C, D, E & F).

2.02 MANUFACTURERS

- A. Acoustic Ceiling Panels: Manufacturers Contact List:
 - 1. Armstrong World Industries, Lancaster, PA www.ceilings.com.
 - a. Contact Information:
 - 1) For pricing and ordering of panels, contact Sherry Brunt / Phyllis Miller at (800) 442-4212, FAX 800-233-5598, or bpo_strategic_accounts@armstrong.com.
 - 2) For Strategic Account information, contact Randy Lay at (303) 775-1409 ralay@armstrong.com.
 - 2. USG Interiors Inc, Chicago, IL www.usg.com.

2.03 ACOUSTICAL PANEL UNITS

- A. Acoustic Ceiling Panels:

1. Description:
 - a. Color: White (surface factory-applied).
 - b. Composition: Wet-formed mineral fiber.
2. Design Criteria:
 - a. Acoustics:
 - 1) Noise Reduction Coefficient (NRC): ASTM C423; 0.70 minimum.
 - 2) Ceiling Attenuation Class (CAC): ASTM E1414/E1414M; 35 minimum.
 - b. Antimicrobial Protection: Resistance against growth of mold/mildew.
 - c. Classification:
 - 1) Meet requirements of ASTM E1264, Type III (mineral base with painted finish), Form 1 (nodular) or Form 4 (cast or molded), Pattern E1 (lightly textured).
 - d. Fire Performance: As specified in Quality Assurance in Part 1 of this specification.
 - e. Light Reflectance (LR): ASTM E1477; 0.83 minimum.
 - f. Sag Resistance: Resistance to sagging in high humidity conditions.
 - g. VOC: Low.
- B. Wide Face Design:
 1. Design Criteria:
 - a. Grid Face: 15/16 inch (24 mm).
 - b. Size: 24 inch x 24 inch x 3/4" (610 mm x 610 mm x 19 mm).
 - c. Edge profile: Angled Tegalur.
 2. Acceptable Product:
 - a. Fine Fissured item 1713 by Armstrong:
 - 1) Grid System: Prelude XL Exposed Tee.
 - 2) Edge Profile: Square Lay-in.
 - b. Radar ClimaPlus Open Plan item 22320 by USG:
 - 1) Grid System: DX/DXL Exposed Tee.
 - 2) Edge Profile: Square.
 - c. Equal as approved by the Architect prior to installation.
 - 1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - 2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.

2.04 SUSPENSION SYSTEM

- A. Manufacturers:
 1. Acceptable Manufacturers. See Section 01 6000:
 - a. Grid Face: 9/16 inch (14 mm).
 - 1) Armstrong World Industries, Lancaster, PA www.ceilings.com.
 - 2) USG Interiors Inc, Chicago, IL www.usg.com.
 2. Acceptable Manufacturers:
 - a. Grid Face: 15/16 inch:
 - 1) Armstrong World Industries Co, Lancaster, PA www.armstrong.com.
 - 2) USG Interiors Inc, Chicago, IL www.usg.com.
 - 3) Equal as approved by the Architect prior to installation.
 - (a) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.

- (b) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.

B. Materials:

1. Grid:

- a. Systems shall meet requirements of ASTM C635/C635M, Intermediate Duty suspension system required for Seismic Design Categories A, B, or C.
- b. Systems shall meet requirements of ASTM C635/C635M, Heavy Duty suspension system required for Seismic Design Categories D, E, or F.
- c. Exposed surfaces shall be finished with factory-applied white baked enamel.
- d. Meet requirements of ASTM D610 for red rust.
- e. Main runners and cross tees:
 - 1) All main beams and cross tees shall be commercial quality hot-dipped galvanized (galvanized steel, aluminum, or stainless steel) as per ASTM A653/A653M. Main beams and cross tees are double-web steel construction with type exposed flange design.
 - 2) Narrow-face design - main runners and cross tees shall have 9/16 inch (14 mm) exposed face in a narrow revealed edge.
 - 3) Wide-face design - main runners and cross tees shall have one inch (25 mm) exposed face.

2. Performance Standards:

- a. DX Systems by USG Interiors required for Seismic Design Categories A, B, or C.
- b. DXL Systems by USG Interiors required for Seismic Design Categories D, E, or F.

3. Wire Hangers, Braces, and Ties:

- a. Zinc-Coated, carbon-steel wire meeting requirements of ASTM A641/A641M, Class 1 zinc coating, soft temper.
- b. Size:
 - 1) Standard size: 12 gauge (0.105 inch) (2.70 mm) galvanized, soft annealed steel wire.
 - 2) Select wire diameter so its stress is less than yield when loaded at three (3) times hanger design load (ASTM C635/C635M), Table 1, 'Direct Hung') will be less than yield stress of wire, but provide not less than 12 gauge (0.105 inch) (2.70 mm).
- c. Protect with rust inhibitive paint.

4. Wall Molding: Channel section of cold-rolled electro-galvanized steel.

5. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of same width as exposed runner.

6. Hold-down Clips: As required by UL to prevent lifting of panels under unusual draft conditions.

7. Seismic Joint Clip:

- a. Required for Seismic Design Categories D, E, or F.
- b. Quality Standard Product:
 - 1) SJCG by Armstrong World Industries, Lancaster, PA www.armstrong.com.
 - 2) Equal as approved by the Architect prior to installation.

- (a) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - (b) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- 8. Seismic Suspension System:
 - a. Required for Seismic Design Categories A, B, C, D, E, or F:
 - b. Design Criteria:
 - 1) Installation of ceiling system must be as prescribed by ICC-ES Evaluation Reports ESR-1222 or ESR-1308 and applicable code.
 - 2) Meet requirements of ASTM A568/A568M for hot-dipped galvanized, cold-rolled steel.
 - 3) Attach cross runners to wall with seismic clips.
 - c. Wall Molding Size: 7/8 inch (22 mm) for all seismic design categories (code approved).
 - d. Acceptable Products. See Section 01 6000.
 - 1) ACM7 Clip by USG Inc, Chicago, IL www.usg.com.
 - 2) BERC-2 Clip by Armstrong World Industries, Lancaster, PA www.ceilings.com.
- 9. Compression Posts/Struts:
 - a. Required for Seismic Design Categories D, E, or F.
 - b. Meet seismic requirements for Project.

2.05 ACCESSORIES:

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same metal and finish as grid.
- C. Gypsum Board: Fire rated type; 5/8 inch thick, ends and edges square, paper faced.
- D. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.
- C. Inspect for defects in backing and support that are not acceptable.
- D. Inspect for defects in support that are not acceptable.
 - 1. All wet work (concrete, painting, and etc.) must be completed and dry.
 - 2. Temperature conditions within Manufacturer's written recommendation.
 - 3. Verify weather tightness of area to receive suspension system prior to installation.
- E. Notify Architect of unsuitable conditions in writing.
 - 1. Do not install acoustical ceiling panels until defects in support or environmental conditions are corrected.

3.02 PREPARATION

- A. Materials shall be dry and clean at time of application.

- B. Lay out suspension system symmetrically about center lines of room unless shown otherwise by Contract Drawings. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

3.03 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360. Individual component deflection not to exceed 1/360 of span.
- C. Install according to the layout determined during "Preparation."
- D. Suspend main runner/tee from overhead construction with hanger wires spaced 4 feet (1.20 m) on center along length of main runner/tee. Install hanger wires plumb and straight. Hanger wires shall not be installed in convenience holes.
- E. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
- F. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- G. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.
- H. Suspend main runner/tee from overhead construction with hanger wires spaced 4 feet (1.20 m) on center along length of main runner/tee. Install hanger wires plumb and straight. Hanger wires shall not be installed in convenience holes.
- I. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- J. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- K. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- L. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- M. Do not eccentrically load system or induce rotation of runners.
- N. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Overlap and rivet corners or install corner caps.
- O. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.
- P. Screws, eyebolts or lag bolts used to support metal acoustical suspended assemblies must have minimum embedment of 5/8 inch (15.9 mm) when installed into structural members.

Q. Embedment must be at least 5/8 inch (15.9 mm).

3.04 INSTALLATION - ACOUSTICAL PANEL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.
- C. Special Techniques:
 - 1. If recommended by Manufacturer, use tile one at a time from at least four (4) open boxes to avoid creating any pattern due to slight variations from box to box. Use tile from same color run in individual rooms to assure color match.
 - 2. Leave tile in true plane with straight, even joints.
- D. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- E. Lay directional patterned units with pattern parallel to longest room axis.
- F. Fit border trim neatly against abutting surfaces.
- G. Install units after above-ceiling work is complete.
- H. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- I. Cutting Acoustical Units:
 - 1. Cut to fit irregular grid and perimeter edge trim.
 - 2. Make field cut edges of same profile as factory edges.
 - 3. Double cut and field paint exposed reveal edges.
- J. Where round obstructions occur, provide preformed closures to match perimeter molding.

3.05 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
 - 1. Suspension Assemblies:
 - a. Field Inspections:
 - 1) Inspect:
 - (a) Suspended ceiling system.
 - (b) Hangers, anchors and fasteners.
 - 2) Correct any work found defective or not complying with contract document requirements at no additional cost to Owner.
- B. Non-Conforming Work:
 - 1. Acoustical Panels: Remove and replace defective materials at no additional cost to Owner including, but not limited to following:
 - a. Remove and replace damaged or broken acoustical ceiling panels.
 - b. Remove and replace discolored acoustical ceiling panels to match adjacent.
 - c. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.07 ADJUSTING

- A. 'Touch-up' minor abraded surfaces.

3.08 CLEANING

- A. Clean exposed surfaces of acoustical ceiling panels, including trim, edge moldings, and suspension members.
 - 1. Comply with Manufacturer's written instructions for cleaning and touch up of minor finish damage.
- B. Waste Management:
 - 1. Remove from site all debris connected with work of this Section.

END OF SECTION

SECTION 09 6724**SEAMLESS FLOORING SYSTEM****PART 1 GENERAL****1.01 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparation of concrete surfaces to receive urethane cement flooring system as described in Contract Documents.
 - 2. Furnish and apply urethane cement flooring system as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for Alkalinity and Concrete Moisture of concrete slab.
 - 2. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - 3. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 4. Section 03 3111: 'Cast-In-Place Structural Concrete' for provision of acceptable concrete substrate.
 - 5. Section 03 6300: 'Epoxy Grouting'.
 - 6. Section 09 0503: 'Floor Substrate Preparation' for:
 - a. Floor substrate preparation.
 - b. Field Testing for Alkalinity and Concrete Moisture of concrete slab.
 - c. Pre-installation conference for Sections under 09 6000 heading 'Flooring'.

1.02 REFERENCES

- A. Association Publications:
 - 1. American Concrete Institute, Farmington Hills, MI www.concrete.org. Abstracts of ACI Periodicals and Publications.
 - a. ACI 302.2R-06, Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials (August 15, 2006).
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM F2170-18, 'Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes'.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate completion of flooring installation with other trades.
- B. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference.
 - 2. Schedule conference after substrate preparation and ONE (1) week minimum before installation of flooring system.
 - 3. In addition to agenda items specified in Section 01 3100 and Section 09 0503, review following:
 - a. Review Testing Agency testing report of Alkalinity and Concrete Moisture of concrete slab.

- b. Review high moisture remediation options when high moisture exists based on moisture testing specified in Section 09 0503 'Flooring Substrate Preparation'.
 - c. Review Flooring Manufacturer's installation conditions verification procedure and requirements.
 - d. Review Building Ambient Conditions for acceptability for floor preparation and flooring installation.
- C. Sequencing:
 - 1. Testing Agency to provide testing for Alkalinity and Concrete Moisture as specified in Section 09 0503 'Floor Substrate Preparation' before Pre-Installation Conference.
 - 2. If high concrete moisture exists, Manufacturer's high moisture remediation of concrete slab before installation of Flooring System.
 - 3. Installation of Seamless Flooring System.
- D. Scheduling:
 - 1. Testing Agency to provide testing for Alkalinity and Concrete Moisture of concrete slab as specified in Section 09 0503 'Floor Substrate Preparation'.
 - 2. Notify Flooring Installer when Building Ambient Conditions requirements are met before installation of flooring system.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's specifications on system and on individual components of system.
 - b. Color and finish selections.
 - c. Maintenance procedures and instructions.
- B. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Written installation instructions.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual:
 - a. Warranty Documentation:
 - 1) Final, executed copy of Warranties.
 - b. Record Documentation:
 - 1) Manufacturers documentation:
 - (a) Manufacturer's literature.
 - 2) Testing and Inspection Reports:
 - (a) Testing Agency Testing Reports of Alkalinity and Concrete Moisture testing.
- D. Maintenance Material Submittals:
 - 1. Extra Stock Materials:
 - a. Leave one (1) gallon of finish coat matching applied material.

1.05 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:
 - 1. Installers shall be qualified installation personnel, trained and approved by Manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Primary system materials shall be delivered to jobsite in Manufacturer's undamaged, unopened containers. Each container shall be marked with:
 - a. Product name(s) and/or Number(s).
 - b. Manufacturer's name and address.

1.07 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Concrete Slab:
 - a. General:
 - 1) Do not install flooring system over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have Alkalinity range and Concrete Moisture Vapor Emission Rate (MVER) recommended by flooring Manufacturer.
 - 2) Final determination as to whether or not a concrete slab is dry enough for flooring installation should be based on evaluating both Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) testing.
 - b. Alkalinity:
 - 1) Do not install flooring system if alkalinity of concrete surface exceeds pH level 9. Corrective procedures are required.
 - c. Concrete Moisture Vapor Emission Rate (MVER):
 - 1) Testing conditions inside building shall be brought to same ambient temperature and relative humidity levels to be normal at occupancy of building. Conditions include normal levels of humidity, lighting, heating, and air conditioning.
 - 2) Do not install sheet carpeting if moisture vapor emission rate (MVER) of concrete slab relative humidity (RH) exceeds 75 percent as per ASTM F2170. Corrective procedures are required.

1.08 WARRANTY

- A. Manufacturer Warranty:
 - 1. Provide Manufacturer's warranty for its normal and intended use.
- B. Special Warranty:
 - 1. Floor must be installed by personnel certified by the Manufacturer, and under the direction of the Manufacturer's design specialists.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Urethane Cement Flooring System:
 - 1. Approved Products:
 - a. Tufcrete Urethane Cement Flooring System.
 - 1) Tufco International Inc, Gentry, AR www.tufcoflooring.com/
 - 2) Local distributor and installer:
Tufco West Industrial Flooring
Willard, UT
John Coones
(435) 723.4026
 - b. PumaCRETE 301-ESD by Engineered Polymer Floor Corp (EPF).

- 1) EPF Corp, Three Rivers, Massachusetts www.EPFloors.com
 - 2) Contact information:
E P Floors Corp / PumaCRETE
Glenn Jobson, VP Sales & Project Management
860.805.0061 mobile
800.808.7773 office
 2. Product requirements:
 - a. 3-component polyurethane concrete floor topping.
 - b. Resistant to thermal shock.
 - c. Seamless flooring system.
 - d. Chemical resistant.
 - e. Abrasion resistant.
 - f. Non-slip finish.
 3. Color: from the Manufacturer's standard available colors, as selected by the Architect.
 4. Acceptable products:
 - a. Equal as approved by the Architect prior to installation.
 - 1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - 2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- B. Sealants: As recommended by Flooring Manufacturer.

PART 3 EXECUTION

3.01 INSTALLERS

- A. Any installers that are approved, trained, and certified by the Manufacturer are acceptable.

3.02 EXAMINATIONS

- A. Verification Of Conditions:
1. Verify concrete surfaces are sufficiently cured and moisture content is within acceptable levels before beginning installation.

3.03 PREPARATION

- A. Surface Preparation:
1. Conduct tests of substrate necessary to determine that substrate meets requirements for satisfactory installation of system.
 2. Prepare accepted substrate to remove laitance and open surface by light brush shot blasting.
 - a. Prepare along walls and at doorways with hand grinder and 80 grit sandpaper.
 - b. Remove shot blasting and edge grinding marks that will be visible after installation of flooring system.
 - c. Repair pitting and other surface defects that would be apparent after installation of flooring system.
 - d. Diamond grind surface after shot blasting.
 - e. After preparation is complete, remove dust and loose material.
 3. Correct deficiencies identified during pre-installation conference and confirm acceptance and approval of substrate with Architect before beginning installation of coating system.

4. Do not install flooring system until completion of epoxy grouting as required by Manufacturer installation instructions.

3.04 APPLICATION

- A. Apply at rates required for thickness appropriate for foot traffic generally.
- B. Apply at rates required for thickness appropriate for vehicle traffic at the Dumpster Room.

3.05 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
 1. Inadequate preparation of substrate that results in deficiencies in appearance of final floor system will be justification for removing floor system from deficient areas, repair of substrate, and reapplication of flooring system, all at no additional cost to Owner.

3.06 PROTECTION

- A. Protect flooring system from damage and wear until Substantial Completion, using temporary coverings as recommended by Manufacturer, if required. Remove temporary covering just before final inspection.

END OF SECTION

SECTION 09 9113**EXTERIOR PAINTING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.

1.02 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.03 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2016.
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- C. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Schedule painting pre-installation conference after delivery of paint or coatings and before or at same time as application of field samples.
 - a. Coordinate pre-installation conferences of all related painting and coating Sections under 09 9000 heading 'Paints and Coatings'.
 - b. Schedule conference before preparation of control samples as specified in Sections under 09 9000 heading 'Paints and Coatings'.
 - c. Conference to be held at same time as Section 09 2116 to review gypsum board finish preparation.
 - 2. In addition to agenda items specified in Section 01 3000, review following:
 - a. Review Quality Assurance for Approval requirements.
 - b. Review Quality Assurance Field Sample requirements.
 - c. Review Submittal requirements for compliance for MPI Approved Products.
 - d. Review Design Criteria requirements.
 - e. Review Cleaning requirements.
 - f. Review painting schedule.
 - g. Review safety issues.
 - 3. Review additional agenda items from Sections under 09 9000 heading 'Paints and Coatings'.

1.05 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.

5. Confirmation of colors selected and that each area to be painted or coated has color selected for it.
- B. Samples: Submit two paper "draw down" samples, 4 x 6 inches in size, illustrating range of colors available for each finishing product specified.
 1. Where sheen is specified, submit samples in only that sheen.
 2. Where sheen is not specified, submit each color in each sheen available.
- C. Closeout Submittals:
 1. Include following in Operations and Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Manufacturer's documentation:
 - (a) Manufacturer's cut sheet for each component of each system.
 - (b) Schedule showing rooms and surfaces where each system was used.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and minimum five (5) satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
 1. Maintain qualified crew of painters throughout duration of the Work.
 2. Upon request, submit documentation.

1.07 MOCK-UP

- A. Before application of any paint system, meet on Project site with Architect, Owner's representative, and Manufacturer's representative. Architect may select one (1) surface for application of each paint system specified. This process will include establishing acceptable substrate conditions required for Project before application of paints and coatings.
- B. Apply paint systems to surfaces indicated by Architect following procedures outlined in Contract Documents and Product Data submission specified above.
- C. After approval of samples, proceed with application of paint system throughout Project. Approved samples will serve as standard of acceptability.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 55 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.
- D. Deliver amount of materials necessary to meet Project requirements in single shipment.
- E. Notify Architect two working days before delivery of coatings.
- F. Store materials in single place.
- G. Keep storage area clean and rectify any damage to area at completion of work of this Section.

- H. Maintain storage area at 55 deg F (13 deg C) minimum.

1.09 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 540 Lux 50 ft candles measured mid-height at substrate surface.
 - 1. Inspection of painting work shall take place under same lighting conditions as application.
 - 2. If painting and coating work is applied under temporary lighting, deficiencies discovered upon installation of permanent lighting will be considered latent damage as defined in MPI Manual, PDCA P1-92.

PART 2 PRODUCTS**2.01 PERFORMANCE AND DESIGN CRITERIA**

- A. Regulatory Agency Sustainability Approval:
 - 1. Conform to work place safety regulations and requirements of those authorities having jurisdiction for storage, mixing, application and disposal of all paint and related hazardous materials.
 - 2. Paint and painting materials shall be free of lead and mercury, and have VOC levels acceptable to local jurisdiction.
 - 3. Master Painters Institute (MPI) Standards:
 - a. Products: Comply with MPI standards indicated and listed in 'MPI Approved Products List'.
 - b. Preparation and Workmanship: Comply with requirements in 'MPI Architectural Painting Specification Manual' for products and coatings indicated.
- B. Performance:
 - 1. Design Criteria:
 - a. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - b. All materials, preparation and workmanship shall conform to requirements of 'Architectural Painting Specification Manual' by Master Painters Institute (MPI).
 - c. All paint manufacturers and products used shall be as listed under Approved Product List section of MPI Painting Manual.
 - d. Provide Premium Grade systems (2 top coats) as defined in MPI Architectural Painting Specification Manual, except as otherwise indicated.
 - e. Where specified paint system does not have Premium Grade, provide Budget Grade.
 - f. Provide products of same manufacturer for each coat in coating system.
 - g. Color Levels:

- 1) Color Level II:
 - (a) Number and placement of interior and exterior paint colors and gloss levels shall be as defined by Color Level II from MPI Manual, PDCA P3-93 as modified in following paragraph.
 - (b) No more than one paint color or gloss level will be selected for same substrate within designated interior rooms or exterior areas.
- C. Materials:
 1. Materials used for any painting system shall be from single manufacturer unless approved otherwise in writing by painting system manufacturers and by Architect. Include manufacturer approvals in Product Data submittal.
 2. Linseed oil, shellac, turpentine, and other painting materials shall be pure, be compatible with other coating materials, bear identifying labels on containers, and be of highest quality of an approved manufacturer listed in MPI manuals. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.

2.02 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Manufacturers: Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
 1. New Surfaces: Use MPI(a) EXT 5.1M Waterborne Light Industrial Coating system.
 2. Previously Finished Surfaces: Use MPI(r) REX 5.1K Waterborne Light Industrial Coating.
- B. Exterior Ferrous Metal:
 1. Materials:
 - a. All paints and coatings.
 - 1) Primer Coat: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
 - 2) Finish Coats: MPI Product 163, 'Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5).
 - b. Traffic signage:
 - 1) Primer Coat: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
 - 2) Finish Coats: MPI Product 163, 'Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5).
 2. Design Criteria:
 - a. Systems specified are in addition to prime coats provided under other Sections of Project Manual.
 - b. Finish Requirements: Use MPI Premium Grade finish requirements for work of this Section.
 - c. Gloss / Sheen Level Required: Gloss Level 5.
- C. Exterior Galvanized Metal:
 1. Materials:
 - a. Polyurethane:
 - 1) Vinyl Wash Primer Coat: MPI Product 80: 'Primer, Vinyl Wash'.
 - 2) Finish Coats:
 - (a) Epoxy MPI Product 101: 'Primer, Epoxy, Anti-Corrosive, for Metal'.

- (b) Polyurethane MPI Product 72: 'Polyurethane, Two-Component, Pigmented, Gloss (MPI Gloss Level 6-7)'.
- b. Latex:
 - 1) Waterborne Primer Coat: MPI Product 134: 'Primer, Galvanized, Water Based'.
 - 2) Finish Coats: MPI Product 11: 'Latex, Exterior Semi-Gloss (MPI Gloss Level 5)'.
- 2. All Other:
 - a. New Surfaces: Use MPI(a) EXT 5.3H Latex Finish system.
 - b. Previously Finished Surfaces: Use MPI(r) REX 5.3H Latex Finish system.
- D. Exterior CMU:
 - 1. Materials:
 - a. Penetrating, water repellent CMU sealer.
 - b. Acceptable products:
 - 1) WR Meadows Intraguard.
 - 2) Equal as approved by the Architect prior to installation.
 - 2. Apply in number of coats as recommended by the manufacturer for the local climate conditions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Protection Of In-Place Conditions:
 - 1. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:
 - a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
- B. Do not begin application of paints and finishes until substrates have been properly prepared.
- C. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- F. Test shop-applied primer for compatibility with subsequent cover materials.
- G. Verification of Conditions:
 - 1. Directing applicator to begin painting and coating work will indicate that substrates to receive painting and coating materials have been previously inspected as part of work of other Sections and are complete and ready for application of painting and coating systems as specified in those Sections.
- H. Pre-Installation Testing:
 - 1. Before beginning work of this Section, examine, and test surfaces to be painted or coated for adhesion of painting and coating systems.
 - 2. Report in writing to Architect of conditions that will adversely affect adhesion of painting and coating work.

3. Do not apply painting and coating systems until party responsible for adverse condition has corrected adverse condition.
- I. Evaluation And Assessment:
 1. Report defects in substrates that become apparent after application of primer or first finish coat to Architect in writing and do not proceed with further work on defective substrate until such defects are corrected by party responsible for defect.
- J. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Masonry, Concrete, and Concrete Masonry Units: 12 percent.

3.02 PREPARATION

- A. Protection of In-Place Conditions:
 1. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:
 - a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
- B. Surface Preparation:
 1. Prepare surfaces in accordance with MPI requirements and requirements of Manufacturer for each painting system specified, unless instructed differently in Contract Documents. Bring conflicts to attention of Architect in writing.
 2. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
 3. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting. Moisture content of materials to be painted shall be within tolerances acceptable to Paint Manufacturer.
- C. Clean surfaces thoroughly and correct defects prior to application.
- D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- E. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- F. Seal surfaces that might cause bleed through or staining of topcoat.

3.03 APPLICATION

- A. Interface with Other Work:
 1. Coordinate with other trades for materials and systems that require painting before installation.
 2. Schedule painting and coating work to begin when work upon which painting and coating work is dependent has been completed. Schedule installation of pre-finished and non-painted items, which are to be installed on painted surfaces, after application of final finishes.
- B. Paint or finish complete all surfaces to be painted or coated as described in Contract Documents, including but not limited to following items.
- C. Apply sealant in gaps 3/16 inch (5 mm) and smaller between two substrates that are both to be painted or coated. Sealants in other gaps furnished and installed under Section 07 9200.

- D. In multiple coat paint work, tint each succeeding coat with slightly lighter color, but approximating shade of final coat, so it is possible to check application of specified number of coats. Tint final coat to required color.
- E. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer.
- F. Touch up suction spots after application of first finish coat.
- G. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.
- H. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.
- I. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.
- J. Finished work shall be a 'Properly Painted Surface' as defined in this Section.
- K. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- L. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- M. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- N. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- O. Apply each coat to uniform appearance.
- P. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- Q. Exterior Ferrous Metal:
 - 1. New Surfaces: Clean metal to be painted of rust, mill scale, grease, oil, and welding spatters, burrs, flux, slag, and fume. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying primer coat.
 - 2. Existing Painted Surfaces:
 - a. Remove deteriorated and chalked existing paint and rust down to sound substrate by scraping or power tools.
 - b. Clean existing sound painted surfaces as well as scraped and sanded existing painted surfaces as recommended by Paint Manufacturer. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying primer coat.
 - c. Spot prime bare metal surfaces followed by a prime coat over entire surface to be painted.
 - d. Lightly sand entire surface.
 - e. Clean surface as recommended by Paint Manufacturer.
 - f. Apply specified finish coats.
- R. Exterior Galvanized Metal:
 - 1. New Surfaces:
 - a. Clean 'passivated' or 'stabilized' galvanized steel as specified in SSPC-SP 1.
 - b. After removal of 'passivated' or 'stabilized' coating or for surfaces without coating, clean surfaces to be painted with mineral spirits or product

recommended by Paint Manufacturer. Change to clean rags or wiping cloths regularly to reduce possibility of re-contamination of surface.

