Addendum No. 002
January 28, 2026

ADDENDUM TO PLANS AND SPECIFICATIONS FOR:
KNOX FULL SERVICE MAINTENANCE FACILITY
DOT-250002

Prepared For: **Ohio Department of Transportation**

Prepared By:

Jerome Scott & Partners Architects
1020 Goodale Boulevard
Columbus, Ohio 43212
tel: 614.225.9535

Korda/Nemeth Engineering, Inc.
1650 Watermark Drive, #200
Columbus, OH 43215
Tel: 614.487.1650

Advanced Engineering Consultants
1405 Dublin Road
Columbus, OH 43215
Tel: 614.486.4778

Paul J Ford & Company
250 E Broad Street, #600
Columbus, OH 43215
Tel: 614.221.6679

This Addendum is included in the work as noted in the Notice to Bidders and Form of Proposal. Each item refers to drawing sheet numbers, specification numbers, or general comments.

To All Bidders: This addendum supplements and amends the original bid documents dated January 16, 2026 and shall be taken into account in preparing proposals and shall become a part of the contract documents.

Receipt of this Addendum shall be acknowledged by inserting its number and date in the space provided on the Bid Form.

This Addendum consists of 140 - 8.5x11 and 11 – 30x42 sheets including all attachments noted herein.

PROCUREMENT, CONTRACTING, AND GENERAL REQUIREMENTS:

SPECIFICATIONS:
The following specifications have been revised:

- 03 30 00 – CAST-IN-PLACE CONCRETE
  - Deleted Paragraph 2.4.F Curing and Sealing Compound and moved it to new paragraph “2.5 Liquid Floor Treatment (Sealer)”.
  - Paragraph 2.8.B.3 – lowered allowable percentage of slag cement in mixes.
  - Paragraph 2.9.C and 2.9.D – clarified locations of mix designs.
  - Paragraph 3.9.D – clarified where a final coat of curing and sealing compound is required on hardened concrete.

- 03 30 10 – CAST-IN-PLACE SILICA FUME CONCRETE
    - Added new paragraph “2.5 Liquid Floor Treatment (Sealer)”.
    - Paragraph 2.8.B.3 – lowered allowable percentage of slag cement in mixes.
    - Paragraph 2.9.A and 2.9.B – clarified locations of mix designs.
    - Paragraph 3.9.D – clarified where a final coat of curing and sealing compound is required on hardened concrete.

- 10 22 13 WIRE MESH PARTITIONS
    - Newark Wire Works, Inc. has been added as an approved manufacturer.

- 27 05 28 – PATHWAYS FOR COMMUNICATIONS SYSTEMS
    - Oldcastle Infrastructure and Charles Industries have been added as additional manufacturers for Underground Boxes.

- 27 11 16 COMMUNICATIONS RACKS, FRAMES, AND ENCLOSURES
    - Chatsworth Products and Hubbell have been added as additional manufacturers for the Free-Standing Equipment Rack.

- 33 11 00 WATER DISTRIBUTION
    - Added “3. “KappAnt” as manufactured by Kapp Alloy & Wire, Inc.”
    - Added “3. “PhosCopper 15” as manufactured by Aufhauser Corporation.”
    - Added “3. “Meta-Braze 179” as manufactured by VBC Group.”
    - Added “2. Zurn 350 double check detector.”
    - Added “3. BEECO Friendly Double Check Detector Assembly.”

- 33 30 00 SANITARY SEWERAGE
    - Added “3. 852 Series Adjustable Cleanout manufactured by Soiux Chief Manufacturing Co”.

- 33 40 00 STORM DRAINAGE
    - Added “3. 852 Series Adjustable Cleanout manufactured by Soiux Chief Manufacturing Co”.
    - Added ”1. Model No. Neenah R-4999-BX with Type "C" grate.”
    - Added “2. East Jordan Iron Works V-7362.”
    - Added “3. FD460 Series as manufactured by Watts.”
    - Revised A/E to contractor in section 3.07.
    - Revised A/E to contractor in section 3.08.
    - Revised A/E to contactor in section 3.09.
    - Revised A/E to contactor in section 3.10.

- 33 56 13 ABOVE GROUND FUEL-STORAGE TANKS
    - Information regarding the fuel management system has been added to Sections 1.2.A and 2.8.A.

- 43 22 56 SALT BRINE PRODUCTION SYSTEM
    - Section 2.3.E.2. has been revised.
    - Sections 2.3.B.G.2 and 2.3.B.G.3 have been removed.

DRAWINGS:

- SP-C-101 STAKING PLAN
    - Revised fuel island concrete limits.
    - Revised structure coordinates on fuel island.

- SP-C-201 GRADING AND STORM SEWER PLAN
    - Revised storm sewer layout around the fuel island to move the oil/water separator south.
    - Revised coded note 2.

- SP-C-202 GRADING AND STORM SEWER PLAN
    - Revised coded note 2.

- SP-C-203 GRADING AND STORM SEWER PROFILE
    - Revised structure 9 in profile "STORM SEWER 4-12.
    - Revised coded note 2.

- SP-C-204 GRADING AND STORM SEWER PROFILE
    - Revised profile "STORM SEWER 9 TO 25".
    - Revised top of casting elevations for CO4 and CO3.
    - Revised coded note 2.
    - Revised Storm Sewer Structure Coordinates Table.

- SP-C-207 GRADING AND STORM SEWER DETAILS
    - Added Oil/Water Separator detail.

- SP-C-208 EROSION AND SEDIMENT CONTROL PLAN
    - Revised fuel island storm sewer layout.
    - Revised fuel island concrete limits.
    - Moved Inlet filter protection.

- SP-C-301 UTILITY PLAN
    - Revised fuel island storm sewer layout.
    - Revised fuel island concrete limits.
    - Revised leaders for coded note 2.

- OM-A-508 INTERIOR DETAILS
    - Detail 9/OM-A-508 Accessible Lockers has been added.

- OM-A-1301 TRUCK STORAGE FF&E PLAN
    - Accessible locker locations have been noted on the plan.

- OM-S-100 – FOUNDATION PLAN – OFFICE MAINTENANCE BUILDING
    - Deleted Foundation note #12 to remove conflict with specifications.

QUESTIONS:

- *RFI 001: Does the end user already have a Netbox Enterprise system in place and this site will connect to it? Or, is this a new Netbox Enterprise system and not connecting to another one?*
    - Response: The S2 Netbox Enterprise shall be included with the access control system.

- *RFI 002: Is all the soil stabilization to be performed through the unit prices? Is there any soil stabilization that you are expecting to be included in the base bid?*
    - Response: No, per the GeoTech Report, soil stabilization is not intended to be needed. Undercut and fill is to be covered under the Unit Prices.

- *RFI 003: Are the windows that are to be abated are metal or wood windows?*
    - Response: The existing windows are Aluminum.

- *RFI 004: Is the roofing [removal/disposal] going to be part of the project or as an alternate. The roofing material may be demolished without abatement so long as the debris is taken to a landfill facility that accepts asbestos.*
    - Response: The roof will be tested for ACM after the occupants have vacated the building. It is assumed there will be ACM in the roof, so the roof removal and disposal is to be included in the base bid as a Unit Price.

END OF ADDENDUM NO. 002

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, and waterstops.
2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
3. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
4. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, vapor-retarder installation, anchor rod and anchorage device installation tolerances, methods for achieving specified floor and slab flatness and levelness, floor and slab flatness and levelness measurement, and concrete protection.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.
5. Bonding agents.
6. Adhesives.
7. Vapor retarders.
8. Semirigid joint filler.
9. Joint-filler strips.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I Type II Type I/II.
2. Fly Ash: ASTM C 618, Class F or C.

3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

F. Water: ASTM C 94/C 94M and potable.

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class C. Include manufacturer's recommended adhesive or pressure-sensitive joint tape, not less than 10 mils (0.25 mm) thick.

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

a. Insulation Solutions, Inc.
b. Raven Industries, Inc.
c. Stego Industries, LLC.

2.4 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

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

a. BASF Corp. - Construction Chemicals.
b. ChemMasters, Inc.
c. Dayton Superior.
d. Euclid Chemical Company (The); an RPM company.
e. Kaufman Products, Inc.

f. L&M Construction Chemicals, Inc.
g. SpecChem, LLC.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating. Compound to be approved by epoxy flooring manufacturer at Admin slab-on-grade.

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

a. BASF Corp. - Construction Chemicals.
b. ChemMasters, Inc.
c. Euclid Chemical Company (The); an RPM company.
d. L&M Construction Chemicals, Inc.
e. W.R. Meadows, Inc.

2.5 LIQUID FLOOR TREATMENT (SEALER)

A. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

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

a. ChemMasters, Inc.
b. Euclid Chemical Company (The); an RPM company.
c. Kaufman Products, Inc.
d. L&M Construction Chemicals, Inc.
e. W.R. Meadows, Inc.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

2.7 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40

percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Slag Cement: *30 percent.*
4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

C. Limit permeability of concrete to maximum 2,000 coulombs. Determine the permeability by testing according to AASHTO T277 except moist cure the permeability samples for 7 days at 7 F followed by 21 days moist curing at 100 F. Perform permeability testing at 28 days.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Adjust the absolute volume of the aggregate if the cement content is increased. The Owner will not provide additional compensation for the admixture or additional cement required by this adjustment.
4. Use an approved set-retarding admixture, Type B or D when the concrete temperature exceeds a nominal temperature of 75 degrees F.

If during the work, the specific gravity of an aggregate changes more than +/-0.02, adjust the design weight to conform to the new specific gravity. Make unit weight determinations in order to calculate and maintain the yield according to ASTM C138. Based on these determinations, adjust the batch weights when necessary. Maintain the specified cement content within a tolerance of +/-1 percent and do not exceed the maximum water-cement ratio. Adjust the amount of water added at the mixer based on the moisture contained in the aggregate and the moisture that the aggregates will absorb.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings and Curbs: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Minimum Cementitious Materials Content: 520 lb/cu. yd.
3. Slump Limit: 2 - 4 inches nominal; 5 inch maximum.

B. Truck Storage and Maintenance Interior Slab-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum W/C Ratio: 0.45.

3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
4. Slump Limit: 2 - 4 inches nominal; 5 inch maximum.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

C. Office *and Cold Storage* Interior Slab-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
4. Slump Limit: 2 - 4 inches nominal; 5 inch maximum.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

D. *Cold Storage walls/piers, Office/Maintenance piers, Salt Storage* drilled piers, Aprons (*unless noted otherwise),* Stoops, and Brine Storage, Fuel Storage, Generator, and Autogate Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
4. Slump Limit: 2 - 4 inches nominal; 5 inch maximum.
5. Air Content: 7 percent, plus or minus 2 percent at point of delivery.

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.2 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.3 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated in Drawings. Embed keys at least 1-1/2 inches (38 mm) into concrete.
3. Space vertical joints in walls as indicated in Drawings. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as columns, piers, bollards, foundation walls, interior and exterior catch basins/trenches, and other locations, as indicated in Drawings.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Notify Architect and testing and inspection agencies 24 hours (48 hours for slab pours) prior to commencement of concrete placement. Slab reinforcing shall be set in place 48 hours prior to commencement of concrete placement for observation by the Engineer.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.\

E. Maintain slump within the nominal slump range in Paragraph 2.8. If below the maximum water-cement ratio, then adjust the quantity of water to meet slump requirements. Do not use concrete with a slump greater than the maximum shown in Paragraph 2.8. When the slump exceeds the nominal slump limit but is below the maximum limit, the Contractor may use an occasional load of concrete in this condition, provided the mixture of succeeding loads is immediately adjusted to reduce slump to within the nominal range.

F. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated in Drawings. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

G. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.5 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.6 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated in Drawings.
2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

a. Specified overall values of flatness, F(F) 20; and of levelness, F(L) 17; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.

b. Correct the slab surface if actual F(F) or F(L) number for the floor installation measures less than required.

C. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated in Drawings. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated in Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.7 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches high unless otherwise indicated, and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
4. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

4. Deleted.

3.9 LIQUID FLOOR TREATMENT APPLICATION

A. Temporary Lighting: Minimum 200 W light source, placed 8 feet above the floor surface, for each 425 sq. ft. of floor being finished.

B. Temporary Heat: Ambient temperature of 50 degrees F minimum.

C. Ventilation: Sufficient to prevent injurious gases from temporary heat or other sources affecting concrete.

D. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions *at Truck Storage, Maintenance and Office (only areas without epoxy flooring) slabs-on-grade only.*

E. Correct defects in the defined traffic floor by grinding or removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.10 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.11 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.12 FIELD QUALITY CONTROL

A. Special Inspections: The Architect will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:
1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
6. Additional Tests: Testing and inspecting agency shall make additional tests of concrete, at Contractor’s expense, when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
7. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 03 30 00

SECTION 03 30 10 - CAST-IN-PLACE SILICA FUME CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, and waterstops.
2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
3. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
4. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, vapor-retarder installation, anchor rod and anchorage device installation tolerances, methods for achieving specified floor and slab flatness and levelness, floor and slab flatness and levelness measurement, and concrete protection.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.
5. Bonding agents.
6. Adhesives.
7. Vapor retarders.
8. Semirigid joint filler.
9. Joint-filler strips.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I Type II Type I/II.
2. Fly Ash: ASTM C 618, Class F or C.

3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
4. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

F. Water: ASTM C 94/C 94M and potable.

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class C. Include manufacturer's recommended adhesive or pressure-sensitive joint tape, not less than 10 mils (0.25 mm) thick.

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

a. Insulation Solutions, Inc.
b. Raven Industries, Inc.
c. Stego Industries, LLC.

2.4 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

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

a. BASF Corp. - Construction Chemicals.
b. ChemMasters, Inc.
c. Dayton Superior.
d. Euclid Chemical Company (The); an RPM company.

e. Kaufman Products, Inc.
f. L&M Construction Chemicals, Inc.
g. SpecChem, LLC.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

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

a. BASF Corp. - Construction Chemicals.
b. ChemMasters, Inc.
c. Euclid Chemical Company (The); an RPM company.
d. L&M Construction Chemicals, Inc.
e. W.R. Meadows, Inc.

2.5 LIQUID FLOOR TREATMENT (SEALER)

A. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

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

a. ChemMasters, Inc.
b. Euclid Chemical Company (The); an RPM company.
c. Kaufman Products, Inc.
d. L&M Construction Chemicals, Inc.
e. W.R. Meadows, Inc.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

2.7 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40

percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Slag Cement: *30 percent.*
4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. Silica Fume: 10 percent.
6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Limit permeability of concrete to maximum 2,000 coulombs. Determine the permeability by testing according to AASHTO T277 except moist cure the permeability samples for 7 days at 7 F followed by 21 days moist curing at 100 F. Perform permeability testing at 28 days.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Adjust the absolute volume of the aggregate if the cement content is increased. The Owner will not provide additional compensation for the admixture or additional cement required by this adjustment.
4. Use an approved set-retarding admixture, Type B or D when the concrete temperature exceeds a nominal temperature of 75 degrees F.

If during the work, the specific gravity of an aggregate changes more than +/-0.02, adjust the design weight to conform to the new specific gravity. Make unit weight determinations in order to calculate and maintain the yield according to ASTM C138. Based on these determinations, adjust the batch weights when necessary. Maintain the specified cement content within a tolerance of +/-1 percent and do not exceed the maximum water-cement ratio. Adjust the amount of water added at the mixer based on the moisture contained in the aggregate and the moisture that the aggregates will absorb.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. *Salt Storage Walls and Mixed Material piers*: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Minimum Cementitious Materials Content: 520 lb/cu. yd.

4. Slump Limit: 2 - 4 inches nominal; 5 inch maximum; or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
5. Air Content: 7 percent, plus or minus 2 percent at point of delivery.

B. *Slabs-on-Grade at Mixed Material Storage (including apron), Salt Storage (including apron), and Wash Bay*: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
4. Slump Limit: 2 - 4 inches nominal; 5 inch maximum; or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
5. Air Content: 7 percent, plus or minus 2 percent at point of delivery.

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated in Drawings.

3.2 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.3 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
3. Space vertical joints in walls as indicated in Drawings. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as columns, piers, bollards, foundation walls, interior and exterior catch basins/trenches, and other locations, as indicated in Drawings.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Notify Architect and testing and inspection agencies 24 hours (48 hours for slab pours) prior to commencement of concrete placement. Slab reinforcing shall be set in place 48 hours prior to commencement of concrete placement for observation by the Engineer.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.\

E. Maintain slump within the nominal slump range in Paragraph 2.8. If below the maximum water-cement ratio, then adjust the quantity of water to meet slump requirements. Do not use concrete with a slump greater than the maximum shown in Paragraph 2.8. When the slump exceeds the nominal slump limit but is below the maximum limit, the Contractor may use an occasional load of concrete in this condition, provided the mixture of succeeding loads is immediately adjusted to reduce slump to within the nominal range.

F. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated in Drawings. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

G. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.5 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.6 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated in Drawings to receive trowel finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated in Drawings.
2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

a. Specified overall values of flatness, F(F) 20; and of levelness, F(L) 17; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.

b. Correct the slab surface if actual F(F) or F(L) number for the floor installation measures less than required.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated in Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.7 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.
b. Continuous water-fog spray.
c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Deleted.

3.9 LIQUID FLOOR TREATMENT APPLICATION

A. Temporary Lighting: Minimum 200 W light source, placed 8 feet above the floor surface, for each 425 sq. ft. of floor being finished.

B. Temporary Heat: Ambient temperature of 50 degrees F minimum.

C. Ventilation: Sufficient to prevent injurious gases from temporary heat or other sources affecting concrete.

D. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions *at Wash Bay slab-on-grade only.*

E. Correct defects in the defined traffic floor by grinding or removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.10 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.11 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

D. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

E. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.12 FIELD QUALITY CONTROL

A. Special Inspections: The Architect will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:
   1. Headed bolts and studs.
   2. Verification of use of required design mixture.
   3. Concrete placement, including conveying and depositing.
   4. Curing procedures and maintenance of curing temperature.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
   1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.

      a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

   2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
   5. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
   6. Additional Tests: Testing and inspecting agency shall make additional tests of concrete, at Contractor’s expense, when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
   7. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 03 30 10

SECTION 33 56 13 - ABOVE GROUND FUEL-STORAGE TANKS

PART 1 - GENERAL

1.1 INTENT

A. The intent of this Specification is to have an above ground storage tank (AST) system (Dual fuel) with an aggregate capacity of 8,000 gallons supplied (6,000 gallon diesel and 2,000 gallons gasoline). A complete AST system shall be defined as a functional AST system that meets all governing federal and state regulations. Contractor shall assemble all items, equipment, and accessories before delivery except for those items, equipment, and accessories that cause height/load restrictions to be exceeded, require removal prior to tightness testing, or may be damaged during transport if assembled prior to delivery, all of which the contractor shall assemble after delivery.

B. Fireguard Tanks. UL 2085 Listed “protected” tanks.

1.2 SCOPE

A. Contractor shall be responsible for providing all equipment, labor, and materials necessary to fabricate cylindrical AST, and all equipment, labor and materials necessary to furnish, assemble, deliver, and unload the AST system. The AST system shall consist of a storage element and two (2) dispensing elements, *and (1) fuel management control unit.* A summary of AST system specified equipment is contained in Part 6.
   1. The storage element shall consist of a two-hour fire rated above ground steel storage tank with 110% secondary containment (i.e., double wall tank) that is cylindrical in shape and is furnished with storage related equipment and accessories as outlined throughout this Specification. Storage related equipment and accessories shall include items that are necessary to store petroleum products and meet all governing federal and state regulations pertaining to such storage, and any additional storage related equipment.
   2. The dispensing element shall consist of a UL-listed free standing dispenser unit with an internal mounted suction pump and related equipment and accessories as outlined throughout this Specification. Dispensing related equipment and accessories shall include items that are necessary to dispense petroleum products and meet all governing federal and state regulations pertaining to such dispensing.
   3. Obtaining all regulatory approvals, permits and inspections for the AST system.
   4. Paying all fees resulting from the approval, permitting, and inspection process.
   5. Supplying anchor bolts and anchoring AST system to foundation.

B. Contractor shall be responsible for providing and installing the foundation pad and protective bollards.

C. Contractor shall be responsible for providing Equipment Notebooks as specified in Section 5.01 of this Specification that contain detailed diagrams, a listing of equipment and products, Manufacturer information and catalogue cut-sheets, and a list with instructions and diagrams that

pertain to any anchoring, hook-ups, connections, procedures, etc. that are necessary to make the AST system complete and operational.

D. Contractor shall be responsible for having the AST system tested for tightness as specified in Section 5.04 of this Specification. The test shall be performed on site after delivery but before system start-up. Contractor will be responsible for making the necessary arrangements regarding test date and time with a testing company designated by the contractor, and for arranging to have the proper regulatory officials present for the testing.

E. Contractor shall be responsible for providing touch-up paint as specified in Section 5.03 of this Specification.

F. Contractor shall be responsible for providing volumetric tank charts as specified in Section 5.08 of this Specification.

1.3 STANDARDS

A. The fabrication, assembling, and furnishing of AST system shall adhere to the latest editions of the following standards and regulatory requirements:
1. Underwriters Laboratories:
   a. Standard for Steel Aboveground Storage Tanks, Standard UL 142
   b. Standard for Insulated Secondary Containment, Protected Type Aboveground Storage Tanks, Standard UL 2085
2. Protected Aboveground Tanks for Motor Vehicle Fuel-Dispensing Stations Outside Buildings, Appendix II-F, Uniform Fire Code, International Fire Code Institute
3. Steel Tank Institute, Standard for Fireguard Thermally Insulated Aboveground Storage Tanks, #F941
4. National Fire Protection Association:
   a. NFPA 30, Flammable and Combustible Liquids Code
   b. NFPA 30A, Automotive and Marine Service Station Code
   c. NFPA 70, National Electric Code
   d. NFPA 704, Standard System for the Identification of the Hazards of Materials for Emergency Response
5. National Fire Prevention Code, Building Officials and Code Administrators
6. Standard Fire Prevention Code, Southern Building Code Congress International
7. Clean Water Act and Oil Pollution Act of 1990, Spill Prevention, Control and Countermeasure (SPCC) Plans, 40 CFR 112, 113, and 114
8. The Ohio Administrative Code:
   a. OAC Rule 1301:7-7-23
   b. OAC Rule 1301:7-7-28 (i.e., the Ohio Fire Code)
   c. OAC Rule 1301:7-7-44
9. US Department of Labor, Occupational Safety & Health Administration:
   a. OSHA Standard Number 1910.21, Definitions,
   b. OSHA Standard Number 1910.23, Guarding Floor and Wall Openings and Holes
   c. OSHA Standard Number 1910.24, Fixed Industrial Stairs
10. American Society for Testing and Materials, ASTM Standard Specification for:
   a. C332-87 (1991)e1, Lightweight Aggregates for Insulating Concrete
   b. A123-89ae1, Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

B. The delivery of AST system shall adhere to all governing DOT standards and regulations.

C. The unloading of AST system shall be in accordance with Manufacturer recommendations.

D. The assembling of items, equipment, and accessories by the contractor shall be in accordance with Manufacturer recommendations.

E. Tightness testing of the AST and AST system components shall be in accordance with respective Manufacturer recommendations.

1.4 SIZE

A. The size of the AST system is based upon the primary tank capacity and secondary tank outer dimensions.
1. Storage element capacity shall be the actual capacity that the primary tank can hold before the installation of any storage related equipment and/or accessories.
2. Storage element dimensions shall be the secondary tank outer dimensions.

B. AST system with sizes as shown in Table 1.04 B.

AST SYSTEM SIZE		
Storage Element CAPACITY	Storage Element DIMENSIONS	Descriptive Name for Reference Purposes
8,000	21’-11” outer length x 8’-6” outer diameter	AST-1

TABLE 1.04 B

C. Capacity and dimensions may vary from Table 1.04 B of this Specification as follows:
1. Capacity may be smaller than capacity shown in Table 1.04 B by one percent (1%).
2. Capacity may exceed the capacity shown in Table 1.04 B by an unspecified amount.
3. Length and diameter may each vary by ± 6 in. (plus or minus six inches) as long as the capacity shown in Table 1.04 B is not reduced by more than 1% (one percent).

1.5 USE

A. AST system will be used in conjunction with the following petroleum products as shown in Table 1.05 A (below):

AST SYSTEM USE	
Descriptive Name	Intended Product or Products
ATS-1	Gasoline & Diesel Fuel

TABLE 1.05 A

B. The intended product for the single compartment AST system will be as shown in Table 1.05 A of this Specification unless specified otherwise when the AST system is ordered. The storage element shall be fabricated, furnished, assembled, etc. so the compartment is compatible for use with the intended product.

C. In the future, the Owner may want to change the use (i.e., product being stored) of a particular AST system. For this reason, the storage element for AST systems of the same size shall be identical regardless of use. For example, the fabrication, furnishing, assembling, etc. of the storage element of a 1,000 gallon AST system used to store diesel shall be the same as 1,000 gallon storage elements used for gasoline storage.

D. In case an AST system's use is changed, each AST system shall be fabricated, furnished, assembled, etc. so that it is compatible for use with any of the other intended products as shown in Table 1.05 A of this Specification. In other words, all systems shall be compatible for use with diesel, and gasoline.

1.6 STORAGE ELEMENT

A. The storage element of the AST system shall consist of an AST with the primary tank and the following storage related assemblies, equipment and accessories:
   1. Venting assembly comprised of:
      a. one (1) atmospheric vent
      b. one (1) emergency vent
      c. one (1) interstitial emergency vent
      d. vent piping for the atmospheric vent
   2. One (1) top fill assembly being comprised of:
      a. fill/spill containment box,
      b. cam lock dust cap
      c. all in one fill/overfill prevention valve with drop tube
   3. Gauge and alarm equipment consisting of:
      a. one (1) product level gauge with dip tube/drop tube float.
      b. one (1) audible overfill alarm.
      c. one (1) interstitial leak detection gauge.
   4. Grounding assembly comprised of:
      a. grounding rod(s)
      b. grounding wire
      c. method of securing the grounding wire
   5. Two (2) additional openings with lockable tight caps or compatible plugs two (2) four inch openings in the primary tank.
   6. Access assembly allowing access to the top of the AST at the joint fill area comprised of:
      a. a stairway to the top of the AST.
      b. a catwalk platform on top of the AST connected to the stairway that allows access to both fill assemblies, both pump out/stick ports, both audible overfill alarms, and the primary tank leak detection gauge that monitors the split.