- c. Apply prime coat.
 - d. Apply finish coats.
- 2. Existing Painted Surfaces:
 - a. Remove deteriorated and chalked existing paint and rust deposits down to sound substrate by sanding, scraping, or wire brushing.
 - b. Clean existing sound painted surfaces as well as scraped and sanded existing painted surfaces as recommended by Paint Manufacturer.
 - c. Apply prime coat.
 - d. Apply finish coats.
- 3. Existing Unpainted Surfaces:
 - a. Wire brush or power wash as necessary to remove 'white rust'.
 - b. Apply prime coat.
 - c. Apply finish coats.
- S. Exterior CMU, Concrete, Stucco
 - 1. New Surfaces:
 - a. On highly porous surfaces when weather is exceptionally hot and dry, it may be desirable to dampen surface before applying first coat of an emulsion paint.
 - b. Completely cover voids in masonry block.
 - c. Roll after spraying if necessary to eliminate pinholing.
 - 2. Existing Unpainted Surfaces:
 - a. Power wash surfaces to be painted.
 - b. Fill cracks with masonry crack filler.
 - c. Apply block filler and finish coat as required for new work.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.
- B. Owner will provide field inspection.
- C. Non-Conforming Work:
 - 1. Correct deficiencies in workmanship as required to leave surfaces in conformance with 'Properly Painted Surface,' as defined in this Section.
 - 2. Correction of 'Latent Damage' and 'Damage Caused By Others,' as defined in this Section, is not included in work of this Section.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition.
- C. Waste Management:
 - 1. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
 - 2. Remove debris caused by work of paint Sections from premises and properly dispose.

3. Retain cleaning water and filter out and properly dispose of sediments.

3.06 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

3.07 SCHEDULE OF PAINT COLORS

- A. Exterior:
 1. Roof penetrations: Match adjacent roof material.
 2. CMU: Sealer shall be transparent and colorless.

END OF SECTION

SECTION 09 9123**INTERIOR PAINTING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
 - 6. Marble, granite, slate, and other natural stones.
 - 7. Ceramic and other tiles.
 - 8. Glass.
 - 9. Acoustical materials, unless specifically indicated.
 - 10. Concealed pipes, ducts, and conduits.

1.02 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.03 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2016.
- B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Schedule painting pre-installation conference after delivery of paint or coatings and before or at same time as application of field samples.
 - a. Coordinate pre-installation conferences of all related painting and coating Sections under 09 9000 heading 'Paints and Coatings'.
 - b. Schedule conference before preparation of control samples as specified in Sections under 09 9000 heading 'Paints and Coatings'.
 - c. Conference to be held at same time as Section 09 2116 to review gypsum board finish preparation.
 - 2. In addition to agenda items specified in Section 01 3000, review following:
 - a. Review Quality Assurance for Approval requirements.
 - b. Review Quality Assurance Field Sample requirements.
 - c. Review Submittal requirements for compliance for MPI Approved Products.
 - d. Review Design Criteria requirements.

- e. Review Cleaning requirements.
- f. Review painting schedule.
- g. Review safety issues.
- 3. Review additional agenda items from Sections under 09 9000 heading 'Paints and Coatings'.

1.05 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
- B. Samples: Submit two paper "draw down" samples, 4 x 6 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Where sheen is not specified, submit each color in each sheen available.
- C. Closeout Submittals:
 - 1. Include following in Operations and Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Manufacturer's documentation:
 - (a) Manufacturer's cut sheet for each component of each system.
 - (b) Schedule showing rooms and surfaces where each system was used.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and approved by manufacturer.
 - 1. Minimum five (5) satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
 - 2. Maintain qualified crew of painters throughout duration of the Work.
 - 3. Upon request, submit documentation.

1.07 MOCK-UP

- A. Before application of any paint system, meet on Project site with Architect, Owner's representative, and Manufacturer's representative. Architect may select one (1) surface for application of each paint system specified. This process will include establishing acceptable substrate conditions required for Project before application of paints and coatings.
- B. Apply paint systems to surfaces indicated by Architect following procedures outlined in Contract Documents and Product Data submission specified above.
- C. After approval of samples, proceed with application of paint system throughout Project. Approved samples will serve as standard of acceptability.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

PART 2 PRODUCTS**2.01 PERFORMANCE AND DESIGN CRITERIA**

- A. Regulatory Agency Sustainability Approval:
 - 1. Conform to work place safety regulations and requirements of those authorities having jurisdiction for storage, mixing, application and disposal of all paint and related hazardous materials.
 - 2. Paint and painting materials shall be free of lead and mercury, and have VOC levels acceptable to local jurisdiction.
 - 3. Master Painters Institute (MPI) Standards:
 - a. Products: Comply with MPI standards indicated and listed in 'MPI Approved Products List'.
 - b. Preparation and Workmanship: Comply with requirements in 'MPI Architectural Painting Specification Manual' for products and coatings indicated.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
 - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 - 2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 5. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.03 PAINT SYSTEMS - INTERIOR

- A. Interior CMU walls:
 - 1. Materials:
 - a. Interior-grade masonry sealer.
 - 2. Performance:
 - a. Design Criteria:
 - 1) Vapor permeable, satin finish.
 - 3. Install in the number of coats recommended by the manufacturer.
- B. Interior Gypsum Board and Plaster:
 - 1. Materials:

- a. Primers:
 - 1) MPI Product 50, 'Primer Sealer, Latex, Interior'.
 - b. Finish Coats:
 - 1) Rest Rooms And Custodial Rooms:
 - (a) MPI Product 115, 'Epoxy-Modified Latex, Interior, Gloss (MPI Gloss Level 6)'.
 - 2) Remaining Painted Surfaces:
 - (a) Ceilings - MPI Product 143 'Latex, Interior, High Performance Architectural, Flat (MPI Gloss Level 1 or 2)'.
 - 2. Performance:
 - a. Design Criteria:
 - 1) New Surfaces: MPI Premium Grade finish requirements.
 - 2) Gloss / Sheen Required:
 - (a) Rest Rooms And Custodial Rooms: Gloss Level 6.
 - (b) Remaining Painted Surfaces: Gloss Level 5.
 - b. Rest Rooms And Custodial Rooms:
 - 1) New Surfaces: Use MPI(a) INT 9.2F Waterborne Epoxy Finish system.
 - c. All Other:
 - 1) New Surfaces: Use MPI(a) INT 9.2B Latex Finish system.
- C. Interior Metal:
- 1. Materials:
 - a. All paints and coatings shall comply with VOC content limits as indicated in section 01 8113.
 - b. Primers:
 - 1) Ferrous Metal: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
 - 2) Galvanized Metal: MPI Product 134: 'Primer, Galvanized, Water Based'.
 - c. Finish Coats: MPI Product 153: 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.
 - 2. Performance:
 - a. Design Requirements:
 - 1) New Surfaces: MPI Premium Grade finish requirements.
 - 2) Gloss / Sheen Level Required: Gloss Level 5.
 - b. Ferrous Metal:
 - 1) New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.
 - c. Galvanized Metal:
 - 1) New Surfaces: Use MPI(a) INT 5.3J Latex Finish system b. Previously Finished Surfaces: Use MPI(r) RIN 5.3AH Latex Finish system.
- D. Floor Sealers – Interior Poured Concrete
- 1. Materials:
 - a. Water-based acrylic sealer.
 - b. Low VOC.
 - c. Vapor permeable.
 - 2. Performance:
 - a. MPI Product INT 3.2F, 'Concrete floor sealer, water based finish' system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:
 - a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
- B. Surface Preparation:
 - 1. Prepare surfaces in accordance with MPI requirements and requirements of Manufacturer for each painting system specified, unless instructed differently in Contract Documents. Bring conflicts to attention of Architect in writing.
 - 2. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
 - 3. Do no painting while surface is damp, unless recommended by Manufacturer. Interior surfaces shall be dry before painting. Moisture content of materials to be painted shall be within tolerances acceptable to Paint Manufacturer.
- C. Clean surfaces thoroughly and correct defects prior to application.
- D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- E. Remove or repair existing paints or finishes that exhibit surface defects.
- F. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- G. Seal surfaces that might cause bleed through or staining of topcoat.
- H. Interior Gypsum Board and Plaster:
 - 1. Interface With Other Work: Properly clean and paint light cove interiors before installation of light fixtures.
 - 2. New Surfaces:
 - a. Primer: Apply primer to be covered with other paint coats with roller only, or with spray gun and back-rolled.
- I. Interior Metal:
 - 1. New Surfaces: Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.

3.03 APPLICATION

- A. Interface with Other Work:

1. Coordinate with other trades for materials and systems that require painting before installation.
 2. Schedule painting and coating work to begin when work upon which painting and coating work is dependent has been completed. Schedule installation of pre-finished and non-painted items, which are to be installed on painted surfaces, after application of final finishes.
- B. Paint or finish complete all surfaces to be painted or coated as described in Contract Documents, including but not limited to following items.
- C. Apply sealant in gaps 3/16 inch (5 mm) and smaller between two substrates that are both to be painted or coated. Sealants in other gaps furnished and installed under Section 07 9200.
- D. In multiple coat paint work, tint each succeeding coat with slightly lighter color, but approximating shade of final coat, so it is possible to check application of specified number of coats. Tint final coat to required color.
- E. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer.
- F. Touch up suction spots after application of first finish coat.
- G. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.
- H. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.
- I. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.
- J. Finished work shall be a 'Properly Painted Surface' as defined in this Section.
1. Paint mechanical, electrical, and audio/visual items that require field painting as indicated in Contract Documents. These include but are not limited to:
 - a. Gas pipe from gas meter into building.
 - b. Mechanical flues and pipes penetrating roof.
 - c. Electrical panel and disconnect enclosures.
 - d. Metal protective structures for refrigerant lines.
 2. Metal reveals at ceiling access doors.
 3. Paint inside of chases in occupied spaces flat black for 18 inches (450 mm) or beyond sightline, whichever is greater.
 4. Paint surfaces in organ chamber behind grille cloth with flat black paint.
- K. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- L. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- M. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- N. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- O. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- P. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- Q. Sand metal surfaces lightly between coats to achieve required finish.

- R. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- S. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

- A. Owner will provide field inspection.
- B. Non-Conforming Work:
 - 1. Correct deficiencies in workmanship as required to leave surfaces in conformance with 'Properly Painted Surface,' as defined in this Section.
 - 2. Correction of 'Latent Damage' and 'Damage Caused By Others,' as defined in this Section, is not included in work of this Section.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition.
- C. Waste Management:
 - 1. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
 - 2. Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be disposed of subject to regulations of applicable authorities having jurisdiction.
 - 3. Remove debris caused by work of paint Sections from premises and properly dispose.
 - 4. Retain cleaning water and filter out and properly dispose of sediments.

3.06 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

3.07 SCHEDULE OF PAINT COLORS

- A. Interior Gypsum Board, Plaster:
 - 1. As selected by the Architect.
- B. Interior Metal:
 - 1. As selected by the Architect.
- C. Interior CMU walls:
 - 1. Transparent sealer (no color).

END OF SECTION

SECTION 10 2800**TOILET, BATH, AND LAUNDRY ACCESSORIES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Commercial toilet accessories.

1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- E. ASTM C1036 - Standard Specification for Flat Glass 2016.
- F. ASTM F446 - Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area 2019.
- G. ISO 25537 - Glass in building — Silvered, flat-glass mirror 2008.

1.03 SUBMITTALS

- A. Product Data: Submit data on accessories describing operating characteristics, size, finish, details of function, rough-in dimensions and attachment methods.
- B. Shop Drawings:
 - 1. Schedule showing items used, location where installed, and proper attaching devices for substrate.
- C. Manufacturer's Installation Instructions: Indicate operation, care, cleaning instructions, special procedures and conditions requiring special attention.
- D. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual:
 - 2. Warranty Documentation:
 - a. Final, executed copy of Warranty for each product.
 - 3. Record Documentation:
 - a. Manufacturer's literature or cut sheets.

1.04 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. For products listed together in same Part 2 articles, obtain products from single source from single manufacturer.

1.05 WARRANTY

- A. Commercial Toilet Accessories:
 - 1. Manufacturer's standard warranty.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. AJW Architectural Products, A&J Washroom Accessories, Inc., New Windsor, NY www.ajwashroom.com.
 - b. American Specialties Inc (ASI), Yonkers, NY www.americanspecialties.com.
 - c. Bobrick Washroom Equipment Inc, North Hollywood, CA www.bobrick.com or Bobrick Washroom Equipment of Canada Ltd, Scarborough, ON (416) 298-1611.
 - d. Bradley Corp, Menomonee Falls, WI www.bradleycorp.com.
 - e. General Accessory Manufacturing Co (GAMCO), Durant, OK www.gamcousa.com.
- B. Materials:
 - 1. Design Criteria:
 - a. Stainless Steel: ASTM A666 Type 304 (18-8); satin finish exposed surfaces unless otherwise indicated.
 - b. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
 - c. Fasteners:
 - 1) Exposed: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant.
 - 2) Concealed: Galvanized Steel.
 - 2. Rest Rooms:
 - a. Mirrors:
 - 1) Channel-Frame Mirror:
 - (a) Frame: Type 304 or Type 430, 20 gauge stainless steel channel frame.
 - (b) Roll-formed one piece construction.
 - (c) Exposed surfaces have #4 satin finish.
 - (d) Edges and corners are burr free.
 - (e) Glass: 1/4 inch (6.4 mm) silver coated and hermetically sealed. Guaranteed for 15 years against silver spoilage. Mirrors meet ASTM C1036 requirements.
 - (f) Concealed surface mounted wall hanger.
 - 2) Approved Products. See Section 01 6000:
 - (a) AJW Architectural Products: Model U711.
 - (b) American Specialties (ASI): Model 0620.
 - (c) Bobrick: Model B-165.
 - (d) Bradley: Model 781.
 - (e) General Accessory (GAMCO): Model C Series.
 - b. Grab Bars:
 - 1) Configuration shown on Contract Drawings. Include center support for longer lengths when required:
 - 2) Design Criteria:
 - (a) Comply with ADA guidelines and ADAAG accessible design for structural strength and local and state codes.
 - (b) Concealed mount.
 - (c) 18 ga (1.27 mm), type 304 stainless steel tubing.
 - (d) 1-1/2 inch (38 mm) diameter.

- (e) Provide center support when required.
- (f) Snap-on flange covers.
- (g) Peened (non-slip) finish.
- (h) Sustain loads in excess of 900 lbs (408 kg).
- 3) Approved Products. See Section 01 6000:
 - (a) AJW Architectural Products: Model UG3 Series.
 - (b) American Specialties (ASI): Model 3800 Series.
 - (c) Bobrick: Model B-6806 Series.
 - (d) Bradley: Model 812 Series.
 - (e) General Accessory (GAMCO): Model 150 Series.

PART 3 PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.
- D. See Sections 04 2000 Unit Masonry and 05 4000 Cold-Formed Metal Framing for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Comply with ADA Accessibility Guidelines and installation heights as shown on Contract Drawings.
- D. Assemble fixtures and associated fittings and trim in accordance with manufacturer's instructions.
- E. Install using mounting devices proper for base structure.
- F. Install equipment level, plumb, and firmly in place in accordance with manufacturer's rough-in drawings.
- G. Where possible, mount like items in adjoining compartments back-to-back on same partition.
- H. Grab Bars:
 - 1. Install as per Manufacturers written installation instructions.
 - 2. Install grab bars to withstand downward force of not less than 250 lbf (1112 N) per ASTM F446.

3.04 REPAIR

- A. Repair or replace defective work, including damaged equipment and components.
- B. Repair or replace malfunctioning equipment, or equipment with parts that bind or are misaligned.

3.05 CLEANING

- A. Clean unit surfaces and leave in ready-to-use condition.

3.06 ADJUSTING

- A. Test each piece of equipment provided with moving parts to assure proper operation, freedom of movement, and alignment. Install new batteries in battery-powered items.

3.07 CLOSEOUT ACTIVITIES

- A. Turn over keys, tools, maintenance instructions, and maintenance stock to Owner.

3.08 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 4400**FIRE PROTECTION SPECIALTIES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).
- B. NFPA 10 - Standard for Portable Fire Extinguishers 2017, with Errata (2018).

1.03 SUBMITTALS

- A. Product Data: Provide extinguisher operational features.
- B. Shop Drawings: Indicate locations of cabinets, cabinet physical dimensions, and rough-in measurements for recessed cabinets.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.
- E. Closeout Submittals:
 - 1. Include following in Operations and Maintenance Manual:
 - a. Warranty Documentation:
 - 1) Include copy of final, executed warranty.
 - b. Record Documentation:
 - 1) Testing and Inspection Reports:
 - (a) Testing Agency Inspecting Reports of Drilled-In Mechanical Anchors / Adhesive Anchors / Screw Anchors.

1.04 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Fire extinguishers shall be inspected and have annual inspection tag attached before Substantial Completion.

1.05 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

1.06 WARRANTY

- A. Manufacturer Warranty:
 - 1. Manufacturer's standard, written warranty on fire extinguisher.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Fire Extinguishers:
 - 1. Approved Manufacturers. See Section 01 6000:

- a. Amerex Corp, Trussville, AL www.amerex-fire.com.
 - b. Ansul Incorporated, Marinette, WI www.ansul.com.
 - c. Buckeye Fire Equipment, Kings Mountain, NC www.buckeyef.com.
 - d. Extinguishers private-labeled by manufacturers approved above are approved, with appropriate documentation.
- B. Cabinets and Brackets:
- 1. Acceptable Manufacturers:
 - a. J L Industries, Bloomington, MN www.jlindustries.com.
 - b. Larsen's Manufacturing Co, Minneapolis, MN www.larsensmfg.com.
 - c. Modern Metal Products / Technico, Owatonna, MN www.modern-metal.com.
 - d. National Fire Equipment Ltd, Scarborough, ON www.nationalfire.com.
 - e. Potter-Roemer, Cerritos, CA www.potterroemer.com.
 - f. Samson Products Inc, City of Commerce, CA www.samsonproducts.com.
 - g. Seton Inc, Richmond Hill, ON (905) 764-1122.
 - h. Equal as approved by the Architect prior to installation.
 - 1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - 2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.
- C. Acceptable Distributors:
- 1. W.W. Grainger, Inc., Lake Forest, IL www.grainger.com.
 - 2. Equal as approved by the Architect prior to installation.
 - a. Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - b. Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
- B. Design Criteria:
- 1. Ten pound dry chemical ABC stored pressurized type equipped with pressure gauge and which does not need recharging except after use.
 - 2. Instructions for repairs, maintenance, and recharging shall be attached.
 - 3. Unit shall be tested and approved by UL and have minimum 4A:60-B:C UL rating. UL rating shall appear on extinguisher labels and be attached to and a part of fire extinguisher units.

2.03 FIRE EXTINGUISHER CABINETS

- A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.
- B. Design Criteria:
- 1. Two-piece, semi-recessed or flush type depending on wall thickness, and have white baked enameled steel tubs with white baked enamel return trim and doors, clear acrylic glazing, 'Safe-T-Lock,' and cylinder locks.
 - 2. Supply each cabinet with one specified fire extinguisher.
- C. Acceptable Manufacturers:
- 1. Basis of Design Product: Ambassador 1017 G10 by J L Industries.

2. Equal as approved by the Architect prior to installation.
 - a. Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - b. Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.

2.04 ACCESSORIES

- A. Extinguisher Brackets:
 1. Design Criteria:
 - a. Heavy duty with minimum of double strap/bracket.
 2. Approved Bracket. See Section 01 6000:
 - a. Basis of Design Product: No. 846 by Larsen's.
 - b. Equal as approved by the Architect prior to installation.
 - 1) Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - 2) Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Securely Install cabinets and hangers plumb and level with wall surfaces.
- C. Trim for cabinets shall be neat in appearance.
- D. Place extinguishers in cabinets.

3.03 ADJUSTING

- A. Fire extinguishers shall be inspected and have annual inspection tag attached before Substantial Completion.

END OF SECTION

SECTION 12 3653**LABORATORY WORKSURFACES****PART 1 GENERAL****1.01 SUMMARY**

- A. Section Includes:
 - 1. Epoxy resin worksurfaces.
 - 2. Setting materials.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Division 05: Framed supports.
 - 3. Section 07 9200 - Joint Sealers.
 - 4. Section 06 4100 - Architectural Wood Casework - Base cabinets.
 - 5. Division 22: Plumbing Fixtures - Plumbing fixtures and trim.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. D570 - Standard Test Method for Water Absorption of Plastics.
 - 2. D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
 - 3. D648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in edge-wise Position.
 - 4. D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
 - 5. D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between 30° C and 300° C With a Vitreous Silica Dilatometer.
 - 6. D785 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials.
 - 7. D790 - Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - 8. D792 - Standard Test Method for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 - 9. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. International Organization for Standardization (ISO) 9001 - Quality Management Systems - Requirements.
- C. Scientific Certification Systems (SCS) - Recycled Content Certifications.
- D. Scientific Equipment and Furniture Association (SEFA) 3 - Work Surfaces.

1.03 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings:
 - a. Submit plan, section, elevation and perspective drawings necessary to describe and convey layout, profiles, and product components, including edge conditions, joints, fitting and fixture locations, anchorage, accessories, and finish colors.
 - b. Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on Shop Drawings.

- c. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
- 2. Product Data: Manufacturer's data sheets on each product to be used, including:
 - a. Preparation instructions and recommendations.
 - b. Storage and handling requirements and recommendations.
 - c. Installation methods.
- 3. Samples:
 - a. Selection samples: For each finish product specified, submit complete set of color chips representing manufacturer's full range of standard colors.
 - b. Verification samples: For each finish product specified, submit samples representing actual product color; supplied product color and gloss may vary slightly from supplied samples.
- B. Quality Control Submittals:
 - 1. Test Reports: Certified test reports or recognized evaluation reports showing compliance with specified performance characteristics and physical properties.
- C. Closeout Submittals:
 - 1. Maintenance Data:
 - a. Provide maintenance, cleaning, and life cycle information.
 - b. Include recommended cleaning materials and procedures, and list of materials detrimental to epoxy resin.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Primary products furnished by single manufacturer with minimum 5 years' experience in work of this Section.
 - 2. Products manufactured in ISO 9001 certified facility.
- B. Installer Qualifications: Minimum 5 years experience in work of this Section.
- C. Mockup:
 - 1. Construct worksurface mockup, 6 feet wide x full depth.
 - 2. Include worksurface and trim.
 - 3. Locate where directed.
 - 4. Approved mockup may remain as part of the Work.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Use pallets larger than sheets during transportation.
 - 2. Package materials to prevent damage during shipping and handling.
- B. Storage:
 - 1. Store products in enclosed area protected from ultraviolet.
 - 2. Store products in manufacturer's unopened packaging until ready for installation.
 - 3. Store panels using protective dividers to avoid damage to surfaces.
 - 4. For horizontal storage, store sheets on pallets of equal or greater size than sheets with protective layer between pallet and sheet and on top of uppermost sheet.
 - 5. Do not store sheets or fabricated panels vertically.
- C. Handling:
 - 1. If protective film is provided, do not remove until panel has been installed.
 - 2. Handle sheets to prevent damage.
 - 3. Remove stickers immediately after installation.

1.06 PROJECT CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's limits.
- B. Avoid direct exposure of products to sunlight.
- C. Do not use worksurfaces as bench, ladder, or seating.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Approved Manufacturers:
 - 1. Durcon, Incorporated (a Wilsonart company), 206 Allison Drive, Taylor, TX 76574, 512-595-8000, www.durcon.com.
 - 2. Equal as approved by the Architect prior to installation.
 - a. Substitution requests shall be approved based on product characteristics and value to the project and are at the sole discretion of the Architect.
 - b. Selection of either the approved manufacturer or substitution or alternate manufacturers shall not incur additional costs to the Owner.

2.02 MATERIALS

- A. Solid Epoxy Resin:
 - 1. Sheets cast from modified epoxy resin and non-asbestos inert fillers; compounded mixture cured and thermoset specifically from formulation to provide exceptional physical and chemical resistance required in medium to heavy duty laboratory environments.
 - 2. Sheets monolithic throughout without surface coating application.
 - 3. Color: To be selected from manufacturer's standard color range.
 - 4. Physical properties; minimum acceptable physical performance in accordance with SEFA 3 testing procedures:
 - a. Density/specific gravity: Tested to ASTM D792; minimum test rating of 133.6 lb/ft³ or 2.14 g/cm³.
 - b. Rockwell hardness: Tested to ASTM D785; minimum M scale rating of 109.
 - c. Fire resistance: tested to ASTM D635; classified as self-extinguishing.
 - d. Surface burning characteristics: Tested to ASTM E84; flame spread index 5 and smoke developed index of 185.
 - e. Coefficient of linear thermal expansion: Tested to ASTM D696; rating of 1.2 x 10⁻⁵ in/in°F or 2.15 x 10⁻⁵ mm/mm°C.
 - f. Heat deflection: Tested to ASTM D648; maximum 293°F or 145°C .
 - g. Flexural strength: Tested to ASTM D790; minimum rating 12.6 KPSI or 87 Mpa.
 - h. Flexural modulus: Tested to ASTM D790; 3240 KPSI or 22.4 Gpa.
 - i. Water absorption, 24 hours: tested to ASTM D570; maximum 0.03% by weight.
 - j. Compression strength: Tested to ASTM D695; minimum 32.7 kpsi or 226 Mpa.
 - k. Chemical resistance; minimum acceptable chemical resistance performance in accordance with SEFA 3:

REAGENT TESTED	METHOD	RATING
Amyl Acetate	A	0
Ethyl Acetate	A	0
Acetic Acid, 98%	B	0
Acetone	A	1

Acid Dichromate, 5%	B	0
Butyl Alcohol	A	0
Ethyl Alcohol	A	0
Methyl Alcohol	A	1

Ammonium Hydroxide, 28%	B	0
Benzene	A	1
Carbon Tetrachloride	A	0
Chloroform	A	1
Chromic Acid , 60%	B	0
Cresol	A	0
Dichloroacetic Acid	A	0
Dimethyl formamide	A	0
Dioxane	A	0
Ethyl Ether	A	0
Formaldehyde, 37%	A	0
Formic Acid, 90%	B	0
Furfural	A	1
Gasoline	A	0
Hydrochloric Acid, 37%	B	0
Hydrofluoric Acid , 48%	B	0
Hydrogen Peroxide, 28%	B	0
Tincture of Iodine	B	0
Methyl Ethyl Ketone	A	0
Methylene Chloride	A	0
Monochlorobenzene	A	0
Naphthalene	A	0

Nitric Acid , 20%	B	0
Nitric Acid, 30%	B	1
Nitric Acid, 70%	B	1
Phenol, 90%	A	0
Phosphoric Acid, 85%	B	1
Silver Nitrate, Saturated	B	0
Sodium Hydroxide, 10%	B	1
Sodium Hydroxide, 20%	B	1
Sodium Hydroxide, 40%	B	1
Sodium Hydroxide, Flake	B	1
Sodium Sulfide, Saturated	B	2
Sulfuric Acid, 25%	B	1
Sulfuric Acid, 85%	B	2
Sulfuric Acid, 96%	B	3
Sulfuric Acid, 85% & Nitric Acid , 70%, Equal Parts	B	3
Toluene	A	1
Trichloroethylene	A	0
Xylene	A	0
Zinc Chloride, Saturated	B	0

Testing Method Descriptions:**Method A: - Volatile chemicals (organic solvents):**

Cotton ball saturated with test reagent is placed in one-ounce bottle (20 x 75mm test tube or similar container) with reservoir of liquid above ball. Container is inverted on test material for period of 24 hours at standard temperature 23 degrees C plus or minus 2 degrees C (73 degrees F plus or minus 4 degrees F).

Method B - Non Volatile Chemicals:

Five drops (1/4 cc) of test reagent are placed on test material surface. Reagent is then covered with watch glass (25 mm) for period of no less than 24 hours at standard temperature of 23 degrees C plus or minus 2 degrees C (73 degrees F plus or minus 4 degrees F).

Result Definitions:

- 0 No Effect: No detectable change in material surface.
- 1 Good: Slight detectable change in color or gloss but no change to function or life of work surface material.

- 2 Fair: Slight surface etching or severe staining. Clearly discernable change in color or gloss but no significant impairment of surface life or function.
- 3 Poor: Pitting, cratering or erosion of work surface material; obvious and significant deterioration. Objectionable change in appearance due to surface discoloration.

2.03 ACCESSORIES

- A. Installation Materials: Manufacturer's joint adhesive, panel adhesive, and sealants as required to suit project conditions.

2.04 FABRICATION

- A. Fabricated tops and accessories in accordance with manufacturer's recommendations, approved Shop Drawings, and SEFA 3.
- B. Epoxy Resin Worksurfaces:
 - 1. Thickness:
 - a. 1 inch (25 mm) unless otherwise indicated.
 - b. Check each sheet at factory for required thickness.
 - c. Maximum variation in thickness: plus or minus 1/16 inch (1.6 mm) from corner to corner.
 - 2. Warpage:
 - a. Inspect tops for warpage prior to fabrication by placing on true flat surface.
 - b. Maximum allowable warpage: 1/16 inch (1.5 mm) in 36 inch (900 mm) span or 3/16 inch (4.5 mm) in 96 inch (2400 mm) span.
 - 3. Fabrication:
 - a. Shop fabricate in longest practical lengths.
 - b. Bond joints with highly chemical resistant cement with properties and color similar to base material.
 - c. Provide 1/8 inch (3 mm) drip groove at underside of exposed edges, set back 1/2 inch (13 mm) from face.
 - d. Finish exposed edges.
 - 4. Fabricate tops with 1/4 inch (6 mm) raised marine edge.
 - 5. Edge treatment: Standard 1/4 inch (2 mm) radius edge with drip groove.
 - 6. Corner treatment: exposed corners shall be eased slightly for safety.
 - 7. Back and end splashes:
 - a. Supplied loose for field installation.
 - b. Same material and thickness as worksurfaces.
 - c. 4 inches (100 mm) high unless otherwise indicated.
 - d. Top-mounted end splash where worksurfaces abut adjacent construction at and locations indicated on Drawings.
 - 8. Joints: Maximum 1/8 inch (2 mm), bonded with epoxy grout.
 - 9. Locate joints away from sinks and over or near supports.
 - 10. Sink cutouts: [As indicated on Drawings.] [Routed for drop-in sink.] [Routed for undermount sink.] [Sink cutout with cover.] [____.]
 - 11. Allowable tolerances:
 - a. Square: Plus or minus 1/64 inch (0.4 mm) for each 12 inches (300 mm) of length.
 - b. Location of cutouts and drilled openings: Plus or minus 1/8 inch (3 mm) of design dimension.

- c. Size of cutouts and drilled openings: Plus 1/8 inch (3 mm) or minus 0 inches (0 mm).
- C. Epoxy Resin Sinks:
- D. Stainless steel
 - 1. Mold sinks from thermosetting epoxy resin.
 - 2. Mold interior corners to radius. Slope sink base to drain outlet.
 - 3. Provide 1-1/2 inch (38 mm) outlet with open ended standpipe; standpipe overflow 2 inches (50 mm) shorter than depth of sink.
 - 4. Unless otherwise indicated, fabricate sinks of drop-in design supported by upper flange from worksurface.
 - 5. Color: To match adjacent worksurface.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Do not begin installation until cabinets have been installed.
- B. Confirm that surfaces to receive tops are plumb and level, with maximum deflection of 1/4 inch (6 mm) in 20 feet (6 m).

3.02 PREPARATION

- A. Clean surfaces just prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer.

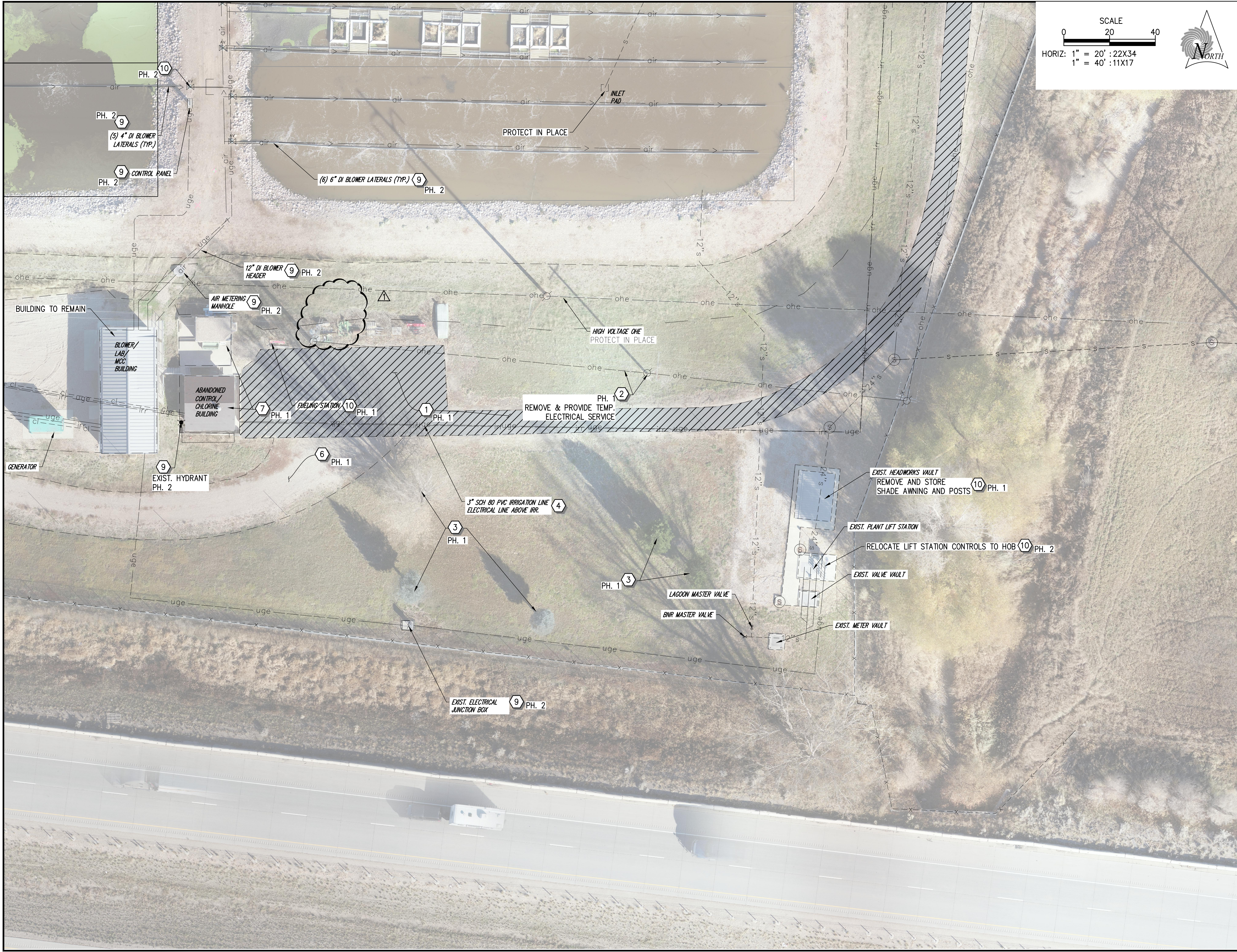
3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Install tops plumb and level.
- C. Scribe to adjacent surfaces in accordance with manufacturer's recommendations.
- D. Fasten tops to supporting construction with adhesives appropriate for use with adjoining construction and as recommended by manufacturer.
- E. Form field joints using manufacturer's recommended adhesive. Form joints to be inconspicuous and nonporous.
- F. Install [laboratory shelving] [laboratory fume hood base work surfaces] [pegboards] [reagent racks] using fasteners and adhesive appropriate for use with adjoining construction and as recommended by manufacturer.

3.04 PROTECTION

- A. Protect installed products until completion of Project.
- B. Touch up, repair, or replace damaged products.

END OF SECTION



SCALE
0 20 40

HORIZ: 1" = 20' :22X34
1" = 40' :11X17

NORTH

DEMOLITION NOTES

1 DISPOSE ASPHALT

2 DISPOSE POWER POLE

3 DISPOSE TREE

4 DISPOSE IRRIGATION PIPE

5 DISPOSE ELECTRICAL CONDUIT

6 STOCKPILE GRAVEL

7 DEMO BUILDING & SURROUNDING CONCRETE

8 ABANDON MANHOLE

9 DISPOSE MISC. ITEM

10 SALVAGE MISC. ITEM

11 ABANDON PIPE W/ CLSM

12 TREE PROTECTION FENCE

NOTES:

1. PH. 1: INITIAL DEMOLITION
PH. 2: DEMOLITION FOLLOWING COMMISSIONING OF NEW TREATMENT PLANT.

2. ABANDON MANHOLE BY REMOVING CONE SECTION; FILL CONNECTING PIPES WITH CLSM; BACKFILL W/ SAND

ZONE 1	ZONE 4
ZONE 2	ZONE 3

1	ADDENDUM 3	02-03-23
REV NO.	COMMENT	DATE

PROFESSIONAL ENGINEER
12-23-22
CLIFTON G. LINFORD
No. 6311187

SUNRISE
ENGINEERING

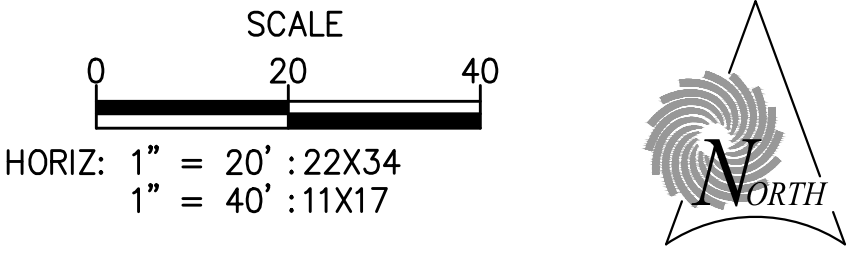
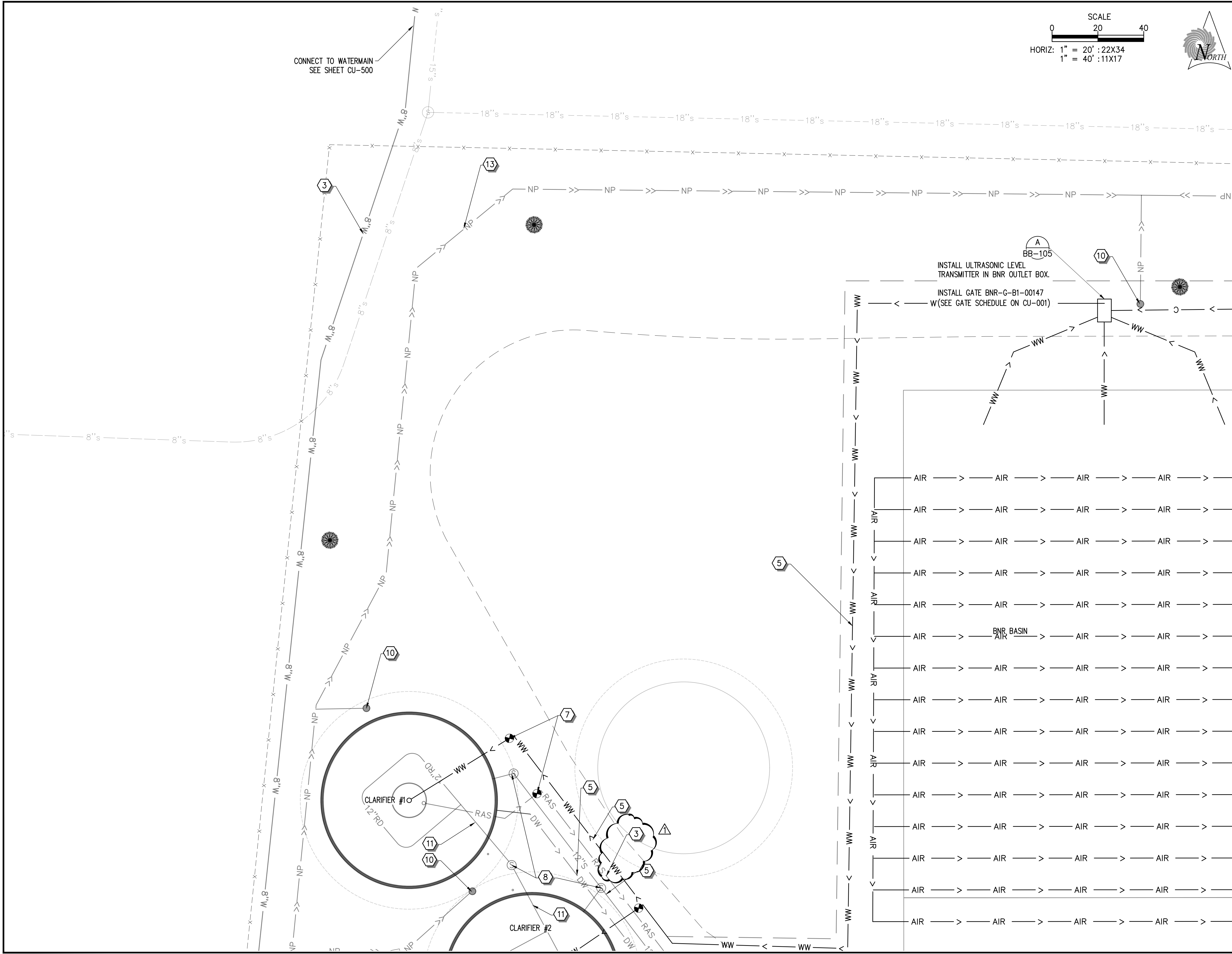
6875 SOUTH 900 EAST
SALT LAKE CITY, UTAH 84047
TEL 801.523.0100 • FAX 801.523.0990
www.sunrise-eng.com

MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

BNR WWTP 2022
CIVIL SITE
DEMOLITION PLAN – ZONE 3

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	CS-103
08242	CL	TR	RW	18 of 249	

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- ### CONSTRUCTION NOTES
- 1 PVC C900 SEWER PIPE
 - 2 FRP HOBAS AIR PIPE
 - 3 PVC C900 WATER PIPE
 - 4 WATER SERVICE LATERAL
 - 5 PVC SDR-35 SEWER PIPE
 - 6 SEWER SERVICE LATERAL
 - 7 PLUG VALVE
 - 8 60" DIA. MANHOLE
 - 9 FIRE HYDRANT ASSEMBLY
 - 10 YARD HYDRANT ASSEMBLY
 - 11 12" CONTECH A2000 DRAIN PIPE
-SEE SHEET CL-206 FOR DETAILS UNDER CLARIFIER.
 - 12 6' X 6' PRE-CAST BOX W/ SLIDE GATES
 - 13 PVC SCH. 80 WATER PIPE

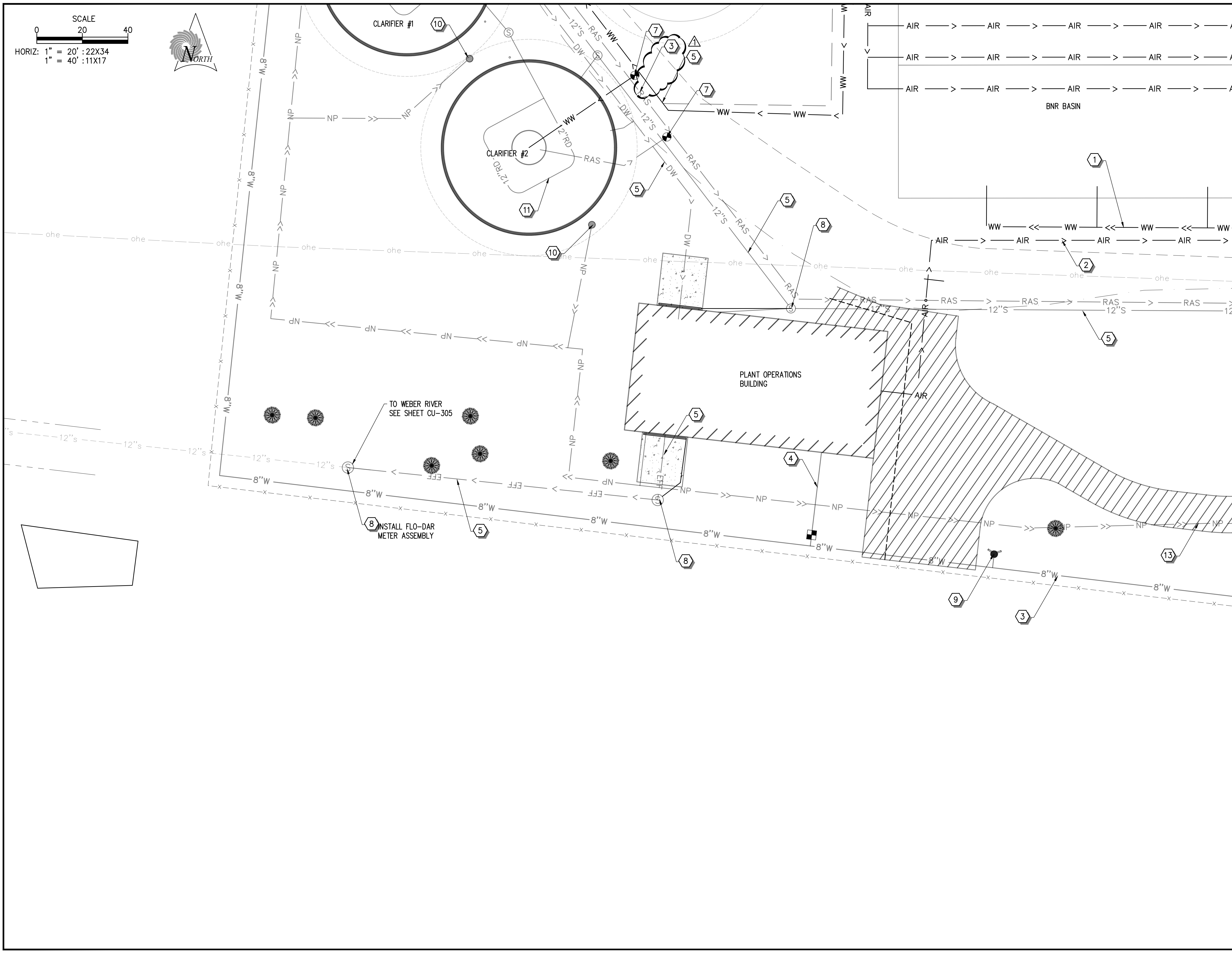
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REV. NO.	COMMENT	DATE

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MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

BNR WWTP 2022
CIVIL UTILITIES
SITE PIPING - ZONE 1

SEI NO. 08242	DESIGNED CL	DRAWN TR	CHECKED RW	SHEET NO. 43 of 249	CU-101
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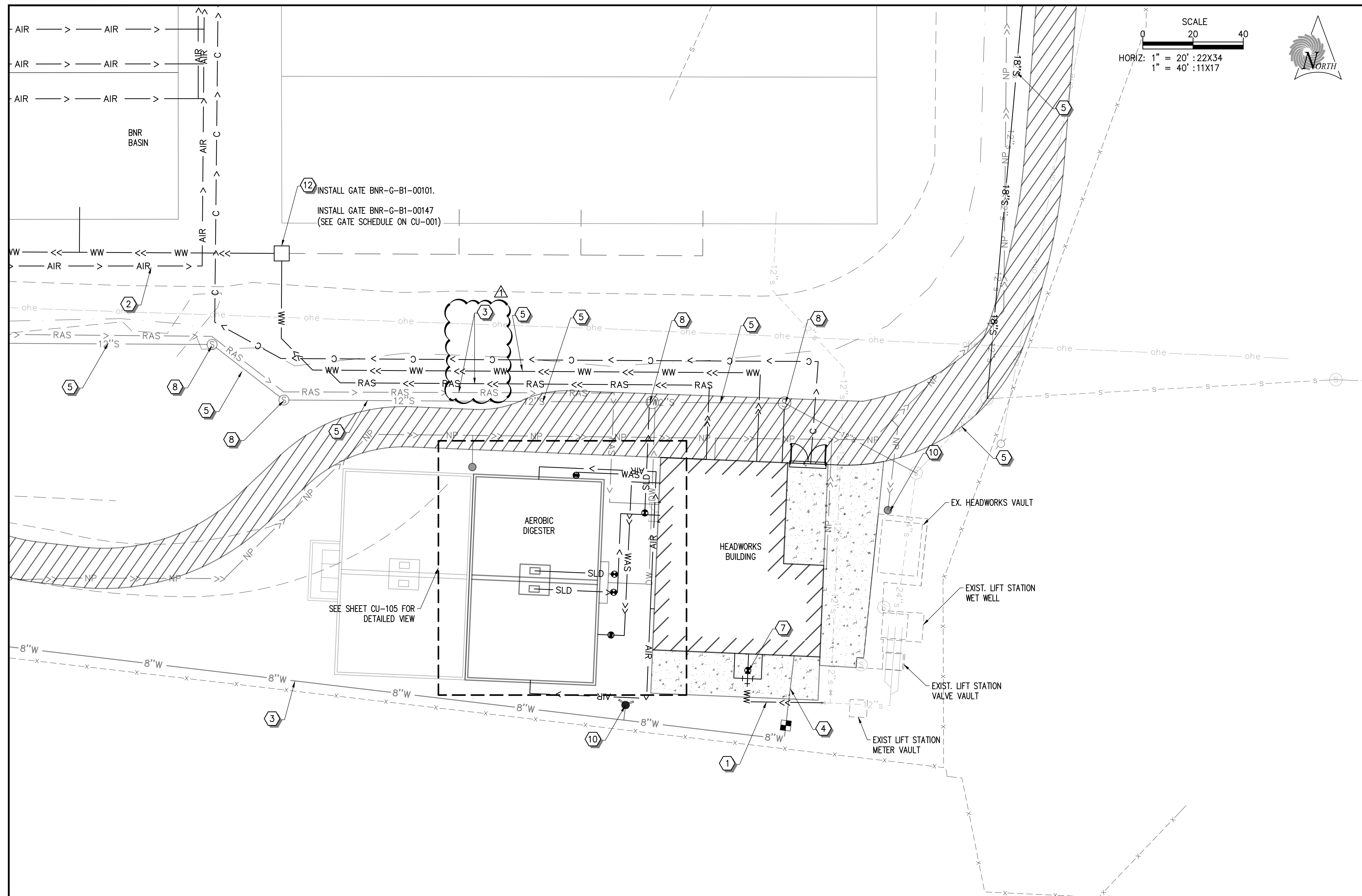


CONSTRUCTION NOTES

- 1 PVC C900 SEWER PIPE
- 2 FRP HOBAS AIR PIPE
- 3 PVC C900 WATER PIPE
- 4 WATER SERVICE LATERAL
- 5 PVC SDR-35 SEWER PIPE
- 6 SEWER SERVICE LATERAL
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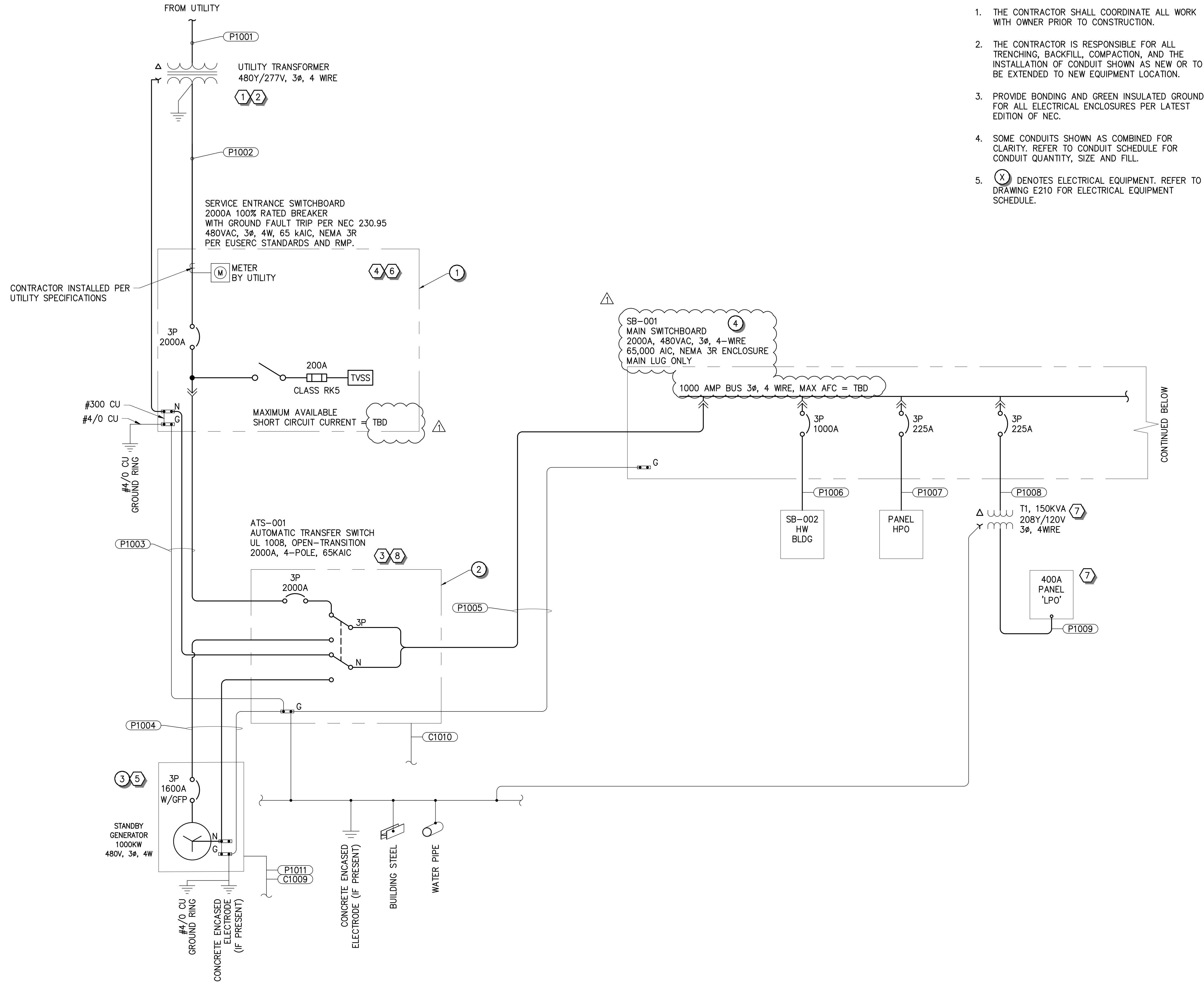
1	ADDENDUM #3	02-03-23
REV NO.	COMMENT	DATE
PROFESSIONAL ENGINEER 12-23-22 CLIFTON G. LINFORD No. 6311187 SUNRISE ENGINEERING 6875 SOUTH 900 EAST SALT LAKE CITY, UTAH 84047 TEL 801.523.0100 · FAX 801.523.0990 www.sunrise-eng.com		
MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT		
BNR WWTP 2022 CIVIL UTILITIES SITE PIPING - ZONE 2		
SEI NO. 08242	DESIGNED CL	DRAWN TR
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CONSTRUCTION NOTES

1	ADDENDUM #3	02-03-23
REV NO.	COMMENT	DATE



SHEET NOTES:

1. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH OWNER PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRENCHING, BACKFILL, COMPACTION, AND THE INSTALLATION OF CONDUIT SHOWN AS NEW OR TO BE EXTENDED TO NEW EQUIPMENT LOCATION.
3. PROVIDE BONDING AND GREEN INSULATED GROUND FOR ALL ELECTRICAL ENCLOSURES PER LATEST EDITION OF NEC.
4. SOME CONDUITS SHOWN AS COMBINED FOR CLARITY. REFER TO CONDUIT SCHEDULE FOR CONDUIT QUANTITY, SIZE AND FILL.
5. (X) DENOTES ELECTRICAL EQUIPMENT. REFER TO DRAWING E210 FOR ELECTRICAL EQUIPMENT SCHEDULE.