B. The throughput for any AST system solicited through this Specification is not expected to exceed 10,000 gallons in any month or 120,000 gallons in any rolling 12-month period. Contractor will NOT be required to install stage I vapor recovery on any storage element.

C. Storage element for any AST system shall also include any storage related equipment and accessories not mentioned in this Specification but required by governing federal and state regulations.

1.7 DISPENSING ELEMENT

A. The dispensing element to be used with gasoline or diesel shall consist of a UL-listed free standing dispenser unit with an internal mounted suction pump and the following related equipment and accessories:
   1. Piping assembly comprised of:
      a. product piping
      b. ball valve (2)
      c. external fire valve
      d. solenoid valve
      e. pressure regulator valve (with a built in shear connection)
      f. flex connector
      g. pressure regulator return line
      h. ½-inch expansion relief valve
   2. Full cabinet dispenser with meter, built-in hose retractor, and illuminated panel
   3. Hose assembly comprised of:
      a. fuel filter base
      b. fuel filter
      c. hose
      d. hose breakaway device
      e. swivel
      f. nozzle
   4. Metal dispenser pedestal

B. The throughput for any AST system solicited through this Specification is not expected to exceed 10,000 gallons in any month or 120,000 gallons in any rolling 12-month period. Contractor will NOT be required to install stage II vapor recovery on any dispensing element.

C. Dispensing element for any AST system shall also include any dispensing related equipment and accessories not mentioned in this Specification but required by governing federal and state regulations.

PART 2 - STORAGE ELEMENT

2.1 ABOVE GROUND STORAGE TANK

A. AST shall meet the Steel Tank Institute's designation of Fire Guard Aboveground Tank for the storage of petroleum products at or near atmospheric pressure. For FIREGUARD based designs. AST body, in addition to U.L. 142, will also meet U.L. 2085, Underwriters Laboratories 2 Hour Fire Rating's Standard for Insulated Aboveground Storage Tanks for Flammable and Combustible Liquids. Choice of tank will be dependent on tank siting and setback requirements listed in NFPA 30 and the Ohio Fire Code.
   1. Provide tank manufactured by Modern Welding, Newark, Ohio; Hamilton Tank, Columbus, Ohio; Stanwade Metal Products, Hartford, Ohio; or Highland Tank, Stoystown, Pennsylvania.

2. The primary and secondary tanks shall be cylindrical in shape and manufactured in accordance with Steel Tank Institute Publication #F941-94, "Standard for Fireguard Thermally Insulated Above Ground Storage Tanks."
3. The listed assembly shall meet the requirements for "protected" tank as defined by the UFC Appendix II-F as of 10/3/97, and "fire resistant" tank as defined by Underwriters Laboratories including impact resistance, ballistics protection, and hose stream resistance criteria as of 10/3/97.
4. Each AST shall consist of an inner steel wall, encased by lightweight thermal insulation material, and an outer steel wall.
5. The outer steel wall shall be UL 2085 listed as of 10/3/97 for secondary containment, and capable of providing a minimum of 110% containment of the primary storage tank's contents.
6. A legible UL 2085 label shall be affixed to the side of each AST. If UL 2085 changes, the subsequent UL listing required by the Steel Tank Institute for Fireguard ASTs shall be displayed.
7. Steel outer wall of each AST shall be painted to prolong weather resistance and to further reduce maintenance needs. The color of the paint shall be white. The type of paint shall be Acrylathane 85 by Madison Chemical Industries, or equivalent.

B. AST shall be designed for use aboveground and include integral secondary containment, and three inches (3 in.) of thermal insulation that provides a minimum two-hour fire rating.
1. The thermal insulation shall be a porous, lightweight monolithic thermal insulation material in the AST's interstitial space.
2. The thermal insulating material shall allow liquid to migrate through the interstice to a monitoring point.
3. The thermal insulation material shall not be exposed to weathering and shall be protected by the steel secondary containment outer wall.
4. Thermal insulation material shall be installed at the factory and be in accordance with ASTM Standard Specification C332-87 (1991)e1.

C. During AST construction, provisions shall be made such that items specified to be bolted or secured to the AST can be bolted or secured to the AST (i.e., catwalk platform is to be bolted to the AST, product piping is to be secured to the end of the AST in two (2) places, etc.).

D. The single use AST shall have the primary tank
1. The tank shall be made using a carbon steel.
   a. The primary tank shall be a minimum of a quarter inch (1/4 in.) thick.
   b. The secondary shell shall be a minimum of a quarter inch (1/4 in.) thick.

E. Each AST shall have an interstitial monitoring tube between the primary tank and secondary tank to be used for monitoring the interstice for liquids. In addition, a monitoring tube in theprimary tank between the bulkheads used to split the primary tank into compartments so that the potential for product mixing can be monitored.
1. Interstitial monitoring tube shall access the AST monitoring point required by Section 2.01 B.2 of this Specification.
2. Primary tank monitoring tube shall access the clear space between bulkheads as required by Section 2.04 E of this Specification.

F. All ASTs shall be constructed such that each AST has the appropriate number and sizes of openings for the required accessories and equipment, and as required by this Specification.
   1. All openings shall be made through the top of the AST with no exceptions.
   2. An eight-inch by eight-inch by one-quarter inch (8 in. x 8 in. x 1/4 in.) thick striker plate shall be installed under each pump out/stick port opening.
   3. A thirty-inch by thirty-inch by one-quarter inch (30 in. x 30 in. x 1/4 in.) thick striker plate shall be installed under each manway.

G. Provide two (2) additional openings as mentioned in Section 1.06 A.5 and outlined in Section 2.06 of this Specification.

H. Primary and secondary tank shall be constructed of one-quarter inch (1/4 in.) metal or thicker.

I. All bulkheads and bulkhead installation shall be in accordance with UL 142. Bulkheads that are less than five-sixteenths of an inch (5/16 in.) thick shall be braced.

J. For the purposes of this Specification, an AST shall consist of a double-wall tank with two (2) supports (i.e., saddles). The tank and supports shall be delivered together as a complete UL-listed assembly. The bottom member of each support shall extend past the vertical members on each side of the support by six inches (6 in.) or until the length of each bottom member equals the secondary tank outer diameter, whichever has the lesser length. The supports shall come complete with pre-drilled anchoring holes and potential grounding holes that are drilled before painting so that the exposed drilled area gets painted.
   1. The bottom member of each support shall have two (2) holes that will be used for anchoring the AST to the foundation, for a total of four (4) anchoring holes per AST.
      a. Anchor holes shall be located in each of the four (4) portions of the bottom members that extend past the vertical members of the supports. Each hole shall be centered in the extended portion that it is located in.
      b. One support shall have round holes and the other support shall have slotted (elliptical) holes to allow for expansion and contraction.
         1) Round holes shall be one and one-eighth inch (1-1/8 in.) in diameter.
         2) Slotted holes shall be one and one-eighth inch (1-1/8 in.) wide by two inches (2 in.) long, with the long dimension running parallel to the length of the AST.
   2. Unless recommended differently by the contractor before AST fabrication, each of the four (4) vertical members of the supports shall have a hole to potentially be used for grounding the AST.
      a. Grounding holes shall be round, and the size of the hole shall be left up to the discretion of the contractor.
      b. Not all holes will actually be used, but having four (4) potential grounding connection points located in different portions of the AST will allow flexibility in choosing the most logical direction or directions to ground from.
      c. Contractor will be responsible for scuffing the paint off the exterior of any holes chosen for grounding.
   3. AST lifting lugs shall be multi-use lugs that are non-removable and permanently installed. Temporary, disposable, single-use, and/or thread-in lifting lugs will not be permitted.

2.2 VENT ASSEMBLY

A. All vents, venting, vent piping, and vent installation shall comply with OFC 1301:7-7-28 and all applicable sections of the fire and mechanical code, including but not limited to the following:
   1. NFPA 30A 2-1.2, 2-4.5 and chapter 3
   2. NFPA 30 2-3.5, 2-3.6, 2-3.7, and chapter 3
   3. UFC 7902.1.10, 7902.2.6, and Appendix II-F 5.3
   4. UL 142
   5. UL 2085

B. Vents and vent piping shall be constructed and/or coated to be corrosion resistant.

C. Vents and vent piping shall be compatible for use with gasoline, and diesel.

D. Vents shall be installed as close to the center of the AST or compartment as practical.

E. Primary tank vent shall be OPW 23-0033 atmospheric vent or equivalent, and shall be such that the vent:
   1. Is protected from the intrusion of rain and foreign objects.
   2. Discharges vapors upward or laterally.
   3. Is delivered with adequate vent piping to achieve a minimum distance of twelve feet (12 ft.) between ground surface and vent discharge height.

F. Emergency vents shall be Morrison Brothers 244 series emergency vents or equivalent. Emergency vents for primary tank and split tank compartments shall be constructed of iron (i.e., 244I series). Emergency vents for interstitial space may require nipples. Emergency vent selection shall take into consideration the possibility of product switching as mentioned in Section 1.05 C and Section 1.05 D of this Specification (i.e., emergency vents shall be tentatively sized for unleaded gasoline, and diesel, and the worst case scenario of those two shall be chosen). All emergency vents shall be such that each vent
   1. Provides emergency pressure relief that begins at or after one (1) pound/square inch of pressure and is fully opened at or before two and one-half (2-1/2) pounds/square inch of pressure.
   2. Has visible markings indicating the relief setting and venting capacity when fully opened.
   3. Has the required venting capacity (Cubic Feet of Free Air per Hour or CFH) calculated in accordance with NFPA 30, Section 2-3.6.4 and Table 2-8.
      a. Required venting capacities for all sizes of AST systems that are being supplied and are in accordance with NFPA 30, Section 2-3.6.4 and table 2-8. These calculations assume all tank shapes are cylindrical and are based upon:
         1) Secondary tank outer dimensions as shown in Table 1.04 B of this Specification.
         2) The assumption that there is a uniform six inches (6 in.) between the outer wall of the primary tank and inner wall of the secondary tank.
      b. Contractor shall be responsible for calculating vent capacities and for submitting these calculations to the Owner upon request.
         1) Compartment tank emergency vents on dual use ASTs shall be sized according to the configuration and capacity of the respective compartment.
         2) All interstitial emergency vents shall be sized according to the configuration and capacity of the secondary tank.

G. Vent piping shall be two inch (2 in.) diameter piping that is constructed of steel or nodular iron. Galvanized vent piping is not acceptable.
   1. Vent piping shall be of adequate length to achieve a minimum distance of twelve feet (12 ft.) between ground surface and vent discharge height.
   2. Vent piping shall be threaded both ends (T.B.E.).
   3. The AST shall be constructed such that it includes a pipe nipple and coupling assembly or equivalent threaded mounting assembly for rigidly and durably securing the vent piping in place on top of the AST.

2.3 FILL ASSEMBLY

A. All storage elements solicited through this Specification shall be filled from the top.

B. All fill equipment and the installation of fill equipment shall comply with OFC 1301:7-7-28, particularly FM-2803.2.2, and all applicable sections of the fire and mechanical code, including but not limited to the following:
   1. NFPA 30A 2-4.6.1, 2-4.9, and 3-6.
   2. NFPA 30 2-3.8 and 3-9.
   3. UFC Appendix II-F 5.6 and 5.7.

C. Fill components shall be constructed and/or coated to be corrosion resistant.

D. All fill components shall be compatible for use with gasoline, and diesel.

E. Fill components shall be installed within their respective compartment as close as possible to where the splitting of the primary tank takes place. All fill components shall be obtainable from the access assembly as required by Section 1.06 A.6.b of this Specification.

F. Fill/spill containment box shall be designed specifically for use with ASTs and shall have the following:
   1. Hinged lid with lockable hasp.
   2. Built-in spill return device.
   3. Five (5) gallon minimum capacity.

G. Fill cap shall be a three-inch (3 in.) cam lock dust cap.

H. Fill/overfill prevention valve shall be a three inch (3 in.) valve designed specifically for use with ASTs, and shall be an OPW 61fstop 3 in., Morrison Brothers 9095 A 3 in., or Clay and Bailey F-30 3 in.. Fill/overfill prevention valve shall have the following:
   1. Mounting hardware.
   2. Three inch (3 in.) diameter fill with fill pipe that terminates within six inches (6 in.) from the bottom of the primary tank or compartment, and is cut at the bottom at a 45 degree angle with the open end of the cut drop tube facing in the direction where dispensing withdrawal will occur.
   3. Three inch (3 in.) cam lock fill adaptor.
   4. Cushioned positive shut-off at 95% capacity of primary tank or compartment.

2.4 GAUGE AND ALARM EQUIPMENT

A. Gauges and alarms shall be constructed and/or coated to be corrosion resistant.

B. Gauges and alarms shall be compatible for use with gasoline, and diesel.

C. All gauge and alarm equipment and the installation of gauge and alarm equipment shall comply with OFC 1301:7-7-28, particularly FM-2803.2.2, and all applicable sections of the fire and mechanical code, which includes but is not limited to the following:
   1. NFPA 30A 2-4.6.1.
   2. NFPA 30 2-3.8.

D. Product level gauge and audible overfill alarm shall be a Morrison Brothers 918 clock gauge with alarm unit, or equivalent.
   1. Product level gauge shall be a non-electric top mounted mechanical clock face gauge.
      a. Gauge shall give product readings in feet and inches, and shall be set to give the same readings that one should get when sticking the tank through the pump out/stick port outlined in sections 2.6 B) through 2.6 B) 2 c of this Specification (i.e., the gauge should be set so that it reads 0 feet and 0 inches at 1/4 in. above the bottom of the primary tank to account for the quarter inch thick striker plate under the pump out/stick port opening).
      b. Gauge shall be visible and readable to the nearest one-eighth inch (1/8 in.) from a distance of twenty feet (20 ft.) away.
      c. Gauge shall be installed on top of the AST in the vicinity of the fill area such that it is clearly visible and readable to personnel filling or sticking the AST.
   2. Float for product level gauge shall be installed inside a dip tube or drop tube to minimize float drifting and tangling.
      a. Float shall be a drop tube float made specifically for installation inside a dip tube/drop tube (option #5 on the Morrison Clock Gauge).
      b. Provisions shall be made to keep localized pressure and/or vacuum from building up within the dip tube/drop tube and interfering with float operation. This can be accomplished with a one-half inch (1/2 in.) diameter hole in the dip tube/drop tube where the location of the hole is above the 95% capacity level but below the top of the primary tank or compartment.
   3. Audible overfill alarm unit shall be a non-electric intrinsically safe battery-operated alarm unit that is mounted remote from the product level gauge.
      a. Audible alarm warning shall be set at 90% of the AST's capacity.
      b. Audible alarm unit shall be attached to the catwalk railing nearest to the fill that the alarm corresponds to and in such a manner that the height of the alarm unit is at or below the top railing but above the intermediate railing.

E. Interstitial leak detection gauge shall be the AT-A-GLANCE Leak Gauge made by Krueger Sentry Gauges, or equivalent.
   1. Interstitial leak detection gauge shall be a non-electric top mounted mechanical gauge that visually indicates a leak through a float and bobber type system.
      a. Gauge shall be installed on top of the AST at the monitoring tube between the primary tank and secondary tank as required by Section 2.01 E of this Specification.

b. Gauge float shall penetrate the interstice by being installed through the monitoring tube that accesses the monitoring point as required by Section 2.01 B.2 of this Specification.
c. The gauge, monitoring tube, and monitoring point shall be located at either end of the AST.
d. Gauge shall be set to start detecting liquid within the interstice when the liquid level at the monitoring point is twelve inches (12 in.) in depth. A twelve inch (12 in.) depth will allow a condensation and evaporation cycle with minimal false leak indications that does not compromise the ability of the gauge to detect a breach in the primary tank.
e. The indicator portion of the gauge shall be installed such that it is visible from twenty feet (20 ft.) away from the end of the AST in which it is installed.

2.5 GROUNDING ASSEMBLY

A. All grounding and grounding equipment shall comply with OFC 1301:7-7-28, particularly F-2803.8, and NFPA 70.

B. Grounding assembly shall provide protection against:
1. Lightning damage.
2. Static discharge, particularly during unloading of transport vehicle.

C. Contractor shall be responsible for determining the number of grounding points and location of grounding points on the storage element.
1. Contractor will be responsible for the following regarding grounding of the AST:
a. The storage element has continuity and will only require one (1) grounding point.
b. Each of the four (4) holes mentioned as potential grounding connection points in Section 2.01 J.2 of this Specification is a valid grounding point.

D. Each required grounding point shall require a grounding assembly consisting of a grounding rod, ten feet (10 ft.) of grounding wire, a method for securing the grounding wire, and/or any other equipment and materials recommended by the contractor.
1. Grounding rods shall be five-eighths inches (5/8 in.) in diameter by eight feet (8 ft.) in length.
2. Grounding wire shall be #4 solid bare copper wire.
3. Method for securing grounding wire shall include all equipment necessary to secure the wire to the AST and to the grounding rod. Method must provide a durable connection. Alligator clips will not be accepted.

E. Contractor shall be responsible for ensuring that the entire AST system has an appropriate grounding method to protect against lightning damage and static discharge. Contractor shall be responsible for notifying the Owner in writing on or before AST system delivery if any portion of the grounding requirements as mentioned in sections 2.05 C through 2.05 D.3 of this Specification will not provide the desired protection and/or meet state and federal regulations pertaining to the grounding of AST systems.

F. If the contractor feels that the grounding requirements are not adequate as mentioned in Section 2.05 E of this Specification, or if the contractor prefers an alternative method that will provide

equal or greater protection, the contractor may use additional grounding measures and/or an alternative grounding method if prior approval is granted by the Owner.

2.6 ADDITIONAL OPENINGS

A. Each AST shall have two (2) additional openings as mentioned in Section 2.01 G of this Specification.
   1. Additional openings shall be other than those openings and/or manways that are
      a. Required by state and federal law.
      b. Necessary for AST equipment and accessories installation to make the AST system a complete system.
      c. Required during AST construction for insulation filling and viewing.
      d. Required by the Steel Tank Institute (STI) regarding the fabrication of Fireguard ASTs.
   2. The additional openings shall be pipe nipples threaded one end (T.O.E.) that penetrate the primary tank.
   3. Additional openings shall be as follows:
      a. Each AST shall have two four inch (4 in.) diameter additional openings.

B. Four inch (4 in.) diameter openings located at each end of the tank shall be considered as the pump out/stick port mentioned is sections 1.06 A.5 of this Specification.
   1. The pump out/stick port must be obtainable from the access assembly as mentioned in Section 1.06 A.6.b of this Specification.
   2. The pump out/stick port shall have a lockable tight cap and a four inch (4 in.) diameter dip tube or drop tube.
      a. Dip tube/drop tube shall terminate within six inches (6 in.) of the bottom of the primary tank or compartment.
      b. Provisions shall be made to keep localized pressure and/or vacuum from building up within the dip tube/drop tube and interfering with manual sticking procedures. This can be accomplished with a one-half inch (1/2 in.) diameter hole in the dip tube/drop tube where the location of the hole is above the 95% capacity level but below the top of the primary tank or compartment.
      c. An eight-inch by eight inch by one-quarter inch thick (8 in. x 8 in. x 1/4 in.) striker plate as mentioned in Section 2.01 F.2 of this Specification shall be located under the pump out/stick port.

2.7 ACCESS ASSEMBLY

A. The platform and staircase specification listed below are designed as parts of an unoccupied equipment platform and access way as defined in the Ohio Building Code (OBC) Sections 502.1 and 505.5. The platform and staircase are not considered part of the means of egress, and are not required to meet the provisions of OBC Section 1009. The platform and staircase design listed below meet the applicable OSHA requirements.

B. Access assembly shall be designed, constructed, and installed in accordance with OSHA standards, particularly standard numbers 1910.21, 1910.23, and 1910.24. Access assembly may

be pre-fabricated, or be fabricated by contractor, or be any combination of both. Access assembly shall include the following:

1. Supported metal catwalk platform on top of the AST for access to specified items.
2. Self-supporting metal stairway assembly to allow egress to and from the catwalk platform.
3. Any other item or equipment that conforms to OSHA standards and is:
    a. necessary to allow egress to and from the top of the AST.
    b. necessary to allow access to specified items on top of the AST.
    c. required by OSHA or any other state or federal regulatory authority.

C. Access assembly, with the possible exclusion of bolts, nuts, and washers, shall be constructed of carbon steel. All items and surfaces, including surfaces exposed by drilling holes, that constitute the access assembly after fabrication and/or construction of the access assembly is complete, excluding items welded to the exterior of the AST such as fixed supports and mounting brackets required by sections 2.07 E.1 and 2.07 E.2 of this Specification, and excluding nuts, bolts, and washers, shall be hot-dip galvanized for corrosion protection after the fabrication and/or construction of the access assembly is complete. Hot-dip galvanizing shall be in accordance with ASTM Standard Specification A123-89ae1.

1. Fixed supports and mounting brackets required by sections 2.07 E.1 and 2.07 E.2 of this Specification that are welded to the AST shall not be galvanized and shall be protected from corrosion by being painted white using the same paint specified in Section 2.01 A.7 of this Specification that is used to paint the AST.

D. All bolts, nuts, and washers used in conjunction with the access assembly shall be constructed and/or factory coated be corrosion resistant (i.e., the bolts, nuts, and washers must be galvanized, or constructed of stainless steel, or have some type of equivalent method of corrosion resistance applied at the factory). All load bearing bolts shall be 10,000 PSI minimum shear bolts.

E. All portions of the access assembly that will have foot traffic shall have slip-resistant, grated, serrated surfaces that do not allow water, snow, or ice to accumulate.

F. Provisions shall be made during AST construction for securing the catwalk platform in place on top of the AST. A total of four (4) attachment points will be required on top of the AST.

1. Two (2) fixed supports shall be welded to the AST such that the location of the fixed supports correspond with the two (2) corners of the catwalk platform that are furthest from the entrance to the catwalk platform.
    a. Each fixed support shall be constructed of a three inch by three inch by one- fourth inch thick (3 in. x 3 in. x 1/4 in. thick) steel angle.
    b. Each fixed support shall have two (2) seven-eighths inch (7/8 in.) diameter holes near the protruding end for bolting the catwalk platform to the fixed supports with two (2) three-fourths inch (3/4 in.) diameter bolts. A minimum of one-half inch (1/2 in.) of metal must be maintained around the holes.
2. Two (2) mounting brackets shall be welded to the AST exterior in the quadrant that is nearest to the catwalk platform opening. Mounting brackets will be used in conjunction with knee braces, and shall be located such that the vertical centerline of the AST and a line extending from the center of the AST to the mounting bracket is approximately sixty (60) degrees.
    a. Each mounting bracket shall have a round hole and a slotted hole for bolting a knee brace to the mounting bracket. The round hole shall be located such that it is below

the slotted hole and closer to the AST exterior. A minimum of one- half inch (1/2 in.) of metal must be maintained around the holes.

1) The round hole shall have a diameter of seven-eighths inches (7/8 in.).
2) The slotted hole shall be two inches (2 in.) long in the horizontal direction and seven-eighths inches (7/8 in.) wide.

b. Each knee brace shall consist of a three inch by three inch by one-fourth inch thick (3 in. x 3 in. x 1/4 in. thick) steel angle that has a round hole and a slotted hole in the lower end for bolting the knee brace to the mounting bracket using two (2) three-fourths inch (3/4 in.) diameter bolts, and two (2) round holes in the upper end for bolting the knee brace to the catwalk platform frame using two (2) three-fourths inch (3/4 in.) diameter bolts. A minimum of one-half inch (1/2 in.) of metal must be maintained around bolt holes.

1) Each round hole shall have a diameter of seven-eighths inches (7/8 in.).
2) The slotted hole shall be one and one-half inches (1-1/2 in.) long in the vertical direction and seven-eighths inches (7/8 in.) wide.
3) The round hole in the lower end shall be below the slotted hole.

3. The method of securing the catwalk platform frame to the top of the AST shall be designed, constructed, and installed such that each point of attachment, including but not limited to welds, fixed supports, mounting brackets, knee braces, bolts, and any other methods and materials used, has the strength to support a moving concentrated load of at least one-thousand pounds (1,000 lbs.) OSHA 1910.24 (c). Load bearing bolts shall be 10,000 PSI minimum shear bolts.

G. Catwalk platform shall consist of a frame, standard railing, and a floor, and have a thirty-six inch (36 in.) wide entrance as measured between the toeboard on either side of the entrance.

1. Catwalk platform frame shall be constructed of three inch by five inch by one-fourth inch thick (3 in. x 5 in. x 1/4 in. thick) steel angles that are welded or bolted together with the five inch (5 in.) legs in the vertical plane, and at least one (1) and possibly more than one (1) middle support where each middle support consists of a three inch by three inch by one-fourth inch thick (3 in. x 3 in. x 1/4 in. thick) steel angle that is welded or bolted to the two (2) outer frame angles perpendicular to the tank length.

a. The bolting together of any portion of the frame will require two (2) seven-eighths inch (7/8 in.) diameter holes and two (2) three-fourths inch (3/4 in.) diameter bolts at each point where bolting will occur. A minimum of one-half inch (1/2 in.) of metal must be maintained around all holes.

b. The three (3) sides of the frame that do not contain the catwalk platform entrance shall have the five inch (5 in.) leg of the steel angle protruding upward as toeboard OSHA 1910.23 (c) (1).

c. The side of the frame that contains the catwalk platform entrance shall have the five inch (5 in.) leg of the steel angle protruding downward OSHA 1910.23 (c) (1) and have two (2) slotted holes for bolting the frame to the stairway platform frame using two (2) three-fourths inch (3/4 in.) diameter bolts.