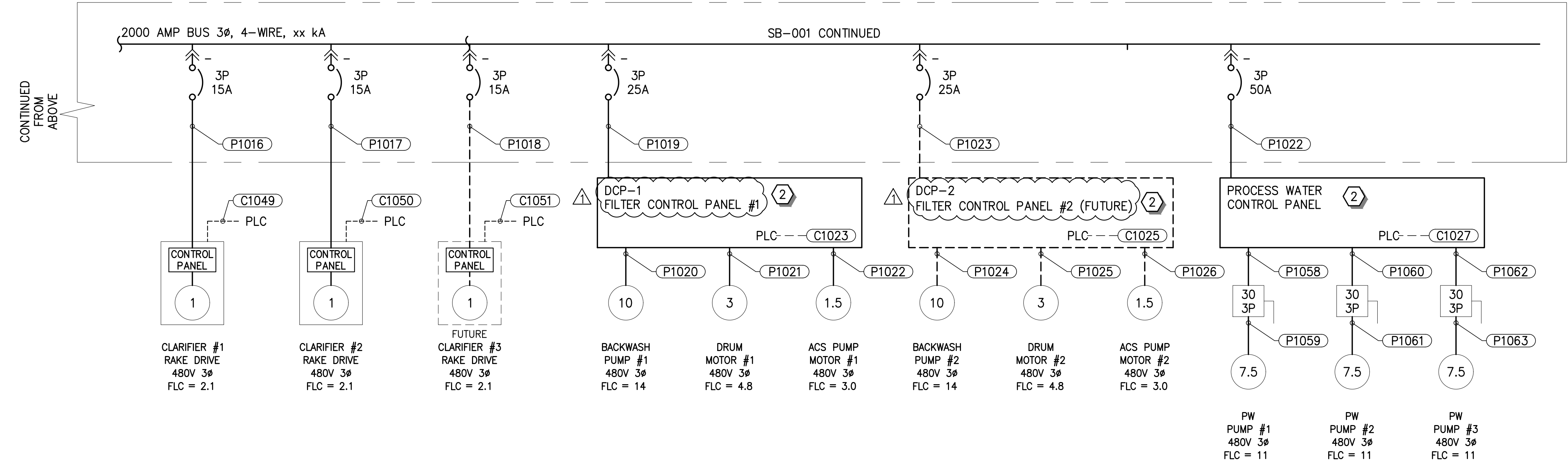
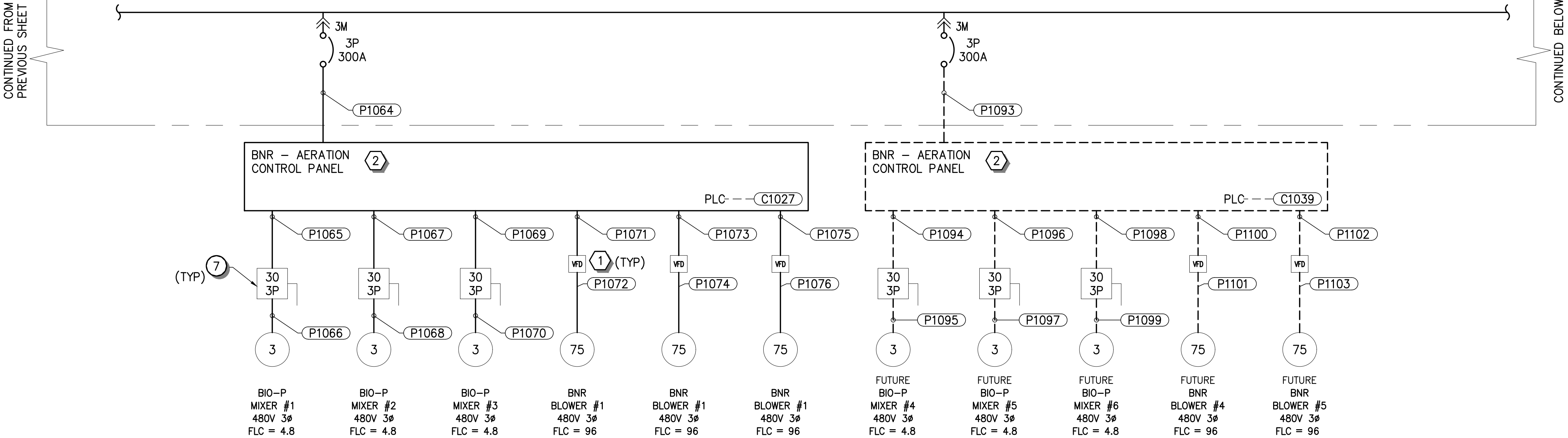
KEY NOTES

1. ALL SERVICE ENTRANCE WORK SHALL BE COORDIANED WITH OWNER AND ROCKY MOUNTAIN POWER (RMP), PRIOR TO CONSTRUCTION. SERVICE ENTRANCE WORK SHALL BE PER UTILITY REQUIREMENTS.
2. TRANSFORMER BY UTILITY, PAD BY CONTRACTOR PER UTILITY STANDARDS. COORDINATE WITH UTILITY FOR DIMENSIONS AND CONDUIT STUB UP LOCATIONS.
3. PROVIDE AND INSTALL AUTOMATIC TRANSFER SWITCH (ATS). ATS SHALL BE UL 1008 LISTED, OPEN-TRANSITION, AND CONFIGURED AS SHOWN IN DRAWING.
4. PROVIDE SIGN AT METERING SWITCHBOARD INDICATING TYPE AND LOCATION OF STANDBY GENERATOR.
5. GENERATOR PROVIDED AND INSTALLED BY CONTRACTOR. CONTRACTOR TO PROVIDE AND INSTALL CONCRETE PAD PER MANUFACTURER'S RECOMMENDATIONS.
6. PROVIDE LABELS INDICATING ARC FLASH HAZARD PER NEC 110.16, AND AVAILABLE FAULT CURRENT PER NEC 110.24
7. DO NOT BOND NEUTRAL TO GROUND IN THE PANELS. BONDING TO OCCUR AT TRANSFORMER T1.
8. COORDINATE WITH MANUFACTURER TO REMOVE N-G LINK AND SERVICE ENTRANCE LABELLING. PROVIDE PLACARD INDICATING LOCATION OF N-G BOND IS AT THE METERING SWITCHBOARD.

1	ADDENDUM #3	2-3-23
REV. NO.	COMMENT	DATE
REGISTERED PROFESSIONAL ENGINEER 23-Dec-2022 No. 362066 J. RANDALL KNAPP STATE OF UTAH SUNRISE ENGINEERING 6875 SOUTH 900 EAST SALT LAKE CITY, UTAH 84047 TEL 801.523.0100 · FAX 801.523.0990 www.sunrise-eng.com		
MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT		
BNR WWTP 2022		
ELECTRICAL ONE-LINE DIAGRAM		
SEI NO. S08242	DESIGNED JRK	DRAWN JRK
CHECKED JRK	SHEET NO. 162 of 249	E-201

SB-001 (CONDUINED)
MAIN SWITCHBOARD
2000A, 480VAC, 3Ø, 4-WIRE
xx,xxx AIC, NEMA 3R ENCLOSURE
MAIN LUG ONLY

CONTINUED FROM
PREVIOUS SHEET



SHEET NOTES:

1. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH OWNER PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRENCHING, BACKFILL, COMPACTION, AND THE INSTALLATION OF CONDUIT SHOWN AS NEW OR TO BE EXTENDED TO NEW EQUIPMENT LOCATION.
3. PROVIDE BONDING AND GREEN INSULATED GROUND FOR ALL ELECTRICAL ENCLOSURES PER LATEST EDITION OF NEC.
4. SOME CONDUITS SHOWN AS COMBINED FOR CLARITY. REFER TO CONDUIT SCHEDULE FOR CONDUIT QUANTITY, SIZE AND FILL.
5. (X) DENOTES ELECTRICAL EQUIPMENT. REFER TO DRAWING E210 FOR ELECTRICAL EQUIPMENT SCHEDULE.

KEY NOTES

- 1 VFDs BY SUPPLIER, WIRING BY CONTRACTOR. TYPICAL OF BNR BLOWERS. COORDINATE WITH CONDUIT SCHEDULE AND VENDOR DRAWINGS FOR CONNECTION DETAILS.
- 2 CONTROL PANEL BY EQUIPMENT VENDOR, INSTALLED BY CONTRACTOR.

1	ADDENDUM #3	2-3-23
REV NO.	COMMENT	DATE
REGISTERED PROFESSIONAL ENGINEER 23-Dec-2022 No. 362066 J. RANDALL KNAPP STATE OF UTAH SUNRISE ENGINEERING 6875 SOUTH 900 EAST SALT LAKE CITY, UTAH 84047 TEL 801.523.0100 · FAX 801.523.0990 www.sunrise-eng.com MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT BNR WWTP 2022 ELECTRICAL ONE-LINE DIAGRAM		
DESIGNED S08242	DRAWN JRK	CHECKED JRK
SHEET NO. 163 of 249	E-202	

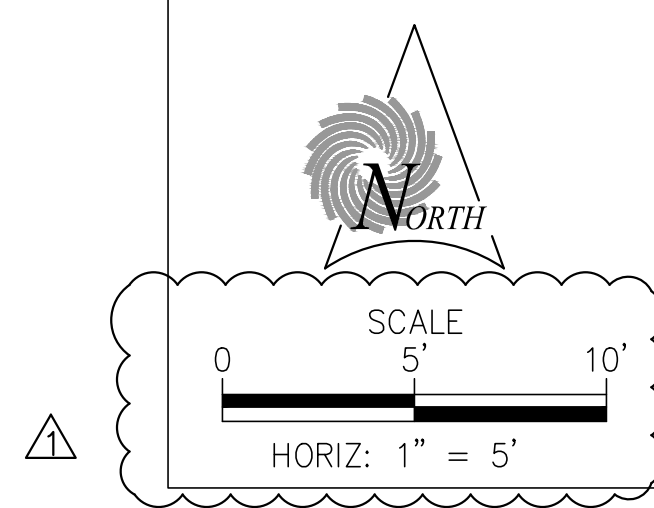
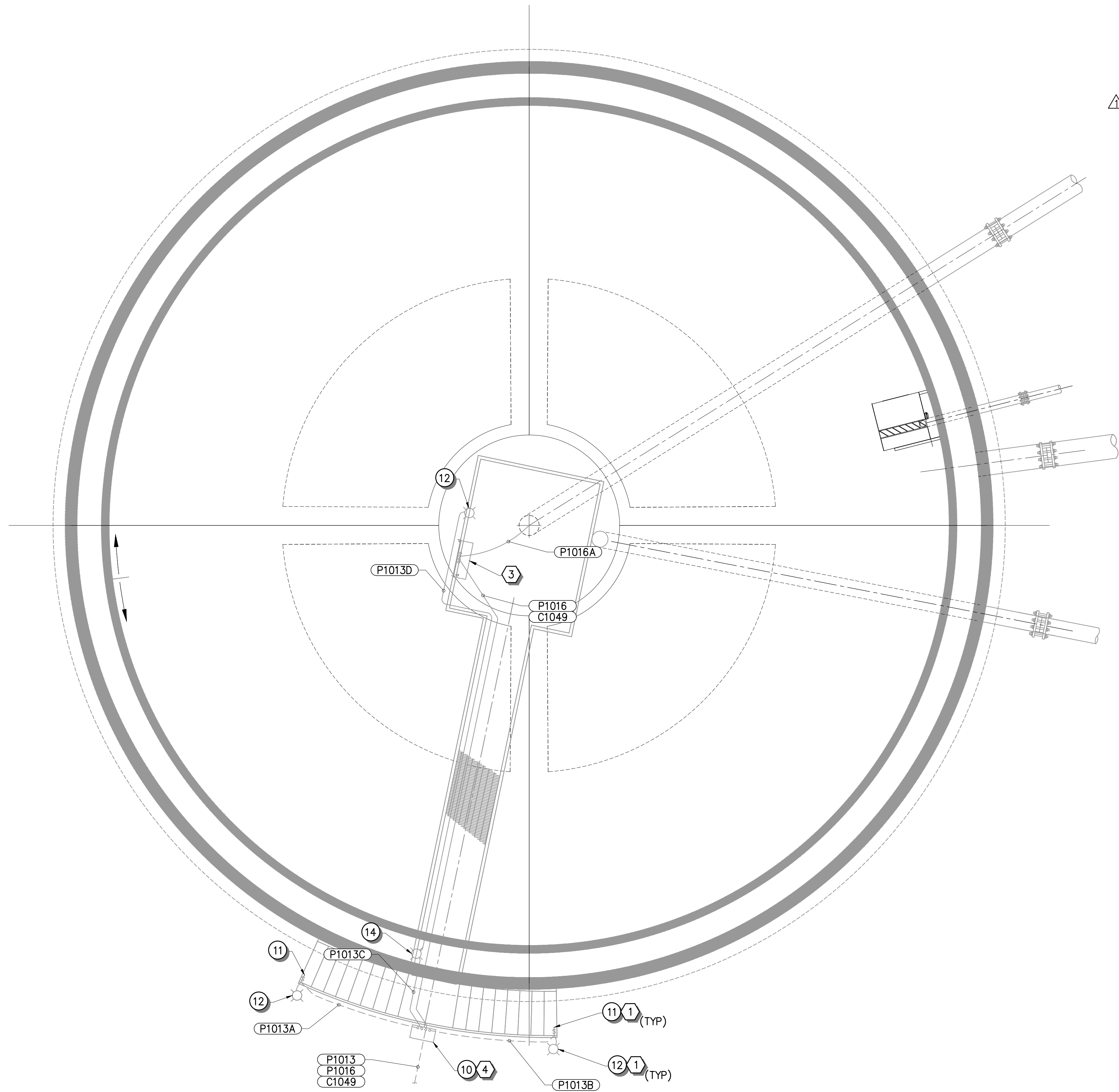
CONDUIT AND CONDUCTOR SCHEDULE

CONDUIT TAG	DESCRIPTION	ROUTING		CONDUIT		CONDUCTORS (CU) PER C.		VOLTAGE	REMARKS OR REFERENCE DRAWING
		FROM	TO	QTY	SIZE	(QTY) & SIZE	GND		
HEADWORKS BUILDING									
P2001	FEEDER TO MCC--HB	SB--002	MCC--HB	2	3"	(4) #350 kcmil	1	480	
P2002	FEEDER TO TRANSFORMER T2	SB--002	XFMR T2	1	2"	(3) #4/0 AWG	#4	480	
P2003	FEEDER TO PANEL LP2A	XFMR T2	PANEL LHB	1	2-1/2"	(4) #4/0 AWG	#4	480	
P2004	POWER TO PLANT SCADA PLC--HB	LHB	PLC--HW	1	3/4"	(4) #12 AWG	#12	120	
P2005	POLYMER SKID POWER	LHB	POLYMER SKID	1	3/4"	(2) #12 AWG	#12	120	
P2006	FEEDER TO DEWATERING CONTROL PANEL #1	MCC--HB	DEWATERING PANEL #1	1	3/4"	(3) #6 AWG	#10	480	
P2007	POWER TO FLOC MIXER #1	DEWATERING PANEL #1	FLOC MIXER #1	1	3/4"	(3) #12 AWG	#12	480	
P2008	POWER TO SCREW PRESS #1	DEWATERING PANEL #1	SCREW PRESS #1	1	3/4"	(3) #12 AWG	#12	480	
P2009	POWER TO SLUDGE FEED PUMP #1	DEWATERING PANEL #1	SLUDGE FEED PUMP #1	1	3/4"	(3) #12 AWG	#12	480	
P2010	POWER TO CONVEYOR #1	DEWATERING PANEL #1	CONVEYOR #1	1	3/4"	(3) #12 AWG	#12	480	
P2011	POWER TO CONVEYOR #2	DEWATERING PANEL #1	CONVEYOR #2	1	3/4"	(3) #12 AWG	#12	480	
P2012	FEEDER TO DEWATERING CONTROL PANEL #2 (FUTURE)	MCC--HB	DEWATERING PANEL #2	1	3/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2013	POWER TO FLOC MIXER #2	DEWATERING PANEL #2	FLOC MIXER #2	1	3/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2014	POWER TO SCREW PRESS #2	DEWATERING PANEL #2	SCREW PRESS #2	1	3/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2015	POWER TO SLUDGE FEED PUMP #2	DEWATERING PANEL #2	SLUDGE FEED PUMP #2	1	3/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2016	FEEDER TO DIGESTER BLOWER #1	MCC--HB	DIGESTER BLOWER #1 DISCONNECT	1	1-1/4"	(3) #1 AWG	#6	480	
P2017	FEEDER TO DIGESTER BLOWER #1	DIGESTER BLOWER #1 DISCONNECT	DIGESTER BLOWER #1	1	1-1/4"	(3) #1 AWG	#6	480	
P2018	FEEDER TO DIGESTER BLOWER #2	MCC--HB	DIGESTER BLOWER #2 DISCONNECT	1	1-1/4"	(3) #1 AWG	#6	480	
P2019	FEEDER TO DIGESTER BLOWER #2	DIGESTER BLOWER #2 DISCONNECT	DIGESTER BLOWER #2	1	1-1/4"	(3) #1 AWG	#6	480	
P2020	FEEDER TO DIGESTER BLOWER #3 (FUTURE)	MCC--HB	DIGESTER BLOWER #3 DISCONNECT	1	1-1/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2021	FEEDER TO DIGESTER BLOWER #3 (FUTURE)	DIGESTER BLOWER #3 DISCONNECT	DIGESTER BLOWER #3 (FUTURE)	1	1-1/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2022	POWER TO RAS PUMP #1	MCC--HB	RAS PUMP #1	1	3/4"	(3) #12 AWG	#12	480	
P2023	POWER TO RAS PUMP #2	MCC--HB	RAS PUMP #2	1	3/4"	(3) #12 AWG	#12	480	
P2024	POWER TO RAS PUMP #3 (FUTURE)	MCC--HB	RAS PUMP #3 (FUTURE)	1	3/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2025	FEEDER TO GRIT REMOVAL CONTROL PANEL #1	MCC--HB	GRIT REMOVAL #1 CONTROL PANEL	1	3/4"	(3) #10 AWG	#10	480	
P2026	POWER TO GRIT COLLECTOR DRIVE MOTOR #1	GRIT REMOVAL #1 CONTROL PANEL	GRIT COLLECTOR DRIVE MOTOR #1	1	3/4"	(3) #10 AWG	#10	480	
P2027	POWER TO GRIT REMOVAL DRIVE PUMP #1	GRIT REMOVAL #1 CONTROL PANEL	GRIT REMOVAL DRIVE PUMP #1	1	3/4"	(3) #10 AWG	#10	480	
P2028	POWER TO BLOWER #1	GRIT REMOVAL #1 CONTROL PANEL	BLOWER #1	1	3/4"	(3) #10 AWG	#10	480	
P2029	POWER TO STIRRER DRIVE #1	GRIT REMOVAL #1 CONTROL PANEL	STIRRER DRIVE #1	1	3/4"	(3) #10 AWG	#10	480	
P2030	POWER TO GRIT SCREW DRIVE #1	GRIT REMOVAL #1 CONTROL PANEL	GRIT SCREW DRIVE #1	1	3/4"	(3) #10 AWG	#10	480	
P2031	FEEDER TO GRIT REMOVAL CONTROL PANEL #2	MCC--HB	GRIT REMOVAL #2 CONTROL PANEL	1	3/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2032	POWER TO GRIT COLLECTOR DRIVE MOTOR #2	GRIT REMOVAL #2 CONTROL PANEL	GRIT COLLECTOR DRIVE MOTOR #2	1	3/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2033	POWER TO GRIT REMOVAL DRIVE PUMP #2	GRIT REMOVAL #2 CONTROL PANEL	GRIT REMOVAL DRIVE PUMP #2	1	3/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2034	POWER TO BLOWER #2	GRIT REMOVAL #2 CONTROL PANEL	BLOWER #2	1	3/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2035	POWER TO STIRRER DRIVE #2	GRIT REMOVAL #2 CONTROL PANEL	STIRRER DRIVE #2	1	3/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2036	POWER TO GRIT SCREW DRIVE #2	GRIT REMOVAL #2 CONTROL PANEL	GRIT SCREW DRIVE #2	1	3/4"			480	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2037	DEWATERING FLOW METER #1	DEWATERING PANEL #1	HB-M--DM--001	1	3/4"	(2) #12 AWG	#12	120	
P2038	DEWATERING FLOW METER #2	DEWATERING PANEL #2	DEWATERING FLOW METER #2	1	3/4"				CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2039	14" VALVE POWER	LHB--11	HB--V--APV--101	1	3/4"	(2) #12 AWG	#12	120	
P2040	14" FLOW METER POWER	LHB--10	AB--M--AM--001	1	3/4"	(2) #12 AWG	#12	120	
P2041	18" VALVE POWER	LHB--24	HB--V--BPV--001	1	3/4"	(2) #12 AWG	#12	120	
P2042	18" FLOW METER POWER	LHB--26	HB--M--BM--001	1	3/4"	(2) #12 AWG	#12	120	
P2043	POWER TO POLYMER SKID	LHB--14	POLYMER SKID	1	3/4"	(2) #12 AWG	#12	120	
P2044	CHEMICAL PUMP POWER	LHB	CHEMICAL ROOM JB--1	1	3/4"	(4) #12 AWG	#12	120	COORDINATE LOCATION OF REQUIREMENTS OF CHEMICAL PUMPS
P2045	DIGESTER VALVE #1 POWER	LHB	DIGESTER VALVE 1	1	1"	(2) #12 AWG	#12	240	
P2046	DIGESTER VALVE #2 POWER	LHB	DIGESTER VALVE 2	1	1"	(2) #12 AWG	#12	240	
P2047	EAST ZONE MANHOLE FLOW METER POWER	LHB	EAST ZONE MANHOLE FLOW METER	1	1"	(2) #12 AWG	#12	120	
P2048	MANHOLE #1 FLOW METER POWER	LHB	MANHOLE #1 FLOW METER	1	1"	(2) #12 AWG	#12	120	
P2049	DIGESTER D.O. #1 POWER	LHB	DIGESTER #1 POWER	1	1"	(2) #12 AWG	#12	120	
P2050	DIGESTER D.O. #2 POWER	LHB	DIGESTER #2 POWER	1	1"	(2) #12 AWG	#12	120	
P2051	DIGESTER D.O. #3 POWER (FUTURE)	LHB	DIGESTER #3 POWER	1	1"			120	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2052	DIGESTER D.O. #4 POWER (FUTURE)	LHB	DIGESTER #4 POWER	1	1"			120	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2053	DIGESTER VALVE #3 POWER (FUTURE)	LHB	DIGESTER VALVE 3	1	1"			240	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
P2054	DIGESTER VALVE #4 POWER (FUTURE)	LHB	DIGESTER VALVE 4	1	1"			240	CONDUIT ONLY. STUB WITH PULL STRING AND CAP FOR FUTURE USE
EXISTING CONDUITS									
P001	POWER TO SCREEN, PRESS, COMPRESSOR	MCC--HB	SCREEN/PRESS CONTROL PANEL	1	1"	(6) #10 AWG	#10	480	POWER TO HW SCREEN / WASH COMPACTOR / COMPRESSOR
P001A	POWER TO SCREEN DRIVE MOTOR	SCREEN/COMPACTOR CTRL PANEL	SCREEN DRIVE MOTOR	1	3/4"	(3) #10 AWG	#10	480	
P001B	POWER TO PRESS DRIVE MOTOR	SCREEN/COMPACTOR CTRL PANEL	PRESS DRIVE MOTOR	1	3/4"	(3) #10 AWG	#10	480	
P001C	POWER TO COMPRESSOR	SCREEN/COMPACTOR CTRL PANEL	COMPRESSOR	1	3/4"	(3) #10 AWG	#10	480	
P001D	SCREEN/PRESS HEAT TRACING	SCREEN/COMPACTOR CTRL PANEL	SCREEN/PRESS HEAT TRACING	1	3/4"	(2) #12 AWG	#12	120	INSTALL PER VENDOR DRAWINGS.
P021	FEEDER TO HW LIFT PUMP #1	MCC--HB	LIFT PUMP #1 DISCONNECT SWITCH DS 021	1	1"	(3) #10 AWG (4) #12 AWG	#10	480	LIFT PUMP POWER MOISTURE/TEMP SENSOR
P021A	POWER TO HW LIFT PUMP #1	DISCONNECT 021	LIFT PUMP #1	1	2"				EXISTING MANUFACTURER SUPPLIED CABLE
P022	FEEDER TO HW LIFT PUMP #2	MCC--HB	LIFT PUMP #2 DISCONNECT SWITCH DS 022	1	1"	(3) #10 AWG (4) #12 AWG	#10	480	LIFT PUMP POWER MOISTURE/TEMP SENSOR
P022A	POWER TO HW LIFT PUMP #2	DISCONNECT 022	LIFT PUMP #2 DISCONNECT SWITCH DS 023	1	2"				EXISTING MANUFACTURER SUPPLIED CABLE
P023	FEEDER TO HW LIFT PUMP #3	MCC--HB	LIFT PUMP #3 DISCONNECT SWITCH DS 023	1	1"	(3) #10 AWG (4) #12 AWG	#10	480	LIFT PUMP POWER MOISTURE/TEMP SENSOR
P023A	POWER TO HW LIFT PUMP #3	DISCONNECT 032	LIFT PUMP #3	1	2"				EXISTING MANUFACTURER SUPPLIED CABLE
P024	POWER TO EX. FLOW METER	LP2x	FIT--024	1	1"	(2) #12 AWG	#12	120	INSPECT EXISTING CONDUCTORS. REPLACE AS NEEDED.

SHEET NOTES:

- CONDUIT SHOWN TO EQUIPMENT LOCATION ONLY. CONTRACTOR SHALL PROVIDE FLEXIBLE CONDUIT STUBS TO EQUIPMENT, FITTINGS, MOUNTING HARDWARE AND ALL ACCESSORIES REQUIRED FOR A COMPLETE AND OPERABLE SYSTEM.
- ROUTE CONDUIT AS NECESSARY BASED ON FIELD CONDITIONS AND TO AVOID OBSTACLES.
- LENGTHS SHOWN IN CONDUIT SCHEDULE ARE APPROXIMATE. CONTRACTOR SHALL VERIFY ACTUAL LENGTHS PRIOR TO CONSTRUCTION.

1	ADDENDUM #3	2-3-23
REV NO.	COMMENT	DATE
6875 SOUTH 900 EAST SALT LAKE CITY, UTAH 84047 TEL 801.523.0100 • FAX 801.523.0990 www.sunrise-eng.com		
MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT		
BNR WWTP 2022		
CONDUIT AND CONDUCTOR SCHEDULE		
SEI NO. S08242	DESIGNED JRK	DRAWN JRK
CHECKED JRK	SHEET NO. 167 of 249	E-206



- SHEET NOTES:**
1. THE CONTRACTOR WILL BE RESPONSIBLE TO LOCATE ALL EXISTING UNDERGROUND UTILITIES BEFORE ANY EXCAVATION IS PERFORMED. ANY DAMAGE TO EXISTING UTILITIES SHALL BE REPAIRED TO NEW CONDITION OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
 2. NOT ALL CONDUITS ARE SHOWN. REFER TO CONDUIT AND CONDUCTOR SCHEDULE FOR INDIVIDUAL CONDUIT FILL REQUIREMENTS. CONDUIT LAYOUT SHOWN IS DIAGRAMMATIC ONLY. CONTRACTOR SHALL FIELD ROUTE AS NECESSARY TO ACCOMMODATE FIELD CONDITIONS AND AVOID OTHER STRUCTURES AS REQUIRED.
 3. REFER TO DRAWING E204–E208 FOR CONDUIT IDENTIFICATION.
 5. (X) DENOTES ELECTRICAL EQUIPMENT. REFER TO DRAWING E210 FOR ELECTRICAL EQUIPMENT SCHEDULE.

- KEY NOTES**
1. PROVIDE AND INSTALL 3–WAY, WEATHERPROOF SWITCHES FOR CLARIFIER AREA LIGHTING. MOUNT SWITCHES AT EACH END OF STAIRWAY ON HANDRAIL. EACH SWITCH CALL BE CONFIGURED TO SWITCH ALL FIXTURES AT CLARIFIER. FIELD ROUTE CONDUITS P1055A–P1055D BASED ON SITE CONDITIONS.
 2. LIGHT FIXTURE LOCATION. MOUNT FIXTURE ON 12' ROUND STEEL POLE AND SECURE TO RAILING WITH STAINLESS STEEL PIPE STRAPS. PROVIDE ALL CONDUIT, FITTINGS, MOUNTING HARDWARE AND ALL REQUIRED ACCESSORIES FOR A COMPLETE AND OPERABLE SYSTEM.
 3. CLARIFIER CONTROL PANEL. CONTROL PANEL PROVIDED BY CLARIFIER EQUIPMENT SUPPLIER AND INSTALLED BY CONTRACTOR. INSTALL PER SUPPLIER RECOMMENDATIONS. COORDINATE EXACT MOUNTING LOCATION AND DETAILS WITH SUPPLIER PRIOR TO INSTALLATION.
 4. ALL BURIED RIGID CONDUIT SHALL BE TAPE WRAPPED TO 4" ABOVE GRADE WITH 3M–50 10 MIL PIPE WRAP OR APPROVED EQUAL.
 5. CONDUIT CALLOUTS SHOWN FOR CLARIFIER #1. REFER TO CONDUIT SCHEDULE FOR CONDUITS TO CLARIFIER #2 AND FUTURE CLARIFIER #3.

ENLARGED CLARIFIER ELECTRICAL PLAN (TYPICAL) (5)

A
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1" = 5'

1	ADDENDUM #3	2-3-23
REV NO.	COMMENT	DATE

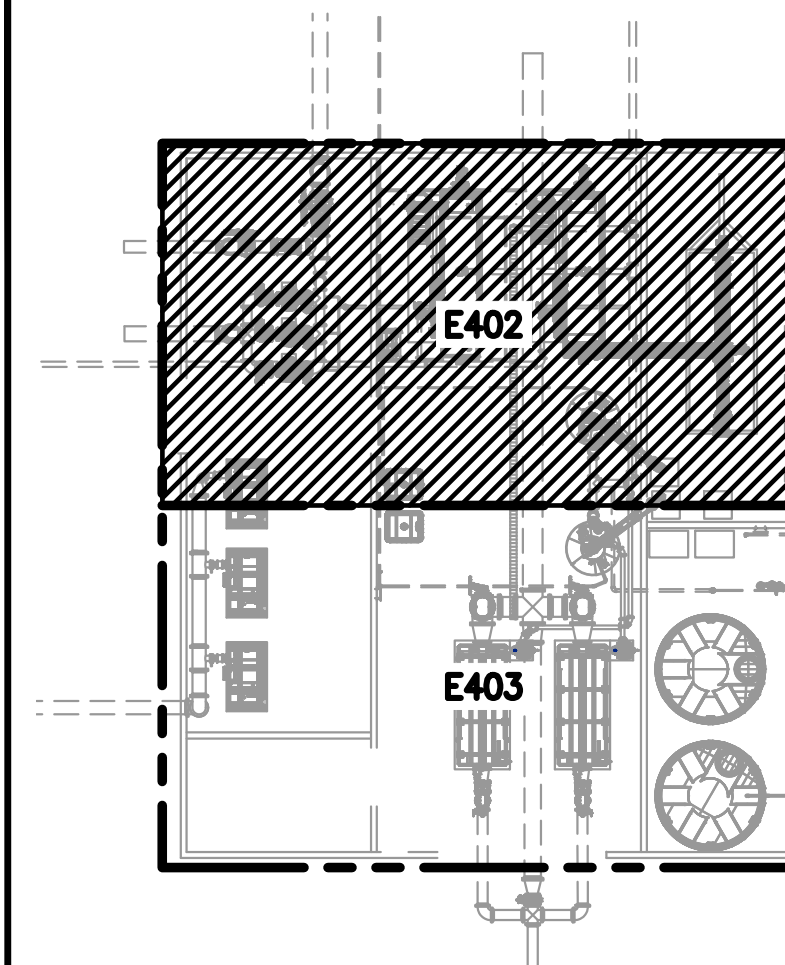
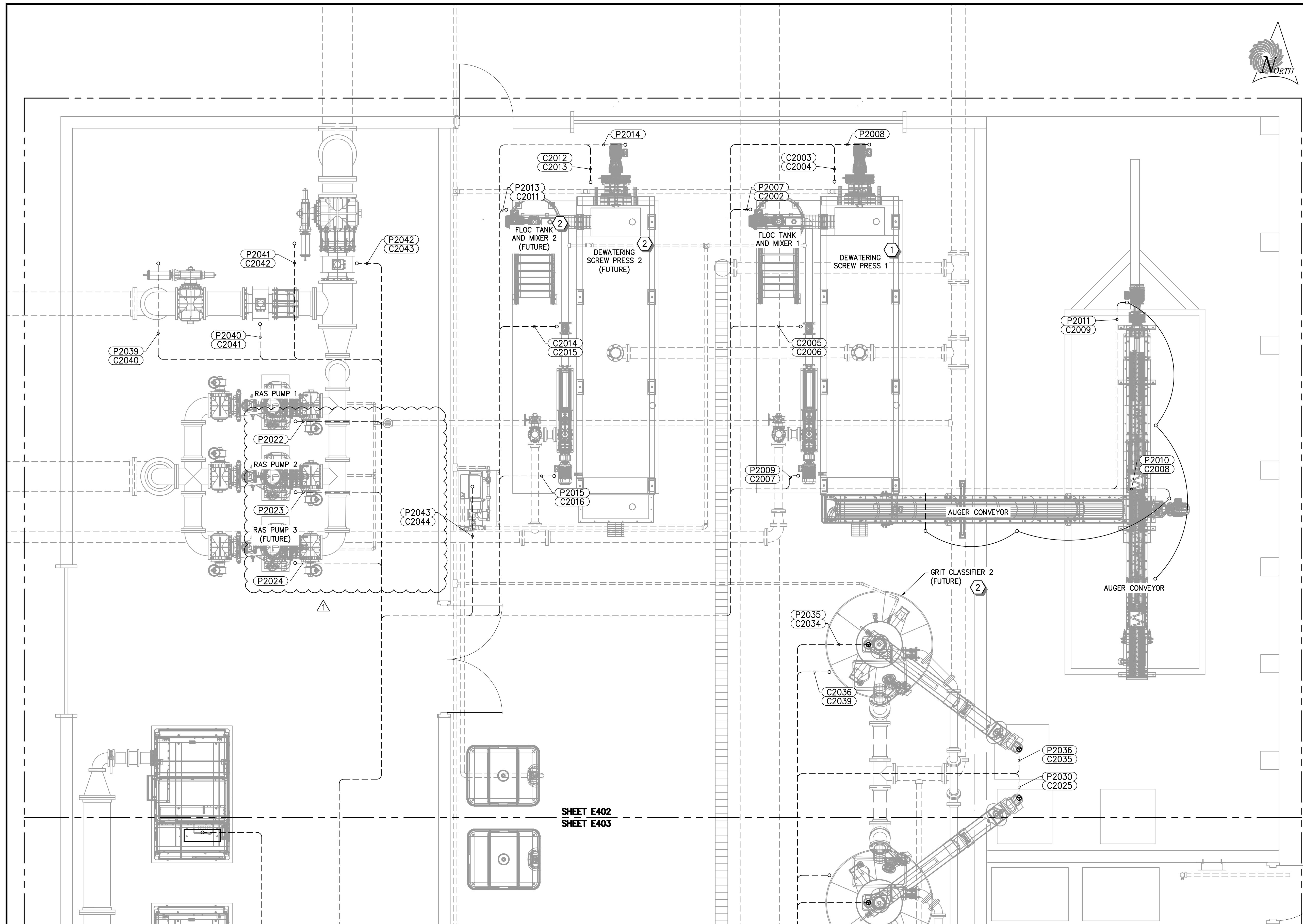
MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

BNR WWTP 2022

ENLARGED CLARIFIER ELECTRICAL PLAN

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	E-307
S08242	JRK	JRK	JRK	178 of 249	

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KEY PLAN

SHEET NOTES:

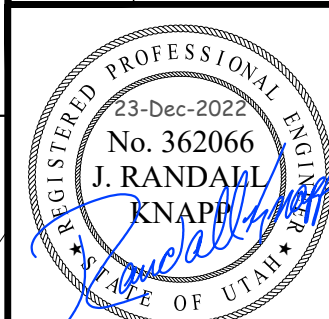
1. CONTRACTOR TO COMPLY WITH GENERAL ELECTRICAL REQUIREMENTS ON DRAWING E100.
2. ALL CONDUITS ARE NOT SHOWN FOR CLARITY. REFER TO CONDUIT AND CONDUCTOR SCHEDULE FOR ADDITIONAL INFORMATION.
3. CONDUITS SHOWN ARE SCHEMATIC ONLY. CONTRACTOR SHALL FIELD ROUTE AS NECESSARY TO AVOID OBSTACLES AND OTHER EQUIPMENT.
4. REFER TO DRAWING E2xx FOR ONELINE DIAGRAMS.
5. REFER TO DRAWING E2xx FOR CONDUIT AND CONDUCTOR SCHEDULE.
6. ALL CONDUCTORS SHALL BE ROUTED IN CABLE TRAY, CONDUIT SUSPENDED FROM CEILING, OR BE INSTALLED IN SURFACE MOUNTED CONDUIT. FLEX CONDUIT MAY BE USED TO STUB TO EQUIPMENT AS PERMITTED BY NEC.
7. VERIFY LOCATION OF EQUIPMENT SHOWN. COORDINATE WITH EQUIPMENT SUPPLIER FOR STUB UP LOCATIONS.

KEY NOTES

- 1 FOR ALL VENDOR SUPPLIED EQUIPMENT, COORDINATE CONDUIT STUB UP LOCATIONS WITH EQUIPMENT SUPPLIER PRIOR TO INSTALLATION.
- 2 FUTURE EQUIPMENT. STUB AND CAP CONDUIT FLUSH WITH FINISHED FLOOR FOR FUTURE USE AS SHOWN.
- 3 CONTROL PANEL PROVIDED BY EQUIPMENT SUPPLIER AND INSTALLED BY CONTRACTOR. COORDINATE WITH MANUFACTURER FOR ADDITIONAL REQUIREMENTS.

SHEET E402
SHEET E403

A
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ENLARGED POWER & CONTROL PLAN
3/8" = 1'

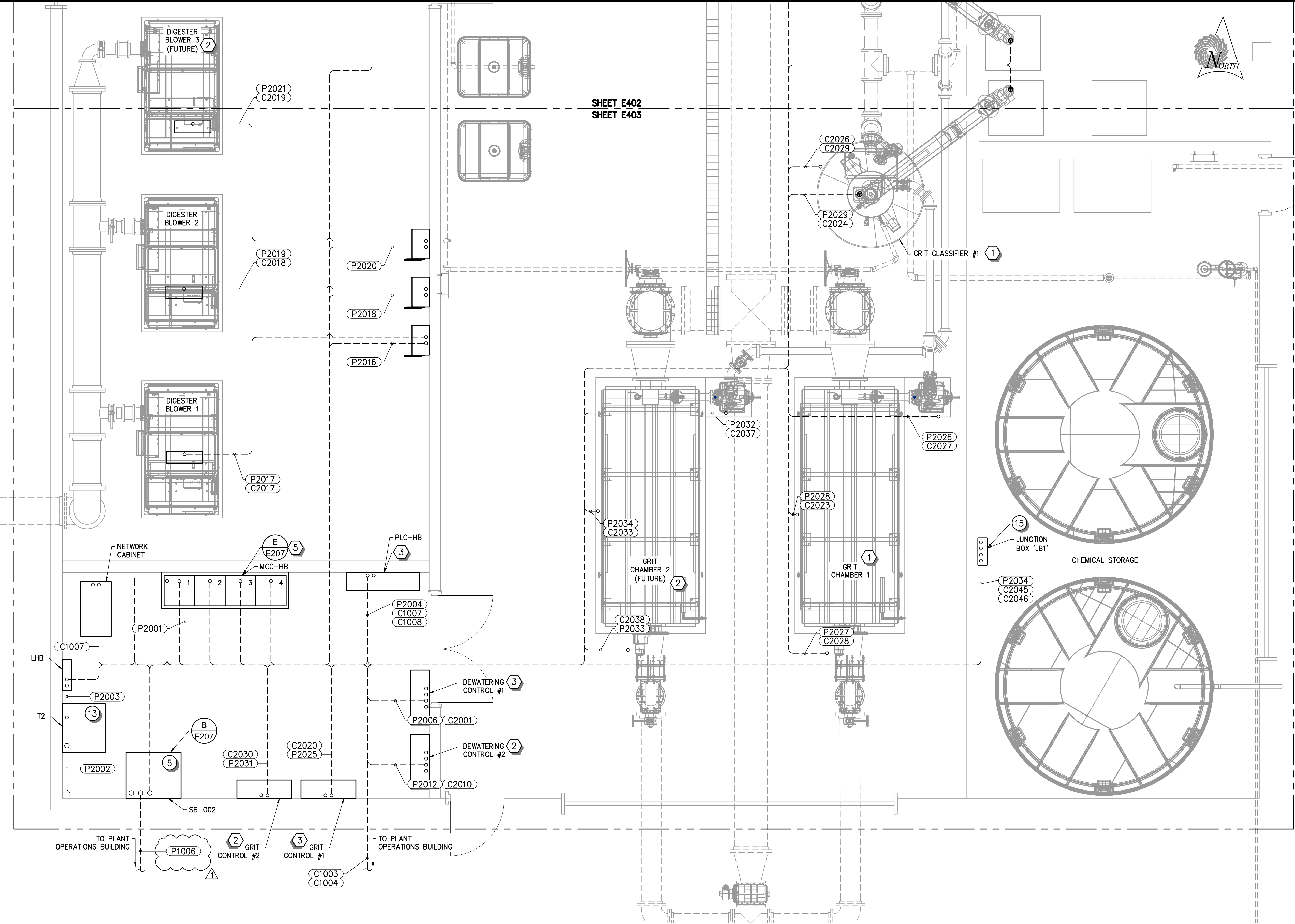
1	ADDENDUM #3	2-3-23
REV NO.	COMMENT	DATE
  SUNRISE ENGINEERING 6875 SOUTH 900 EAST SALT LAKE CITY, UTAH 84047 TEL 801.523.0100 • FAX 801.523.0990 www.sunrise-eng.com		

MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

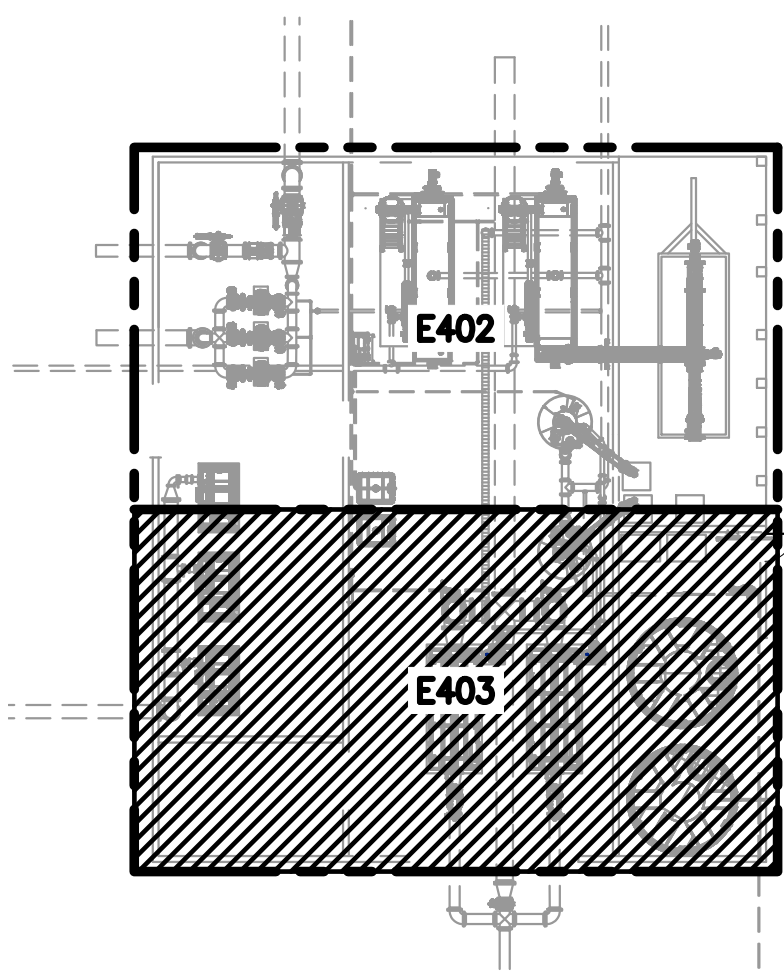
BNR WWTP 2022

HB POWER AND CONTROL PLAN

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	E-402
S08242	JRK	JRK	JRK	181 of 249	



SHEET E402
SHEET E403



KEY PLAN

SHEET NOTES:

- 1. CONTRACTOR TO COMPLY WITH GENERAL ELECTRICAL REQUIREMENTS ON DRAWING E100.
- 2. ALL CONDUITS ARE NOT SHOWN FOR CLARITY. REFER TO CONDUIT AND CONDUCTOR SCHEDULE FOR ADDITIONAL INFORMATION.
- 3. CONDUITS SHOWN ARE SCHEMATIC ONLY. CONTRACTOR SHALL FIELD ROUTE AS NECESSARY TO AVOID OBSTACLES AND OTHER EQUIPMENT.
- 4. REFER TO DRAWING E204-E208 FOR CONDUIT AND CONDUCTOR SCHEDULE.
- 5. REFER TO DRAWING E210 FOR ELECTRICAL EQUIPMENT SCHEDULE.
- 6. ALL CONDUCTORS SHALL BE ROUTED IN CABLE TRAY, CONDUIT SUSPENDED FROM CEILING, OR BE INSTALLED IN SURFACE MOUNTED CONDUIT. FLEX CONDUIT MAY BE USED TO STUB TO EQUIPMENT AS PERMITTED BY NEC.
- 7. VERIFY LOCATION OF EQUIPMENT SHOWN. COORDINATE WITH EQUIPMENT SUPPLIER FOR STUB UP LOCATIONS.

KEY NOTES

- 1 FOR ALL VENDOR SUPPLIED EQUIPMENT, COORDINATE CONDUIT STUB UP LOCATIONS WITH EQUIPMENT SUPPLIER PRIOR TO INSTALLATION.
- 2 FUTURE EQUIPMENT. STUB AND CAP CONDUIT FLUSH WITH FINISHED FLOOR FOR FUTURE USE AS SHOWN.
- 3 CONTROL PANEL PROVIDED BY EQUIPMENT SUPPLIER AND INSTALLED BY CONTRACTOR. COORDINATE WITH MANUFACTURER FOR ADDITIONAL REQUIREMENTS.
- 4 REFER TO SCADA AND INSTRUMENTATION PLANS FOR RTU EQUIPMENT DETAILS.
- 5 REFER TO CONDUIT SCHEDULE FOR MCC-HB CONDUIT DETAILS.

B ENLARGED ELECTRICAL PLAN
~ 1/2" = 1'

1	ADDENDUM #3	2-3-23
REV NO.	COMMENT	DATE
6875 SOUTH 900 EAST SALT LAKE CITY, UTAH 84047 TEL 801.523.0100 · FAX 801.523.0990 www.sunrise-eng.com		
MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT		
BNR WWTP 2022		
HP POWER AND CONTROL PLAN		
SEI NO. S08242	DESIGNED JRK	DRAWN JRK
CHECKED JRK	SHEET NO. 182 of 249	E-403

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SHEET TAG	DESCRIPTION	MAKE	MODEL	RANGE	LOOP POWERED	NOTES
I111	PI-140	BNR AIR LINE PRESSURE GAUGE	ASHCROFT	1279	N/A	OR APPROVED EQUAL
I111	LT-146	BNR OUTLET STRUCTURE 1 LEVEL TRANSMITTER	DWYER	PBLT2 (MERCOID)	YES	OR APPROVED EQUAL
I121	PSL-222	COMPRESSED AIR TO BNR BASINS PRESSURE SWITCH	ASHCROFT	B-SERIES	YES	OR APPROVED EQUAL
I121	PI-223	COMPRESSED AIR TO BNR BASINS PRESSURE GAUGE	ASHCROFT	1279	N/A	OR APPROVED EQUAL
I132	FE/FIT-382	RAS TO BNR BASINS FLOW SENSOR/TRANSMITTER	SIEMENS	MAG 5100W + MAG 6000	NO	18"; OR APPROVED EQUAL
I132	FE/FIT-392	WAS TO DIGESTER FLOW SENSOR/TRANSMITTER	SIEMENS	MAG 5100W + MAG 6000	NO	14"; OR APPROVED EQUAL
I143	PIT-491	UTILITY WATER PUMPS PRESSURE TRANSMITTER	E+H	CERABAR PMP51B	YES	OR APPROVED EQUAL
I143	FE/FIT-492	UTILITY WATER PUMPS FLOW SENSOR/TRANSMITTER	SIEMENS	MAG 5100W + MAG 6000	NO	OR APPROVED EQUAL
I162	PSL-672	UTILITY WATER LOW PRESSURE SWITCH	ASHCROFT	B-SERIES	YES	OR APPROVED EQUAL
I162	PI-673	UTILITY WATER LOW PRESSURE GAUGE	ASHCROFT	1279	N/A	OR APPROVED EQUAL
I162	FE/FIT-653	POLYMER TO SCREW PRESS 1 FLOW SENSOR/TRANSMITTER	SIEMENS	MAG 5100W + MAG 6000	NO	1/2"; OR APPROVED EQUAL
I162	FSH-882	POLYMER AREA EMERGENCY WASH STATION FLOW SWITCH	DWYER	V6 FLOTECT	N/A	OR APPROVED EQUAL

INSTRUMENT SCHEDULE

DRAWING IS TO SCALE
IF BAR MEASURES:
1" = FULL SCALE
1/2" = HALF SCALE

[illegible]

MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

5455 WEST OLD HWY ROAD MORGAN, UT 84050

BNR WASTEWATER TREATMENT 2022

INSTRUMENTATION - DETAILS

INSTRUMENT SCHEDULE



533 W 2600 S, Suite 25
Bountiful, Utah 84010
Phone: (801) 677-0011
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DRAWING NO.