1) Bolt holes shall be seven-eighths inches (7/8 in.) wide, two inches (2 in.) long in the vertical direction, and located in the vertical leg at opposite ends but within the span of the opening. A minimum of one-half inch (1/2 in.) of metal must be maintained around the holes.

d. If the side containing the catwalk platform entrance exceeds thirty-six inches (36 in.), an additional three inch by five inch by one-fourth inch thick (3 in. x

5 in. x 1/4 in. thick) steel angle will be required for toeboard along the portion of that side that is not intended to be part of the entrance OSHA 1910.23 (c) (1).

1) The additional steel angle shall be welded or bolted to the frame. Bolting will require a bolt hole and a bolt in each end for a total of two (2) seven- eighths inch (7/8 in.) diameter holes and two (2) three-fourths inch (3/4 in.) diameter bolts per additional steel angle.

e. Frame, including but not limited to all welds, bolts, and materials, shall be designed, constructed, and installed to support a moving concentrated load of at least one-thousand pounds (1,000 lbs.) OSHA 1910.24 (c). Load bearing bolts shall be 10,000 PSI minimum shear bolts.

f. Each of the two (2) steel frame angles that are perpendicular to the side with the catwalk platform opening shall have four (4) bolt holes for a total of eight (8) holes in the catwalk platform frame that are used for bolting the frame in place above the AST. Two (2) of the holes in each steel angle shall be used for bolting the frame to fixed supports and the remaining two (2) holes in each steel angle shall be used for bolting the frame to knee braces. Instead of placing all holes in the frame, the contractor may place some or all holes in clips that are welded or bolted to the bottom of the frame. The bolting of a clip to the frame will require two (2) seven-eighths inch (7/8 in.) diameter holes and two (2) three-fourths inch (3/4 in.) diameter bolts per clip (a bolt and hole in each end of the clip) to secure the clip to the frame. A minimum of one-half inch (1/2 in.) of metal must be maintained around all holes.

1) Holes shall be horizontally slotted, and shall be seven-eighths inches (7/8 in.) wide and three inches (3 in.) long. There shall be two (2) holes near each end of each of the two (2) steel frame angles that are perpendicular to the catwalk platform opening, and the pair of holes near each end shall be situated such that one (1) hole is directly above the other hole. The purpose of having slotted holes is to allow for minor adjustments so that the catwalk platform floor height can be matched up with the stairway platform floor height.

2) A total of eight (8) three-fourths inch (3/4 in.) diameter bolts shall be used to bolt the frame and/or clips already attached to the frame to the fixed supports and knee braces. Bolting shall be such that there are two (2) bolts per fixed support and two (2) bolts per knee brace.

g. Each middle support shall have the vertical leg protruding downward, and shall be used to provide support for bearing bar clear spans exceeding thirty-four inches (34 in.) and support to the catwalk platform floor in the area where equipment protrusion will occur.

1) A middle support shall be located at least one inch (1 in.) but no more than two inches (2 in.) away from the edge of the largest equipment cut-out in the catwalk platform flooring, and in such a manner that the support is between the cut-out and catwalk platform entrance.

h. The catwalk platform frame shall have a minimum of four (4) nine-sixteenths inch (9/16 in.) diameter holes for bolting the catwalk platform floor in place using one-half inch (1/2 in.) diameter bolts. If the catwalk platform floor consists of two (2) square or rectangular pieces of open steel floor grating, then a minimum of eight

i. holes will be required. A minimum of one-half inch (1/2 in.) of metal must be maintained around all holes.

j. A minimum of three inches (3 in.) shall be maintained between all components of the catwalk platform frame and the outer shell of the AST.

k. The outer edge of the frame at the catwalk platform opening shall extend three inches (3 in.) past the perimeter of the AST outer shell in the horizontal direction.

2. Catwalk platform railing shall consist of top railing, intermediate railing, and posts OSHA 1910.23 (e) (1). All railing shall be constructed of one and one-half inch (1-1/2 in.) diameter schedule 40 steel pipe OSHA 1910.23 (e) (3) (ii) that is welded together. All railing surfaces shall be smooth OSHA 1910.23 (e) (1) requires smooth top railing.
   a. Top railing shall be installed around the perimeter of the catwalk platform except at the entrance OSHA 1910.23 (c) (1), and shall have a vertical height of forty- two inches (42 in.) as measured from the catwalk platform floor top surface to the top surface of the railing OSHA 1910.23 (e) (1).
   b. Intermediate railing shall be installed around the perimeter of the catwalk platform except at the entrance OSHA 1910.23 (c) (1), and shall have a vertical height of twenty-one inches (21 in.) as measured from the catwalk platform floor top surface to the center of the railing OSHA 1910.23 (e) (1).
   c. Posts shall be installed at each corner of the catwalk platform, every eight feet (8 ft.) or less along continuous top railing and/or intermediate railing spans OSHA 1910.23 (e) (3) (ii), and on either side of the entrance to the catwalk platform. Single use catwalk platforms will require at least four (4) posts and dual use catwalk platforms will require at least five (5) posts.
   d. Posts shall be welded and/or bolted to the catwalk platform frame. Whenever possible, posts shall be secured to the outside of the frame.
      1) If posts are bolted instead of welded, two (2) seven-eighths inch (7/8 in.) diameter holes and two (2) three-fourths inch (3/4 in.) diameter bolts will be required for securing each post. A minimum of one-half inch (1/2 in.) of metal shall be maintained around all bolt holes.
   e. Catwalk platform railing shall be designed, constructed, and installed such that all railing, including all welds used to connect top railing, intermediate railing, and posts together, and all welds and/or bolts used to secure posts to the catwalk platform frame, has the strength to support a load of at least two-hundred pounds (200 lbs.) applied in any direction at any point on the top railing OSHA 1910.23 (3) (iv). All bolts shall be 10,000 PSI minimum shear bolts.
   f. Provisions shall be made for attaching audible overfill alarm units to the catwalk platform railing such that the height of the alarm unit is at or below the top railing but above the intermediate railing.

3. Catwalk platform floor shall consist of open steel floor grating that is constructed of carbon steel and has a standard mesh (i.e., type 19W2), serrated surface, cross bars that are spaced two inches (2 in.) on center, and one and one-fourth inch (1-1/4 in.) deep by three-sixteenths inch (3/16 in.) wide bearing bars that are spaced a maximum of one and three-sixteenths inches (1-3/16 in.) on center so that the gaps between nearest edges are one inch (1 in.) or less and do not meet OSHA's definition of a floor hole OSHA 1910.21 (a) (1) and do not require extra protection OSHA 1910.23 (a) (8) through (9). Floor shall be installed with the bearing bars perpendicular to the AST length.
   a. Contractor shall use one (1) continuous piece of open steel floor grating for the catwalk platform floor unless the width and length of the platform both exceed thirty-six inches (36 in.). If catwalk platform width and length both exceed thirty-six inches (36 in.), the contractor will be permitted to use two (2) pieces of open steel floor grating. The use of more than two (2) pieces of open steel floor grating for the floor will require prior approval from the Owner.

1) Each piece of open steel floor grating used for catwalk platform flooring shall be square or rectangular in shape, and shall have a one-fourth inch (1/4 in.) thick steel tab welded in each corner (four 4 tabs per each piece) for securing the grating to the catwalk platform frame.
    a) Each steel tab shall have a nine-sixteenths inch (9/16 in.) diameter hole in the center of the tab to be used for bolting the grating to the frame with one-half inch (1/2 in.) diameter bolts. A minimum of three-sixteenths inch (3/16 in.) of metal must be maintained around the tab hole.
2) When more than one (1) piece of open steel floor grating is used, the separate pieces shall be fastened together at the seam where the pieces abut. Additional supports may also be required under seams.

b. Catwalk platform floor shall have cut-outs (i.e., holes) to allow the protrusion of specified equipment through the floor so that the equipment is accessible.
1) The catwalk platform floor of a single use AST shall have cut-outs for the fill assembly and the pump out/ stick port for a total of two (2) cut-outs, and the catwalk platform floor of a dual use AST shall have cut-outs for both fill assemblies, both pump out/stick ports, and the primary tank leak detection gauge monitoring the tank split for a total of five (5) cut-outs.
    a) Fill assemblies and pump out/stick ports shall protrude through and at least two inches (2 in.) above the catwalk platform floor.
    b) Primary tank leak detection gauges shall protrude through and above the catwalk platform floor such that the indicator portion of the gauge is visible to someone standing on the catwalk platform.
2) The gap between the perimeter of a cut-out and the perimeter of equipment as it protrudes through the cut-out shall be at least one-half inch (1/2 in.) wide but no more than one inch (1 in.) wide so that the gap does not meet OSHA's definition of a floor hole OSHA 1910.21 (a) (1) and does not require extra protection OSHA 1910.23 (a) (8) through (9).
3) The distance between the perimeter of cut-outs and the outer edges of any piece of open steel floor grating used as catwalk platform flooring shall be four inches (4 in.) or greater.
    a) At least two (2) continuous (i.e., uncut) cross bars shall be located between all cut-out perimeters and the flooring outer edge that is furthest away from the catwalk platform entrance.
4) The distance between the perimeters of adjacent cut-outs shall be at least three inches (3 in.).
5) The distance between the perimeter of the nearest cut-out and the edge of the catwalk platform frame middle support that provides support in the area of the cut-outs shall be at least one inch (1 in.) but no more than two inches (2 in.).

c. Catwalk platform floor shall be designed, constructed, and installed to support a moving concentrated load of at least one-thousand pounds (1,000 lbs.) OSHA 1910.24 (c).

4. Catwalk platform shall be designed, constructed, and installed such that it is square or rectangular in shape OSHA 1910.24 (g) requires platform width to equal or exceed stair width and platform length to be at least thirty inches (30 in.), and does not extend over tank openings other than those required to be obtainable from the access assembly.

H. Stairway shall consist of stairs and a stairway platform at the top of the stairs.
1. Stairs shall consist of treads welded to clips that are welded to stringers, and stair railing.
a. Treads, clips, and stringers shall be designed, constructed, and installed such that the incline angle (i.e., angle between the ground and stringers) is at least forty-five (45) degrees but no more than fifty (50) degrees OSHA 1910.24 (e) requires a minimum of thirty (30) degrees and a maximum of fifty (50) degrees.
1) Each tread shall consist of a single rectangular piece of open steel floor grating that is constructed of carbon steel and has a standard mesh (i.e., type 19W2), serrated surface, cross bars spaced at two inches (2 in.) on center, and one and one-fourth inch (1-1/4 in.) deep by three-sixteenths inch (3/16 in.) wide bearing bars spaced no more than one and three- sixteenths (1-3/16 in.) on center so that the gaps between nearest edges of the bearing bars are one inch (1 in.) or less and do not meet OSHA's definition of a floor hole OSHA 1910.21 (a) (1) and do not require extra protection OSHA 1910.23 (a) (8) through (9).
a) Each tread shall be installed such that it is in the horizontal plane with the bearing bars perpendicular to the stringers.
b) Nosings will only be required if the leading edge of treads are not readily identifiable by persons descending the stairs OSHA 1910.24 (f).
2) Clips shall consist of two inch by two inch by one-fourth inch thick (2 in. x 2 in. x 1/4 in. thick) steel angles. Two (2) clips will be required for each tread. The clip length shall equal or exceed the tread width as specified in Section 2.07 G.1.c.3) of this Specification.
3) Stringers shall consist of ten inch (10) channel. Each stairway will require two (2) stringers with the stringer length to be determined by the contractor.
a) Each stringer shall have a one-fourth inch thick (1/4 in.) steel tab welded to the bottom on the inside in such a manner that the tab is under the first step and is not a trip hazard.
b) Each tab shall have a nine-sixteenths inch (9/16 in.) diameter hole for bolting stringers to the foundation with one-half inch (1/2 in.) diameter bolts. A minimum of one-half inch (1/2 in.) of metal must be maintained around the hole. The tab hole alignment shall be such that it is between the bars of the first tread so that a one-half inch (1/2 in.) diameter concrete drill bit can be placed between the bars and down through the hole in the tab.
c) Each stringer shall be secured to the stairway platform frame and/or stairway platform supports by welds and/or bolts such that the stairs, when combined with the stairway platform, form a self-supporting stairway. Bolting will require two (2) seven-eighths inch (7/8 in.) diameter holes and two three-fourths inch (3/4 in.) bolts per stringer. A minimum of one-half inch (1/2 in.) of metal must be maintained around holes.
b. Treads, clips, and stringers, including but not limited to welds and bolts, shall be designed, constructed, and installed to support a moving concentrated load of at least one-thousand pounds (1,000 lbs.) OSHA 1910.24 (c). Load bearing bolts shall be 10,000 PSI minimum shear bolts.
c. Stairs shall be thirty inches (30 in.) wide as measured between the inner edges of the stringers OSHA 1910.24 (d) requires minimum 22 inch width, and have a uniform rise height, uniform tread run, and uniform tread width OSHA 1910.24

d. requires uniform rise height and uniform tread width.
   1) Rise height shall be at least eight and three-fourths inches (8-3/4 in.) but no more than nine and one-half inches (9-1/2 in.) OSHA 1910.24 (e), Table D-1, values of rise for angles to the horizontal of 45 degrees to approximately 50 degrees.
   2) Tread run shall be at least eight inches (8 in.) but no more than eight and three-fourths inches (8-3/4 in.) OSHA 1910.24 (e), Table D-1, values of tread run for angles to the horizontal of 45 degrees to approximately 50 degrees.
   3) Tread width shall be a minimum of nine and eleven-sixteenths inches (9-11/16 in.) (i.e., eight 3/16 in. bearing bars that are 1-3/16 in. on center).

e. Stair railing shall be installed along the stairs OSHA 1910.23 (d) (1) on both open sides OSHA 1910.23 (d) (1) (iii) and OSHA 1910.24 (h) and shall consist of top railing, intermediate railing, and posts OSHA 1910.23 (e) (2) and OSHA 1910.24 (h) that are constructed of one and one-half inch (1-1/2 in.) diameter schedule 40 steel pipe OSHA 1910.23 (e) (3) (ii) that is welded together. All railing surfaces shall be smooth OSHA 1910.23 (e) (1) requires smooth top railing.
   1) Top railing shall be installed such that the height of the railing is thirty-two inches (32 in.) as measured vertically from the top surface of the front edge of a tread to the top surface of the top railing OSHA 1910.23 (e) (2) requires 30 in. to 34 in. height for stair top railing.
   2) Intermediate railing shall be installed such that the height of the railing is sixteen inches (16 in.) as measured vertically from the top surface of the front edge of a tread to the center of the intermediate railing OSHA (e) (2) requires stair railing to be similar to standard railing: intermediate railing height = 1/2 top railing height.
   3) Stair posts shall be installed at the beginning and end of all stair top railing and intermediate railing spans. Middle stair posts are also required every eight feet (8 ft.) along continuous top railing and intermediate railing spans OSHA 1910.23 (e) (3) (ii).
      a) Posts at the stair entrance and middle posts shall be welded and/or bolted to the outside or top of the stringers.
      b) Posts at the top of the stairs shall be welded and/or bolted to the outside or top of the stringers and/or outside of the stairway platform frame.
      c) If posts are bolted instead of welded, two (2) seven-eighths inch (7/8 in.) diameter holes and two (2) three-fourths inch (3/4 in.) diameter bolts will be required to secure each post. A minimum of one-half inch (1/2 in.) of metal shall be maintained around all bolt holes.
   4) Stair railing shall be designed, constructed, and installed such that all railing, including all welds used to connect top railing, intermediate railing, and posts together, and all welds and/or bolts used to secure posts to the stringers and/or stairway platform frame, has the strength to withstand a two-hundred pound (200 lb.) force applied in any direction at any point on the top railing OSHA 1910.23 (e) (3) (iv). All bolts shall be 10,000 PSI minimum shear bolts.

2. Stairway platform shall consist of a frame, supports, standard railing, and a floor. Stairway platform shall have a stair entrance that is thirty inches (30 in.) wide as measured between the toeboard on either side of the entrance, and a catwalk platform entrance that is thirty-six inches (36 in.) wide as measured between the toeboard on either side of the entrance. Stairway platform shall be constructed such that someone ascending the stairs must turn left on the stairway platform to enter the catwalk platform.

a. Stairway platform frame shall be constructed of four (4) three inch by five inch by one-fourth inch thick (3 in. x 5 in. x 1/4 in. thick) steel angles that are welded or bolted together. The five inch (5 in.) leg of all the steel angles used in the construction of the frame shall be in the vertical plane.
   1) The bolting together of any portion of the stairway platform frame will require two (2) seven-eighths inch (7/8 in.) diameter holes and two (2) three-fourths inch (3/4 in.) diameter bolts at each point where bolting will occur. A minimum of one-half inch (1/2 in.) of metal must be maintained around all holes. The steel angle on the side of the stairway platform frame that will be the entrance to the catwalk platform from the stairway platform (i.e., the side that abuts the catwalk platform) shall have the five inch (5 in.) leg of the steel angle protruding downward OSHA 1910.23 (c) (1), and have two slotted holes for bolting the stairway platform frame to the catwalk platform frame.
      a) Bolt holes shall be seven-eighths inches (7/8 in.) wide, two (2 in.) long in the horizontal direction, and located in the vertical leg at opposite ends. A minimum of one-half inch (1/2 in.) of metal must be maintained around all bolt holes.
   2) The steel angle on the side of the stairway platform frame that will be the entrance to the stairway platform from the stairs (i.e., the side that abuts the stairs) shall have the five inch (5 in.) leg of the steel angle protruding upward as toeboard OSHA 1910.23 (c) (1) with the portion of the vertical leg that spans the entrance cut down so that it matches or is no more than one-fourth inch (1/4 in.) lower than the top surface of the stairway platform floor.
   3) The remaining two (2) steel angles that do not span an entrance shall have the five inch (5 in.) legs protruding upward as toeboard OSHA 1910.23 (c) (1).
   4) Stairway platform frame, including but not limited to all welds, bolts, and materials shall be designed, constructed, and installed to support a moving concentrated load of at least one-thousand pounds (1,000 lbs.) OSHA (c). Load bearing bolts shall be 10,000 PSI minimum shear bolts.
   5) The stairway platform frame shall have four (4) nine-sixteenths inch (9/16 in.) diameter holes for bolting the stairway platform floor in place using one-half inch (1/2 in.) diameter bolts. A minimum of one-half inch (1/2 in.) of metal must be maintained around all holes.
   6) The stairway platform frame shall be bolted and/or welded to the stairway platform supports. If the frame is bolted to the supports, two (2) seven- eighths inch (7/8 in.) diameter holes and two (2) three-fourths inch (3/4 in.) diameter bolts will be required near each corner of the frame for a total of eight (8) holes and eight (8) bolts. A minimum of one-half inch (1/2 in.) of metal must be maintained around the holes.

b. Four (4) stairway platform supports will be required. Supports shall be constructed of three inch by three inch by one-fourth inch thick (3 in. x 3 in. x 1/4 in. thick) steel angles that are welded or bolted to each corner of the frame. Bolting will require two (2) seven-eighths inch (7/8 in.) diameter holes and two (2) three-fourths inch (3/4 in.) diameter bolts (eight 8 total bolts and bolt holes) near the ends of the support for bolting to the frame. A minimum of one-half inch (1/2 in.) of metal must be maintained around the holes.
   1) Stairway platform supports shall be sized such that the stairway platform flooring height matches the catwalk platform flooring height and the junction of the separate floors does not present a trip hazard.

2) Each stairway platform support shall have a one-fourth inch thick (1/4 in. thick) steel tab welded to the bottom such that the tab lies flat against the foundation surface and does not present a trip hazard.
   a) Each tab shall have a nine-sixteenths inch (9/16 in.) diameter hole for bolting the stairway support to the foundation using one-half inch (1/2 in.) diameter bolts. A minimum of one-half inch (1/2 in.) of metal must be maintained around all tab holes.
3) Stairway platform supports may have to be notched at the catwalk platform opening and/or stair opening.

c. Stairway platform railing shall consist of top railing, intermediate railing, and posts OSHA 1910.23 (e) (1). All stairway platform railing shall be constructed of one and one-half inch (1-1/2 in.) diameter schedule 40 steel pipe OSHA 1910.23 (e) (3) (ii) that is welded together. All railing surfaces shall be smooth OSHA 910.23 (e) (1) requires smooth top railing.
   1) Top railing shall be installed around the perimeter of the stairway platform along the two (2) sides of the platform that do not contain an entrance to the stairs or the catwalk platform (i.e., that do not abut the stairs or catwalk platform) OSHA 1910.23 (c) (1) and OSHA 1910.24 (h). Top railing shall have a vertical height of forty-two inches (42 in.) as measured from the stairway platform floor top surface to the top surface of the railing OSHA 1910.23 (e) (1).
   2) Intermediate railing shall be installed around the perimeter of the stairway platform along the two (2) sides of the platform that do not contain an entrance to the stairs or the catwalk platform (i.e., that do not abut the stairs or catwalk platform) OSHA 1910.23 (c) (1) and OSHA 1910.24 (h). Intermediate railing shall have a vertical height of twenty-one inches (21 in.) as measured from the stairway platform floor top surface to the center of the railing OSHA 1910.23 (e) (1).
   3) Posts shall be welded or bolted to the outside of the stairway platform frame. An exception will be made to allow some of the posts to be welded or bolted to the outside or top of the stair stringers. If posts are bolted instead of welded, two (2) seven-eighths inch (7/8 in.) diameter holes and two (2) three-fourths inch (3/4 in.) diameter bolts will be required to secure each post. A minimum of one-half inch (1/2 in.) of metal shall be maintained around all bolt holes.
      a) A post with a chain loop welded to it near the top will be required on each side of the entrance from the stairs to the stairway platform. Contractor shall protect the opening between the posts by providing a safety chain that spans the opening. Safety chain shall include a spring-loaded clasp on each end that can be secured to a chain loop.
      b) The post located at the top of the stairs and on the left side of the entrance for someone ascending the stairs (i.e., the entrance post at the top of the stairs that will be nearest to the AST system) shall be considered a stair post and shall be used in conjunction with stair top railing and stair intermediate railing only.
      c) The post located at the top of the stairs and on the right side of the entrance to someone ascending the stairs (i.e., the entrance post at the top of the stairs that will be furthest from the AST system) shall be considered as both a stairway platform post and a stair post and shall be used in conjunction with stairway platform top railing, stairway

platform intermediate railing, stair top railing, and stair intermediate railing.

d) A post will be required near each of the two (2) corners of the stairway platform that are furthest from the entrance of the stairs to the stairway platform (i.e., on each end of the side of the stairway platform that is opposite and parallel to the side containing the stair entrance). These posts shall be considered as stairway platform posts and shall be used in conjunction with stairway platform top railing and intermediate railing only.

4) Stairway platform railing shall be designed, constructed, and installed such that all railing, including all welds used to connect top railing, intermediate railing, and posts together, and all welds and/or bolts used to secure posts to the stringers and/ or stairway platform frame, has the strength to withstand a two-hundred pound (200 lb.) force applied in any direction at any point on the top railing OSHA 1910.23 (e) (3) (iv). All bolts shall be 10,000 PSI minimum shear bolts.

d. Stairway platform floor shall consist of open steel floor grating that is constructed of carbon steel and has standard mesh (i.e., type 19W2), serrated surface, cross bars spaced two inches (2 in.) or less on center, and one and one-fourth inch (1-1/4 in.) deep by three-sixteenths inch (3/16 in.) wide bearing bars that are spaced a maximum of one and three-sixteenths inches (1-3/16 in.) on center so that the gaps between nearest edges are one inch (1 in.) or less and do not meet OSHA's definition of a floor hole OSHA 1910.21 (a) (1) and do not require extra protection OSHA 1910.23 (a) (8) through (9). Floor shall be installed with the bearing bars perpendicular to the AST length.

1) Contractor shall use one (1) continuous piece of grating for the floor, and the grating shall be square or rectangular in shape.

a) Stairway platform floor grating shall have a one-fourth inch (1/4 in.) thick steel tab welded in each corner (four 4 tabs total) to be used for securing the floor grating to the catwalk platform frame.

b) Each steel tab shall have a nine-sixteenths inch (9/16 in.) diameter hole in the center of the tab to be used for bolting the grating to the frame with one-half inch (1/2 in.) diameter bolts. A minimum of three-sixteenths inch (3/16 in.) of metal must be maintained around the tab hole.

c) Stairway platform floor shall be installed such that the floor height equals the catwalk platform floor height and the seam at the junction of the separate floors does not present a trip hazard.

d) Stairway platform floor shall be designed, constructed, and installed to support a moving concentrated load of at least one-thousand pounds (1,000 lb.) OSHA 1910.24 (c).

e. Stairway platform shall be designed, constructed, and installed such that it is square or rectangular in shape OSHA 1910.24 (g) requires platform width to equal or exceed stair width and platform length to be at least thirty inches (30 in.).

I. If any portion of the design of the access assembly as provided by sections 2.7 E) through 2.7 G.2.e of this Specification will result in a finished product that does not meet OSHA requirements, the contractor shall be responsible for altering and/or re-designing the access assembly so that the finished product will meet all OSHA requirements.

1. Any alteration and/or re-design of the access assembly will require prior approval from the Owner before construction of the altered or re-designed access assembly begins.

J. The intent of the access assembly is to provide safe and easy methods of filling and sticking AST systems from the top. Contractor may re-design or alter the design of the access assembly as provided by sections 2.07 E through 2.07 G.2.e of this Specification if the contractor feels that they can provide an equal or better-finished product for the same price or for a lesser price.
   1. Any alteration and/or re-design of the access assembly will require prior approval from the Owner before construction of the altered or re-designed access assembly begins.

K. The access assembly shall be designed, constructed, and installed in such a manner that the entire assembly, including all joints, welds, bolts, and materials of construction that comprise the access assembly, and the connection between the access assembly and the AST, has continuity and is grounded through the grounding of the AST through the AST supports as required by Section 2.05 of this Specification.
   1. If the contractor determines that the access assembly or portions of the access assembly and/or the connection of the assembly to the AST does not have the proper continuity, the contractor must ground the access assembly or portions of the access assembly separately from the AST. Separate grounding will require the following:
      a. An additional grounding hole or holes similar to the holes mentioned in Section 2.01 J.2 of this Specification with the location and number of grounding holes to be determined by the contractor.
      b. An extra grounding rod matching the type mentioned in Section 2.05 D.1 of this Specification.
      c. An additional ten feet (10 ft.) of copper wire for each additional grounding hole required that matches the type mentioned in Section 2.05 D.2 of this Specification.
      d. A method for securing grounding wire that matches the method mentioned in Section 2.05 D.3 of this Specification.
   2. If an alternate method of grounding is used, or if separate grounding will be performed, or if additional grounding is required, the contractor shall be responsible for notifying the Owner in writing and obtaining the Owner's approval as mentioned in sections 2.05 E and 2.05 F. of this Specification.