1902

SHEET

8/19/2022 C:\USERS\MICHAEL_JOHNSON\AQUA ENGINEERING\WG\SID - 002191.P MGSID / AND C DESIGN\050 DRAFTING\998 INSTRUMENTATION\TYPICAL PANEL\1003.DWG

Item	Manufacturer	Part Number	Discription	Qty	Notes
PLC EQUIPMENT					
1	ALLEN BRADLEY	5069-L340ER	COMPACT LOGIX PROCESSOR MODULE	1	
2	ALLEN BRADLEY	5069-RTB64-SCREW	COMPACT LOGIX PLC POWER SCREW TERMINAL BLOCK KIT	1	
3	ALLEN BRADLEY	5069-IB16	COMPACT LOGIX 16PT DISCRETE 24VDC INPUT MODULE	7	
4	ALLEN BRADLEY	5069-OB16	COMPACT LOGIX 16PT DISCRETE 24VDC OUTPUT MODULE	3	
5	ALLEN BRADLEY	5069-IF8	COMPACT LOGIX 8PT CURRENT ANALOG INPUT MODULE	2	
6	ALLEN BRADLEY	5069-OF4	COMPACT LOGIX 4PT CURRENT ANALOG OUTPUT MODULE	1	
7	ALLEN BRADLEY	5069-RTB18-SCREW	COMPACT LOGIX MODULE SCREW TERMINAL BLOCK	13	
POWER DISTRIBUTION EQUIPMENT					
20	PHOENIX CONTACT	2904601	10A 24VDC QUINT POWER SUPPLY	2	
21	PHOENIX CONTACT	2907719	24VDC REDUNDANCY DIODE	1	
22	PHOENIX CONTACT	2907573	C CURVE 20A DIN RAIL MOUNT BREAKER	1	
23	PHOENIX CONTACT	2907571	C CURVE 15A DIN RAIL MOUNT BREAKER	1	
25	PHOENIX CONTACT	3046430	UT6 120V FUSE TERMINAL BLOCK WITH LED	LOT	
26	PHOENIX CONTACT	3046414	UT6 24V FUSE TERMINAL BLOCK WITH LED	LOT	
30	PHOENIX CONTACT	0800886	DIN RAIL END CLAMP	LOT	
31	PHOENIX CONTACT	3044131	UT6 24-8GA FEED THROUGH TERMINAL	LOT	
32	PHOENIX CONTACT	3044157	UT6 24-8GA FEED THROUGH GROUND TERMINAL	LOT	
33	PHOENIX CONTACT	3047028	UT4/UT6 TERMINAL END COVER	LOT	
36	PHOENIX CONTACT	3047303	UTTB4 TERMINAL SPACER PLATE	LOT	
37	PHOENIX CONTACT	3044814	UTTB4 16-10GA TWO POLE FEED THROUGH TERMINAL	LOT	
38	PHOENIX CONTACT	3044759	UTTB4 16-10GA DOUBLE LEVEL GROUND TERMINAL	LOT	
39	PHOENIX CONTACT	3047293	UTTB4 DOUBLE LEVEL TERMINAL END COVER	LOT	
40	PHOENIX CONTACT	3046100	UT4 120V FUSED TERMINAL WITH LED	LOT	
41	PHOENIX CONTACT	2900304	120V PLC INTERFACE RELAY	LOT	
42	PHOENIX CONTACT	3030323	UT6 10 TERMINAL PLUG IN BRIDGE - RED	LOT	
43	PHOENIX CONTACT	3032606	UT6 10 TERMINAL PLUG IN BRIDGE - BLUE	LOT	
44	PHOENIX CONTACT	3032224	UT4 50 TERMINAL PLUG IN BRIDGE - RED	LOT	
45	PHOENIX CONTACT	3032211	UT4 50 TERMINAL PLUG IN BRIDGE - BLUE	LOT	
46	PHOENIX CONTACT	2966786	FBST 500MM PLUG IN BRIDGE - RED	LOT	
47	PHOENIX CONTACT	2966692	FBST 500MM PLUG IN BRIDGE - BLUE	LOT	
48	PHOENIX CONTACT	3214366	UTT4 FUSED DOUBLE LEVEL TERMINAL W/24V LED	LOT	
50	PHOENIX CONTACT	3214301	UT 2.5 TRIPLE LAYER TERMINAL /BOTTOM LAYER GROUNDED	LOT	
51	PHOENIX CONTACT	3214314	UT 2.5 TRIPLE LAYER TERMINAL END CONVER	LOT	
54	IDEC	RJ1S-CL-A120	RELAY 120VAC COIL SPST W/SURGE SUPPRESSION	LOT	
55	IDEC	RJ1S-CLD-D24	RELAY 24VDC COIL SPST W/SURGE SUPPRESSION	LOT	
56	IDEC	SJ1S-07LW	DIN MOUNT RELAY BASE FOR RJ1S RELAYS	LOT	
PANEL EQUIPMENT					
60	SAGINAW	SCE-724818FSD	72"x48"x18" ELECTRICAL ENCLOSURE	1	
61	SAGINAW	SCE-72P78F1	BACK PANEL FOR 72"x48" ENCLOSURES	1	
62	SAGINAW	SCE-LF24NO	24" LED PANEL LAMP W/ AUTO DOOR SWITCH	2	
64	APC	BX1000M	1000VA UPS	1	
65	LEVITON	T5015	15A 120V SIMPLEX OUTLET	1	
66	PASS & SEYMOUR	SL7	SIMPLEX RECEPTACLE COVER PLATE	1	
67	LEVITON	CR15	15A 120V DUPLEX OUTLET	1	
68	LEVITON	SL8	DUPLEX RECEPTACLE COVER PLATE	1	
69	BELL	5320-0	SINGLE GANG ELECTRICAL BOX	2	
70	PANDUIT	F4X4WH6	4" x 4" WIRE DUCT, WHITE	LOT	
71	PANDUIT	C4WH6	4" WIRE COVER, WHITE	LOT	
72	PANDUIT	F2X4WH6	2" x 4" WIRE DUCT, WHITE	LOT	
73	PANDUIT	C2WH6	2" WIRE COVER, WHITE	LOT	
76	PANDUIT	F1X4LG6	1" x 4" WIRE DUCT, LT GRAY	LOT	
77	PANDUIT	C1LG6	1" WIRE COVER, LT GRAY	LOT	
84	SOUTHWIRE		MTW TINNED CONTROL WIRE (SIZE, COLOR VARIES)	LOT	
85	BELDEN	8760	#18 TWISTED SHIELDED PAIR, TINNED COPPER	LOT	
86	PHOENIX CONTACT	VARIES	TERMINAL BLOCK LABELS	LOT	
87	PHOENIX CONTACT	VARIES	WIRE LABELS	LOT	
88	PHOENIX CONTACT	VARIES	BACKPANEL ADHESIVE LABELS	LOT	
89	CUSTOM	VARIES	ENGRAVED LABELS	LOT	
NETWORK EQUIPMENT					
90	ALLEN BRADLEY	1783-BVS20CGL	MANAGED ETHERNET SWITCH	1	
91	PANDUIT	FWME2	FIBER TERMINATION ENCLOSURE	1	
92	PANDUIT	FAP62AQDLCZ	6 LC (12 STRAND) FIBER TERMINATION PANEL	2	

ORIGINAL				
NO.	DATE	DESIGN	DRAWN	CHECKED
0	00/00/0000	MT	MGJ	MT
REVISIONS				

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MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

5455 WEST OLD HWY ROAD MORGAN, UT 84050

PLC PANEL DRAWINGS

TYPICAL BILL OF MATERIALS

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DRAWING IS TO SCALE IF BAR MEASURES:
1" = FULL SCALE
1/2" = HALF SCALE

SHEET 3 OF 14

1003

8/19/2022 C:\USERS\MICHAEL_JOHNSON\AQUA ENGINEERING\MGSID - 002191.P MGSID / AND C DESIGN\050 DRAFTING\998 INSTRUMENTATION\TYPICAL PANEL\004.DWG

DISCRETE INPUTS			
IO ADDRESS	TAG	DESCRIPTION	
R1S1:00	ZI-311	SECONDARY CLARIFIER 1 AUTO	PLC-PB
R1S1:01	YI-311	SECONDARY CLARIFIER 1 RUNNING	PLC-PB
R1S1:02	YA-311	SECONDARY CLARIFIER 1 FAIL	PLC-PB
R1S1:03	JAH-311	SECONDARY CLARIFIER 1 TORQUE ALARM HIGH	PLC-PB
R1S1:04	JAHH-311	SECONDARY CLARIFIER 1 TORQUE ALARM HIGH HIGH	PLC-PB
R1S1:05	ZI-321	SECONDARY CLARIFIER 2 AUTO	PLC-PB
R1S1:06	YI-321	SECONDARY CLARIFIER 2 RUNNING	PLC-PB
R1S1:07	YA-321	SECONDARY CLARIFIER 2 FAIL	PLC-PB
R1S1:08	JAH-321	SECONDARY CLARIFIER 2 TORQUE ALARM HIGH	PLC-PB
R1S1:09	JAHH-321	SECONDARY CLARIFIER 2 TORQUE ALARM HIGH HIGH	PLC-PB
R1S1:10	ZI-331	FUTURE SECONDARY CLARIFIER 3 AUTO	PLC-PB
R1S1:11	YI-331	FUTURE SECONDARY CLARIFIER 3 RUNNING	PLC-PB
R1S1:12	YA-331	FUTURE SECONDARY CLARIFIER 3 FAIL	PLC-PB
R1S1:13	JAH-331	FUTURE SECONDARY CLARIFIER 3 TORQUE ALARM HIGH	PLC-PB
R1S1:14	JAHH-331	FUTURE SECONDARY CLARIFIER 3 TORQUE ALARM HIGH HIGH	PLC-PB
R1S1:15	FQI-492	UTILITY WATER PUMPS FLOW TOTAL	PLC-PB
R1S2:00			
R1S2:01			
R1S2:02			
R1S2:03			
R1S2:04			
R1S2:05			
R1S2:06			
R1S2:07			
R1S2:08			
R1S2:09			
R1S2:10			
R1S2:11		SPD FAIL	
R1S2:12		UPS ON BATTERY	
R1S2:13		UPS FAIL	
R1S2:14		POWER SUPPLY A FAIL	
R1S2:15		POWER SUPPLY B FAIL	
DISCRETE OUTPUTS			
IO ADDRESS	TAG	DESCRIPTION	
R1S4:00	YC-311	SECONDARY CLARIFIER 1 START COMMAND	PLC-PB
R1S4:01	YC-321	SECONDARY CLARIFIER 2 START COMMAND	PLC-PB
R1S4:02	YC-331	FUTURE SECONDARY CLARIFIER 3 START COMMAND	PLC-PB
R1S4:03			
R1S4:04			
R1S4:05			
R1S4:06			
R1S4:07			
R1S4:08			
R1S4:09			
R1S4:10			
R1S4:11			
R1S4:12			
R1S4:13			
R1S4:14			
R1S4:15			
R1S4:16			
ANALOG INPUTS			
IO ADDRESS	TAG	DESCRIPTION	
R1S7:00	PI-491	UTILITY WATER PUMPS PRESSURE	PLC-PB
R1S7:01	FI-492	UTILITY WATER PUMPS FLOW	PLC-PB
R1S7:02			
R1S7:03			
R1S7:04			
R1S7:05			
R1S7:06			
R1S7:07			

ORIGINAL				
NO.	DATE	DESIGN	DRAWN	CHECKED
0	00/00/0000	MT	MGJ	MT
REVISIONS				

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MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

5455 WEST OLD HWY ROAD MORGAN, UT 84050

PLC PANEL DRAWINGS

PLC-PB IO SCHEDULE

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SHEET 4 OF 14

1004

8/19/2022 C:\USERS\MICHAEL_JOHNSON\AQUA ENGINEERING\WG51D - 0021 91.P.MCS1D 1 AND C DESIGN\050 DRAFTING\998 INSTRUMENTATION\TYPICAL PANEL\1005.DWG

DISCRETE INPUTS			
IO ADDRESS	TAG	DESCRIPTION	
R1S1:00	LAL-011	PLANT LIFT STATION WET WELL LEVEL ALARM LOW	PLC-HW
R1S1:01	LAL-011	PLANT LIFT STATION WET WELL LEVEL ALARM HIGH	PLC-HW
R1S1:02	ZI-021	PLANT LIFT STATION PUMP 1 REMOTE	PLC-HW
R1S1:03	YI-021	PLANT LIFT STATION PUMP 1 RUNNING	PLC-HW
R1S1:04	YA-021	PLANT LIFT STATION PUMP 1 FAIL	PLC-HW
R1S1:05	YC-021	PLANT LIFT STATION PUMP 1 START COMMAND	PLC-HW
R1S1:06	TAH-021	PLANT LIFT STATION PUMP 1 TEMPERATURE ALARM HIGH	PLC-HW
R1S1:07	MMA-021	PLANT LIFT STATION PUMP 1 MOISTURE ALARM	PLC-HW
R1S1:08	ZI-022	PLANT LIFT STATION PUMP 2 REMOTE	PLC-HW
R1S1:09	YI-022	PLANT LIFT STATION PUMP 2 RUNNING	PLC-HW
R1S1:10	YA-022	PLANT LIFT STATION PUMP 2 FAIL	PLC-HW
R1S1:11	YC-022	PLANT LIFT STATION PUMP 2 START COMMAND	PLC-HW
R1S1:12	TAH-022	PLANT LIFT STATION PUMP 2 TEMPERATURE ALARM HIGH	PLC-HW
R1S1:13	MMA-022	PLANT LIFT STATION PUMP 2 MOISTURE ALARM	PLC-HW
R1S1:14			
R1S1:15			
R1S2:00	ZI-023	PLANT LIFT STATION PUMP 3 REMOTE	PLC-HW
R1S2:01	YI-023	PLANT LIFT STATION PUMP 3 RUNNING	PLC-HW
R1S2:02	YA-023	PLANT LIFT STATION PUMP 3 FAIL	PLC-HW
R1S2:03	YC-023	PLANT LIFT STATION PUMP 3 START COMMAND	PLC-HW
R1S2:04	TAH-023	PLANT LIFT STATION PUMP 3 TEMPERATURE ALARM HIGH	PLC-HW
R1S2:05	MMA-023	PLANT LIFT STATION PUMP 3 MOISTURE ALARM	PLC-HW
R1S2:06	ZI-381A	RAS TO BNR BASINS VAVLE REMOTE	PLC-HW
R1S2:07	FQI-382	RAS TO BNR BASINS FLOW TOTAL	PLC-HW
R1S2:08	ZI-391A	WAS TO DIGESTER VALVE REMOTE	PLC-HW
R1S2:09	ZI-391B	WAS TO DIGESTER VALVE POSITION	PLC-HW
R1S2:10	FQI-392	WAS TO DIGESTER FLOW TOTAL	PLC-HW
R1S2:11	ZI-512	AEROBIC DIGESTER 1 DECANT VALVE 1 REMOTE	PLC-HW
R1S2:12	ZIO-512	AEROBIC DIGESTER 1 DECANT VALVE 1 OPENED	PLC-HW
R1S2:13	ZIC-512	AEROBIC DIGESTER 1 DECANT VALVE 1 CLOSED	PLC-HW
R1S2:14	ZI-513	AEROBIC DIGESTER 1 DECANT VALVE 2 REMOTE	PLC-HW
R1S2:15	ZIO-513	AEROBIC DIGESTER 1 DECANT VALVE 2 OPENED	PLC-HW
R1S3:00	ZIC-513	AEROBIC DIGESTER 1 DECANT VALVE 2 CLOSED	PLC-HW
R1S3:01	ZI-514	AEROBIC DIGESTER 1 DECANT VALVE 3 REMOTE	PLC-HW
R1S3:02	ZIO-514	AEROBIC DIGESTER 1 DECANT VALVE 3 OPENED	PLC-HW
R1S3:03	ZIC-514	AEROBIC DIGESTER 1 DECANT VALVE 3 CLOSED	PLC-HW
R1S3:04	ZI-516	AEROBIC DIGESTER 1 DECANT VALVE 4 REMOTE	PLC-HW
R1S3:05	ZIO-516	AEROBIC DIGESTER 1 DECANT VALVE 4 OPENED	PLC-HW
R1S3:06	ZIC-516	AEROBIC DIGESTER 1 DECANT VALVE 4 CLOSED	PLC-HW
R1S3:07	ZI-517	AEROBIC DIGESTER 1 DECANT VALVE 5 REMOTE	PLC-HW
R1S3:08	ZIO-517	AEROBIC DIGESTER 1 DECANT VALVE 5 OPENED	PLC-HW
R1S3:09	ZIC-517	AEROBIC DIGESTER 1 DECANT VALVE 5 CLOSED	PLC-HW
R1S3:10	ZI-518	AEROBIC DIGESTER 1 DECANT VALVE 6 REMOTE	PLC-HW
R1S3:11	ZIO-518	AEROBIC DIGESTER 1 DECANT VALVE 6 OPENED	PLC-HW
R1S3:12	ZIC-518	AEROBIC DIGESTER 1 DECANT VALVE 6 CLOSED	PLC-HW
R1S3:13	ZI-532	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 1 REMOTE	PLC-HW
R1S3:14	ZIO-532	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 1 OPENED	PLC-HW
R1S3:15	ZIC-532	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 1 CLOSED	PLC-HW
R1S4:00	ZI-533	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 2 REMOTE	PLC-HW
R1S4:01	ZIO-533	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 2 OPENED	PLC-HW
R1S4:02	ZIC-533	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 2 CLOSED	PLC-HW
R1S4:03	ZI-534	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 3 REMOTE	PLC-HW
R1S4:04	ZIO-534	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 3 OPENED	PLC-HW
R1S4:05	ZIC-534	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 3 CLOSED	PLC-HW
R1S4:06	ZI-536	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 4 REMOTE	PLC-HW
R1S4:07	ZIO-536	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 4 OPENED	PLC-HW
R1S4:08	ZIC-536	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 4 CLOSED	PLC-HW
R1S4:09	ZI-537	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 5 REMOTE	PLC-HW
R1S4:10	ZIO-537	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 5 OPENED	PLC-HW
R1S4:11	ZIC-537	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 5 CLOSED	PLC-HW
R1S4:12	ZI-538	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 6 REMOTE	PLC-HW
R1S4:13	ZIO-538	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 6 OPENED	PLC-HW
R1S4:14	ZIC-538	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 6 CLOSED	PLC-HW
R1S4:15			
R1S5:00	ZI-551	AEROBIC DIGESTER 1 AIR VALVE 1 REMOTE	PLC-HW
R1S5:01	ZIO-551	AEROBIC DIGESTER 1 AIR VALVE 1 OPENED	PLC-HW
R1S5:02	ZIC-551	AEROBIC DIGESTER 1 AIR VALVE 1 CLOSED	PLC-HW
R1S5:03	ZI-552	AEROBIC DIGESTER 1 AIR VALVE 2 REMOTE	PLC-HW
R1S5:04	ZIO-552	AEROBIC DIGESTER 1 AIR VALVE 2 OPENED	PLC-HW
R1S5:05	ZIC-552	AEROBIC DIGESTER 1 AIR VALVE 2 CLOSED	PLC-HW
R1S5:06	ZI-561	FUTURE AEROBIC DIGESTER 2 AIR VALVE 1 REMOTE	PLC-HW
R1S5:07	ZIO-561	FUTURE AEROBIC DIGESTER 2 AIR VALVE 1 OPENED	PLC-HW
R1S5:08	ZIC-561	FUTURE AEROBIC DIGESTER 2 AIR VALVE 1 CLOSED	PLC-HW
R1S5:09	ZI-562	FUTURE AEROBIC DIGESTER 2 AIR VALVE 2 REMOTE	PLC-HW
R1S5:10	ZIO-562	FUTURE AEROBIC DIGESTER 2 AIR VALVE 2 OPENED	PLC-HW
R1S5:11	ZIC-562	FUTURE AEROBIC DIGESTER 2 AIR VALVE 2 CLOSED	PLC-HW
R1S5:12	FAH-682	POLYMER EYEWASH SHOWER FLOW ALARM HIGH	PLC-HW
R1S5:13			
R1S5:14			
R1S5:15			

DISCRETE INPUTS			
IO ADDRESS	TAG	DESCRIPTION	
R1S6:00			
R1S6:01			
R1S6:02			
R1S6:03			
R1S6:04			
R1S6:05			
R1S6:06			
R1S6:07			
R1S6:08			
R1S6:09			
R1S6:10			
R1S6:11			
R1S6:12			
R1S6:13			
R1S6:14			
R1S6:15			
R1S7:00			
R1S7:01			
R1S7:02			
R1S7:03			
R1S7:04			
R1S7:05			
R1S7:06			
R1S7:07			
R1S7:08			
R1S7:09			
R1S7:10			
R1S7:11		SPD FAIL	
R1S7:12		UPS ON BATTERY	
R1S7:13		UPS FAIL	
R1S7:14		POWER SUPPLY A FAIL	
R1S7:15		POWER SUPPLY B FAIL	
DISCRETE OUTPUTS			
IO ADDRESS	TAG	DESCRIPTION	
R1S8:00	ZCO-512	AEROBIC DIGESTER 1 DECANT VALVE 1 OPEN COMMAND	PLC-HW
R1S8:01	ZCC-512	AEROBIC DIGESTER 1 DECANT VALVE 1 CLOSE COMMAND	PLC-HW
R1S8:02	ZCO-513	AEROBIC DIGESTER 1 DECANT VALVE 2 OPEN COMMAND	PLC-HW
R1S8:03	ZCC-513	AEROBIC DIGESTER 1 DECANT VALVE 2 CLOSE COMMAND	PLC-HW
R1S8:04	ZCO-514	AEROBIC DIGESTER 1 DECANT VALVE 3 OPEN COMMAND	PLC-HW
R1S8:05	ZCC-514	AEROBIC DIGESTER 1 DECANT VALVE 3 CLOSE COMMAND	PLC-HW
R1S8:06	ZCO-516	AEROBIC DIGESTER 1 DECANT VALVE 4 OPEN COMMAND	PLC-HW
R1S8:07	ZCC-516	AEROBIC DIGESTER 1 DECANT VALVE 4 CLOSE COMMAND	PLC-HW
R1S8:08	ZCO-517	AEROBIC DIGESTER 1 DECANT VALVE 5 OPEN COMMAND	PLC-HW
R1S8:09	ZCC-517	AEROBIC DIGESTER 1 DECANT VALVE 5 CLOSE COMMAND	PLC-HW
R1S8:10	ZCO-518	AEROBIC DIGESTER 1 DECANT VALVE 6 OPEN COMMAND	PLC-HW
R1S8:11	ZCC-518	AEROBIC DIGESTER 1 DECANT VALVE 6 CLOSE COMMAND	PLC-HW
R1S8:12	ZCO-532	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 1 OPEN COMMAND	PLC-HW
R1S8:13	ZCC-532	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 1 CLOSE COMMAND	PLC-HW
R1S8:14	ZCO-533	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 2 OPEN COMMAND	PLC-HW
R1S8:15	ZCC-533	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 2 CLOSE COMMAND	PLC-HW
R1S9:00	ZCO-534	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 3 OPEN COMMAND	PLC-HW
R1S9:01	ZCC-534	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 3 CLOSE COMMAND	PLC-HW
R1S9:02	ZCO-536	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 4 OPEN COMMAND	PLC-HW
R1S9:03	ZCC-536	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 4 CLOSE COMMAND	PLC-HW
R1S9:04	ZCO-537	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 5 OPEN COMMAND	PLC-HW
R1S9:05	ZCC-537	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 5 CLOSE COMMAND	PLC-HW
R1S9:06	ZCO-538	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 6 OPEN COMMAND	PLC-HW
R1S9:07	ZCC-538	FUTURE AEROBIC DIGESTER 2 DECANT VALVE 6 CLOSE COMMAND	PLC-HW
R1S9:08	ZCO-551	AEROBIC DIGESTER 1 AIR VALVE 1 OPEN COMMAND	PLC-HW
R1S9:09	ZCC-551	AEROBIC DIGESTER 1 AIR VALVE 1 CLOSE COMMAND	PLC-HW
R1S9:10	ZCO-552	AEROBIC DIGESTER 1 AIR VALVE 2 OPEN COMMAND	PLC-HW
R1S9:11	ZCC-552	AEROBIC DIGESTER 1 AIR VALVE 2 CLOSE COMMAND	PLC-HW
R1S9:12	ZCO-561	FUTURE AEROBIC DIGESTER 2 AIR VALVE 1 OPEN COMMAND	PLC-HW
R1S9:13	ZCC-561	FUTURE AEROBIC DIGESTER 2 AIR VALVE 1 CLOSE COMMAND	PLC-HW
R1S9:14	ZCO-562	FUTURE AEROBIC DIGESTER 2 AIR VALVE 2 OPEN COMMAND	PLC-HW
R1S9:15	ZCC-562	FUTURE AEROBIC DIGESTER 2 AIR VALVE 2 CLOSE COMMAND	PLC-HW
R1S10:00			
R1S10:01			
R1S10:02			
R1S10:03			
R1S10:04			
R1S10:05			
R1S10:06			
R1S10:07			
R1S10:08			
R1S10:09			
R1S10:10			
R1S10:11			
R1S10:12			
R1S10:13			
R1S10:14			
R1S10:15			

ANALOG INPUTS			
IO ADDRESS	TAG	DESCRIPTION	
R1S11:00	LI-011	PLANT LIFT STATION WET WELL LEVEL	PLC-HW
R1S11:01	FI-031	PLANT LIFT STATION FLOW	PLC-HW
R1S11:02	ZI-381B	RAS TO BNR BASINS VALVE POSITION	PLC-HW
R1S11:03	FI-382	RAS TO BNR BASINS FLOW	PLC-HW
R1S11:04	ZI-391B	WAS TO DIGESTER VALVE POSITION	PLC-HW
R1S11:05	FI-392	WAS TO DIGESTER FLOW	PLC-HW
R1S11:06	AI-501	AEROBIC DIGESTER 1 DISSOLVED OXYGEN 1	PLC-HW
R1S11:07	AI-502	AEROBIC DIGESTER 1 DISSOLVED OXYGEN 2	PLC-HW
R1S12:00	AI-521	AEROBIC DIGESTER 2 DISSOLVED OXYGEN 1	PLC-HW
R1S12:01	AI-522	AEROBIC DIGESTER 2 DISSOLVED OXYGEN 2	PLC-HW
R1S12:02			
R1S12:03			
R1S12:04			
R1S12:05			
R1S12:06			
R1S12:07			
R1S12:08			
ANALOG OUTPUTS			
IO ADDRESS	TAG	DESCRIPTION	
R1S13:00	ZC-381	RAS TO BNR BASINS VALVE POSITION COMMAND	PLC-HW
R1S13:01	ZC-391	WAS TO DIGESTER VAVLE POSITION COMMAND	PLC-HW
R1S13:02			
R1S13:03			

ORIGINAL				
NO.	DATE	DESIGN	DRAWN	CHECKED
0	00/00/0000	MT	MGJ	MT
REVISIONS				



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MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

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PLC PANEL DRAWINGS
PLC-HW IO SCHEDULE

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IF BAR MEASURES:
1" = FULL SCALE
1/2" = HALF SCALE

SHEET 5 OF 14

1005

MGSID – Sewer System Improvement Project
Geotechnical Investigation

October 30, 2020



October 30, 2020

Larry Nance, Chair
Mountain Green Sewer Improvement District
5455 West old Highway Road
Mountain Green, Utah 84050

Subject: MGSID - Sewer System Improvement Project
Geotechnical Investigation
Mountain Green, Utah

Mr. Nance,

Enclosed herein is the report for a geotechnical investigation for the above referenced project. This report presents the results of the geotechnical subsurface exploration, engineering analysis, and recommendations for design and construction of the proposed structures for the sewer system improvement project in Mountain Green, Utah.

We appreciate the opportunity to provide geotechnical services to you for this project. Should you have any questions about the report, or if we may be of further service in any way, please let us know.

Sincerely,
SUNRISE ENGINEERING, INC.

Prepared by:



Dao Yang, P.E.
Project Engineer/Hydrogeologist

Reviewed by:

A blue ink signature of Derek Anderson.

Derek Anderson, P.E.
Environmental Division Manager

MGSID – SEWER SYSTEM IMPROVEMENT PROJECT

GEOTECHNICAL INVESTIGATION

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1 INTRODUCTION

Sunrise Engineering, Inc. (Sunrise) has completed a geotechnical investigation for structures related to the sewer system improvement project in Mountain Green, Utah proposed by the Mountain Green Sewer Improvement District (MGSID). The topographic locale of the project site is in Sections 26 and 27, Township 5 North, Range 1 East, Salt Lake Base and Meridian (SLBM), as shown in Figure 1. This report presents a summary of the geotechnical investigation.

1.1 Objectives

The objectives of the geotechnical investigation were to:

- Evaluate subsurface soil/rock and groundwater conditions within the project area, and
- Provide appropriate foundation and earthwork recommendations at the project site.

1.2 Scope of Work

The following tasks have been completed:

- Collection and review of available geologic and soil data within the project area.
- Drilling of six borings (B-1 through B-6) to depths ranging from approximately 30 to 50 feet below grade.
- Analysis of collected geotechnical data.
- Provision of recommendations for design and construction of the proposed project.

2 PROPOSED CONSTRUCTION

As shown in Figure 2, the proposed construction consists of two clarifiers, one maintenance and storage building, one aerobic digester, and a headworks screen and dewatering structure at the treatment plant, and a wet well at the Monte Verde Lift Station.

3 SITE INVESTIGATION

3.1 General Geology

Geologic units in the Morgan Valley area range from early Proterozoic to Holocene age. The Morgan Valley area is in a region with complex structural features, mostly related to three major episodes of mountain building (Wallace and others, 2012). During the early Proterozoic, intense deformation occurred approximately the same time as high-grade metamorphism and igneous intrusion (Bryant, 1988). During the mostly Cretaceous time, compression caused shortening and development of the Sevier fold and thrust belt (Yonkee and others, 1997). During the middle Cenozoic, extension occurred that resulted in the

deep fill of tuffaceous rocks (Constenius, 1996). During the late Cenozoic, extension, which continues today, caused the development of Basin-and-Range-type features (Smiths and Bruhn, 1984). Morgan Valley is bounded on the west and east sides by normal faults, though the locations of and offset on these faults may vary; the faults may not be continuous along the sides of the valley (Wallace and others, 2012).

Morgan Valley is filled with probably Oligocene Norwood Formation and slightly older tuffaceous to volcanoclastic, lacustrine, and fluvial sedimentary rocks. The Norwood strata extend north of Morgan Valley across the topographic divide (Morgan-Weber County line) into Ogden Valley (Wallace and others, 2012). The Northwood Formation unconformably overlies the Wasatch Formation in the Morgan Valley syncline.

Several types of Quaternary deposits are present in the project area. Remnants of Pliocene and/or Pleistocene (lower Quaternary) alluvial deposits are present on both sides of Morgan Valley and along Cottonwood Creek. Quaternary (upper Pleistocene) lacustrine, deltaic and alluvial deposits related to Lake Bonneville are present in Morgan Valley, though the lake did not occupy the valley after it dropped to the Provo shoreline (Wallace and others, 2012). Deposits younger than Lake Bonneville are mostly Holocene alluvium in the valley.

Most of the alluvium in Morgan Valley greater than 10 feet thick is located along the major tributaries and the floodplain of the Weber River (Gates and others, 1984). The alluvium is mainly derived from Tertiary sedimentary rocks that flank the valley and from Lake Bonneville deposits. The alluvial valley-fill deposits in Morgan Valley consist primarily of clay, silt, sand and gravel, and are determined by Gates and others (1984) to be more than 200 feet thick.

3.2 Field Exploration and Subsurface Soil and Groundwater Conditions

Fieldwork was conducted on September 9 and 11, 2020. Six borings (B-1 through B-6) were drilled at the proposed structure locations using a hollow-stem auger rig. Approximate boring locations are shown in Figure 2. At the treatment plant site, borings B-1 through B-5 were drilled to a depth of approximately 30 feet below grade. At the Monte Verde lift station site, boring B-6 was drilled to a depth of approximately 50 feet below grade.

3.2.1 Drilling Operation and Sampling

During drilling operations, soil samples were obtained at 5-foot intervals. Samplers were driven with a 140-pound safety hammer free-falling from a distance of 30 inches. Blows required to drive the sampler at 6-inch intervals, for a total length of 18 inches, were recorded in the field. The sum of the last 12 inches of driving is recorded on the boring log at respective sampling depths and represents the standard penetration number. Blow counts recorded in the field were corrected for sampler diameter, depth, hammer efficiency and rod length (standard corrections). In situ visual classification of soil samples was conducted in accordance with the Unified Soil Classification System (USCS).

3.2.2 Subsurface Soils

Based on field observations and geotechnical laboratory testing, the subsurface materials encountered at the treatment plant site generally consist of a clay layer at the surface, ranging in depth from 6 feet to 11 feet below grade, underlain by poorly-sorted sand and gravelly sand up to a depth of 31 feet below grade. However, the surficial clay layer is absent at the Monte Verde lift station site, where the surficial material consists of poorly-sorted small gravel with some sand underlain by poorly-sorted sand and gravelly sand up to a depth of 51 feet below grade.

A geotechnical laboratory report with soils testing results based on samples collected in the field is provided in Appendix A. Boring logs are provided in Appendix B.

3.2.3 Groundwater Conditions

After the borings were completed, groundwater was measured at depths ranging from approximately 5 feet to 6.5 feet below grade at the treatment plant site, and about 10 feet below grade at the Monte Verde lift station site. The boring logs show the depth to groundwater (Appendix B). It should be noted that seasonal fluctuations in precipitation, surface runoff from adjacent properties, or other on or offsite sources may also increase moisture conditions at the site. Fluctuations in groundwater levels of 5 feet or more may be possible at the site.

3.4 Geologic Hazards

3.4.1 Active Fault and Surface Fault Rupture

An active fault is a fault displaying evidence of greater than four inches of displacement along one or more of its traces during Holocene time (about 10,000 years ago to present).

According to the U.S. Geological Survey, or USGS, (2020), there is no active fault in the Mountain Green area. Therefore, a trenching program is not required.

3.4.2 Landslide/Rock Fall

Landslide or landslip is a geological phenomenon which includes a wide range of ground movement such as rock falls, deep failure of slopes, and shallow debris flows which can occur in offshore, coastal and onshore environments. Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors affecting the original slope stability. Typically, pre-conditional factors build up specific sub-surface conditions that make the area/slope prone to failure, whereas the actual landslide often requires a trigger before being released. According to Elliott and Harty (2010), the project site is in a very low landslide susceptibility zone. The ground surface at and surrounding the site is flat; therefore, rock fall potential is low.

3.4.3 Flooding and Erosion

Flooding and the consequent erosion associated with flooding are those hazards that are the result of concentrated flow of stormwater during torrential rains. Based on both a review of published maps and observations during fieldwork, the site topography is relatively flat, void of apparent drainages or collection areas, and slopes gently towards the west at an average gradient of approximately 0.5% according to the latest USGS topographic quadrangle map. According to the Federal Emergency Management Agency (FEMA) (2010 and 2017), the Monte Verde lift station is not within the floodplain and the treatment plant is in an area protected from the 1%-annual-change or greater flood hazard by a levee system. Therefore, the potential for flooding and erosion at the site is considered to be low.

3.4.4 Avalanche Path

An avalanche is a rapid flow of snow down a slope, from either natural triggers or human activity. Typically occurring in mountainous terrain, an avalanche can mix air and water with the descending snow. Powerful avalanches have the capability to entrain ice, rocks, trees, and other material on the slope. Avalanches are primarily composed of flowing snow, and are distinct from mudslides, rock slides, and serac collapses on an icefall. In mountainous terrain, avalanches are among the most serious objective hazards to life and property, with their destructive capability resulting from their potential to carry an enormous mass of snow rapidly over large distances.

According to the Utah Avalanche Center (2020), since 1900, no avalanches have been recorded in the project area. Therefore, the site is not within an avalanche path.

3.4.5 Liquefaction

Liquefaction is a process by which soils below the water table temporarily lose strength and behave as a viscous liquid rather than a solid. The types of soils most susceptible are clay-free deposits of sand and silts, and occasionally gravel. When seismic waves, primarily shear waves, pass through saturated granular layers, they distort the granular structure and cause loosely packed groups of particles to collapse. These collapses increase the pore-water pressure between the soil grains if drainage cannot occur. If the pore-water pressure rises to a level approaching the weight of the overlying soil, the effective stresses between soil grains drops to zero and the granular layer temporarily behaves as a viscous liquid rather than a solid. The liquefaction potential of a soil depends primarily on the looseness of the soil, the amount of cementing or clay between particles, and the amount of drainage restriction. Two conditions must exist for liquefaction to occur: (1) the soil must be susceptible to liquefaction (loose, water-saturated, sandy soil, typically between 0 and 30 feet below the ground surface) and (2) ground shaking must be strong enough to cause susceptible soils to liquefy (Anderson and others, 1994).

No liquefaction potential map is available for Morgan County, Utah. A liquefaction analysis was performed based on the empirical SPT approach. Idriss and Boulanger (2010) and Seed et al. (2003) have summarized the NEHRP (National Earthquake Hazards Reduction Program) recommended empirical SPT

approach for evaluating soil liquefaction potential (NEHRP, 2009). The stress-based approach was initiated by Seed and Idriss (1967) and has been used widely (Idriss and Boulanger, 2010). The basic framework is to compare the earthquake-induced cyclic stress ratios (CSR) with the cyclic resistance ratios (CRR) of the soil. The analysis for borings B-1 through B-6 indicates that the medium dense to very dense gravelly sand encountered from approximately 5 to 50 feet below grade at both the treatment plant and Monte Verde lift station sites is not liquefiable if a 500-year earthquake occurs. However, should a 2,500-year earthquake occur, the sands at different depths at various boring locations would have probabilities ranging from 0.08 to 1.0 to liquefy. The liquefaction evaluation results are summarized in Table 1.

Table 1: Liquefaction Evaluation for 2,500-Year Return Interval Event (M=6.79/PGA=0.399g) with Probability 2% in 50 Years (or 0.04%)

Boring #	Depth (feet)	USCS Classification	Liquefaction Probability	Overall Probability*
B-1	6-11	Silty Sand (SM)	100.0%	0.040%
B-2	16-21	Sand (SP)	45.6%	0.018%
B-2	26-31	Sand (SP)	100.0%	0.040%
B-3	26-31	Sand (SP)	100.0%	0.040%
B-4	26-31	Sand (SP)	7.1%	0.003%
B-5	11-16	Sand (SP)	1.3%	0.001%
B-5	26-31	Sand (SP)	99.9%	0.040%
B-6	11-16	Sand (SP)	3.8%	0.002%
Note: Overall probability = liquefaction probability times earthquake occurrence probability.				

Table 1 indicates the overall liquefaction potential at the site is very low after considering the earthquake occurrence probability (ranging from 0.001% to 0.04%). Should a 2,500-year earthquake occur, the settlement resulting from liquefaction of the sand formation at the site is estimated to be less than 0.25 inches.

4 DESIGN RECOMMENDATIONS

4.1 Site Preparation

Topsoil, manmade fills (where encountered) and soils loosened by construction activities should be removed from building pad areas, pavement areas, and concrete flatwork areas prior to foundation excavation and placement of site grading fills. Following site stripping, subgrade should be proof-rolled to a firm, non-yielding condition or 90% of the maximum dry density (ASTM D-1557).

Soft areas detected during proof-rolling operations should be removed and replaced with structural fill. If soft soils extend more than 1.5 feet deep, stabilization may be required. The use of stabilization

should be approved by the geotechnical engineer and would likely consist of over-excavating by at least 1.5 feet, placing a geofabric (such as Mirafi 600X) or geogrid (such as Tensar BX1100) at the bottom of the excavation over which a stabilizing fill consisting of angular coarse gravel with cobbles is placed up to the design subgrade.

Vegetation and other deleterious materials should be removed from the site. Stripped soils will be unsuitable as structural fill but may be stockpiled for later use in landscaped areas.

4.2 Temporary Excavation and Site Grading

Earthwork will be required to level construction sites. All temporary excavations should conform to regulations of the Occupational Safety and Health Administration (OSHA).

Based on the results of the field investigation at the treatment plant site, the shallow clayey soil at the site may be classified as Type A for the purpose of OSHA classification of earth materials exposed in temporary excavations if excavation is no more than 5 feet deep. With restrictions, Type A soils generally correspond to allowable temporary slope inclinations of 0.75:1 (horizontal to vertical) or 53°. However, if excavation is deeper than 5 feet, the sandy soil may be classified as Type C. With restrictions, Type C soils generally correspond to allowable temporary slope inclinations of 1.5:1 (horizontal to vertical) or 34°.

At the Monte Verde Lift Station, the granular soils may be classified as Type C.

However, excavation in saturated sand material will require flatter side slopes and dewatering. Temporary sheeting and shoring may be required since the cohesionless sand will tend to flow into the excavation.

Shallow temporary construction excavations not exceeding 4 feet in depth may be constructed with near-vertical side slopes. It is the responsibility of the contractor to provide safe working conditions in connection with below grade excavations.

The maximum anticipated depth of trench excavations for electrical conduits is 4 feet. These trench excavations could be made with near-vertical side slopes. Sheeting and shoring should be used whenever required by safety considerations. OSHA regulations do not require that trenches less than 4 feet deep be shored, but deeper trenches should be sheeted and shored in all cases.

Steep slopes are particularly susceptible to shallow slope sloughing in periods of heavy rainfall or upslope surface runoff. This is particularly true for fill slopes constructed of soil. It may be necessary to protect temporary slope faces during periods of heavy rainfall by diverting surface water away from slopes or other measures. It may also be necessary to treat temporary slopes with protective material to keep from drying out depending on the length of time that the temporary slope will be exposed and whether it would be possible to remove the desiccated material prior to refilling the excavation.

4.3 Fill Material

All fill material should be inorganic soils free of vegetation and debris. Fill material should meet the requirements based on the intended use, as summarized in Table 2. Compaction requirements are provided in Table 3.

Table 2: Fill Material Requirements

Fill Type	Application	Requirements		
		Gradation		Plasticity
		Size	Percent finer by weight	
Structural Fill	Under foundations, concrete slabs or other structural areas	4 inch No. 4 sieve No. 200 sieve	100 20-65 ≤20	Liquid limit 20 max Plasticity Index 6 max
Site Grading Fill	Fill in non-structural areas and below pavements	4 inch No. 200 sieve	100 <50	Liquid limit 40 max Plasticity Index 10 max
Pipe Zone Backfill	Within utility pipe zone	3/4 inch 3/8 inch No. 4 sieve No. 16 sieve No. 200 sieve	100 78-92 55-67 28-38 7-11	Non-plastic
Trench Backfill	Utility trench backfill above pipe zone	6 inch No. 200 sieve	100 <50	Liquid limit 30 max Plasticity Index 6 max
Aggregate Base Course	Access Road and Parking Area	2 inch 1½ inch 3/4 inch 3/8 inch No. 4 sieve No. 40 sieve No. 200 sieve	100 85-100 70-85 55-75 40-65 15-30 4-10	Non-plastic

Table 3: Compaction Requirements

Item	Description
Fill Lift Thickness	8 inches or less in loose thickness
Compaction	95% of the material's maximum dry density (MDD) per ASTM D1557 below footings, floor slabs and road areas as well as areas with 5 feet or more fill. 90% of material's MDD per ASTM D1557 in other areas of fill and backfill.
Moisture Content	near optimum water content (within ±2% of optimum at the time of placement and compaction).

Pea gravel or other similar non-cementitious, poorly graded materials should not be used as fill or backfill without prior approval from the geotechnical engineer.

Fill should be tested frequently for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified compaction is achieved. This may require adjustment of the moisture content.

4.4 Permanent Slopes

All final cut and fill slopes, if any, shall be graded to at least 2.0:1.0 (horizontal: vertical) or retained.

4.5 Utility Trenches

It should be noted that utility trench excavations have the potential to degrade the engineering properties of the adjacent fill materials. Utility trench walls that are permitted to move laterally can lead to reduced bearing capacity and increased settlement of adjacent structural elements and overlying slabs. Backfill for utility trenches is as important as the original preparation or structural fill placed to support either a foundation or slab. Therefore, it is imperative that the backfill for utility trenches be placed to meet the project specifications for structural fill.

4.6 Foundations

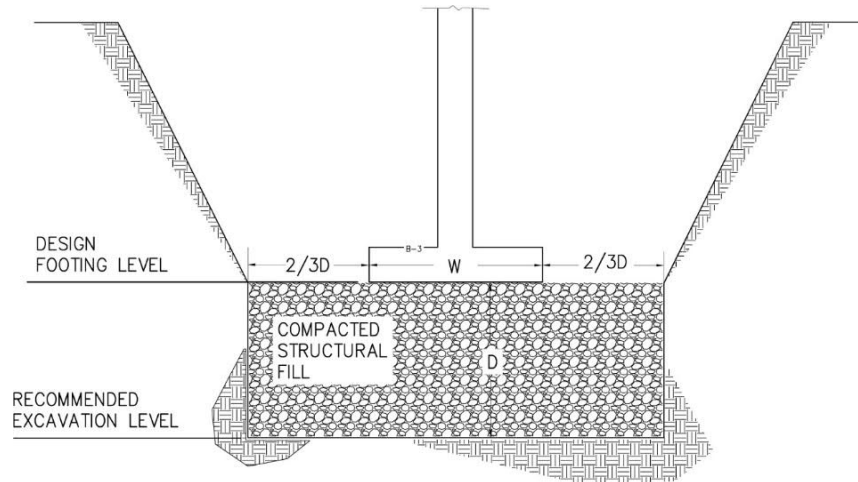
4.6.1 Footings

Based on the on-site soil conditions, it is recommended that structures be constructed on spread footings. Footings should not be installed on loose or disturbed soil, undocumented fill, topsoil, construction debris, frozen soil, or within ponded water. If unsuitable soils are encountered, they should be over-excavated and replaced with structural fill.

A minimum thickness of 1 foot of structural fill should be placed beneath footings up to the foundation elevation. The structural fill should also extend laterally beyond the edges of the foundation. Prior to placement of structural fill, proof-rolling of previously stripped subgrade should be completed (see Section 4.1). Compaction of structural fill should follow the recommendations described in Section 4.3.

If soft soils are encountered and are difficult to compact, a geofabric (such as Mirafi 600X or other approved equivalent) or a geogrid (such as Tensar BX1100 or other approved equivalent) should be placed at the bottom of the excavation.

The over-excavation and backfill procedure is illustrated in the following diagram:



OVEREXCAVATION / BACKFILL FOR SPREAD FOOTINGS

If the exposed soils on which the footings are to be founded become loose or disturbed, they should be re-compacted before concrete is placed.

4.6.2 Design Criteria

Based on the available data and in compliance with applicable building codes, the recommended design parameters for footings are summarized in Table 4.

Table 4: Design Criteria

Bearing Capacity	
Spread/continuous wall footings	2,000 pounds per square foot (psf)
Increase above value for short, transient loads	30%
Continuous footing width	18-24 inches
Exterior footing frost depth	30 inches
Total allowable settlement	< 1 inch
Estimated differential settlement	< ½ inch
Coefficient of subgrade reaction, k_1^1	100 pounds per cubic inch (pci) at treatment plant and 300 pci at Monte Verde lift station
Density of subgrade	110-120 pcf
Density of structural fill	130 pcf
Note 1: This value representative of a 1-foot by 1-foot footing and should be scaled appropriately for a larger foundation. The coefficient decreases as the width of the foundation increases. The following equation may be used to scale the coefficient of subgrade reaction: $k = k_1 \left(\frac{B+1}{2B} \right)^2 \text{ at Monte Verde lift station}$ $k = k_1 / B \text{ at treatment plant}$ Where, k = scaled coefficient of subgrade reaction and B = foundation width.	

4.6.3 Slab on Grade

The design requirements for a slab on grade are provided in Table 5.

Table 5: Design Recommendations for Slabs on Grade

Item	Description
Support for slab on grade	A minimum of 4 inches of crushed gravel underlain by a minimum of 12 inches of reworked native soil or structural fill that is properly placed and compacted.
Modulus of subgrade reaction, k_1	See Table 4.

4.6.4 Lateral Pressure

Excavation walls and retaining walls will be subjected to horizontal loads from the lateral earth pressure of backfill. When the granular fill is lightly compacted, drained, and the surface of the soil slope behind the wall is horizontal, the backfill may be considered equivalent to a fluid with a density of 35 pounds per cubic foot (pcf) for active pressure and 55 pcf for static pressure. When the soil slope behind the wall slopes upward at 2H:1V (26.7°), the backfill may be considered equivalent to a fluid with a density of 45 pcf for active pressure and 75 pcf for static pressure.

4.6.5 Lateral Resistance

Resistance to lateral loads at the bottom of the footings can be calculated based on a coefficient of friction of 0.3. Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of 250 pcf. Below the water table, this granular soil should be considered equivalent to a fluid with a density of 150 pcf. Note that fill against the sides of footings should be placed and compacted to at least 90% of maximum dry density as indicated in Section 4.3.

4.6.6 Drainage

Drainage design should provide for rapid removal of water from foundation soils and pavement materials, both during and after construction. Roof drainage should be discharged at least five feet away from the facilities. Drainage design should provide for intercepting water and directing it away from cut and fill slopes.

4.6.7 Cement Type

During the subsurface investigation, two soil samples were collected for testing (B-1 at 5 feet below grade and B-6 at 10 feet below grade). The samples were delivered under proper chain-of-custody protocols to a laboratory for sulfate analysis. The laboratory results indicate the sulfate concentration

ranges from <13 to 18 mg/kg of dry soil, which is a negligible level (Appendix C). Therefore, Cement Type I or II is recommended for the project construction.

4.7 Seismic Lateral Earth Force

4.7.1 Site Class

Based on the data collected from borings B-1 through B-6 and geological information in the area, the site can be classified as Site Class D (stiff soil) according to International Code Council, Inc. (2018).

4.7.2 Seismic Design Category

The seismic design category for the project site is D.

4.7.3 Seismic Lateral Earth Force

Seismic activity can generate increased lateral earth pressures acting on the foundation walls of the proposed lift station building. The increase is influenced by horizontal ground acceleration. Based on Mononobe-Okabe procedures for a vertical wall with horizontal backfill, the additional lateral pressures due to earthquake motions were estimated as follows:

$$\Delta P_{ae} = 13.26 \cdot H^2 \text{ for the walls}$$

Where ΔP_{ae} = seismic lateral pressures in pounds per linear foot (plf) acting at a distance of $0.6 \cdot H$ from the base of the wall, where H is the height of retained soil in feet.

Based on a site response analysis, other seismic parameter values that may be useful for the structural design of the project features at the site are identified as follows:

Parameter	Value (g)	Parameter	Value (g)	Parameter	Value
S_s	0.893	S_{DS}	0.680	F_a	1.143
S_1	0.321	S_{D1}	0.376	F_v	1.758
S_{MS}	1.02	PGA	0.399		
S_{M1}	0.564				

5 LIMITATIONS

The analyses and recommendations presented in this report are based on the data obtained from the borings at the indicated locations (Figure 2). This report does not reflect variations which may occur at other areas or across the project site. The nature and extent of such variations may not become evident until construction. If variations appear evident, it will be necessary to reevaluate the recommendations of this report.

This report has been prepared for the exclusive use and specific application to the project discussed and has been prepared in accordance with currently accepted geotechnical engineering practices. No warranties, either expressed or implied, are provided. In the event that any changes in the nature, design, or location of the project as outlined in this report are planned, the recommendations contained in this report shall be considered invalid unless the changes are reviewed, and the conclusions of this report modified or verified in writing by the geotechnical engineer.