2.8 FUEL MANAGEMENT CONTROL UNIT

A. Provide fuel management control unit manufactured by Syntech FuelMaster 3500 Series.

PART 3 - DISPENSING ELEMENT

3.1 DISPENSER

A. Dispenser shall comply with OFC 1301:7-7-28, particularly FM-2805.2, F-2805.3, and FM-2805.9, and all applicable sections of the fire and mechanical code, including but not limited to the following:
   1. NFPA 30A 2-4.6.2, 2-4.6.5, 4-2, 4-3, and 7-2.1.
   2. UFC 5201 and 5202.

B. Dispenser panels shall be constructed and/or coated to be corrosion resistant.

C. One dispenser shall be compatible for use for diesel and the other dispenser for gasoline.

D. Dispenser basis of design shall be a Gasboy model 9135TWK(2) or equivalent by Wayne or Atlas.
   1. Dispenser shall be a single product full cabinet dispenser with two (2) nozzels and two (2) suction pumps each capable of pumping up to twenty-two gallons per minute (22 GPM).
   2. Dispenser shall have two (2) one (1) horsepower 60 Hz electric motors that are capable of operating at 115 VAC or 230 VAC and have a method or switch for selecting 115 VAC or 230 VAC.
   3. Motor shall be explosion proof.
   4. Dispenser housing shall have a durable factory finish.
   5. Dispenser shall be labeled as either gasoline or diesel in the product display area.
   6. Dispenser shall have the following equipment and features:
      a. Illuminated dial face.
      b. Register capable of recording individual deliveries to 999.9 gallons and totalizer records of 999,999.9 gallons or better.
      c. Meter with an accuracy flow rate of plus or minus three tenths of a percent (+ or - 0.3 %) or better.
      d. A one and one-half inch (1-1/2 in.) NPT inlet and a one inch (1 in.) NPT outlet.
      e. Built-in hose retractor.
   7. Furnish wih a pulse transmitter to connect to the fuel master unit.

3.2 HOSE ASSEMBLY

A. Hose assembly and product dispensing shall comply with OFC 1301:7-7-28, particularly FM-2805.2, FM-2805.7, and FM-2807.5.5, and all applicable sections of the fire and mechanical code, including but not limited to the following:
   1. NFPA 30A 2-4.6.2, 2-4.6.3, 4-2, 4-3, and 7-2.1.
   2. UFC 5201, 5202, and Appendix II-F (6.4).

B. Hose assembly shall be constructed and/or coated to be corrosion resistant.

C. Hose assembly shall be compatible for use with both diesel and gasoline.

D. Hose assembly shall consist of a fuel filter base, fuel filter, product hose, reconnectable hose breakaway device, swivel, and nozzle. All components of the hose assembly shall be UL- listed for the intended purposes for which they will be used.
   1. Fuel filter base shall be a Cim-Tek Model 805 single aluminum adapter (1 in. NPT) or equivalent.
      a. Fuel filter base shall be installed externally and adjacent to the dispenser on the effluent side.
   2. Fuel filter shall be a high-volume commercial spin-on filter (1 in. NPT) that, when used in conjunction with the Cim-Tek model 805 base or equivalent, shall be rated to provide filtration for flows of up to thirty gallons per minute (30 GPM).
      a. A Cim-Tek 800-10 fuel filter or equivalent (for use with dispensing elements specified to be gasoline) that has the following:
         1) ten (10) micron nominal filtration for particulate removal.

b. A Cim-Tek 800HS-30 Type 2 fuel filter or equivalent (for use with dispensing elements specified to be diesel fuel) that has the following:
   1) thirty (30) micron nominal filtration for particulate removal.
   2) ability to absorb/eliminate excess water but pass small amounts of entrained water common to diesel fuel blends.

1. Product hose shall be Goodyear Flexsteel hardwall hose or equivalent.
   c. Product hose shall be of hardwall construction and shall be:
      1) black in color.
      2) one inch (1 in.) inner diameter by one and one-half inch (1-1/2 in.) outer diameter.
      3) fourteen feet (14 ft.) in length.
   d. Product hose shall be installed on the effluent side of the filter base.
   e. Hose retractor that is built-in to the dispenser shall be attached to the product hose at a distance of seven feet (7 ft.) out measured from the outer wall of the dispenser on the effluent side.

3. Reconnectable hose breakaway device shall be a Husky model 2276 Safe-T-Break or equivalent.
   a. Reconnectable hose breakaway device shall have a one inch (1 in.) diameter flow through and must be capable of the following:
      1) stopping the flow of fuel on both sides of the separation.
      2) preventing “line shock” nuisance separations.
      3) achieving proper separation from a two-hundred pound (200 lb.) to three-hundred pound (300 lb.) pull force.
      4) retaining UL-listing after separation and reconnection.
   b. Reconnectable hose breakaway device shall be installed on the effluent end of the product hose and may require a whip hose in addition to the fourteen feet (14 ft.) of product hose. If a whip hose is necessary, the whip hose shall be black in color, be compatible and UL-listed for the intended purpose, have hardwall construction, have a length of one foot (1 ft.) or less, and have an inner diameter of one inch (1 in.).
4. Swivel shall be a Husky model 0087 swivel or equivalent.
   a. Swivel shall have:
      1) multi-plane swivel ability.
      2) one inch (1 in.) inlet and one inch (1 in.) outlet.
5. Fuel dispensing nozzle shall:
   a. Be a Husky 1 + VIII high volume automatic shut-off nozzle or equivalent (for use with dispensing elements specified to be diesel fuel) that has the following:
      1) Hold-open clip
      2) Automatic shut-off if and/or when:
         a) gas tank is full
         b) nozzle falls from fill tank
         c) nozzle is raised above horizontal
      3) One-inch (1 in.) inlet size
      4) Diesel spout
      5) Splash guard
         a) Nozzle guard.

3.3 PIPING ASSEMBLY

A. Piping assembly shall comply with OFC 1301:7-7-28, particularly FM-2801.5, F-2803.5.1, FM-2803.10, FM-2805.2, FM-2805.9, and FM-2807.5.6, and all applicable sections of the fire and mechanical code, including but not limited to the following:
   1. NFPA 30A 2-4.6, 3-1, 3-3, 3-7, and 4-3.6.
   2. NFPA 30 2-3, 3-3, 3-4, 3-5, 3-6, and 3-8.
   3. UFC 5201, 5202, and Appendix II-F (6.4).

B. Piping assembly shall be constructed and/or coated to be corrosion resistant.

C. Piping assembly shall be compatible for use with both diesel and gasoline.

D. Piping assembly shall consist of product piping, ball valves (2), external fire valve, solenoid valve, pressure regulation valve (with built in shear nipple), and a flex connector. All components of the piping assembly shall be UL-listed for the intended purposes for which they will be used. Piping, fittings, couplings, bushings, valves, and other piping components that will routinely come into contact with fuel shall NOT be constructed of galvanized material.
   1. Piping shall be threaded schedule 40 piping with compatible 150# nodular iron or steel fittings, couplings, and bushings in one and one-half inch (1-1/2 in.) diameter.
      a. Exposed piping shall be painted white using Madison Chemical Industries Acrylathane 85, or equivalent.
      b. Suction piping inside the tank shall be one and one-half inch (1-1/2 in.) in diameter and shall terminate at a distance of four inches (4 in.) above the bottom of the primary tank or compartment. Product piping outside the tank to the ball valve shall be one and one-half inch (1-1/2 in.) in diameter. Product piping after the ball valve effluent shall be one and one-half inches (1-1/2 in.) in diameter.
      c. Piping running parallel to the tank end bulkhead (i.e., vertical piping) shall be supported by being secured with clamps to brackets or shelves on the AST at the top and bottom of the bulkhead.
      d. The following minimum clear distances shall be maintained around the product piping for maintenance and inspection purposes, but shall not be exceeded so as to provide protection against possible step-on:
         1) one inch (1 in.) between the AST bulkhead and vertical piping.
         2) three inches (3 in.) between the ground and horizontal piping.
         3) one-half inch (1/2 in.) around the piping as it enters the dispenser pedestal required by Section 1.07 A.4 and outlined in Section 3.04 of this Specification.
         4) three inches (3 in.) between vertical piping and the closest wall of the dispenser pedestal box (i.e., lid overhangs box by 2 in. to provide step-on protection).
   2. Ball valve shall be designed specifically for use with aboveground piping and shall be a Morrison Brothers 691 Full Port 1-1/2 in. ball valve or equivalent.
      a. Ball valve shall have the following:
         1) Steel, nodular iron, or brass material of construction
         2) threaded connections
         3) locking capability
         4) thermal expansion relief capability when valve is closed.
      b. (1) Ball valve shall be installed so that it is located within one foot (1 ft.) or less of suction outlet.

c. (2) Ball valve shall be installed on the product piping just prior to the pipe entering the dispenser pedestal.

3. External fire valve shall be designed specifically for use with aboveground piping and shall be a Morrison Brothers 346 series 1-1/2 in. external emergency valve or equivalent.
   a. External fire valve shall have the following:
      1) steel or nodular iron material of construction, and
      2) threaded or flanged connections.
   b. External fire valve must be located in the product piping within two feet (2 ft.) of the AST shell. The solenoid valve outlined in Section 3.03 D4 of this Specification shall be located in the piping between the pump outlet and the external fire valve.
4. Solenoid valve shall be a Morrison Brothers 710 series Solenoid Valve or equivalent.
   a. Solenoid valve inlet and outlet shall each be one and one-half inches (1-1/2 in.) in diameter.
   b. Solenoid valve shall be installed in the product piping following the external fire valve at the top of the tank.
   c. Solenoid operates at 120 volts.
   d. Solenoid must have a 100 mesh screen on the inlet side.
   e. Solenoid valve must be mounted with the solenoid vertical or upright.
5. Flex connector shall be a Hose Master Fire-Shield FSSSE or FSS2WE, or equivalent.
   a. Flex connector shall have the following:
      1) one and one-half inch (1-1/2 in.) diameter.
      2) twelve inch (12 in.) maximum length.
   b. Flex connector shall be used to connect the rigid piping to the pressure regulation valve (with built in shear nipple).
   c. The flex connector installation shall be such that the flex connector is completely contained within the dispenser pedestal box and does not come in contact with the floor of the dispenser pedestal box.

2. Pressure Regulation Valve shall be an EBW Model 664 Pressure Regulator Valve or equivalent.

   1) The shear groove of the pressure regulator valve shall be flush or nearly flush with the bottom of the plate cover portion of the dispenser pedestal that is required by Section 1.07 A.4 and outlined in Section 3.04 of this Specification and/or in accordance with Manufacturer's specifications.
   2) The portion of the pressure regulator valve below the shear groove shall be securely fastened to the box portion of the dispenser pedestal.
   3) The pressure regulator valve body shall have sufficient clearance for moving parts, normal operation, inspection, maintenance, and testing.
   4) The three-eighths inch (3/8 in.) pressure regulator return line shall be installed from the pressure regulator valve to a termination point prior to the solenoid valve and again before the ball valve at the top of the tank at the suction tube connection.

6. Expansion Relief Valve shall be a Morrison Brothers 0200AV ½-inch Expansion Relief Valve (50 psi setting) or equivalent.

3.4 DISPENSER PEDESTAL

A. Dispenser pedestal shall allow dispensing element to comply with OFC 1301:7-7-28, particularly FM-2805.9, and all applicable sections of the fire and mechanical code, which includes but is not limited to NFPA 30A 4-2.5.

B. Dispenser pedestal (excluding bolts, nuts, and washers) shall be constructed of carbon steel that is painted to be corrosion resistant. Galvanized steel will not be accepted because zinc oxides and zinc hydroxides in the coating react with the paint and cause delamination.
   1. All surfaces of the pedestal that are exposed after construction of the pedestal is complete, including the pedestal interior as well as exterior, and all surfaces exposed by drilling holes, shall be painted black using Madison Chemical Industries Acrylathane 85, or equivalent.

C. All bolts, nuts, and washers used in conjunction with the pedestal shall be constructed and/or factory coated to be corrosion resistant (i.e., the bolts, nuts, and washers must be galvanized, or constructed of stainless steel, or have some type of equivalent method of corrosion resistance applied at the factory).

D. Dispenser pedestal shall be a Morrison Brothers 434 Pedestal (compatible with the Gasboy

E. / Atlas Dispenser) or an approved equal which works in conjunction with provided dispenser.
   1. 34”L x 21”W x 16”H base that is 12 gauge steel, powder coated.

F. The intent of the dispenser pedestal is to allow all piping to remain aboveground while providing methods for items listed below. Contractor may alter the dispenser pedestal design if the alternative design incorporates the methods as listed below. Construction of an alternative design will require the Owner’s approval.
   1. A method for spill containment under the dispenser. Box shall be utilized as a sump that has an approximate spill containment capacity of five (5) gallons below the piping entrance hole.
   2. A method for securely bolting the dispenser in place. Dispenser shall securely bolt to the plate cover, which shall securely bolt to the box which shall securely bolt to the concrete slab or foundation under the dispenser pedestal.
   3. A method for securely fastening the pressure regulator valve in place. The pressure regulator valve shall be securely fastened to a stabilizer bar that is firmly bolted in place.
   4. A method for venting the dispenser pedestal that minimizes rainwater accumulation inside the dispenser pedestal. The piping entrance hole shall provide open venting of the box. The plate cover shall prevent rainwater from entering through the top of the box and the overhang of the plate cover shall impede rainwater from entering through the piping entrance hole.
   5. A method for minimizing corrosion by limiting dispenser pedestal contact with the ground. The dispenser pedestal shall have one-half inch (1/2 in.) legs to minimize corrosion due to contact with the ground.

PART 4 - LABELING, MARKINGS, IDENTIFICATION

4.1 UNDERWRITERS’ LABORATORY REQUIREMENTS

A. All aboveground storage tanks shall have labeling, markings, and/or identification regarding the Underwriters' Laboratory Listing (UL 2085, "Insulated Secondary Containment Aboveground Tank for Flammable Liquids," or, if UL 2085 changes, the subsequent UL listing required by the Steel Tank Institute for Fireguard ASTs). UL Listing shall be displayed on the fill end of single use ASTs and the diesel-dispensing end of dual use ASTs.

4.2 STEEL TANK INSTITUTE REQUIREMENTS

A. All aboveground storage tanks shall have labeling, markings, and/or identification required by Section 9.0 of Steel Tank Institute Publication #F941 (Jan., 1997 edition), "Standard for Thermally Insulated Aboveground Storage Tanks", which includes but is not limited to:
   1. The serial numbered, brass label issued by the Steel Tank Institute.
   2. Vinyl Fireguard label which shall be displayed in the center of all four (4) sides of the AST.
   3. Steelmark label which shall be displayed above the left hand corner of each Fireguard label.
   4. The required venting capacities which includes:
      a. the required venting capacity for the secondary tank (annulus space),
      b. the required venting capacity for the primary tank of single use ASTs, and
      c. the required venting capacities for each compartment of dual use ASTs;
   5. The weight of the AST; and
   6. Other appropriate warning labels include but are not limited to statements such as:
      a. "Tank cannot be reused after fire."
      b. "Each compartment requires overfill prevention and an anti-siphon device."

B. The brass label with the serial number, the required venting capacities, the AST weight, and other appropriate warning labels required by the Steel Tank Institute shall be displayed on the diesel-dispensing end of the AST.

4.3 DIMENSIONS AND CAPACITY INFORMATION

A. Aboveground storage tank shall have labeling, markings, and/or identification regarding AST dimensions and capacity, which shall be displayed on the diesel-dispensing end of the ASTs.
   1. The AST shall have labeling, markings, and/or identification of the secondary tank length and diameter.
   2. The AST shall have labeling, markings, and/or identification of the length, diameter, and capacity of each compartment.

4.4 DUAL BULKHEAD SPLIT IDENTIFICATION

A. The aboveground storage tank shall have a one inch thick (1 in. thick) black stripe on the circumference of the AST exterior to identify the AST split that creates the two separate compartments. The stripe shall be such that it is centered between the two (2) bulkheads used to split the primary tank into compartments.
   1. The stripe must be a durable decal or must be painted on. If paint is used, the paint shall be Madison Chemical Industries Acrylathane 85, or equivalent.

4.5 PRODUCT IDENTIFICATION

A. Aboveground storage tank shall have four inch (4 in.) upper case block lettering displayed on the exterior indicating whether the intended product or products are GASOLINE or DIESEL.
   1. The AST shall have GASOLINE displayed on the three (3) exposed sides of the smaller compartment and DIESEL displayed on the three (3) exposed sides of the larger compartment.
   2. GASOLINE lettering shall be black and DIESEL lettering shall be green. All lettering shall be at least three-fourths of an inch (3/4 in.) thick.
      a. The intended product for an AST or compartment must be identified on the AST or compartment by being painted on or through the use of a durable, rectangular, one-piece decal that has a white background for the lettering. Painting will require that the paint be Madison Chemical Industries Acrylathane 85, or equivalent.

B. Fill/spill containment boxes shall have one inch (1 in.) upper case block lettering displayed on the exterior of the lid indicating the intended product corresponding to that fill followed by the word FILL (i.e., GASOLINE FILL or DIESEL).
   1. GASOLINE FILL lettering shall be black. DIESEL FILL lettering shall be green. All lettering shall be at least one-fourth inch (1/4 in.) thick.
      a. Fill/spill containment box markings must be painted on or be a durable, rectangular, one-piece decal with a white background. Painting will require the paint be Madison Chemical Industries Acrylathane 85, or equivalent.

C. Every dispenser shall have a sticker with one inch (1 in.) block lettering or larger affixed in the product display area indicating whether the intended product is GASOLINE or DIESEL.
   1. Sticker shall be a durable, one-piece, rectangular decal that has black lettering on a white background. Lettering shall be at least one-fourth inch (1/4 in.) thick.

4.6 HAZARD IDENTIFICATION

A. Aboveground storage tank shall have four inch (4 in.) upper case block lettering displayed on the exterior indicating whether the intended product or products are FLAMMABLE or COMBUSTIBLE and indicating NO SMOKING.
   1. The smaller compartment (gasoline) of the AST shall have FLAMMABLE with NO SMOKING underneath displayed on the three (3) exposed sides of the compartment near but below the intended product identification required by Section 4.05 A.1 of this Specification (directly below GASOLINE).
   2. The larger compartment (diesel) of the AST shall have COMBUSTIBLE with NO SMOKING underneath displayed on the three (3) exposed sides of the compartment near but below the intended product identification required by Section 4.05 A.1 of this Specification (directly below DIESEL).
   3. FLAMMABLE or COMBUSTIBLE and NO SMOKING lettering shall be red. All lettering shall be at least three-fourths of an inch (3/4 in.) thick.
      a. FLAMMABLE or COMBUSTIBLE and NO SMOKING lettering must be painted on or be durable, rectangular, one-piece decals with white backgrounds. Painting will require the paint to be Madison Chemical Industries Acrylathane 85, or equivalent.

B. Aboveground storage tank shall have placarding that indicates the product code and flammable hazard rating of the intended product or products.
   1. The smaller compartment of the AST shall have the placarding displayed on the three.
   2. exposed sides of the smaller compartment near the location of the intended product identification required by Section 4.05 A.1 of this Specification.
   3. The larger compartment of the AST shall have the placarding displayed on the three.
   4. (3) exposed sides of the larger compartment near the location of the intended product identification required by Section 4.05 A.1 of this Specification.
   5. The product codes and flammable hazard ratings for the placarding shall be as follows:
      a. For gasoline placarding, the product code shall be 1203 and the flammable hazard rating shall be 3.
      b. For diesel, the product code shall be 1993 and the flammable hazard rating shall be 2.
   6. Product code/flammable hazard rating placarding shall consist of diamond shaped decals with uniform sides that are at least ten inches (10 in.) in length (i.e., a 10 in. x 10 in. square or larger that is rotated to be a diamond). Each placarding decal shall have the following:
      a. A red background with one-eighth inch (1/8 in.) thick white trim lines parallel to and approximately one-half inch (1/2 in.) in from each side of the diamond.
      b. A white rectangle centered within the diamond that has a height of at least four inches (4 in.) and a width of at least seven and one-half inches (7-1/2 in.).
      c. The symbol for flammable/combustible liquids (i.e., a flame) located near the top point of the diamond.
      d. Black numbering for the product code that is centered within the white rectangle and has a minimum text height of three and one-half inches (3-1/2 in.), a minimum text width of one and three-eighths inches (1-3/8 in.), and a minimum text line thickness of three-eighths of an inch (3/8 in.); and
      e. White numbering for the flammable hazard rating that is located near the bottom point of the diamond and has a minimum text height of two inches (2 in.), a minimum text width of one inch (1 in.), and a minimum text line thickness of three-eighths of an inch (3/8 in.).

C. Aboveground storage tanks shall display the Hazardous Materials Identification System (HMIS) on the exterior of the AST. The HMIS shall be in accordance with NFPA 704.
   1. The HMIS shall have health, flammability, and instability hazard ratings located in a square-on-point field such that the entire field is diamond shaped with uniform fifteen inch (15 in.) sides (i.e., a 15 in. x 15 in. square that is rotated to have a diamond shape) and each individual hazard rating field is diamond shaped with uniform seven and one- half inch (7-1/2 in.) sides (i.e., four 7.5 in. x 7.5 in. squares that are rotated to have diamond shapes and share a common point where the intersection of one corner from each hazard rating field occurs).
      a. The health hazard rating field shall be in the 9:00 position and shall have a blue background.
      b. The flammability hazard rating field shall be in the 12:00 position and shall have a red background.
      c. The instability hazard rating field shall be in the 3:00 position and shall have a yellow background.
      d. The unused hazard field shall be in the 6:00 position and shall have a white background.
   2. The AST shall have the HMIS displayed on all four (4) sides of the AST.

3. HMIS hazard rating lettering shall be black in color.
    a. Letter height shall be six inches (6 in.).
    b. Line thickness of the lettering shall be fifteen-sixteenths of an inch (15/16 in.).
    c. Letter width shall be four and one-fifth inches (4-1/5 in.) for numerals 0, 2, 3.
    d. Letter width for the numeral 1 shall be the same as the line thickness.
4. The HMIS must be identified on the AST by being painted on or by using an HMIS decal kit. Painting will require the paint to be Madison Chemical Industries Acrylathane 85, or equivalent.

D. Every dispenser shall have stickers with one inch (1 in.) block lettering or larger affixed to the front panel instructing users to STOP ENGINE and indicating NO SMOKING.
1. Stickers shall be durable, one-piece, rectangular decals that have black lettering on white backgrounds. Lettering shall be at least one-fourth inch (1/4 in.) thick.

4.7 VENT IDENTIFICATION

A. Aboveground storage tanks shall have one inch (1 in.) upper case block lettering displayed on top of the AST near each vent opening that differentiates between the different vents (i.e., pressure vacuum vents, primary tank emergency vents, compartment tank emergency vents, and interstitial emergency vents).
1. Lettering shall be at least one-fourth inch (1/4 in.) thick and black in color, and must be painted on or be a durable sticker.
    a. Painting will require the paint to be Madison Chemical Industries Acrylathane 85, or equivalent.
    b. Stickers shall be durable, one-piece, rectangular decals that have white backgrounds.
2. Vents and vent openings shall be differentiated as follows:
    a. The AST shall have lettering on top of the AST near the pressure/vacuum vent opening that indicates “PRESSURE/ VACUUM VENT.”
    b. The AST shall have lettering on top of the AST near the compartment tank emergency vent opening that indicates “COMPARTMENT TANK EMERGENCY VENT.”
    c. The AST shall have lettering on top of the AST near the interstitial emergency vent that indicates “INTERSTITIAL EMERGENCY VENT.”

PART 5 - MISCELLANEOUS

5.1 EQUIPMENT NOTEBOOK

A. Contractor shall be responsible for providing the Owner with an Equipment Notebook.
1. The Equipment Notebook shall contain the following:
    a. Detailed as-built diagrams of the tank and entire AST system including dimensions and labeling of tank openings.
    b. A listing and inventory of all equipment and products that constitute the AST system including information on products and equipment used such as the name of the Manufacturer, model number, size, and any other pertinent or relevant information.

c. Catalogue cut-sheets and/or Manufacturer's literature regarding all equipment and products that constitute the AST system; and
d. A list with instructions and diagrams that pertains to any anchoring, hook-ups, connections, procedures.

2. Contractor shall include the quantity Equipment Notebooks as indicated in Division 1. The Equipment Notebook shall have labeling on the front cover (i.e., a Title) that indicates the size and use of the AST system, and the name and address of the location where the AST system is delivered.
3. After award but before construction begins, awarded contractors must supply the Owner with preliminary copies of the Equipment Notebook for review by the Owner. In lieu of providing as-built information as required by sections 5.01 A.1.a through 5.01 A.1.d of this Specification, the contractor shall provide proposed information. The Owner will not submit orders to a particular contractor for AST systems until all preliminary Equipment Notebooks have been received from that contractor and reviewed and accepted by the Owner.
   a. Awarded contractors shall supply the Owner with one (1) copy of the preliminary Equipment Notebook for each size and type of AST system awarded to that contractor.
   b. If information contained in the preliminary Equipment Notebook as required by Section 5.01 A.3 for a particular size and type of AST system is different than the information contained in the as-built Equipment Notebook as required by Section 5.01 A.2 of this Specification for the same size and type of AST system, the contractor shall be responsible for providing a copy of the as-built Equipment Notebook as indicated in Division 1.

5.2 STAINING/BLEEDING

A. Contractor shall be responsible for minimizing rust staining and bleeding.
   1. Contractor shall paint and/or coat all exposed surfaces of the piping, dispenser pedestal, AST, and items welded to the exterior of the AST as required by this Specification, and hot-dip galvanize the access assembly as required by this Specification.
   2. Contractor shall paint, coat, and/or hot-dip galvanize all surfaces exposed from drilling holes as required by this Specification.
   3. Contractor shall paint and/or coat all exposed surfaces of any AST equipment or accessory that does not come painted or coated from the factory. When available, the contractor shall provide factory painted or factory coated equipment and accessories.
   4. Contractor shall paint and/or coat all male product piping threads and all pipe nipple threads that are external to the AST. When the contractor installs a threaded piece of pipe, equipment, or accessory, and then backs off the threads, the contractor shall be responsible for touching-up the threads where the backing off occurred.
   5. Contractor shall caulk around the brass label on the AST.
   6. Contractor shall use corrosion resistant nuts, bolts, and washers in conjunction with the access assembly and dispenser pedestal as required throughout this Specification.
   7. Contractor shall use corrosion resistant nuts, bolts, washers, fasteners, etc., in conjunction with the AST system whenever possible.

B. Madison coatings should not be applied to hot-dip galvanized items because delamination may occur {CorroNews}.

C. Galvanized items should not be used if the galvanized coating on the item will be exposed to petroleum product because diesel fuel is not compatible with galvanized materials {PEI/RP200-96}. Because of diesel incompatibility, and because of the potential of product switching by the Owner, galvanized items that will be exposed to diesel or gasoline will not be permitted.

5.3 TOUCH-UP PAINT

A. Contractor shall be responsible for providing touch-up paint.
   1. Contractor shall provide one (1) quart of white and one (1) quart of black touch-up paint.
      a. White touch-up paint shall be Madison Chemical Industries Acrylathane 85, or equivalent, and shall be the same as the paint specified in Section 2.01 A.7 of this Specification that is used to paint the steel outer wall of the AST.
      b. Black touch-up paint shall be Madison Chemical Industries Acrylathane 85, or equivalent, and shall be the same as the paint specified in Section 3.04 B.1 of this Specification that is used to paint the dispenser pedestal.

5.4 TIGHTNESS TESTING

A. Contractor shall be responsible for designating a testing company, for having each AST system purchased by the Owner from that contractor tested for tightness on site after delivery but before system start-up, and for the testing company's actions.
   1. Contractor shall make provisions and/or modifications to the AST system during construction to allow for testing to be performed.
   2. With regards to tightness testing, the contractor shall assume that
      a. The primary tank, interstice, and product piping from the shear valve to the pump, including the flex connector, will require testing, and that these components can be tested concurrently and/or consecutively (i.e., in other words, the Owner will not permit piping to be tested one week and tank testing the next week, but will permit testing of an AST system to be performed concurrently and/or consecutively); and
      b. The stairway is required to be secured in place and the flex connector secured in place prior to testing of the AST system.
   3. Contractor shall provide the testing company with any relevant information and/or procedures necessary for the performance of the testing, and pay for testing services rendered.
   4. In the event that an AST system or any part of that AST system fails a tightness test, repairs shall be made and the AST system shall be re-tested.
   5. Contractor shall be responsible for making the arrangements regarding test date and time with the contractor's designated testing company, and for arranging to have the proper regulatory officials present for the testing.
   6. After testing is complete, the contractor shall be responsible for having the AST system restored to its original condition, and for assembling on site those items, equipment, and accessories not previously assembled as per Section 1.01 of this Specification.
      a. Testing personnel who have permission from the contractor may act on the contractor's behalf and assemble those items, equipment, and accessories on site that were not previously assembled and/or removed for testing purposes.

5.5 AST SYSTEM START-UP

A. AST system start-up shall be when the Owner receives product into the AST system and begins using that system in a manner to perform a preliminary test of the system.
   1. AST system start-up shall not occur until after the following:
      a. All permitting is complete;
      b. Installation of the AST system is complete.
      c. The AST system has passed a tightness test as required by Section 5.04 of this Specification.
      d. The AST system has passed any inspections and tests required by regulatory authorities.
      e. The AST system has passed an inspection and operating test by the Owner.
      f. The AST system has passed all inspections.
   2. Contractor shall be required to attend start-up of AST system.

5.6 OWNER ACCEPTANCE OF THE AST SYSTEM

A. The AST system shall be considered "accepted" by the Owner when five (5) working days have elapsed after the date AST system start-up as required by Section 5.05 of this Specification has occurred unless the contractor is informed otherwise by the Owner within those five (5) days.
   1. If the AST system is deemed by the Owner to be flawed or operating improperly, use of that AST system will be halted until proper actions have been taken.
      a. If the contractor is determined not to be at fault in any way for the flaws or improper operation, the Owner acceptance of the AST system will occur when the five (5) working day trial period has elapsed after AST system start-up has occurred.
      b. If the contractor is determined to be at fault in any way for the flaws or improper operation of the AST system, the Owner acceptance of the system will not occur until:
         1) The proper actions have been taken.
         2) AST system start-up is repeated, if start-up is deemed necessary by the Owner; and A new five (5) working day trial period has occurred.

5.7 WARRANTY

A. Contractor shall warranty all components of each AST system for a period of one (1) year from the date of Contract Completion:

B. The AST shall have the thirty- (30) year warranty that comes standard with Fireguard ASTs.

C. All factory bought equipment and accessories shall have their respective standard factory warranties.

5.8 VOLUMETRIC TANK CHART

A. Contractor shall include two (2) copies of a volumetric tank chart with each AST system.

1. The volumetric tank chart shall cross-reference product depth in feet and inches to the nearest gallon of product for the size of primary tank or compartment in question, and shall have an accuracy of five percent (5%) or better.
    a. The volumetric tank chart shall give product readings starting at a depth of three inches (3 in.) from the bottom of the primary tank or compartment, and terminating at a depth of one inch (1 in.) below the top of the primary tank or compartment.
    b. The volumetric tank chart shall list product gallonage conversions in one-eighth inch (1/8 in.) increments.
2. In addition to the cross-referencing table, the following items shall be included on each volumetric tank chart:
    a. A statement that indicates the primary tank or compartment inner diameter, in feet and inches.
    b. A statement that indicates the primary tank or compartment inner length, in feet and inches.
    c. A statement that indicates the primary tank or compartment capacity, in gallons.
    d. A statement that indicates the intended product to be used in conjunction with the tank or compartment.
    e. A statement that indicates the product depth at which the overfill alarm is set to go off, in feet and inches.
    f. A statement that indicates the product depth at which shut-off of product delivery (i.e., overfill protection) is set to occur, in feet and inches.
    g. The serial number of the AST that the volumetric tank chart corresponds to.
    h. The name and address of the location where the AST system is delivered.
    i. A statement that says “One-fourth inch (1/4 in.) must be subtracted from stick readings due to a quarter inch thick striker plate located under the stick port.
3. Contractor shall be responsible for having each volumetric tank chart laminated.
4. Volumetric tank charts may be double sided.

PART 6 - SUMMARY OF SPECIFIED EQUIPMENT

6.1 PROVIDE EQUIPMENT AS INDICATED BELOW OR THE ASSOCIATE ENGINEER APPROVED EQUALS.

A. Aboveground Storage Tank: Fireguard (protected, secondary containment, 2 hour fire rating, 30 year warranty).

B. Vent Assembly:
    1. Normal vent: OPW 23-0033 or equivalent (2 in. atmospheric vent).
    2. Emergency vent: Morrison Brothers 244I series or equivalent.
    3. Interstitial emergency vent: Morrison Brothers 244 series with nipple, or equivalent.
    4. Vent piping: 2 in. diameter, steel or nodular iron.

C. Fill Assembly:
    1. Fill/spill containment box: hinged lid, built-in spill return device, five gal. min. capacity.
    2. Fill cap: 3 in. cam lock dust cap.

3. Fill/overfill prevention valve (with fill pipe terminating within 6 in. of tank bottom and cut at the bottom a 45-degree angle): OPW 61fstop 3 in., Morrison Brothers 9095A 3 in., or Clay and Bailey F-30 3 in..

D. Gauge and Alarm Equipment:
1. Product level gauge with audible overfill alarm: Morrison Brothers 918 clock gauge with alarm unit and option #5 for float inside a dip tube/drop tube or equivalent.
2. Interstitial leak detection gauge: At-A-GLANCE leak gauge by Krueger Sentry Gauges or equivalent.
3. Primary tank leak detection gauge for interstice between dual bulkheads on a split tank: At-A-GLANCE leak gauge by Krueger Sentry Gauges or equivalent.

E. Dispenser: Gasboy® Model 9153TKW(2) suction dispenser or or equivalent by Wayne or Atlas.
1. Dispenser Pedestal: Morrison Brothers 434 Pedestal

F. Piping Assembly:
1. Product piping: Non-galvanized threaded schedule 40 piping with compatible 150# nodular iron or steel fittings, and couplings (1-1/2 in. dia. suction piping under pump that terminates 4 in. above tank bottom, 1-1/2 in. dia. product piping between suction pipe and ball valve, and 1-1/2 in. dia. product piping after ball valve).
2. Ball valve: Morrison Brothers 691 full port 1-1/2 in. ball valve (with 1-1/2 in.:2 in. bushing), or equivalent.
3. External fire valve: Morrison Brothers 346 series 1-1/2 in. external emergency valve, or equivalent.
4. Solenoid Valve: Morrison Brothers Model 710 series 1-1/2 in. or equivalent.
5. Pressure Regulator valve: EBW 664 Series Pressure Regulator Valve 1-1/2 in. diameter or equivalent.
6. Flex connector: Hose Master 1-1/2 in. Fire-Shield FSSSE or FSS2WE flex connector (12 in. length or less, installed so that the flex connector is contained within the dispenser pedestal), or equivalent.
7. Return Line: The pressure regulator return line of 3/8 in. copper tubing with compatible 150# nodular iron, steel, or brass fittings from the pressure regulator to a point prior to the solenoid valve and again at the top of the tank at the point where the suction tube inters the tank.
8. Expansion Relief Valve: Morrison Brothers 0200AV ½-inch Expansion Relief Valve or equivalent.

G. Hose Assembly:
1. Fuel filter base: Cim-Tek model 805 1 in. single aluminum adaptor or equivalent.
2. Fuel filter: Cim-Tek 800-10 fuel filter for gasoline, or equivalent, and Cim-Tek 800HS-30 Type 2 fuel filter for diesel, or equivalent.
3. Product hose: Goodyear Flexsteel hardwall hose (1 in. dia., 14 ft. length), or equivalent.
4. Reconnectable hose breakaway device: Husky model 2276 Safe-T-Break or equivalent.
5. Swivel: Husky model 0087 swivel or equivalent.
6. Fuel dispensing nozzle: Husky 1-A automatic shut-off nozzle for gasoline, or equivalent, and Husky 1 + VIII high volume automatic shut-off nozzle for diesel, or equivalent.

*TBD: Indicates ‘To Be Determined’

END OF SECTION 33 56 13

SECTION 43 22 56 - SALT BRINE PRODUCTION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Salt Brine Production System (SBPS)

B. Chemical Blending System

C. Vertical Storage Tanks

D. Piping

E. Extent and location of the Salt Brine Production System and shelter is shown on the drawings. Concrete slab size and thickness is shown.

F. Related Sections: The following sections contain requirements that relate to this section:

1. Division 03 Section "Cast-in-Place Silica-Fume Concrete" for Salt Brine System's foundation and pad.
2. Division 31 – Section "Earthwork"
3. Division 32 – Section "Asphalt Paving" for drives associated with the system.
4. Division 32 – Section "Concrete Paving" for walks and drives associated with the system.
5. Division 33 – "Utilities" for water and electrical utilities to support the Salt Brine System.

G. Delivery, Storage and Handling:

H. Deliver the Salt Brine Production System to the new location. Handle and store the system to prevent damage.

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each product type required indicating compliance with requirements, including installation instructions. Provide complete operating and maintenance instructions for each product.

C. MAINTENANCE MATERIAL SUBMITTALS

a. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

i. Brine Hose: Provide 100'-0" of additional brine hose of type designed for connection from tanks to brine dispensers.

PART 2 - PRODUCTS

2.1 Concrete base: Provide concrete base shown on drawings and specified in Division 3 Cast-in-Place Silica Fume Concrete.

2.3 Salt Brine Production System (SBPS)

A. This section covers requirements for Salt Brine Production Systems (SBPS) intended for use as a generator of quality salt brine that is used as a prewetting, anti-icing, and/or a de-icing agent on pavement or roadways. The system shall be fully automated eliminating the need for manual salinity testing, monitoring, and adjustment.

The system must use an upflow brine production process to insure single pass saturation of fresh water being introduced into the salt bed for increased production. In addition, the upflow process will provide a sediment free brine solution that can be stored in standard flat bottom storage vessels. The need for cone bottom storage vessels is unacceptable.

The system shall include a secondary pump and plumbing arrangement allowing for manual brine production in the event of a primary pump, valve, or other electrical component failure. The secondary plumbing must include a means of automatic shutdown when the onboard storage tank is full. The secondary pump and all plumbing components shall be pre-installed and wired to provide immediate operation.

B. Provide Salt Brine Production System: (PLC-3000SS-HYD Hydraulic Brine Maker by Pengywn.

A. Manufacturers: Subject to compliance with requirements, provide the following product:
1. Pengwyn; PLC-3000SS-HYD Hydraulic Brine Maker (Basis-of-Design Product).
2. No other manufacturers / products will be accepted. Listed manufacturer is the approved sole-source vendor for the products specified within this Section.

B. System Capabilities:
1. Production: Minimum production rate of 3,000 gallons of brine per hour.
2. Clean out feature.

C. System Controls:
1. Production.
2. Salinity.
3. Diagnostics.
4. Recirculation.
5. Remote fill.
6. Customized Brine Solution: Must have automatic blending two ingredients.

7. Security: Access and prevention features.

D. Data Tracking and Control:
   1. Material usage.
   2. Production rate and amount.
   3. RFI load out system.

E. Construction Materials:
   1. Hopper – to be 304 Stainless Steel construction.
   2. Frame – to be ~~304 Stainless Steel~~ *Galvanized Steel* construction.
   3. Control Panel.
   4. Pumps.
   5. Hardware.
   6. Valves.
   7. Fittings.
   8. Tank Volume Sensors.
   9. Salinity Sensors.
   10. Brine Hoses.

F. Electrical Requirements: Refer to Drawings and Division 26 "Electrical" for electrical requirements.

G. Pump and Plumbing Components:

   1. All plumbing fittings shall be constructed of corrosion resistant materials such as PVC, glass reinforced polypropylene, or stainless steel. All electric valves shall be constructed of glass reinforced polypropylene with stainless steel balls and stems. Wherever possible, the use of manifold flange fittings with EPDM gaskets and stainless steel clamps shall be used for ease of maintenance. All metal fasteners shall be a minimum of 316 grade stainless steel.
   2. ~~The primary pump shall be a 2" x 1 ½" stainless steel centrifugal pump that is close coupled to a 3 HP, 230V, single phase, TEFC motor. Based on water, the pump shall produce 165 GPM at 30' TDH. A dual volute casing and mechanical shaft seal shall prevent the intrusion of liquid to the electric motor.~~
   3. ~~The secondary pump shall be an epoxy coated cast iron effluent ejector pump which includes a ½ HP, 115V oil filled motor with thermal overload protection. Based on water, the 1 ½" pump discharge shall be capable of pumping 100 GPM at 10' TDH.~~

H. Control Package:
   1. The control system shall allow for either continuous brine production to fill a single or multiple vertical storage tanks, or batch production to fill a truck mounted applicator tank. In addition, the control system shall allow for truck loading and offloading from a single or multiple vertical storage tanks. All of these functions shall be accomplished with a single pump and control package.
   2. The system controls shall come standard with the option of multiple users tracking for filling and offloading of storage tanks in a shared environment. Each user shall have their password to access the truck fill operation. The system will track the time

and date, gallons ordered, gallons produced, and truck identification number for viewing and/or downloading by the system administrator.

3. All operation and calibration features shall be password protected to prevent unauthorized use or inadvertent start-up. During production, the system shall utilize a dual toroidal sensor application to insure that the brine that is transferred to storage or truck tanks is within the acceptable range of 23.3% plus or minus .3%. If the brine is oversaturated it shall be looped back through the system while fresh water is incorporated to provide an acceptable solution. Once the brine is within range it would be diverted to a storage or truck tank. Should the brine concentration fall below the target range the system will shut down and the user will be prompted to add more salt.
4. The controller shall include a 12.1" TFT, 32000 color touch screen. The controller shall include USB ports and a CompactFLASH card that is removable for data transfer. The controller shall also be capable of integrating optional networking and Ethernet support for remote access and data transfer.
5. The operation screen of the controller shall be capable of showing the following: target brine concentration, real-time brine concentration, mode, gallons ordered, gallons produced or transferred, and storage tank volume in gallons for up to 8 storage tanks. In addition, the liquid flow throughout the system shall be displayed in real-time.
6. The controller shall be capable of logging the following information per production event: time and date, brine concentration produced, salt used, water used, gallons ordered, gallons completed, truck ID, user group if multiple users are selected, and any errors. Any transfer event shall track: time and date, gallons ordered, gallons completed, truck ID, user group if multiple users are selected, and any errors.
7. In the event of a component malfunction or failure, the system shall shut down and perform a self-diagnosis to inform the user of the fault.

I. Hydraulic Oil:
   1. Contractor to provide hydraulic oil. AW-32 Hydraulic oil must be added to the "full" or "high" line on the sight gage and must be free of contaminates.

2.4 Chemical Blending System

A. This specification covers requirements for an Automatic Three Product Chemical Blending System intended for use as a generator of quality blended liquid solutions that are used as a prewetting, anti-icing, and/or a de-icing agent on pavement or roadways. The system shall be fully automated eliminating the need for manual testing, monitoring, and adjustment. The system shall be capable of blending up to 3 different liquid deicing chemicals in order to create a custom blended solution on demand. The user interface shall be capable of selecting 2 or 3 product blend ratios. The desired blends shall be controlled automatically through the use of magnetic style flow meters and 24 volt PWM regulating ball valves.

B. Provide Blend Boss system by Varitech Industries, Inc.

C. Pumps:

1. The brine pump shall be a 2” x 1 ½” bronze centrifugal pump that is close coupled to a 3 HP, 230 volt, single phase electric motor. Based on water, this pump shall be capable of pumping 160 GPM at 30 TDH. The discharge side of the brine pump shall include a 2” stainless steel magnetic style flowmeter with flow capabilities from 2 to 160 GPM.

2. The primary additive pump shall be a 1 ½” bronze centrifugal pump that is close coupled to a 2 HP, 115/230 volt, single phase electric motor. Based on water, this pump shall be capable of pumping 120 GPM at 10 TDH. The discharge side of the brine pump shall include a 2” stainless steel magnetic style flowmeter with flow capabilities from 2 to 160 GPM. In addition to the flowmeter, the discharge line shall also include a 2” 24 VDC, PWM regulating ball valve.

3. The secondary additive pump shall be a 1” bronze centrifugal pump that is close coupled to a ¾ HP, 115/230 volt, single phase electric motor. Based on water, this pump shall be capable of pumping 40 GPM at 10 TDH. The discharge side of the brine pump shall include a 1 1/2” stainless steel magnetic style flowmeter with flow capabilities from 2 to 80 GPM. In addition to the flowmeter, the discharge line shall also include a 2” 24 VDC, PWM regulating ball valve.

4. The discharge lines of the brine pump and additive pumps must each include a 2” 3-way electric ball valve that will divert flow back to storage tanks while the interface is calculating the user defined blend percentages. Once the percentages have been verified these 3-way valves shall automatically shift allowing the liquid to be discharged to the truck.

D. Enclosure:

1. The pumps, flow meters, valves, and mixing manifold shall be enclosed in a cabinet that is constructed of a galvanized frame with stainless steel top and side panels. The enclosure shall have a means for accessing the pumps and plumbing for troubleshooting and maintenance while protecting all of the components from the outside elements.

E. Controller:

1. The controller shall include a 2.8” LCD color display that has LED illumination and adjustable brightness controls. The display shall include 5 silicone keyboard function keys with tactile feedback that will allow for all calibration and operating functions. The display shall have an IP rating of no less than 67 and shall have a single CAN connection point on the back of the display for cable routing to control all functions. The controller shall be capable of 12 configurable inputs and 12 configurable outputs and shall also include a 2 color status LED.

2. The display shall be mounted in a NEMA 4 rated plastic enclosure that is large enough to enclose the controller and also allow for the following switch mounting: On/Off, Blend/Recirculate, Reset, and E-Stop. The enclosure shall be mounted on the stainless steel pump enclosure in order to provide a turnkey package.

F. Remote Fill Pendant

1. The system shall include a remote fill pendant that allows the operator to have start/stop and Estop controls while standing at the truck during the filling process. The pendant must include a minimum 25’ cable and pendant and switches shall be able to withstand the outside elements.

2.5 Vertical Storage Tanks

A. Products: Subject to compliance with requirements, provide products by one of the following:
   1. Varitech Industries
   2. Snyder Industries, Inc.
   3. Assmann Corporation

B. Provide a complete vertical storage tank system. Tanks shall be 0.5 inch thickness high impact linear polyethylene with a capacity of 10,000 gallons. Tank material shall include UV stabilizer and be natural unpigmented color.

C. All tank materials and resins shall be highly resistant to liquid calcium chloride at ambient temperatures.

D. Tank shall be complete with 16 inch wide manway with secured cover, stainless steel outlet and inlet located per brine system manufacturer recommendation, and 2 inch vent. A 3/4" butress fitting will be installed on the side of the manway dome to accommodate the truck tank unload hose.

E. Provide liquid level calibrations molded into the tank wall.

F. The tank shall have tie-down slots molded in to prevent slippage of the restraining cable. Provide stainless steel tie-down cable system and stainless steel tie-down anchors to be placed in the concrete.

G. Provide a tie-down chain system and method for attaching non corrosive tie-down to the concrete slab base.

2.6 Piping

A. Schedule 80 PVC with solvent welding joints.

B. EPDM, spiral plied synthetic fabric with wire helix, sized per brine system manufacturer recommendation. Temperature range – 40 F to 180 F.

C. Fittings and couplings: Cam-lock / Banjo design. Polypropylene with stainless steel levers.

PART 3 - EXECUTION

3.1 Installation and Startup:

A. Grading: Prepare base and sub-base. Install on compacted material.

B. Concrete: Form and install concrete as specified in Division 03 - Cast-in-Place Silica Fume Concrete.

C. Assembly:

1. Install shelter level and bolt anchors using similar bolt-down method. Connect to power supply and provide piping connection.
2. Install all piping between brine components, blend station, and tanks per manufacturer instructions.
3. Contractor shall provide all *equipment, fittings, and accessories; and shall* make all plumbing and electrical connections as required to create a fully operational system.
4. Test completed assembly to assure proper operation of entire complete system. Clean and demonstrate operation to Owner.

D. Manufacturer shall provide a minimum of 8-hours of on-site support for installation and training.

END OF SECTION 43 22 56

SECTION 10 22 13 - WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard-duty wire mesh partitions.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.

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

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wire mesh partition hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire mesh items with cardboard protectors on perimeters of panels and doors and with posts wrapped to provide protection during transit and Project-site storage. Use vented plastic.

B. Inventory wire mesh partition door hardware on receipt, and provide secure lockup for wire mesh partition door hardware delivered to Project site.

1. Tag each item or package separately with identification, and include basic installation instructions with each item or package.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of construction contiguous with wire mesh units by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance provide products from one of the following:
   1. American Woven Wire Corporation
      a. Corona CA (Ph.) 909-884-9990
      b. www.americanwirecorp.com
   2. Indiana Wire Products
      a. 915 North Ireland St., Greensburg, IN 47240 (PH.)800-451-0406
      b. www.indianawireproducts.com
   3. Miller Wire Works, Inc.
      a. 7429 Georgia Rd., Birmingham AL 35212, (Ph.) 800-315-6374
      b. www.millerwireworks.com
   4. Newark Wire Works, Inc.
      a. 1059 King Georges Post Rd. Edison, NJ 08837 (PH.)866-347-1910
      b. https://newarkwireworks.com/

2.2 SOURCE LIMITATIONS

A. For wire mesh products, obtain each color, grade, finish, type, and variety from single source with resources to provide products of consistent quality in appearance and physical properties.

2.3 STANDARD-DUTY WIRE MESH PARTITIONS

A. Mesh: 0.135-inch-diameter, intermediate-crimp steel wire woven into 1-1/2-inch diamond mesh.

B. Vertical Panel Framing: 1-1/4-by-5/8-by-0.080-inch cold-rolled, C-shaped steel channels with holes for 1/4-inch-diameter bolts not more than 12 inches o.c.

C. Horizontal Panel Framing: 1-by-1/2-by-1/8-inch cold-rolled steel channels.

D. Horizontal Panel Stiffeners: Two cold-rolled steel channels, 3/4 by 3/8 by 1/8 inch, bolted or riveted toe to toe through mesh; or one 1-by-1/2-by-1/8-inch cold-rolled steel channel with wire mesh woven through channel.

E. Top Capping Bars: 2-1/4-by-1-inch cold-rolled steel channels.

F. Posts for 90-Degree Corners: 1-1/4-by-1-1/4-by-1/8-inch steel angles or square tubes with holes for 1/4-inch- diameter bolts aligning with bolt holes in vertical framing; with floor anchor clips.

G. Posts for Other-Than-90-Degree Corners: Steel pipe or tubing with holes for 1/4-inch-diameter bolts aligning with bolt holes in vertical framing; with floor anchor clips.

1. Partitions up to 12 Ft. High: 1-1/4-inch OD by 1/8 inch.
2. Partitions up to 20 Ft. High: 2-1/2-inch OD by 1/8 inch.

H. Adjustable Corner Posts: Two 1-1/4-by-5/8-by-0.080-inch cold-rolled, C-shaped steel channels connected by steel hinges at 36 inches o.c., with holes for 1/4-inch-diameter bolts aligning with bolt holes in vertical framing.

I. Line Posts: 3-inch-by-4.1-lb or 3-1/2-by-1-1/4-by-0.127-inch steel channels; with 1/4-inch steel base plates.

J. Three-Way Intersection Posts: 1-1/4-by-1-1/4-by-1/8-inch steel tubes or channels, with holes for 1/4-inch- diameter bolts aligned for bolting to adjacent panels.