6 REFERENCES

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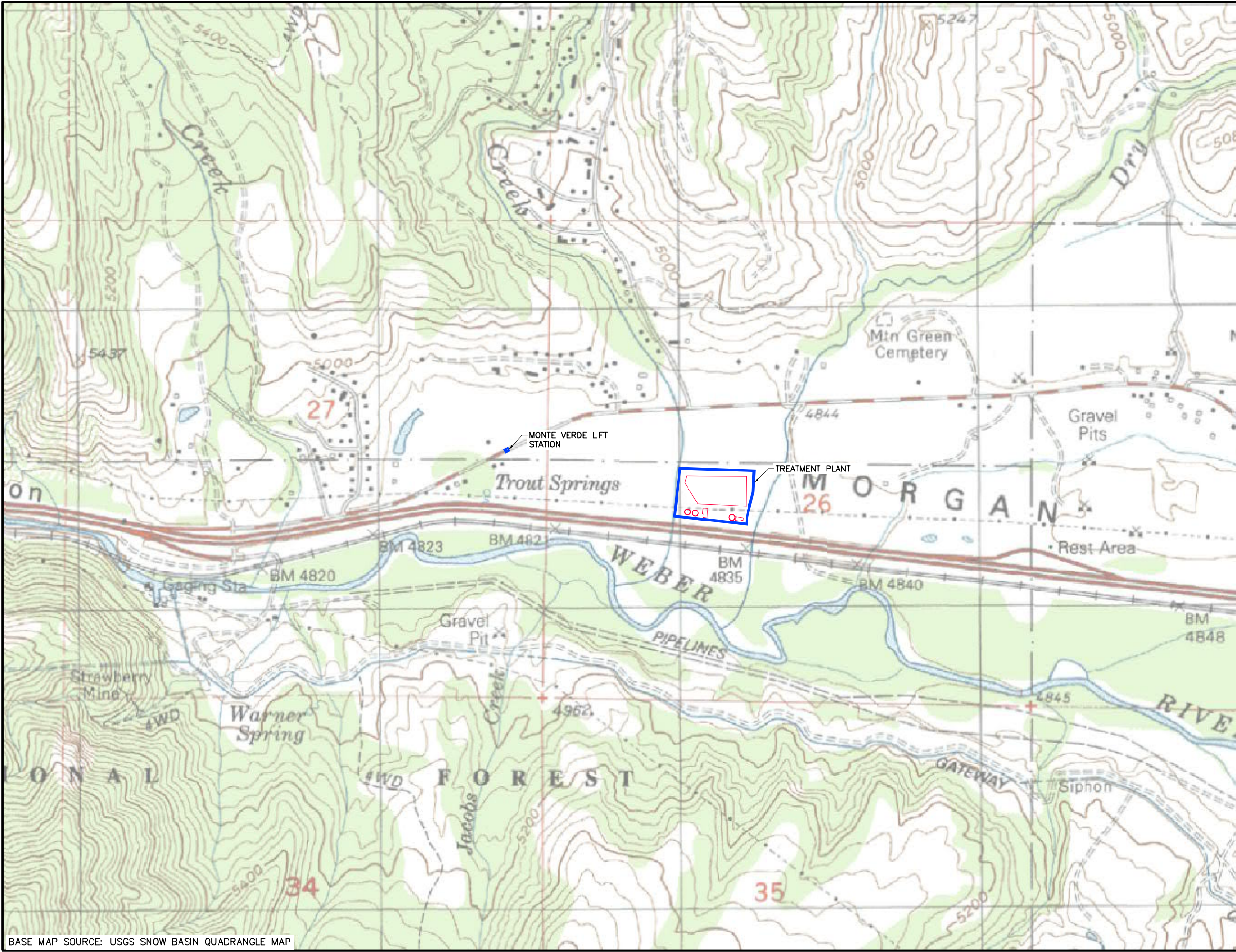
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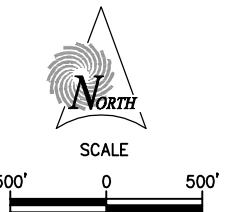
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Figures



BASE MAP SOURCE: USGS SNOW BASIN QUADRANGLE MAP



REV. NO.	COMMENT	DATE
FOR REVIEW ONLY NOT FOR CONSTRUCTION DATE SUNRISE ENGINEERING 6875 SOUTH 900 EAST SALT LAKE CITY, UTAH 84047 TEL 801.523.0100 • FAX 801.523.0990 www.sunrise-eng.com		
MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT		
SEWER SYSTEM IMPROVEMENT PROJECT GEOTECHNICAL INVESTIGATION PROJECT LOCATION MAP		
SEI NO. S07580	DESIGNED DQY	DRAWN DQY
CHECKED DSA	SHEET NO. 01 of 02	FIG. 1

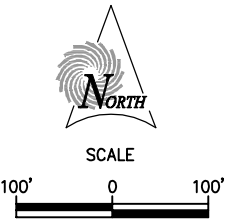
P:\Mountain Green\WTP - Preliminary Design\Geotechnical\Design 30\Wt Gr Geotech Figs.dwg Oct 17, 2020 3:13pm dyang



MONTE VERDE LIFT STATION POPOSED MAINTENANCE & REPLACEMENT



TREATMENT PLANT – PROPOSED MAINTENANCE, REPLACEMENT & IMPROVEMENTS



REV. NO.	COMMENT	DATE
FOR REVIEW ONLY NOT FOR CONSTRUCTION DATE SUNRISE ENGINEERING 6875 SOUTH 900 EAST SALT LAKE CITY, UTAH 84047 TEL 801.523.0100 • FAX 801.523.0990 www.sunrise-eng.com		
MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT		
SEWER SYSTEM IMPROVEMENT PROJECT GEOTECHNICAL INVESTIGATION SITE MAP		
SEI NO. S07580	DESIGNED DQY	DRAWN DSA
CHECKED DQY	SHEET NO. 02 of 02	FIG. 2

P:\Mountain Green\WWTP - Preliminary Design\Geotechnical\Design 30\Wt Gr Geotech Figs.dwg Oct 17, 2020 3:14pm dyang

Appendix A
Geotechnical Laboratory Report

REPORT OF SIEVE ANALYSIS AND ATTERBERG LIMITS

CLIENT: Sunrise Engineering
Attn: Dao Yang
6875 South 900 East
Midvale, Utah 84047

PROJECT: Mountain Green Sewer Project

DATE: September 29, 2019

REPORT: 000726-008
LAB NUMBER: 1223-1

SAMPLE SOURCE: Native
METHOD OF TEST: ASTM C136/ C117/ D4318

RESULTS

ID	B-1 @ 10'	B-2 @ 15'	B-3 @ 5'	B-4 @ 20'	B-5 @ 10'	B-6 @ 20'
Classification	SM	SP	CL	SP	SP	SP
Liquid Limit			39			
Plastic Limit			23			
Plastic Index			16			
Wet Density			110.6			
Dry Density			90.26			
U.S. Standard Sieve Number						
1"		100		100	100	
3/4"	100	98		96	94	100
1/2"	95	96		87	79	98
3/8"	90	94		84	71	94
#4	70	79	100	79	52	72
#10	50	61	99	76	38	44
#40	22	29	74	62	20	11
#100	9	7	45	11.0	6	4
#200	4.3	2.5	28.3	3.7	2.4	2.5

Respectfully submitted,
Utah Testing and Engineering

Ryan Brown
Operations Manager

Appendix B

Boring Logs

DATE 9/9/20

LOG OF BORING NO. B-1

PROJECT MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

BORING LOCATION LAT: 41.1389 LONG: -111.8086

PROJECT LOCATION SEWER SYSTEM IMPROVEMENT PROJECT

RIG TYPE TRUCK-MOUNTED

DRILLING METHOD AUGER

SURFACE ELEVATION 4840 FEET

FIELD ENGINEER DY

DEPTH IN FEET	GEOGRAPHICAL LOG	SAMPLING TYPE	PENETRATION RESISTANCE (PER 6 INCHES)	BLOW COUNTS/FOOT	N ₆₀	RECOVERY (INCHES)	GROUNDWATER LEVEL	USCS CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0										
5		SPL	4-2-2	4	5	3		CL	Brown clay, medium stiff, dry.	
10		SPL	1-4-12	16	20	4		SM	Dark brown silty sand, medium dense, saturated.	
15		SPL	34-18-42	60	69	8			Brown gravelly sand, poorly-sorted, very dense, saturated.	
20		SPL	5-14-17	31	36	10		SP	Brown sand, poorly-sorted, dense, saturated.	
25		SPL	2-36-33	69	73	16			Brown sand, poorly-sorted, very dense, saturated.	
30		SPL	4-26-22	48	47	12			Brown sand, poorly-sorted, dense, saturated.	
									Bottom of boring	

D&M Dame & Moore Sampler

SPL Split Spoon Sampler

Groundwater Level

STRATIFICATION LINES ARE APPROXIMATE. IN-SITU TRANSITION MAY BE GRADUAL.



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PROJECT NO.	07580
SHEET NO.	1 OF 1

DATE 9/9/20

LOG OF BORING NO. B-2

PROJECT MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

BORING LOCATION

LAT: 41.1390

LONG: -111.8089

PROJECT LOCATION SEWER SYSTEM IMPROVEMENT PROJECT

RIG TYPE

TRUCK-MOUNTED

DRILLING METHOD

AUGER

SURFACE ELEVATION

4839 FEET

FIELD ENGINEER

DY

DEPTH IN FEET	GEOGRAPHICAL LOG	SAMPLING TYPE	PENETRATION RESISTANCE (PER 6 INCHES)	BLOW COUNTS/FOOT	N ₆₀	RECOVERY (INCHES)	GROUNDWATER LEVEL	USCS CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0								CL		
5		SPL	3-2-3	5	7	15	▼		Brown silty clay, medium stiff, moist to saturated.	
10		SPL	16-45-15	60	75	10			Brown gravelly sand, poorly-sorted, very dense, saturated.	
15		SPL	7-17-14	31	36	8		SP	Brown sand, poorly-sorted, dense, saturated.	
20		SPL	10-12-15	27	31	10			Brown sand, poorly-sorted, medium dense, saturated.	
25		SPL	3-5-43	48	50	8			Brown gravelly sand, poorly-sorted, dense, saturated.	
30		SPL	10-17-11	28	27	8			Brown sand, poorly-sorted, medium dense, saturated.	
									Bottom of boring	

D&M Darné & Moore Sampler

SPL Split Spoon Sampler

▼ Groundwater Level

STRATIFICATION LINES ARE APPROXIMATE. IN-SITU TRANSITION MAY BE GRADUAL.

PROJECT NO.	07580
SHEET NO.	1 OF 1



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DATE 9/9/20

LOG OF BORING NO. B-3

PROJECT MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

BORING LOCATION

LAT: 41.1390

LONG: -111.8100

PROJECT LOCATION SEWER SYSTEM IMPROVEMENT PROJECT

RIG TYPE

TRUCK-MOUNTED

DRILLING METHOD

AUGER

SURFACE ELEVATION

4837 FEET

FIELD ENGINEER

DY

DEPTH IN FEET	GEOGRAPHICAL LOG	SAMPLING TYPE	PENETRATION RESISTANCE (PER 6 INCHES)	BLOW COUNTS/FOOT	N ₆₀	RECOVERY (INCHES)	GROUNDWATER LEVEL	USCS CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0										
5		D&M	3-1-3	4	4	17	▼	CL	Brown silty clay, soft, moist to saturated.	Bulk Density = 110.6 pcf Dry Density = 90.3 pcf WC = 22.4% LL = 39% & PL = 23%
10		SPL	6-4-15	19	24	8			Brown sand, poorly-sorted, medium dense, saturated.	
15		SPL	14-19-22	41	47	8			Brown gravelly sand, poorly-sorted, dense, saturated.	
20		SPL	4-22-25	47	54	17		SP	Brown gravelly sand, poorly-sorted, very dense, saturated.	
25		SPL	5-16-17	33	35	18			Brown gravelly sand, poorly-sorted, dense, saturated.	
30		SPL	14-17-12	29	28	16			Brown sand, poorly-sorted, medium dense, saturated.	
									Bottom of boring	

D&M Dame & Moore Sampler

SPL Split Spoon Sampler

▼ Groundwater Level

STRATIFICATION LINES ARE APPROXIMATE. IN-SITU TRANSITION MAY BE GRADUAL.

PROJECT NO.	07580
SHEET NO.	1 OF 1



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DATE 9/9/20

LOG OF BORING NO. B-4

PROJECT

MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

BORING LOCATION

LAT: 41.1391

LONG: -111.8104

PROJECT LOCATION

SEWER SYSTEM IMPROVEMENT PROJECT

RIG TYPE

TRUCK-MOUNTED

DRILLING METHOD

AUGER

SURFACE ELEVATION

4836 FEET

FIELD ENGINEER

DY

DEPTH IN FEET	GEOGRAPHICAL LOG	SAMPLING TYPE	PENETRATION RESISTANCE (PER 6 INCHES)	BLOW COUNTS/FOOT	N ₆₀	RECOVERY (INCHES)	GROUNDWATER LEVEL	USCS CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0										
5		SPL	2-1-2	3	4	8	▼	CL	Brown silty clay, soft, moist to saturated.	
10		SPL	2-1-7	8	10	8			Brown clay with some sand, stiff, saturated.	
15		SPL	14-34-20	54	64	8			Brown gravelly sand, poorly-sorted, very dense, saturated.	
20		SPL	23-21-19	40	47	18		SP	Brown gravelly sand, poorly-sorted, dense, saturated.	
25		SPL	2-12-24	36	38	18			Brown gravelly sand, poorly-sorted, dense, saturated.	
30		SPL	18-18-17	35	34	16			Brown gravelly sand, poorly-sorted, dense, saturated.	
									Bottom of boring	

D&M Dame & Moore Sampler

SPL Split Spoon Sampler

▼ Groundwater Level

STRATIFICATION LINES ARE APPROXIMATE. IN-SITU TRANSITION MAY BE GRADUAL.

PROJECT NO.	07580
SHEET NO.	1 OF 1



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DATE 9/9/20

LOG OF BORING NO. B-5

PROJECT MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

BORING LOCATION

LAT: 41.1391

LONG: -111.8107

PROJECT LOCATION SEWER SYSTEM IMPROVEMENT PROJECT

RIG TYPE

TRUCK-MOUNTED

DRILLING METHOD

AUGER

SURFACE ELEVATION

4836 FEET

FIELD ENGINEER

DY

DEPTH IN FEET	GEOGRAPHICAL LOG	SAMPLING TYPE	PENETRATION RESISTANCE (PER 6 INCHES)	BLOW COUNTS/FOOT	N ₆₀	RECOVERY (INCHES)	GROUNDWATER LEVEL	USCS CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0										
5		SPL	3-2-7	9	12	8	▼	CL	Brown silty clay, stiff, saturated.	
10		SPL	8-18-16	34	43	8			Brown gravelly sand, dense, saturated.	
15		SPL	14-16-12	28	32	8			Brown sand, poorly-sorted, dense, saturated.	
20		SPL	20-20-19	39	45	18		SP	Brown gravelly sand, poorly-sorted, dense, saturated.	
25		SPL	8-14-20	34	36	18			Brown gravelly sand, poorly-sorted, dense, saturated.	
30		SPL	16-17-15	32	31	16			Brown gravelly sand, poorly-sorted, dense, saturated.	
									Bottom of boring	

D&M Dame & Moore Sampler

SPL Split Spoon Sampler

▼ Groundwater Level

STRATIFICATION LINES ARE APPROXIMATE. IN-SITU TRANSITION MAY BE GRADUAL.



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PROJECT NO.	07580
SHEET NO.	1 OF 1

DATE 9/11/20

LOG OF BORING NO. B-6

PROJECT MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

BORING LOCATION LAT: 41.1409 LONG: -111.8179

PROJECT LOCATION SEWER SYSTEM IMPROVEMENT PROJECT

RIG TYPE TRUCK-MOUNTED

DRILLING METHOD AUGER

SURFACE ELEVATION 4829 FEET

FIELD ENGINEER DY

DEPTH IN FEET	GEOGRAPHICAL LOG	SAMPLING TYPE	PENETRATION RESISTANCE (PER 6 INCHES)	BLOW COUNTS/FOOT	N ₆₀	RECOVERY (INCHES)	GROUNDWATER LEVEL	USCS CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0										
5		SPL	7-9-15	24	32	8		GP	Poorly-sorted small gravel with some brown sand, firm, rounded.	
10		SPL	7-14-12	26	28	8	▼		Brown gravelly sand, medium dense, saturated.	
15		SPL	6-9-18	27	27	9		SP	Brown sand, poorly-sorted, medium dense, saturated.	
20		SPL	5-25-20	45	47	16			Brown gravelly sand, poorly-sorted, dense, saturated.	
25		SPL	5-24-13	37	36	8			Brown gravelly sand, poorly-sorted, dense, saturated.	
30										

D&M Dame & Moore Sampler

SPL Split Spoon Sampler

▼ Groundwater Level

STRATIFICATION LINES ARE APPROXIMATE. IN-SITU TRANSITION MAY BE GRADUAL.

PROJECT NO.	07580
SHEET NO.	1 OF 2



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LOG OF BORING NO. B-6

PROJECT MOUNTAIN GREEN SEWER IMPROVEMENT DISTRICT

BORING LOCATION

LAT: 41.1409

LONG: -111.8179

PROJECT LOCATION SEWER SYSTEM IMPROVEMENT PROJECT

RIG TYPE

TRUCK-MOUNTED

DRILLING METHOD

AUGER

SURFACE ELEVATION

4829 FEET

FIELD ENGINEER

DY

DEPTH IN FEET	GEOGRAPHICAL LOG	SAMPLING TYPE	PENETRATION RESISTANCE (PER 6 INCHES)	BLOW COUNTS/FOOT	N ₆₀	RECOVERY (INCHES)	GROUNDWATER LEVEL	USCS CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
35		SPL	3-21-21	42	36	18			Brown gravelly sand, poorly-sorted, dense, saturated.	
40		SPL	17-29-26	55	44	16			Brown gravelly sand, poorly-sorted, dense, saturated.	
45		SPL	12-25-24	49	37	16		SP	Brown gravelly sand, poorly-sorted, dense, saturated.	
50		SPL	14-26-24	50	35	18			Brown gravelly sand, poorly-sorted, dense, saturated.	
55									Bottom of boring	
60										
65										

D&M Dame & Moore Sampler

SPL Split Spoon Sampler



Groundwater Level

STRATIFICATION LINES ARE APPROXIMATE. IN-SITU TRANSITION MAY BE GRADUAL.

PROJECT NO.	07580
SHEET NO.	2 OF 2


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Appendix C

Chemical Laboratory Results



9/21/2020

Work Order: 20I0736
Project: 07580

Sunrise Engineering Inc.
Attn: Dao Yang
6875 S 900 E
Midvale, UT 84047

Client Service Contact: 801.262.7299

The analyses presented on this report were performed in accordance with the National Environmental Laboratory Accreditation Program (NELAP) unless noted in the comments, flags, or case narrative. If the report is to be used for regulatory compliance, it should be presented in its entirety, and not be altered.



Approved By:

Mark Broadhead, Project Manager



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Certificate of Analysis

Sunrise Engineering Inc.
Dao Yang
6875 S 900 E
Midvale, UT 84047

PO#:
Receipt: 9/11/20 16:05 @ 24.9 °C
Date Reported: 9/21/2020
Project Name: 07580

Sample ID: B-1 @ 5'

Matrix: Solid

Lab ID: 2010736-01

Date Sampled: 9/9/20 9:10

Sampled By: Dao Yang

	<u>Result</u>	<u>Units</u>	<u>Minimum Reporting Limit</u>	<u>Method</u>	<u>Preparation Date/Time</u>	<u>Analysis Date/Time</u>	<u>Flag(s)</u>
Inorganic							
Sulfate, Soluble (IC)	18	mg/kg dry	12	EPA 300.0	9/14/20	9/14/20	
Total Solids	84.8	%	0.1	SM 2540G	9/14/20	9/15/20	



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Certificate of Analysis

Sunrise Engineering Inc.
Dao Yang
6875 S 900 E
Midvale, UT 84047

PO#:
Receipt: 9/11/20 16:05 @ 24.9 °C
Date Reported: 9/21/2020
Project Name: 07580

Sample ID: B-6 @ 10 '

Matrix: Solid

Lab ID: 2010736-02

Date Sampled: 9/11/20 11:00

Sampled By: Dao Yang

	<u>Result</u>	<u>Units</u>	<u>Minimum Reporting Limit</u>	<u>Method</u>	<u>Preparation Date/Time</u>	<u>Analysis Date/Time</u>	<u>Flag(s)</u>
Inorganic							
Sulfate, Soluble (IC)	ND	mg/kg dry	13	EPA 300.0	9/14/20	9/14/20	
Total Solids	79.2	%	0.1	SM 2540G	9/14/20	9/15/20	



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Certificate of Analysis

Sunrise Engineering Inc.
Dao Yang
6875 S 900 E
Midvale, UT 84047

PO#:
Receipt: 9/11/20 16:05 @ 24.9 °C
Date Reported: 9/21/2020
Project Name: 07580

Report Footnotes

Abbreviations

ND = Not detected at the corresponding Minimum Reporting Limit (MRL).

1 mg/L = one milligram per liter or 1 mg/kg = one milligram per kilogram = 1 part per million.

1 ug/L = one microgram per liter or 1 ug/kg = one microgram per kilogram = 1 part per billion.

1 ng/L = one nanogram per liter or 1 ng/kg = one nanogram per kilogram = 1 part per trillion.



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**PORTABLE ELECTRIC
SUBMERSIBLE PUMP FOR
CORROSIVE & ABRASIVE
APPLICATIONS**

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.....

7.5 HP (5.5kW)

G 530T / G 536T

4"(100mm) / 3"(75/80mm) NPT or Hose
.....

10 HP (7.5kW)

G 554T / G 556T

4"(100mm) / 3"(75/80mm) NPT or Hose
.....



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 - 2) Nitride Hardened 410 Stainless Steel for abrasive applications. (Standard)
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- Mechanical Seals in wholly enclosed pressure compensated oil chamber.
- Field adjustable Nitrile Rubber-lined Diffuser/Wear Plate Optimizes efficiency throughout the life of the pump. Optional Polyurethane Diffusers and Wear Plates are available.
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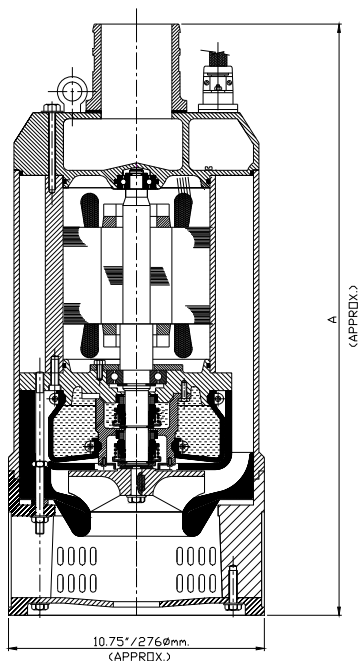
E-mail: sales@modypump.com



ELECTRIC SUBMERSIBLE DRAINAGE PUMP

G-500/530/550 SERIES

5HP(3.7kW) / 7.5(5.5kW) / 10HP(7.5kW)

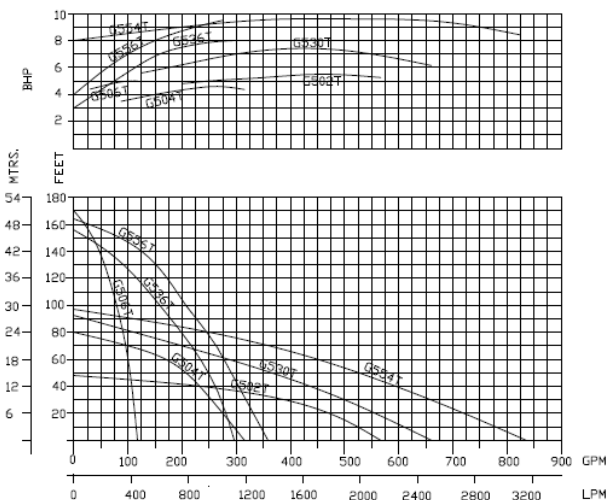


MODEL A

G-502	25-1/4" (640mm)
G-504	
G-506	
G-530	28-1/2" (725mm)
G-536	
G-554	29-1/2" (750mm)
G-556	

PERFORMANCE CURVES

MODEL: G 502/504/506/530/536/554/556 (50/60 Hz)



G-500/530/550 SERIES

MATERIALS OF CONSTRUCTION AND ENGINEERING DATA

MOTOR

2-pole induction **continuous rated** motor with squirrel cage rotor.
Stator insulation class 'H' (180°C)
Speed : 3400 RPM @ 60 Hz, 2800 RPM @ 50 Hz
Power Rating : 5HP/7.5HP/10HP @ 60 Hz, 3.7kW/5.5kW/7.5kW @ 50Hz Full Load
Current FLA: 7.1, 11, 14 Amps @ 460v. 8.1, 12.5, 16 @ 400v.
Max. temperature of the pump liquid: 104°F/40°C
Max. start/stop per hour : 15

POWER SUPPLY

3 phase, 50/60 Hz, AC Supply. Available in any voltage frequency combination. (208/220/230/380/415/460/575/1000V)

BALL BEARINGS

The rotor shaft is carried in two single row, deep groove ball bearings.
The bearings are enclosed with high temperature grease-containing special Anti-corrosion additive.

POWER CABLE

Waterproof/oil proof, rubber-insulated, neoprene-sheathed copper conductor flexible cable, 50ft. (15m) length standard. Type SOOW in North America, EPR in the Middle East and HO7RN in the EU. 6 Core with thermal overloads optional.

SHAFT SEAL

Tandem Tungsten Carbide/Tungsten Carbide and Tungsten Carbide/Tungsten Carbide Mechanical seals wholly enclosed in a pressure compensated oil chamber.

CORROSION RESISTANT

Epoxy coated Aluminum Outer Casing
Epoxy coated Extruded Aluminum Stator Casing
Nitrile Rubber- Lined Diffuser/Wear plate. Polyurethane Optional.
Shaft: 431 Stainless Steel
Hardware: 304 Stainless Steel
Impeller: Nitride Hardened 410SS to 56HRC is Standard.
pH Range 5 - 8

STRAINER

304 Stainless Steel with 1" (25mm) X 1/4" (6mm) {G 502/504},
1-3/16" (30mm) X 3/8" (9.5mm) {G530/554},
1/4" (6mm) Round Holes {G 506/536/556}

SUBMERGENCE

Submergence below liquid surface min 5" (127mm) max. 50' (15m).

WEIGHTS (Approx. without cable)

G 502/504:	110lbs. (50Kg)
G 506:	115lbs. (52Kg)
G 530:	130lbs. (59Kg)
G 536:	135lbs. (61Kg)
G 554:	142lbs. (64Kg)
G 556:	147lbs. (67Kg)

Due to continuous product development, specifications are subject to change without notice.

03.10 Rev.0



Quotation

PO Box 209.
Layton, UT 84041
Phone: (801) 444-9900
Fax: (801) 444-9901
Cell: (801) 920-1116
Email: brett.hazen@tech-flow.com

To: Whitaker Construction
Attn: Michael
cc:

Sent by email Dec 14, 2022

Phone:
Fax:
email:

Date: 14-Dec-22
Quote: BH1313

Reference:

Application:
Job Name:
Job Site:

We are pleased to quote the following for your favorable consideration:

Line	Qty	Part No.	Description	Price ea.	Ext. Price
1	5		Mody G554T 10HP, 3ph-60Hz-480v 3550 RPM electric submersible dewatering pump. Tandem TC/TC and TC/TC Mech. Seals. 410SS Hardened Impeller ss shaft Strainer and Hardware. 4" NPT SS Outlet. 50' cable. Equipped with Zinc Anodes.	\$7,555.00	\$37,775.00
2	5		Control Panels (Recommended/Required) <u>Manual</u> Manual Push Button Single Control Box overload protection. 480v Part# MPB10H460N3RM16) enclosed in Nema 3R Fiberglass Enclosure for short ckt.	\$610.00	\$3,050.00
3	5		Standard Ship from Factory: 2-3 weeks A.R.O. (subject to prior sale) Expedited Fee: 2-5 business days A.R.O. (subject to prior sale) for an additional	\$500.00	\$2,500.00
4	1		Freight will be Prepaid & addede to the final invoice	\$0.00	\$0.00
5	1		Sales Tax will be added if not tax exempt	\$0.00	\$0.00

Grand Total: \$43,325.00

Delivery:

Routing:

FOB:

Valid For: 60 days

Terms: net 30

Thank you for the opportunity to quote.
Please call or fax our office if we can be of further assistance.

Quoted By: Brett Hazen



MODEL: G/M 554 T (50/60 Hz)