K. Four-Way Intersection Posts: 1-1/4-by-1-1/4-by-1/8-inch steel tubes, with holes for 1/4-inch-diameter bolts aligned for bolting to adjacent panels.

L. Floor Shoes: Metal, not less than 2 inches high; sized to suit vertical framing, drilled for attachment to floor, and with setscrews for leveling adjustment.

M. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/4-by-1/2-by-1/8-inch steel channels or 1-1/4-by-5/8-by-0.080-inch cold-rolled, C-shaped steel channels, banded with 1-1/4-by-1/8-inch flat steel bar cover plates on four sides, and with 1/8-inch thick angle strike bar and cover on strike jamb.

1. Hinges: Full-surface type, 3-by-3-inch steel, three per door; bolted, riveted, or welded to door and jamb framing.
2. Cylinder Lock: Mortise type with interchangeable core cylinder specified in Section 087111 "Door Hardware”; operated by key outside and recessed turn knob inside.

N. Sliding Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/2-by-3/4-by-1/8-inch steel channels, banded with 1-1/2-by-1/8-inch flat steel bar cover plates on four sides.

1. Hardware: Two, four-wheel roller-bearing carriers; box track; and bottom guide channel for each door.
2. Cylinder Lock: Mortise type with intercahngable core cylinder specified in Section 087111 "Door Hardware"; operated by key outside and recessed turn knob inside.

O. Accessories:
1. Adjustable Filler Panels: 0.060-inch- thick, steel sheet; capable of filling openings from 2 to 12 inches.

P. Finish: Powder-coated finish unless otherwise indicated.

1. Color: As selected by Architect from manufacturer's full range.

2.4 MATERIALS

A. Steel Wire: ASTM A510/A510M.

B. Steel Plates, Channels, Angles, and Bars: ASTM A36/A36M.

C. Steel Sheet: Cold-rolled steel sheet, ASTM A1008/A1008M, Commercial Steel (CS), Type B.

D. Steel Pipe: ASTM A53/A53M, Schedule 40, unless another weight is indicated or required by structural loads.

E. Steel Tubing: ASTM A500/A500M, cold-formed structural-steel tubing or ASTM A513/A513M, Type 5, mandrel-drawn mechanical tubing.

F. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.

G. Panel-to-Panel Fasteners: Manufacturer's standard steel bolts, nuts, and washers.

2.5 FABRICATION

A. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-sized components as recommended by wire mesh item manufacturer. Furnish bolts, hardware, and accessories required for complete installation with manufacturer's standard finishes.

1. Fabricate wire mesh items to be readily disassembled.
2. Welding: Weld corner joints of framing and grind smooth, leaving no evidence of joint.

B. Standard Duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.

1. Mesh: Weld mesh to framing.
2. Framing: Fabricate framing with mortise-and-tenon corner construction.

    a. Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.

3. Fabricate wire mesh partitions with 3 to 4 inches of clear space between finished floor and bottom horizontal framing.
4. Doors: Align bottom of door with bottom of adjacent panels.

a. For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.

5. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.

2.6 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean items of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning.".

D. Shop Priming: Apply shop primer to uncoated surfaces of wire mesh units unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

E. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on powder-coat finish, suitable for use indicated, with a minimum dry film thickness of 2 mils.

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine floors for suitable conditions where wire mesh items will be installed.

C. Examine walls to which wire mesh items will be attached for properly located blocking, grounds, and other solid backing for attachment of support fasteners.

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

3.2 INSTALLATION OF WIRE MESH PARTITIONS

A. Anchor wire mesh partitions to floor with 3/8-inch- diameter, postinstalled expansion anchors at 12 inches o.c. through anchor clips located at each post and corner. Shim anchor clips as required to achieve level and plumb installation.

B. Anchor wire mesh partitions to floor with 3/8-inch- diameter, postinstalled expansion anchors at 12 inches o.c. through floor shoes located at each post and corner. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation.

C. Anchor wire mesh partitions to walls at 12 inches o.c. through back corner panel framing.

D. Secure top capping bars to top framing channels with 1/4-inch- diameter, "U" bolts spaced not more than 28 inches o.c.

E. Provide line posts at locations indicated.

F. Provide seismic supports and bracing as indicated or, if not indicated, as recommended by manufacturer and as required for stability, extending and fastening members to supporting structure.

G. Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.

H. Install doors complete with door hardware.

3.3 REPAIR

A. Repair Painting:

1. Wire brush and clean rust spots, welds, and abraded areas immediately after installation, and apply repair paint with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

    a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Repair of Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

3.4 ADJUSTING

A. Adjust doors and gates to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Verify that latches and locks engage accurately and securely without forcing or binding.

3.5 PROTECTION

A. Remove and replace defective work, including doors and framing that are warped, bowed, or otherwise unacceptable.

END OF SECTION 102213

SECTION 27 05 28 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Optical-fiber-cable pathways and fittings.
4. Metal wireways and auxiliary gutters.
5. Nonmetallic wireways and auxiliary gutters.
6. Metallic surface pathways.
7. Nonmetallic surface pathways.
8. Hooks.
9. Boxes, enclosures, and cabinets.

1.2 DEFINITIONS

ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid conduit.

C. RNC: Rigid nonmetallic conduit

1.3 ACTION SUBMITTALS

A. Product data for the following:
1. Wireways and fittings.
2. Boxes, enclosures, and cabinets.
3. Underground boxes.

Shop Drawings: For custom enclosures and cabinets and underground boxes. Include plans, elevations, sections, and attachment details.

1.4 INFORMATIONAL SUBMITTALS

Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of pathway groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

3. Underground ducts, piping, and structures in location of underground enclosures and handholes.

Qualification Data: For professional engineer.

Seismic Qualification Data: Provide seismic bracing for all pathway racks, enclosures, cabinets, equipment racks, and their mounting provisions, including those for internal components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which certification is based and their installation requirements.
4. Detailed description of conduit support devices and interconnections on which certification is based and their installation requirements.

D. Source quality-control reports.

PART 2 - PRODUCTS

METAL CONDUITS AND FITTINGS

A. Description: Metal raceway of circular cross section with manufacturer-fabricated fittings.

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

1. AFC Cable Systems, Inc.
2. Allied Tube & Conduit.
3. O-Z/Gedney.
4. Robroy Industries.
5. Southwire Company.
6. Thomas & Betts Corporation.

C. General Requirements for Metal Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
2. Comply with TIA-569-D.

D. GRC: Comply with ANSI C80.1 and UL 6.

ARC: Comply with ANSI C80.5 and UL 6A.

F. EMT: Comply with ANSI C80.3 and UL 797.

G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.

2. Fittings for EMT:

    a. Material: Steel.
    b. Type: set-screw, compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.

Joint Compound for GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Description: Nonmetallic raceway of circular section with manufacturer-fabricated fittings.

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

1. AFC Cable Systems, Inc.
2. Allied Tube & Conduit.
3. RACO; Hubbell.
4. Thomas & Betts Corporation.

C. General Requirements for Nonmetallic Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
2. Comply with TIA-569-D.

RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

Fittings: Comply with NEMA TC 3; match to conduit or tubing type and material.

F. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

Description: Comply with UL 2024; flexible-type pathway with a circular cross section, approved for plenum and riser installation unless otherwise indicated.

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

1. Alpha Wire Company.
2. Arnco Corporation.
3. Endot Industries Inc.

4. IPEX.
5. Lamson & Sessions; Carlon Electrical Products.

C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

D. Comply with TIA-569-D.

2.4 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal trough of rectangular cross section fabricated to required size and shape, without holes or knockouts, and with hinged or removable covers.

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

1. Legrand – Cablofil.
2. Cooper B-Line.
3. Panduit Corp.

C. General Requirements for Metal Wireways and Auxiliary Gutters:

1. Comply with UL 870 and NEMA 250, Type 1 or Type 3R for wet or damp locations unless otherwise indicated, and sized according to NFPA 70.
2. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
3. Comply with TIA-569-D.

D. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

Wireway Covers: Hinged type, or Flanged-and-gasketed type for wet or damp locations, unless otherwise indicated.

F. Finish: Manufacturer's standard enamel finish.

2.5 SURFACE METAL PATHWAYS

A. Description: Galvanized steel with snap-on covers, complying with UL 5.

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

1. Mono-Systems, Inc.
2. Wiremold / Legrand
3. Panduit Corp.

Finish: Manufacturer's standard enamel finish in color selected by Architect

D. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

E. Comply with TIA-569-D.

2.6 SURFACE NONMETALLIC PATHWAYS:

A. Description: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC.

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

1. Hubbell Incorporated
2. Mono-Systems, Inc.
3. Wiremold / Legrand
4. Panduit Corp.

Finish: Texture and color selected by Architect from manufacturer's standard colors.

D. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.

E. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

F. Comply with TIA-569-D.

2.7 HOOKS

A. Description: Prefabricated sheet metal cable supports for telecommunications cable.

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

1. Caddy
2. Cooper B-Line.
3. Panduit
4. Arlington

C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

D. Comply with TIA-569-D.

E. Galvanized or stainless steel.

F. J shape.

BOXES, ENCLOSURES, AND CABINETS

A. Description: Enclosures for communications.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cooper Technologies Company; Cooper Crouse-Hinds.
2. Hoffman.
3. O-Z/Gedney.
4. Quazite:Hubbell Power Systems, Inc.
5. RACO; Hubbell.
6. Thomas & Betts Corporation.

C. General Requirements for Boxes, Enclosures, and Cabinets:

1. Comply with TIA-569-D.
2. Boxes, enclosures, and cabinets installed in wet locations shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for use in wet locations.

Box extensions used to accommodate new building finishes shall be of same material as recessed box.

4. Device Box Dimensions: 4 inches square by 2-1/8 inches deep
5. Audio / Visual Device Box Dimensions: Per equipment manufacturer requirements or as indicated on drawings.
6. Gangable boxes are prohibited.

D. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

H. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 or Type 3R, with continuous-hinge cover with flush latch unless otherwise indicated.

1. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

J. Cabinets:

1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.

3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

UNDERGROUND BOXES

A. Description: Molded of fiberglass-reinforced polyester resin, with frame and covers of polymer concrete and fiberglass.

B. Manufacturers: Subject to compliance with requirements, provide products the following
   1. Hubbell Power Systems, *basis of design*
   2. *Oldcastle Infrastructure*
   3. *Charles Industries*

C. General Requirements for Fiberglass Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
3. Comply with TIA-569-D and SCTE 77.

Color of Frame and Cover: Green.

Configuration: Designed for flush burial with closed bottom unless otherwise indicated.

F. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.

G. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

H. Cover Legend: Molded lettering, "COMMUNICATIONS".

Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

J. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.10 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

Tests of materials shall be performed by an independent testing agency.

2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

Outdoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed Conduit: ARC, or RNC, Type EPC-40-PVC.
2. Concealed Conduit, Aboveground: GRC.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
4. Boxes and Enclosures, Aboveground: NEMA 250, Type 4X.

B. Indoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT
3. Exposed and Subject to Severe Physical Damage: GRC. Pathway locations include the following:
   a. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
   b. Mechanical rooms.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT
5. Damp or Wet Locations: ARC.
6. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: EMT .
7. Pathways for Optical-Fiber or Communications-Cable Risers in Vertical Shafts: EMT

C. Minimum Pathway Size: 1-inch trade size communication cables

D. Pathway Fittings: Compatible with pathways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use set-screw or compression, steel fittings with insulated throats. Comply with NEMA FB 2.10.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

Install surface pathways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

Comply with the following standards for installation requirements except where requirements on Drawings or in this Section are stricter:

1. NECA 1.
2. ANSI/BICSI N1.
3. TIA-569-E.

NECA 101

NECA 102.

NECA 111.

B. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

C. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

D. Comply with requirements in Section 270529 "Hangers and Supports for Communications Systems" for hangers and supports.

E. Comply with requirements in Section 270544 "Sleeves and Sleeve Seals for Communications Pathways and Cabling" for sleeves and sleeve seals for communications.

F. Pathways shall not exceed 40% fill rate at the completion of the project.

G. Do not share pathways for voice and data systems with other low voltage cabling.

H. Provide conduits in inaccessible environments, including but not limited to above drywall ceilings, in walls, above HVAC ductwork, fume hoods, lab counters and cabinets

I. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

J. Complete pathway installation before starting conductor installation.

K. Arrange stub-ups so curved portions of bends are not visible above finished slab.

L. Provide pull-box for any conduit run that exceeds 100 feet.

M. LB fittings are not permitted in lieu of pull boxes.

Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.

O. Conceal rigid conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

P. Support conduit within 12 inches of enclosures to which attached.

Q. All conduits shall have insulated bushings.

R. Conduits for backbone cabling routed to MTR and TR's shall end adjacent in a corner of room where multiple sheets of plywood backboard are installed. Secure conduits to backboard when entering room from above. Extend conduits from below 4 inches above finished floor.

S. Maintain the following clearances between pathways and possible sources of electromagnetic interference exceeding 5 KVA:
   1. Power lines enclosed in a grounded metal conduit (or equivalent shielding) in proximity to grounded metal conduit pathway: 6"
   2. Unshielded power lines or electrical equipment in proximity to a grounded metal conduit pathway: 12"
   3. Unshielded power lines or electrical equipment in proximity to open or nonmetal pathways: 24"
   4. Electrical motors and transformers: 47"

T. Raceways Installed Below Slabs:
   1. Where pathways are permitted to run below slabs they should be installed in non-metallic conduit and encased in 3" envelope of concrete. Provide 6" layer of over fill above encasement.
   2. Conduits shall not be installed above the vapor barrier.

U. Stub-ups to Above Recessed Ceilings:

   1. Use EMT for pathways.
   2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

X. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus one additional quarter-turn.

Y. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure, to assure a continuous ground path.

Z. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

AA. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Secure

pull wire, so it cannot fall into conduit. Cap pathways designated as spare alongside pathways in use.

Surface Pathways:

1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
2. Install surface pathway with a minimum 2-inch radius control at bend points.
3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:

1. 1-Inch Trade Size and Larger: Install pathways in maximum lengths of 75 feet.
2. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

DD. Install pathway-sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway-sealing fittings according to NFPA 70.

Install devices to seal pathway interiors at accessible locations. Locate seals, so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service pathway enters a building or structure.
3. Where otherwise required by NFPA 70.

FF. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet. Install in each run of aboveground ARC that is located where environmental temperature change may exceed 100 deg F, and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.

b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.

c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
d. Attics: 135 deg F temperature change.

Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.

4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

HH. Hooks:
1. Hooks are allowed for pathways only above accessible drop ceilings. Do not install above drywall ceilings or in areas with limited access.
2. Hooks are acceptable as pathways from cable trays to conduit stub-ups located within rooms.
3. Route hooks to center of room and out to corridor. Do not route hooks along walls.
4. Minimum clearance between ceiling and hook shall be 6 inches. Do not install hooks more than 18 inches above ceiling.
5. Shall be supported by dedicated threaded rod supports. Do not use ceiling grid support wire or support rods or supports for other trades.
6. Hook spacing shall allow no more than 3 inches of slack. The lowest point of the cables shall be no less than 3 inches adjacent to ceilings, and no less than 6 inches adjacent to mechanical ductwork and fittings, luminaires, power conduits, power outlets, and other electrical equipment.
7. Space hooks no more than 4 feet o.c.
8. Provide a hook at each change in direction.
9. Size to allow a minimum of 25 percent future capacity without exceeding design capacity limits.

II. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

JJ. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

KK. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.

LL. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

MM. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

NN. Set metal floor boxes level and flush with finished floor surface.

OO. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

PP. All pull boxes shall be accessible. Do not place above drywall ceilings, HVAC ductwork or piping.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe of less than 6 inches in nominal diameter.
2. Install conduit 36 inches below finished grade and encase in concrete.
3. Install backfill as specified in Section 312000 "Earth Moving.
4. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."

Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.

6. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete around conduit for a minimum of 12 inches on each side of the coupling.

b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits, but a minimum of 6 inches below grade. Align planks along centerline of conduit.

8. Underground Warning Tape: Comply with requirements in Section 270553 "Identification for Communications Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install handholes with bottom below frost line, 32 inches below grade.

Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

Field cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 270544 "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 27 05 28

SECTION 27 11 16 - COMMUNICATIONS RACKS, FRAMES, AND ENCLOSURES

GENERAL

1.1 SUMMARY

A. Section Includes:

1. backboards
2. 19-inch equipment racks.
3. Power strips.
4. Grounding.
5. Labeling.

1.2 DEFINITIONS

Access Provider: An operator that provides a circuit path or facility between the service provider and user. An access provider can also be a service provider.

B. BICSI: Building Industry Consulting Service International.

C. LAN: Local area network.

D. RCDD: Registered communications distribution designer.

E. SBB: Telecommunications grounding bus bar.

F. PBB: Telecommunications main grounding bus bar.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for equipment racks and cabinets.
2. Include rated capacities, operating characteristics, electrical characteristics, certifications, standards compliance, and furnished specialties and accessories.

B. Shop Drawings: For communications racks, frames, and enclosures. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Equipment Racks and Cabinets: Include workspace requirements and access for cable connections.

3. Grounding: Indicate location of grounding bus bar and its mounting detail showing standoff insulators and mounting brackets.

1.4 INFORMATIONAL SUBMITTALS

Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.

QUALITY ASSURANCE

A. Installer Qualifications: Cabling installer must have personnel certified by BICSI on staff.

1. A BICSI certified RCDD, listed on the BICSI website with current credentialing. Contractor submittals shall include copies of all certificates of staff to work on the project.

2. The Contractor must hold a current certification from the manufacturer of the proposed connectivity solution. This certification must be valid for both installation and testing and shall enable the Contractor to offer the full manufacturer's product and applications warranties as specified. All technicians working on the project will have manufacturers training and training certificates.

3. The cabling contractor must have a minimum of five (5) years of documented experience installing structured cabling systems.

4. Installation personnel shall consist of 100% BICSI certified staff and listed on the BICSI website. There shall be at least one BICSI certified Technician during all cable installation work.

PART 2 - PRODUCTS

PERFORMANCE REQUIREMENTS

UL listed.

B. RoHS compliant.

BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches. Comply with requirements for plywood backing panels specified in Section 061000 "Rough Carpentry."

WALL MOUNTED EQUIPMENT CABINET

A. Description: Dual hinged wall mounted cabinet with threaded rails designed for mounting telecommunications equipment. Width is compatible with EIA/ECIA 310-E, 19-inch equipment mounting with an opening of 17.72-inches between rails.

B. Manufacturers:
1. Basis of design shall be Great Lakes Case & Cabinets Co. GL23WM

2. Approved equal by Panduit, Chatsworth, Atlas, Hubbell

C. General Requirements:

1. Frames: Modular units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
2. Material: Extruded aluminum.
3. Finish: Manufacturer's standard, baked-polyester powder coat.
4. Color: Black.
5. UL Listed: UL 1863

Wall mounted cabinets:

1. Overall Height: 24 inches.
2. Overall Width: 22.25 inches
3. Overall Depth: 25 inches.
4. Number of Rack Units per Rack: 12.

Numbering: Every rack units, on interior of rack.

5. Threads: #12-24.
6. Base shall have a minimum of four mounting holes for permanent attachment to wall.
7. Self-leveling.

2.4 FREE STANDING EQUIPMENT RACK

A. Description: Two post racks with threaded rails designed for mounting telecommunications equipment. Width is compatible with EIA/ECIA 310-E, 19-inch equipment mounting with an opening of 17.72-inches between rails.

B. Manufacturers:
1. Basis of design shall be Siemon RS3-07-*S*
2. *Chatsworth Products*
3. *Hubbell*

C. General Requirements:

1. Frames: Modular units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
2. Material: Extruded aluminum.
3. Finish: Manufacturer's standard, baked-polyester powder coat.
4. Color: Black.
5. UL Listed: UL 1863

Floor-Mounted Racks:

1. Overall Height: 84 inches.
2. Overall Width: 20.25 inches
3. Upright Depth: 3 inches.
4. Two-Post Load Rating: 500 lb unsecured, 1000 lb bolted to floor.

5. Number of Rack Units per Rack: 45.

Numbering: Every rack units, on interior of rack.

6. Threads: #12-24.
7. Vertical and horizontal cable management channels, top and bottom cable troughs, horizontal rack bonding bus bar, and a power strip.
8. Base shall have a minimum of four mounting holes for permanent attachment to floor.
9. Top shall have provisions for attaching to cable tray or ceiling.
   Self-leveling.

2.5 POWER STRIPS

A. Power Strips: Comply with UL 1363.
   1. Manufacturers:
      a. Hubbell #PR10420 power strip with #PRSLB4 mounting bracket
      b. Approved equal

   2. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   3. Rack mounting with standoff brackets to provide 6 inches of separation from cable management system.
   4. 20-A, 120-V ac, NEMA WD 6, Configuration 5-20R receptacles. Provide quantity of receptacles required to accommodate all rack mounted equipment

GROUNDING

Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

Rack SBBs: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, minimum of 14 mounting holes, NRTL listed as complying with UL 467, and complying with TIA-606-B. Predrilling shall be with holes for use with lugs specified in this Section.

1. Rack-Mounted Horizontal SBB: Designed for mounting in 19- equipment racks. Include a copper splice bar for transitioning to an adjoining rack, and stainless-steel or copper-plated hardware for attachment to the rack.

2.7 LABELING

A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Comply with requirements in Section 270553 “Identification for Communication Systems”.

2.8 HORIZONAL CABLE MANAGEMENT

A. Manufacturers:
   1. Siemon RS3-RWM02DS

2. Or approved equal.

B. Metal, with integral wire retaining fingers.

C. Baked-polyester powder coat finish, black.

D. Hinged removable door.

E. 2 RU’s, 7 inches depth

F. Minimum 3 per rack; provide greater quantity as required for complete system

G. Provide horizontal crossover cable manager at top of each relay rack, with a minimum height of two rack units each.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Comply with BICSI TDMM for layout of communications equipment spaces.

C. Comply with BICSI ITSIMM for installation of communications equipment spaces.

D. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

E. Support floor mounted racks at the top by the cable tray system.

F. Install racks and cable tray so that the cable tray water fall works properly.

G. Backboards:

1. Provide backboards for all wall of MTR’s and TR’s.
2. Install with 96-inch dimension vertical, 12 inches above finished floor. If plywood is fire rated, ensure that fire-rating stamp is visible after installation.
3. Butt adjacent backboards sheets tightly to form smooth gap free corners and joints.
4. Comply with requirements for backboard installation in BICSI's "Information Technology Systems Installation Methods Manual" and TIA-569-D.
5. Route and mount only communications cabling and equipment on the backboard.
6. Backboards shall remain unpainted. If painted, they shall be replaced at the Contractor’s expense.

Coordinate layout and installation of communications equipment in racks and room. Coordinate service entrance configuration with Owner.

1. Meet jointly with system providers, equipment suppliers, and Owner to exchange information and agree on details of equipment configurations and installation interfaces.
2. Record agreements reached in meetings and distribute them to other participants.
3. Adjust configurations and locations of distribution frames, cross-connects, and patch panels in equipment spaces to accommodate and optimize configuration and space requirements of telecommunications equipment.
4. Adjust configurations and locations of equipment with distribution frames, cross-connects, and patch panels of cabling systems of other communications, electronic safety and security, and related systems that share space in equipment room.
5. Install racks so that there is a minimum of 3 feet of clearance at the back of the rack (measured from back of installed switches) and 3 feet clearance at the front of the rack (measured from installed equipment face), and 3 feet clearance at one side of the rack.

I. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

3.2 GROUNDING

A. Comply with NECA/BICSI 607.

B. Install grounding according to BICSI ITSIMM, "Bonding, Grounding (Earthing) and Electrical Protection" Chapter.

C. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems"

D. Connect each rack SBB to near room SBB or the PBB.

IDENTIFICATION

A. Coordinate system components, wiring, and cabling complying with TIA-606-B. Comply with requirements in Section 270553 "Identification for Electrical Systems."

END OF SECTION 27 11 16

SECTION 33 11 00
WATER DISTRIBUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide new water lines from the existing water main to points shown on the plans. This includes, but is not limited to the following:
   1. Piping and fittings
   2. Fire hydrants
   3. Curb boxes and valves
   4. Post indicating valves, standard and electrically supervised
   5. Post type siamese
   6. Tapping sleeves and valves
   7. Meter pit and piping
   8. Flushing and testing
   9. Sterilization
   10. All labor, equipment, devices, materials and performing all operations necessary in connection with the combined water system as herein specified and shown, indicated or noted on the drawings and subject to the terms and conditions of the contract.

1.02 RELATED SECTIONS

A. Section 03 30 00, "Cast-in-Place Concrete"

B. Section 31 23 33, "Piped Utilities - Basic Methods"

1.03 REFERENCES

A. American Society of Testing and Materials (ASTM).
   - A377 Specification for Gray Iron and Ductile Iron Pressure Pipe.
   - A47 Specification for Ferritic Malleable Iron Castings.
   - A53 Specifications for Pipe, Steel, Black and Hot-Dipped, Zinc coated welded and seamless.
   - D1785 Polyvinyl Chloride (PVC) Plastic Pipe, Schedule 40, 80 and 120.
   - D2774 Underground Installation of Thermoplastic Pressure Piping.
   - D2855 Making Solvent Cement Joints with Polyvinyl Chloride (PVC) Pipe and Fittings.
   - D2241 Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
   - D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe Systems.
   - D3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
   - F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
   - B32 Solder Metal.
   - B88 Seamless Copper Water Tube.

B. American Water Works Association (AWWA).
   - B300 Hypochlorites.
   - B301 Liquid Chlorine.
   - C104 Cement-Mortar Lining for Cast-Iron and Ductile-Iron Pipe and Fittings for Water.

C110 Ductile-Iron and Gray-Iron Fittings, 3 inches through 48 inches, for Water and Other Liquids.
C111 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
C115 Flanged Ductile Iron and Gray Iron Pipe with Threaded Flanges.
C151 Ductile-Iron Pipe. Centrifugal Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
C153 Ductile-Iron Compact Fittings, 3 inches through 12 inches, for Water and Sewage Systems.
C502 Dry Barrel Fire Hydrants.
C508 Swing-Check Valves for Waterworks Service, 2 inch through 24 inch NPS.
C515 Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
C511 Reduced-Pressure Principle Backflow Prevention Assembly.
C600 Installation of Grey and Ductile Cast-Iron Water Mains and Appurtenances.
C651 Disinfecting Water Mains.
C800 Underground Service Line Valves and Fittings.
C900 Poly(Vinyl Chloride) (PVC) Pressure Pipe 4 inches through 12 inches for water.
M23 PVC Pipe - Design and Installation.

C. American National Standards Institute (ANSI).

D. Underwriter's Laboratories (U.L.).

E. Factory Mutual (FM).

F. National Sanitation Foundation (NSF).

G. Plumbing and Drainage Institute (PDI).

H. National Fire Protection Association (NFPA).

I. Local Authority Standards / City of Mt. Vernon Standards

1.04 REGULATOR REQUIREMENTS

A. Conform to applicable City code for materials and installation of the Work of this Section.

B. Contractor to obtain and pay for all required permits, tap fees, inspection fees, etc., as required by Governing Authority.

1.05 CONCRETE WORK

A. Unless otherwise noted, all cast-in-place concrete shall be by the General Trades Contractor.

B. Unless otherwise noted, all concrete material and installation shall be as required in Division 3 of the Specifications.

1.06 SUBMITTALS

A. Submit under provisions of Division 1.

B. Submit product data, shop drawings, catalog cuts, etc., for pipe, fire hydrants, detector checks, meters, fittings, valves and accessories.

C. Certification from the Contractor stating that hydrostatic tests have been conducted in accordance with Specifications and in the presence of the Project Manager / Inspector and that the completed pipeline is acceptable in accordance with criteria set forth in Specifications for leakage.

D. Certification from the Contractor stating that pipe lines constructed have been disinfected as specified and are safe for conveying potable water.

E. Sequence of work in accordance with this Section and Division 1.

1.07 QUALITY ASSURANCE

A. Conform to applicable governing code for materials and installation of the work of this Section. In the event of a conflict between the drawings and the code, the code shall govern. No extra charges will be allowed for any changes necessary for code compliance.

PART 2 PRODUCTS

2.01 DUCTILE IRON PIPE (PIPE SIZE 3 INCHES AND LARGER)

A. Pipe shall conform to ANSI/AWWA C151/A21.51, Class 53, push-on type (buried piping), or to ANSI/AWWA C115/A21.15, flanged type (exposed piping - water vaults, meter pits, etc.). Pipe shall have cement mortar lining per ANSI/AWWA C104/A21.4 inside and asphaltic coating per ANSI/AWWA C151/A21.51 outside.

B. Fittings shall be ductile iron per ANSI/AWWA C110/A21.10. Fittings shall have cement mortar lining per ANSI/AWWA C104/A21.4 inside and asphaltic coating per ANSI/AWWA C110/A21.10 outside. Fittings 16 inches and smaller may be manufactured according to ANSI/AWWA C153/A21.53. Pressure rating shall be 350 psi minimum.

C. Joints for exterior buried piping shall be mechanical joint type for fittings and push-on type for pipe, rubber ring gasket type conforming to ANSI/AWWA C111/A21.11.
1. "Tyton Joint Pipe" as manufactured by U.S. Pipe Co.
2. "Super Bell-Tite Joint Pipe" as manufactured by Clow Co.

D. Joints for exposed piping (meter pits, water vaults, etc.) shall be flanged joints conforming to ANSI/AWWA C115/A21.15 and to ANSI B16.1, 125 lb. template.

E. All piping and fittings shall be certified by the NSF for use in potable water systems.

2.02 SEAMLESS COPPER WATER TUBING (LESS THAN 3 INCHES SIZE)

A. Seamless copper water tubing shall be Type "K" soft temper (buried piping) or Type "L" hard drawn (exposed piping - pits, vaults, etc.), conforming to ASTM B88 with solder (exposed piping) or brazed (buried piping) joints.

B. Joints shall be 150 psi wrought copper socket solder (ANSI/ASTM B16.22) or brazed (ANSI B31.1) joints.

C. Solder shall be 95/5 tin-antimony (ASTM B32), lead-free.
1. "Silvabrite 100" as manufactured by Engelhard.
2. "Bridgit" as manufactured by J.W. Harris Co.
001
3. *"KappAnt" as manufactured by Kapp Alloy & Wire, Inc.*

D. Copper Brazing Alloys: Silver/Phosphorous or Silver/Zinc alloys having a melting point greater than 1,000 degrees F. (ANSI B31.1)
1. Sil-Fos filler as manufactured by Handy Harmon.
2. Aircosil filler as manufactured by Airco Welding Products.
001
3. *"PhosCopper 15" as manufactured by Aufhauser Corporation.*

E. Copper/phosphorous or silver/zinc alloys having a melting point greater than 1,350 degrees F.
1. "Stay-Silv 0" as manufactured by J.W. Harris.
2. "FOS-Flo 7" as manufactured by Handy Harmon.
001
3. *"Meta-Braze 179" as manufactured by VBC Group.*

F. Fittings shall be of the recessed solder joint type (exposed) or brazed (buried) of either wrought copper or cast brass.

G. Flux shall be non-corrosive.

H. All piping and fittings shall be certified by the NSF for use in potable water systems.

I. No alloys containing lead shall be used for brazing or soldering. Contractor shall certify that solder or brazing used for entire new piping system is lead-free.

2.03 GALVANIZED CARBON STEEL PIPE (LESS THAN 4 INCHES SIZE)

A. Galvanized carbon steel pipe shall be Schedule 40 with screwed ends conforming to ASTM A53.

B. Fittings shall be malleable iron screwed end fittings, conforming to ASTM A47 and A338 with minimum pressure rating of 150 psi.

C. All piping and fittings shall be certified by NSF for use in potable water systems.

2.04 VALVES

A. Gate Valves: 3 Inches and Larger: Resilient wedge, iron body, non-rising stem, UL/FM listed, mechanical joint or flanged ends (flanged ends in valve pits only), working pressure rating 150 psi minimum, renewable bronze yoke bushings, and bronze seat rings; shall conform to AWWA C515. Square operating nut, counter clockwise to open (buried piping) or handwheel operator (valve pits).
1. American Darling, Clow, Mueller.

B. Gate Valves: Smaller than 3 Inches: Class 150, solid wedge, non-rising stem (buried piping) or inside screw and rising stem (valve pits), flanged or threaded end connections with a union on one side of the valve. Square operating nut, counter clockwise to open (buried piping) or handwheel operator (valve pits).

C. Indicator Valves:
1. Factory assembled UL listed and FM approved PIV, rated at 175 psi minimum, with inside screw grade post indicator-operator. Turn operator counterclockwise to open unless otherwise directed by local fire department. Provide post with a fail-safe feature in case of breaking off above grade to keep valve intact and to move to open position. Furnish worm gear type operator with permanently oil lubricated watertight gear case complete with handle. Bituminous coat all surfaces below grade not less than 12 mils thick. Finish fill, prime and factory finish all above grade surfaces with a multiple coat of high-gloss, weather-resistant, red enamel.
2. Mueller, Co. Model No. A20806, Kennedy Model No. 2945A and Clow Model No. 2945A.
3. Electrically supervised. PIV complete with integral tamper switch. Division 16 Contractor to provide control/signal wiring.

D. Swing Check Valves:
1. UL/FM listed, 175# WWP cast iron body; brass moving parts including clapper valve seat and pivot shaft, Buna-N "O" ring, flanged connections.
   a. Viking Model C2, Grinnell, Reliable, or Central.

2.05 VALVE BOXES

A. Valve boxes shall be cast iron Buffalo type and shall have screw type extension adjustment with flared base. Boxes shall be of sufficient length so that at least 6 inches of adjustment remains when installed to finished grade. The word "water" shall be cast on the cover.
1. Sigma Corporation, East Jordan Iron Works, Bingham and Taylor, or approved equal.

2.06 TAPPING SLEEVES AND VALVES

A. Materials and operations shall conform to AWWA C515. Valves shall have one (1) end flanged and other end mechanical joint type with flange for bolting to tapping machine. Sleeves shall be 2-piece cast iron, with mechanical joint ends. Tapping sleeves furnished complete with joint accessories. Valve and sleeve assembly shall be capable of withstanding at least 125 psi work pressure.
1. Clow Co. Model F5093 valve and F5205 sleeve or approved equal.

2.07 DETECTOR CHECK

A. UL/FM listed, 175# WWP, cast iron body, two (2) tapped bases for meter and bypass trimming, hard rubber bushings, bronze clapper with full face rubber gasket, neoprene discs, flanged connections. Bronze hinge pins, weights and seat.

B. Full meter bypass including magnetic drive disc meter with bronze case, globe and check valves.

C. Hersey Model DC, Grinnell, Reliable, Central, Automatic Sprinkler, or Viking.

2.08 FIRE HYDRANT

A. Provide fire hydrants per City of Mt. Vernon Fire Department and Water Department standards. If no such standards exist, the following may be used:
   1. Dry barrel type, low profile hydrant shall comply with local government requirements and shall be UL listed and FM approved. Hydrant shall have 5 1/4 inch valve opening and two (2) hose outlets and one (1) 4 1/2 inch steamer nozzle complete with non-binding caps and cap chains. Hose outlet threads shall be local fire department.
   2. Exterior surface shall be filled, primed, and finished with a multiple coat, high-gloss, weather-resistant red enamel. All surfaces below grade shall receive a coating of bitumen not less than 12 mils thick. Care shall be exercised not to plug barrel drainage outlet applicable provisions of AWWA C502.
   3. Mueller Co., Clow, East Jordan Iron Works.

2.09 DISINFECTION MATERIALS

A. Liquid chlorine shall conform to AWWA B301. Calcium and sodium hypochlorite shall conform to AWWA B300.

2.10 PRESSURE REDUCING VALVES

A. 2 Inch and Smaller: All bronze body, stainless steel renewable seats, reinforced Buna-N diaphragm and valve disc (ASSE 1003), dead end service type.

B. 3 Inch and Larger: Flanged cast iron body dead end service type with bypass tappings, renewable stainless-steel stem and seats, replaceable diaphragm and housing, rubber disc, globe valve, 250 psi WWP with internal parts to be epoxy coated.

2.11 METER PIT

A. Furnish meter pits as per Mt Vernon Standard Drawings.

B. Furnish a precast concrete meter pit with sump drain, access and construction as indicated on the Drawings.
   1. E.C. Babbert, Norwalk Concrete Ind., or Mack Ind.

C. Manhole Covers

2.12 CURB OR SERVICE STOP

A. Ground key, round way, inverted key type; shall be made of bronze conforming to ASTM B61/B62 and rated 150 psi minimum. Ends shall be as appropriate for connection to the service piping. Arrow shall be cast into body of the curb or service stops indicating direction of flow.

2.13 BACKFLOW PREVENTERS

A. Double check detector assembly back flow (ASSE 1048), bronze or cast iron body, meeting the requirements of the local water department.
   1. 3/4 Inch to 10 Inches: Watts #709 double check detector assembly.
   2. *Zurn 350 double check detector.*
   3. *BEECO Friendly Double Check Detector Assembly.*

001

2.14 SPECIALTIES

A. Supervisory (Tamper) Switch:
   1. Weather-resistant, single-pole, double-throw switch, roller type switch actuator, spring-loaded plunger, tamper-proof cover (extra set of contacts).
      a. Potter-Roemer Fig. 6220

B. Pressure Gauge:
   1. UL/FM listed, dial spring, brass case, 3 1/2 inches diameter, 1/4 inch NPT male connection, range: 0-300 psig.
      a. Reliable Model UA, Viking, Grinnell, Central, Star, or Automatic Sprinkler.

PART 3 EXECUTION

3.01 GENERAL CONSTRUCTION REQUIREMENTS

A. Handling:
   1. Utmost care shall be exercised in transporting and handling of pipe, fittings, valves, etc., in order to avoid shock damage to pipe or protective coatings and linings. Pipe, fittings and accessories shall be loaded and unloaded by lifting with hoist or skidding in a manner that will avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground. In the event that any part of the coating or lining is damaged, the repair shall be made by the Contractor to the satisfaction of the Engineer or the pipe shall be rejected.
   2. In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench without blocking access to driveways, alleys, or public utility facilities.

3.02 PIPING INSTALLATION

A. Pipe buried in ground shall have firm bearing along entire length of undisturbed earth. Pipe on fill or loose soil shall be supported every 6 feet on brick or concrete piers and then firmly embedded in sand. Provide compacted clay bulkheads to prevent groundwater in sand from draining to building.

B. Pipe trenches shall be evenly graded.

C. Depth of bury shall not be less than 4 feet from finished grade to top of pipe barrel. Should there be an apparent significant discrepancy between the ground elevations shown on the drawing and those established in the Contractor's stakeout, the Engineer shall be notified at least ten (10) days ahead of the pipe laying operation. Pipe shall not be laid with depth of bury less than 4 feet without the approval of the Engineer.

D. Securely anchor each mechanical joint, tee, plug, caps and bends using pipe clamps, tie-rods or concrete thrust blocks conforming to the requirements of NFPA 24 and the authorities having jurisdiction.

E. All changes in direction shall be made with fittings or joint deflection not exceeding manufacturer's recommendations. Any transition from one (1) pipe size to another shall be made with a reducing fitting. Reducing bushings are prohibited except where specifically called for on the drawings or unless approved by the Engineer.

F. Pipe cuttings and drilling, where necessary, shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise authorized, cutting shall be done by means of an approved type mechanical cutter. Cut sections of pipe shall be reamed or filed to remove all burrs.

G. Laying:
1. Each section of pipe shall be inspected for defects prior to being lowered into the trench. Defective, damaged or unsound pipe shall not be used.
2. Pipe trenching and bedding foundation shall be provided in accordance with Section 31 23 33, "Piped Utilities." Trenches shall be kept dry during bedding and laying operations. Pipe shall not be laid when the conditions of trench or weather are unsuitable.
3. All pipe shall be carefully lowered into the trench by crane or other method as approved by the Engineer.
4. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipelaying crew cannot put the pipe into the trench and in place without getting earth into it, the Engineer may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the preceding pipe. During laying operations, no debris, tools, clothing, or other material shall be placed in the pipe. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other substances can enter the pipe or fittings. As work progresses, the interior of the pipe shall be cleaned of any dirt and superfluous materials.
5. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under it except at the bells. Pipe and fittings which do not allow a sufficient and uniform space for joints shall be removed and replaced with pipe and fittings of proper dimensions to insure such uniform space. The manufacturer's recommendations as to limits of deflection of joints shall be strictly adhered to. Precautions shall be taken to prevent dirt from entering the joint space.
6. Joints on laid pipe shall not be covered until approved. Pipe, pipe fittings, or appurtenances found defective after installation shall be replaced at the Contractor's expense.

H. Locating:
1. Where location of water pipe is not clearly defined by dimensions of Drawings, water pipe shall not be laid horizontally closer than 10 feet from an active sanitary sewer line except where the bottom of the water pipe will be at least 18 inches above top of the sewer pipe.
2. Where water pipe will cross under active gravity flow sanitary sewer lines, sewer pipe for a distance of at least 10 feet on each side of crossing shall be fully encased in concrete 4 inches thick or shall be made of pressure pipe with no joint located within 3 feet horizontally of the crossing. Joints in sewer pipe closer horizontally of the crossing than 3 feet shall be encased in concrete.
3. Water lines in all cases shall cross above sewage force main or inverted siphons and shall not be less than 18 inches above the sewer main. Sewage force mains or inverted siphon shall be lowered in order to satisfy above requirements and also the minimum cover depth over water line of 4 feet.
4. Water lines shall not be laid in same trench with any gas line, fuel line or electric wiring.

I. Install utility warning tape 18 inches below finished grade.

J. Distribution System Installation.
1. PVC Pipe: Conform to manufacturer's recommendations and AWWA M23 and ASTM D2744.
2. Gate Valves: Install in accordance with AWWA C600 and manufacturer's recommendations.
3. Tapping Sleeves and Valves: The Contractor shall be approved by the authority having jurisdiction for tapping service connection. Install under pressure on lines shown. Valves and sleeves shall be installed in accordance with manufacturer's recommendations. Lines shall be drilled and valves installed using approved equipment as recommended by valve manufacturer. Outages to existing mains during installation, except where approved in cases of emergency, will not be permitted.
4. Valve Boxes: Install in accordance with AWWA C600 over all new below grade valves. Boxes shall be centered over the valves. Earth fill shall be carefully tamped around each valve box to a distance of 4 feet on all sides of the box or to the undisturbed trench face if less than 4 feet. A concrete collar shall be placed around each box top at finished grade. Collar shall be 18 inches diameter and 8 inches thick.

K. Thrust Blocks
1. Provide cast-in-place concrete thrust blocks where shown and of the size indicated. The base and thrust bearing sides of block shall be cast directly against undisturbed earth. Sides of thrust blocks not subject to thrust may be cast against forms. The area of bearing shall not be less than that indicated on the drawings. Blocking shall be placed so that the fitting joints will be accessible for repair.
2. Approved joint restraint systems may be used in lieu of thrust blocks.

L. Fire Hydrants
1. Install in accordance with AWWA C600, as applicable except at modified herein.

2. Operating nut shall not be more than 3 feet above the finished grade. Hydrants shall be set so that the bury line marked on the barrel is flush with finished grade. Set hydrants plumb and on a firm footing. Footers shall be provided prior to setting hydrant consisting of either cast-in-place slab or solid concrete block not less than 6 inches thick and 15 inches square. Thrust blocks or restraint rods shall be provided as shown after hydrant has been set in place.
3. Provision shall be taken to carry off drainage from each new hydrant. The area around the base of each new hydrant shall be excavated sufficiently to permit placement of approximately 1/3 cubic yard of 3/4 inch size clean crushed stone to a level several inches above drain opening. The stone shall be placed as shown and covered with roofing paper prior to backfilling to prevent clogging of drain pit.
4. Where ground water is encountered standing at levels above that of hydrants drains the Contractor shall immediately contact the inspector who shall notify the project engineer. Measures will be taken to remedy the situation as directed.
5. Each hydrant and branch line shall be thoroughly flushed, pressure tested and disinfected as specified after thrust blocks and concrete footings have been cured prior to any backfilling.

3.03 QUALITY CONTROL

3.03.1 HYDROSTATIC TESTS

A. General Requirements:
1. The Contractor shall provide all necessary water, equipment and instrumentation required for proper completion of the flushing and testing of piping systems. Source and quality of water, test procedures and disposal of water shall be approved by the Engineer.
2. All tests shall be made in the presence of the Local Authority's Inspector. Preliminary tests made by the Contractor without being observed by the Inspector will not be accepted. Notify the Engineer and the Inspector at least twenty-four (24) hours before any work is to be inspected or tested.
3. All defects in the piping systems shall be repaired and/or replaced and retested until acceptable to the Engineer. Repairs shall be made to the standard of quality specified for the entire system.
4. Sections of the system may be tested separately, however, any defect which may develop in a section previously tested and accepted shall be promptly corrected and retested. Pressure tests shall be made between valves to demonstrate ability of valve to sustain pressure.
5. All piping systems shall be tested in accordance with these test methods in addition to any test required by local plumbing codes or building authorities.

B. Flushing: All piping systems shall be flushed with water to remove construction debris prior to testing. Water for flushing operations shall be paid by the Contractor at the rate set by the authority having jurisdiction.

C. Hydrostatic Testing:
1. Perform in accordance with AWWA C600 or NFPA 24. Any contradictions between these Specifications and AWWA C600 or NFPA 24, AWWA C600 or NFPA 24 shall govern. Local Code shall govern over these Specifications or AWWA C600 or NFPA 24.

2. All newly laid pipe, above ground or below ground, or any valved section thereof, shall be subjected to a hydrostatic pressure test as hereinafter tabulated. All piping, that will be considered inaccessible or impossible to repair after the completion of all work, shall be hydrostatically tested while still accessible. Examples of such piping are those near or under basins, lagoons, railroads, paved roads, concrete structures, and concrete foundations.
3. The Contractor shall backfill all pipe and provide all reaction backing before hydrostatic testing. It shall be the Contractor's responsibility to locate and repair any and all leaks that may develop. The Engineer may direct the Contractor to leave certain joints and connections uncovered until testing has been completed.
4. Where any section of a main is provided with concrete reaction backing, the hydrostatic pressure test shall not be made until at least five (5) days have elapsed after the concrete reaction backing was installed. If high early strength cement is used in the concrete reaction backing, the hydrostatic pressure test shall not be made until at least two (2) days have elapsed.
5. Reaction backing shall be in accordance with the drawings.
6. Before applying the specified test pressure, all air shall be expelled from the pipe and the lines shall be thoroughly flushed. If hydrants or blow off valves are not available, taps at points of highest elevation shall be made before the test is made and plugs inserted after the air has been expelled.
7. Each valved section of the pipe shall be slowly filled with water at specified test pressure, based on the elevations of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The Contractor shall make arrangements for metering the amount of water used during the test.
8. The Contractor shall complete testing, backfilling, grading, and cleanup between valved sections as he advances. If the Contractor fails to comply with this provision, pipe laying will be stopped until cleanup is completed.
9. After the section of line to be tested has been filled with water, the specified test pressure shall be applied and maintained for a minimum period of six (6) consecutive hours and for such additional period necessary for the inspector to complete the inspection of the line under test. If defects are noted, repairs shall be made at no additional cost to the Owner and the test repeated until all parts of the line withstand test pressure.
10. Hydrostatic test pressure (gauge) shall be the greater of 1.5 times the working pressure at the point of testing or 150 psi for all pressure piping. Maximum permitted leakage based on 18 foot pipe length is 8 quarts per hour per 100 joints of 12 inches nominal diameter and correspondingly varied for other pressures and sizes of pipe as provided in the AWWA C600 Specification.
11. The pressure shall be maintained within a maximum variation of 5% during the entire leakage test. Leakage measurements shall not be started until the air has been expelled and a constant test pressure has been established.

3.03.2 DISINFECTION

A. Before acceptance of domestic operation, each unit of completed supply line and distribution system shall be disinfected as specified below or as prescribed by AWWA C651.

B. After pressure tests have been made, the unit to be disinfected shall be thoroughly flushed with water until all entrained dirt and mud have been removed before introducing the chlorinating material. The chlorinating material shall be either liquid chlorine conforming to AWWA B301 or hypochlorite conforming to AWWA B300. The chlorine material shall provide a dosage of not less than 50 parts per million and shall be introduced into water lines in an approved manner. Treated water shall be retained in pipe long enough to destroy all non-spore-forming bacteria. Except where a shorter period is approved, retention time shall be at least twenty-four (24) hours and shall produce not less than 10 ppm of chlorine at extreme end of line at end of retention period. All valves on lines being disinfected shall be opened and closed several times during contact period. Lines shall then be flushed with clean water until residual chlorine is reduced to less than 1.0 ppm. Samples of water shall be taken from points in the system in sterilized containers for bacterial examination. Disinfecting shall be repeated until tests indicate absence of pollution for at least two (2) full days. System will not be accepted until satisfactory bacteriological results have been obtained.

END OF SECTION

SECTION 33 30 00
SANITARY SEWERAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary drainage piping, fittings, drop connections, and accessories.

B. Connection of building sanitary drainage system to municipal sewers.

C. Manholes.

D. Permits, inspection fees, tap fees, etc.

1.02 RELATED SECTIONS

A. Section 31 00 00, "Earthwork"

B. Section 31 23 33, "Piped Utilities - Basic Methods"

C. Section 03 30 00, "Cast-in-Place Concrete"

1.03 REFERENCES

A. ASTM 2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.

B. ASTM D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

C. ASTM D3212 - Joints for drainage Sewer Plastics Pipes using Flexible Elastomeric Seals.

D. ANSI/ASTM A74 - Cast Iron Soil Pipe and Fittings.

E. AWWA C106 - Cast Iron Pressure Pipe.

F. ASTM C12 - Standard Practice for Installing Vitrified Clay Pipe Lines.

G. ASTM C700 - Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.

H. ASTM C425 - Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.

1.04 REGULATORY REQUIREMENTS

A. Conform to applicable municipal code for materials and installation of the Work of this Section. In the event of a conflict between the drawings and the code, the code shall govern. No extra charges will be allowed for any changes necessary for code compliance.

B. Contractor to obtain and pay for all required permits, tap fees, inspection fees, etc., as required by State and local authority.

1.05 SUBMITTALS

A. Submit shop drawings under provisions of Division 1.

B. Submit shop drawings indicating dimensions, and invert elevations of manholes and cleanouts.

C. Submit product data under provisions of Division 1.

D. Submit product data for pipe, manholes, castings, and pipe accessories.

E. Submit shop drawings indicating pipe, manholes and cleanouts.

1.06 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Division 1.

B. Accurately record location of pipe runs, connections, manholes, cleanouts, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities. Provide location, size, and elevation of uncharted utilities.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Plastic Pipe: ANSI/ASTM D3034, SDR 35 Type PSM, polyvinyl chloride (PVC) material.

B. Plastic Pipe Joints: ASTM D3212, bell and spigot style, flexible elastomeric seals.

C. Clay Pipe 4 Inches-24 Inches: ASTM C-700, Vitrified Clay Pipe, Extra Strength.

D. Clay Pipe Joints: ASTM C-425.

E. Cast Iron Soil Pipe: ANSI/ASTM A74. Building service lines only.

2.02 PIPE ACCESSORIES

A. Fittings: Same material as pipe, molded or formed to suit pipe size and end design, in required "T," bends, elbows, cleanouts, reducers, traps, and other configurations required.

2.03 MANHOLES

A. Lid and Frame: Cast iron construction, removable lid, closed lid design; nominal lid and frame diameter as shown on plans.

B. Shaft Construction and Eccentric Cone Top Section: ASTM C478, O-ring joints per ASTM C443 reinforced precast concrete pipe sections, lipped male/female joints; cast ladder rungs into shaft sections at 16 inches, nominal shaft diameter of 48 inches. Cast-in-place concrete side walls may be used in place of precast construction. Cast-in-place side walls shall be 8 inches nominal thickness.

C. Base Pad: Cast-in-place concrete of type specified in Section 03 30 00, "Cast-in-Place Concrete"; leveled top surface to receive sewer pipe Section. Precast base sections may be used in lieu of cast-in-place base.

D. Resilient connectors between precast manhole and pipes shall conform to ASTM C-923.

2.04 CLEANOUTS

A. Cleanouts shall be adjustable, vandal-proof with heavy cast iron top for exterior use.
1. Zurn Z-1400-VP as manufactured by Zurn Industries, Inc.
2. Jay R. Smith 4220-U, as manufactured by Jay R. Smith Manufacturing Co.
3. *852 Series Adjustable Cleanout manufactured by Soiux Chief Manufacturing Co.*

001

2.05 BEDDING MATERIAL

A. Type E as specified in Section 31 00 00, "Earthwork."

2.06 FILL MATERIAL

A. Type A, D, J or K as specified in Section 31 00 00, "Earthwork."

2.07 VENT PIPING

A. Pipe: PVC Pipe, Schedule 40 per ASTM D1785.

B. Fittings: Per ASTM D2466. Connect with solvent cement type per ASTM D2855-93.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that trench cut is ready to receive work, and excavations, dimensions, and elevations are as indicated on Drawings.

B. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with Type A or Type D fill material.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling and compaction.

3.03 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with ANSI/ASTM D2321, and manufacturer's instructions. Seal joints watertight.

B. Install rigid pipe, fittings and accessories in accordance with ASTM C-12 and manufacturer's instructions.

C. Bed pipe with Type E material per standard detail on Drawings.

D. Lay pipe to slope gradient noted on Drawings.

E. Install bedding of Type E material at sides and over top of pipe per standard detail.

F. Place bedding in maximum 6 inch lifts, consolidating each lift.

G. Refer to Section 31 23 33, "Piped Utilities - Basic Methods," for backfill and compaction requirements. Do not displace or damage pipe when compacting.

H. Connect to building sewer outlet and municipal sewer system.

I. Every length of pipe shall be inspected and cleaned of all dirt and debris before being laid. Prior to the placing of a length of pipe, the end of the previously laid length shall be carefully and thoroughly wiped smooth and cleaned to obtain an even and close fitting joint.

J. No length of pipe shall be laid until the preceding lengths of pipe have been thoroughly embedded in place, so as to prevent movement or disturbance of the pipe.

K. Where existing pipe is to be extended, the same type of pipe shall be used unless otherwise specified or directed.

L. Only full lengths of pipe are to be used in the installation, except that partial lengths of pipe may be used at the entrance to structures where necessary to obtain a proper connection to the structure.

M. All pipe entering structures shall be cut flush with the inside face of the structure, and the cut ends of the pipe and surface of the structure shall be properly rounded and finished so that there will be no protrusion, ragged edges, or imperfections that will impede the flow of water or affect the hydraulic characteristics of the installation.

N. The Contractor shall protect the installation at all times during construction, and movement of construction equipment, vehicles and loads over and adjacent to any pipe shall be done at the Contractor's risk.

O. At all times when pipe laying is not in progress, all open ends of all pipes shall be closed by approved temporary watertight plugs. If water is in the trench when work is resumed, the plug shall not be removed until the trench has been pumped dry and all danger of water entering the pipe has passed.

3.04 INSTALLATION - MANHOLES AND CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.05 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Division 1.

3.06 PROTECTION

A. Protect finished installation under provisions of Division 1.

B. Protect pipe and bedding from damage or displacement until backfilling operation in progress.

3.07 TESTING

A. Leakage Tests. Leakage through the joints of all sanitary sewer pipe shall not exceed the following allowable limits:

100 gallons per inch of tributary pipe diameter per twenty-four (24) hours per mile of length of the computed equivalent for shorter lengths and shorter periods of time. All sanitary sewers shall be tested.

1. Infiltration Test: This test is to be conducted when the height of ground water table is 2 feet or more above the elevation of the inside crown of pipe at the upstream limit of the section being tested.

   The infiltration test shall be made by installing a weir or other measuring device approved by the Engineer in the lower end of the sewer section to be tested. The quantity of ground water infiltration into the sewer shall be measured and shall not exceed the allowable leakage.

2. Exfiltration Test: This test is to be conducted when the height of the ground water table is less than 2 feet above the elevation of the inside crown of pipe at the upstream limit of the section being tested.

In general, a test section shall include the distance between two (2) successive manholes. Should the test section fail the exfiltration test, the entire system installed shall be tested, either manhole to manhole or as a whole as directed by the Engineer. The inlet end of the upstream and downstream manholes shall be closed with a watertight bulkhead and the sewer, along with the upstream manhole, shall be filled with water until the elevation of the water in the upstream manhole is 2 feet higher than the inside crown of the pipe in the section being tested, or 2 feet above the existing ground water in the trench, whichever is the higher elevation. The length of section to be tested may be filled and maintained full of water for a period of approximately twenty-four (24) hours prior to the start of the test. If the water level in the upper manhole has dropped during this twenty-four (24) hour period, the level shall be raised to the test elevation marked prior to the measurement of leakage. If the Contractor elects to test at any time during the twenty-four (24) hour period, the water shall be set at the test elevation mark and the test made.

The exfiltration will be determined by measuring the volume of water that is required to be added to return the surface of the water in the upstream manhole to the test elevation mark. The test period shall be a minimum of one (1) hour duration from the start of the test.

The Engineer, because of adjacent trench material consideration, may order that after the completion of the exfiltration test the test section of line shall be drained and the infiltration, under existing ground conditions, shall be measured within three (3) hours by means of a weir located in the downstream manhole.

The allowable leakage is based on maximum difference in elevation of 8 feet between the level of water in the upper manhole and the invert of the bulkhead pipe at the downstream manhole. If the difference in elevation exceeds 8 feet, the allowable leakage shall be increased 5% for each 1 foot in excess of eight feet.

3. Air Test: In lieu of exfiltration tests required for pipe sizes 8 inches through 24 inches and subject to approval of the Engineer, the Contractor may request an air test for checking tightness of sanitary sewer pipe construction. Air test shall conform to ASTM F-1417. Selection sections or sections of pipe between manholes shall be tested. Manholes shall be tested by plugging connecting pipe and filling with water to 2 feet from the crown of the highest entering pipe. After the filled manhole has been allowed to stand for twenty-four (24) hours, no loss of water will be permitted in a four (4) hour period.

   Air testing of pipes will be accomplished only by use of equipment that has been approved by the Engineer and in accordance with the following steps:
   a. Plug all pipe outlets with suitable test plugs. Brace each plug securely.
   b. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig.
   c. After an internal pressure of 4.0 psig is obtained, allow at least two (2) minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.

d. When pressure decreases to 3.5 psig, start stop-watch. Determine the time in seconds that is required for the internal air pressure to reach 2.5 psig. Minimum permissible pressure holding time for runs of single pipe diameter and for systems of 4 inch, 6 inch, or 8 inch laterals in combination with trunk lines shall be as published in tables by the National Clay Pipe Institute.

In the event the allowable leakage limits are not met, the Contractor shall determine the location where excess water is entering or leaving the sewer. The sewer and/or manholes shall be repaired in a manner satisfactory to the Engineer and retested until the leakage is within the allowable limit.

The Contractor shall include, in the price bid per linear foot of sewer, the cost of all bulkheads, plugs, pipe stopper, pumps, compressors, water, weirs, labor, delays, and any other items of cost necessary for the performance and completion of the required leakage test and for the cost of any repairs of adjustments which may be necessary to make the project conform to the required allowable leakage limits.

All leakage tests shall be conducted under the supervision of the Engineer or his/her representative.

4. Manholes: Manholes shall be air tested per ASTM C-1244.

B. Deflection: Prior to final acceptance of completed thermoplastic sewer lines, the Contractor shall, at his/her expense, perform a pipe deflection test on all main line sanitary sewers.

All lines shall be measured for vertical ring deflection no sooner than thirty (30) days after completion of backfilling operations, provided in the judgment of the Engineer, sufficient settlement of the backfill has occurred. The Engineer shall be the sole judge as to when sufficient settlement has occurred.

The maximum limit of vertical deflection shall not exceed 5% of the base inside diameter of the pipe as presented in Appendix XI of ASTM D-3034.

The test shall be accomplished by manually pulling an approved "go, no-go" mandrel with nine (9) arms.

The Contractor shall be responsible to provide all equipment and labor, including mandrel, to perform and conduct the required test. The Contractor shall also be responsible to notify the Engineer at least forty-eight (48) hours in advance of the anticipated date of the testing for scheduling of personnel needed to monitor the testing operations.

In areas where deflections exceed the 5% limit, the Contractor, at no additional expense to the Owner, will correct the problem area(s) as directed by the Engineer by one of the following procedures:

1. Trench shall be re-excavated, the backfill and pipe removed and replaced in accordance with the original plans and specifications. If in the opinion of the Engineer or his/her representative the pipe has been damaged the pipe shall be replaced with new pipe and installed per the plans and specifications. The failed sections of pipe corrected by this method shall be retested in accordance with this section no sooner than thirty (30) days after the correction is made or otherwise directed by the Engineer.
2. The failed section(s) will be rerounded by means of an internal pneumatic vibratory compactor, performed by an approved company providing this service. Methods, types of equipment, and company to provide service shall be submitted in writing to the Engineer for approval at least five (5) working days in advance of performing this procedure. This method may only be used if approved by the Engineer and it is determined that the deflection has not exceeded 10% of the base inside diameter of the pipe, by pulling a nine (9) arm "go, no-go" mandrel having a diameter equal to 90% of the base inside diameter of the pipe.

After either Procedure 1 or 2 is completed, the repaired area(s) will be retested according to this section prior to final acceptance.

END OF SECTION

SECTION 33 40 00
STORM DRAINAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Storm drainage piping, fittings, and accessories.

B. Connection of building and site storm water drainage system to municipal sewers.

C. Catch basins, curb inlets, manholes, underdrains, and headwalls.

D. Rock channel protection.

E. Permits, inspection fees, tap fees, etc.

1.02 RELATED SECTIONS

A. Section 31 23 33, "Piped Utilities - Basic Methods"

B. Section 03 30 00, "Cast-in-Place Concrete"

C. Section 31 00 00, "Earthwork"

1.03 REFERENCES

A. ASTM A74-87: Specification for Cast Iron Soil Pipe and Fittings.

B. ANSI/ASTM C76-89: Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

C. ANSI/ASTM C443-85: Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

D. ASTM D1248-89: Polyethylene Plastics Molding and Extrusion Materials.

E. ASTM D2321-89: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.

F. ASTM D-3034-89: Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

G. ASTM D3212-89: Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

H. ASTM F405-89: Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings.

I. ASTM F794: Standard Specification for Poly(Vinyl Chloride) (PVC), Large Diameter Ribbed Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

J. Uni-Bell, Uni-B-9: Recommended Standard Performance Specifications for Poly(Vinyl Chloride) (PVC), Large Diameter Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

K. AASHTO M252: Standard Specification for Corrugated Polyethylene Drainage Tubing, 3 to 10 Inches Diameter.

L. AASHTO M 294: Standard Specification for Corrugated Polyethylene Pipe, 4 to 60 Inches Diameter.

M. State of Ohio, Department of Transportation – Construction and Materials Specifications (CMS) 2023

1.04 REGULATORY REQUIREMENTS

A. Conform to applicable City code for materials and installation of the Work of this Section.

B. Contractor to obtain and pay for all required permits, tap fees, inspection fees, etc., as required by Governing Authority.

1.05 SUBMITTALS

A. Submit shop drawings under provisions of Division 1.

B. Submit shop drawings indicating dimensions, and invert elevations of manholes and cleanouts.

C. Submit product data under provisions of Division 1.

D. Submit product data for pipe, manholes, castings, and pipe accessories.

1.06 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Division 1.

B. Accurately record location of pipe runs, connections, catch basins, manholes, cleanouts, and invert elevations if different than shown on plans.

C. Identify and describe unexpected variations to subsoil condition or discovery of uncharted utilities.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Pipe Size: 12 Inches or Larger.
1. Reinforced Concrete Pipe: ANSI/ASTM C76, Class III mesh reinforcement, inside nominal diameter as shown on plans, bell and spigot end joints, tongue and groove end joints.
2. Concrete Pipe Joint Device: Flexible Plastic Gaskets: AASHTO M198, Type B, Mastic joint / ANSI/ASTM C443, rubber compression gasket joint
3. Smooth Interior Corrugated Polyethylene Pipe and Fittings: AASHTO M 294 Type S.
4. Smooth Interior Ribbed Poly (Vinyl Chloride) (PVC) Gravity Sewer Pipe & Fittings: ASTM F794, Uni-Bell, Uni-B-9.

B. Pipe Size: Less than 12 inches.
1. Service weight cast iron soil pipe and fittings for sizes through 15 inches: Bell and spigot type conforming to ASTM A74.
2. Type PSM Poly (Vinyl Chloride) (PVC) sewer pipe and fittings ASTM D-3034, joints per ASTM D-3212.
3. Smooth Interior Corrugated Polyethylene Pipe and Fittings: AASHTO M 252 Type S.
4. Smooth Interior Ribbed Poly (Vinyl Chloride) (PVC) Gravity Sewer Pipe & Fittings: ASTM F794, Uni-Bell, Uni-B-9.

2.02 PIPE ACCESSORIES

A. Polyethylene Pipe:
1. The pipe and fittings shall be free of foreign inclusions and visible defects. The ends of the pipe shall be cut squarely and cleanly so as not to adversely effect joining.
2. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe. Inside diameter tolerances shall be plus 3% minus 1.5%. Corrugated fittings may be either molded or fabricated by the manufacturer. Fittings produced by manufacturers other than the supplier of the pipe lengths shall not be permitted without the approval of the project engineer.
3. Couplings shall be corrugated to match the pipe corrugations and the width shall not be less than 1/2 the nominal diameter of the pipe. Split couplings shall be manufactured to engage an equal number of corrugations on each side of the pipe joint.
4. A manufacturer's certification that the product was manufactured, tested, and supplied in accordance with this specification shall be furnished upon request to the project engineer.

2.03 CATCH BASINS, CURB INLETS

A. Basin Lid and Frame: Cast iron construction, nominal lid and frame size as shown on plans manufactured by Neenah Foundry Co. or equal.

B. Shaft and Top Section: Reinforced precast concrete, lipped male/female joints; nominal dimensions as shown on plans. Cast-in-place, brick or block side walls may be used in place of precast construction. Brick or concrete block side walls shall be 8 inches nominal thickness. When brick or concrete block are used, the outside walls of the manhole shall be plastered with a 1/2 inch coat of lime cement mortar.

C. Base Pad: Cast-in-place concrete of type specified in Section 03 30 00, "Cast-in-Place Concrete"; leveled top surface to receive concrete shaft sections, sleeved to receive storm sewer pipe sections. Precast base sections may be used in lieu of cast-in-place base.

2.04 MANHOLES

A. Lid and Frame: Cast iron construction, removable lid, open checkerboard grill 22 1/4 inches.

B. Shaft Construction and Eccentric Cone Top Section: Reinforced precast concrete pipe sections, lipped male/female joints; cast steel ladder rungs into shaft sections at 16 inches; nominal shaft diameter of 48 inches. Cast-in-place, brick or block side walls may be used in place of precast construction. Brick or concrete block side walls shall be 8 inches nominal thickness. When brick or concrete block are used, the outside walls of the manhole shall be plastered with a 1/2 inch coat of lime cement mortar.

C. Base Pad: Cast-in-place concrete of type specified in Section 03 30 00, "Cast-in-Place Concrete"; leveled top surface to receive concrete shaft sections, sleeved to receive sewer pipe sections. Precast base sections may be used in lieu of cast-in-place base.

2.05 HEAD WALLS

A. Size and type as shown on plans.

2.06 UNDER DRAINS

A. Filter Fabric: Mirafi Geotextile, 160N or equal.

B. Filter Aggregate: ODOT #8/Type H.

C. Tubing: Polyethylene tubing, ASTM F-405 / AASHTO M 252.

2.07 CLEANOUTS

A. Cleanouts shall be adjustable, vandal-proof with heavy duty cast iron top for exterior use.
1. Zurn Z-1400-VP, as manufactured by Zurn Industries, Inc.
2. Jay R. Smith 4220-U, as manufactured by Jay R. Smith Manufacturing Co.
001
3. *852 Series Adjustable Cleanout manufactured by Soiux Chief Manufacturing Co.*

2.08 ROCK CHANNEL PROTECTION

The material shall consist of sound durable rock broken concrete or stone. Reinforcing steel in broken concrete shall not protrude beyond the surface of the concrete. A filter shall be placed consisting of filter fabric or a 6 inches bed of No. 3 or 4 crushed gravel stone or slag. Filter fabric shall be placed with long dimension parallel to the flow and shall be laid loosely but without wrinkles.

This material shall be one (1) of four (4) types defined below:

Type A shall consist of sizes such that at least 85% of the total material by weight shall be larger than an 18 inch but less than a 30 inch square opening. At least 50% of material by weight shall be larger than a 24 inch square opening. The material smaller than an 18 inch square opening shall consist predominantly of rock spalls and rock fines and shall be free of soil.

Type B shall consist of sizes such that at least 85% of the total material by weight shall be larger than a 12 inch but less than a 24 inch square opening. At least 50% of the total material by weight shall be larger than an 18 inch square opening. The material smaller than a 12 inch square opening shall consist predominantly of rock spalls and rock fines and shall be free of soil.

Type C shall consist of sizes such that at least 85% of the total material by weight shall be larger than a 6 inch but less than an 18 inch square opening. At least 50% of the total material by weight shall be larger than a 12 inch square opening. The material smaller than a 6 inch square opening shall consist predominantly of rock spalls and rock fines and shall be free of soil.

Type D shall consist of sizes such that at least 85% of the total material by weight shall be larger than a 3 inch but less than a 12 inch square opening. At least 50% of the total material by weight shall be larger than a 6 inch square opening. The material smaller than a 3 inch square opening shall consist predominantly of rock spalls and rock fines and shall be free of soil.

2.09 TRENCH DRAINS

A. Lid and Frame: Cast iron construction nominal lid and frame size as shown on plans.
   1. *Model No. Neenah R-4999-BX with Type "C" grate*
   2. *East Jordan Iron Works V-7362.*
   3. *FD460 Series as manufacted by Watts.*

001

2.10 AREA DRAINS

A. 12 inch square top drain, Dura-Coated cast iron body with bottom outlet, seepage pan and combination membrane flashing clamp and frame for heavy duty cast iron loose slotted grate with suspended sediment bucket.
   1. ZURN Z-610, as manufactured by Zurn Industries, Inc.
   2. *37800 Series as manufactured by Josam Co.*
   3. *FD460 Series as manufacted by Watts.*

001

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that trench cut is ready to receive work, and excavations, dimensions, and elevations are as indicated on Plans.

B. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with Type A or Type D fill material.

B. Remove large stones or other hard matter which could damage storm sewer or impede consistent backfilling or compaction.

3.03 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories, in accordance with ANSI/ASTM C76, ASTM D2321, and manufacturer's instructions.

B. Bed sewer with Type E fill material per standard drawing provided on plans.

C. Lay pipe to slope gradients noted on Drawings.

D. Place bedding material in maximum 6 inch lifts, consolidating each lift.

E. Backfill and compact per the requirements of Section 31 23 33, "Piped Utilities - Basic Methods." Do not displace or damage pipe when compacting.

INSTALLATION - PIPE

A. Visually inspect all conduit before it is placed in the trench. Replace any damaged or deformed pipe at no additional cost to the owner.

B. Install pipe, fittings, and accessories, in accordance with ANSI/ASTM C76, ASTM D2321, and manufacturer's instructions.

C. Bed sewer with Type E fill material per standard drawing provided on plans.

D. Lay pipe to slope gradients noted on Drawings.

E. The inlet of all rigid conduit must have a bell. If field cutting is necessary to furnish a bell at the inlet, locate the cut end at an interior joint by removing part of a section within the run. Join the conduit as described below and encase the joint with a concrete collar to ensure a stable connection.

F. The top and bottom of reinforced concrete pipe that has elliptical or quadrant mat reinforcing will be clearly marked on the pipe. Handle and place this pipe so that the markings remain in a vertical plane through the center of the pipe.

G. Handle and place reinforced concrete pipe with auxiliary reinforcements (stirrups) with the centerline of the auxiliary reinforcement system (stirrups) in a vertical plane through the center of the pipe.

H. Fill all lifting holes in rigid conduit with concrete according to the manufacturer’s recommendations or using a method approved by the Engineer.

I. Place bedding material in maximum 6-inch lifts, consolidating each lift.

J. Backfill and compact per the requirements of Section 31 23 33, "Piped Utilities - Basic Methods." Do not displace or damage pipe when compacting.

K. Immediately after placing conduit, construct the end treatments at both the outlet and inlet ends. Show this activity as part of the conduit construction on the progress schedule. These end treatments include headwalls, concrete riprap, rock channel protection, sod or other erosion control items.

L. Lay all conduit from outlet end to inlet unless approved by the Engineer.

3.05 JOINING CONDUIT

A. Ensure the joints are clean and free from dirt or debris. Join the conduit sections as described below. Visually inspect all conduit, joints, and gaskets before placing any backfill. Rejoin, re-lay, or replace any conduit that does not meet the requirements.

B. Join conduit according to the requirements below. Record any deviations from the plan and revise the plan.

C. Rigid Conduit: Join rigid conduit, according to the following requirements.
1. For all concrete pipe that is not epoxy coated, seal the joints using one of the following methods:
   a. Fill the joint with bituminous pipe joint filler, providing a smooth transition on the inside and a complete seal on the outside.
   b. Use preformed flexible joint sealant to seal the joint. Before installing the joint sealant, prime both surfaces of the joint with asphalt-based primer according to the joint sealant manufacturer’s recommendations.
   c. Use resilient and flexible gasket joints. If the conduit is a sanitary sewer pipe, test the joint for infiltration and exfiltration according to ASTM C 969 or ASTM C 1103. If any joint does not meet the test requirements, make corrections until the joint meets the test requirements.
2. For epoxy coated concrete pipe, seal the joint using fibrated coal tar joint compound applied according to the conduit manufacturer’s recommendations.

D. Plastic Conduit: Join plastic conduit, using either coupling bands, bell and spigot joints, or bell-bell couplers. Join the conduit according to the following requirements.
1. Coupling bands: Furnish coupling bands of the same size as the conduit and that engage at least two full corrugations on each conduit section. Furnish gasketed coupling bands of the same material as the plastic conduit.
2. Bell and spigot joints: If using bell and spigot joints, drive the spigot securely into the bell. For gasketed joints, ensure that the gasket is properly seated after joining.
3. Bell-bell couplers: If using bell-bell couplers, drive the conduit securely into the coupler.

3.06 INSTALLATION - CATCH BASINS, MANHOLES, AND CLEANOUTS

A. Install drainage structures as shown on the plans and standard construction drawings. Maintain flows at all times until the new facilities are completed and in service.

B. Visually inspect all precast drainage structures before they are placed. Replace all drainage structures that are damaged as determined by the Engineer.

C. Form bottom of excavation clean and smooth to correct elevation, provide 6 inches of Type E fill material under base.

D. Install each drainage structure casting to the elevation, station, and offset shown on the plans. Any deviations must be approved by the Engineer. If the Engineer does not approve the deviation, stop all related work until the drainage structure is reinstalled. The offset is to the center of the casting. Place each manhole base so that it is in alignment with the pipe and its invert elevation according to the standard construction drawings. Use flat slab top manholes as shown on the standard construction drawing. Do not remove the flat slab top manhole lifting devices.

E. Locate or cut conduits so any protrusion inside the structure wall is minimized.

F. Set iron frames, tops, and covers in mortar with a flush joint.

G. Prevent earth or debris resulting from construction operations from entering the drainage structure. Remove any debris resulting from construction.

H. Thoroughly grout the underdrain outlet pipe to the precast reinforced concrete outlet with a flush mortar joint.

I. Take adequate precautions to prevent concrete or mortar from freezing. Preheat the brick, concrete block, or precast concrete structure throughout the entire mass to a temperature between 50 to 80 deg. F (10 to 27 deg. C) before placing mortar if the ambient temperature is 40 deg. F (4 deg. C) or less.

J. Brick and Block Masonry:
   1. For brick and block masonry drainage structure construction thoroughly wet the units before placing in mortar. Lay the units with a flush mortar joint. Cure the exposed surfaces of all brick and block masonry by covering with wet burlap or by applying a curing membrane according to 705.07. Keep burlap wet for at least 48 hours.

K. Modular Precast Concrete:
   1. For precast concrete modular drainage structures furnish precast bases on a compacted bed with or without a bedding material as described in the installation plan. Ensure that the bed is level and uniformly supports the entire area of the base. Seal all joints between modules as described above for concrete conduit.
   2. All penetrations through precast drainage structures must be either manufactured or cored.
   3. After placing the conduit, grout all openings with non-shrink mortar.

L. Reconstruction to Grade: When reconstructing an existing manhole, catch basin or inlet to grade, follow the procedure below.

1. Carefully remove and clean the existing castings.
2. Remove the existing walls of manholes down to the spring line of the conduit or below as necessary. Remove existing walls of catch basins and inlets below the window openings, grates, or any points of wall failure.
3. Using the salvaged casting, reconstruct the structure to the new grade, conforming as nearly as practicable to the existing dimension and type of construction.

M. Adjustment to Grade: When adjusting an existing manhole, catch basin, or inlet to match grade, follow the procedure below.
1. Carefully remove and clean the existing frame, adjust the height of supporting walls, and reset the existing frame in mortar or concrete to the new grade.
2. Carefully remove the existing cover or grate and install a casting or an acceptable adjusting device on file at the Laboratory or an adjusting device approved by the Engineer to the new grade and install according to the adjusting device manufacturer's recommendations.

N. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe end sections.

O. Establish elevations and pipe inverts for inlets and outlets as indicated.

P. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

Q. Form invert channel in manhole to spring line of sewer.

3.07 FIELD QUALITY CONTROL/PERFORMANCE INSPECTION

A. Testing and Inspection shall meet ODOT CMS Item 611.

B. Notify the Engineer at least five workdays before conducting a performance inspection.

001

B. For all conduits, the *contractor* shall inspect all lengths greater than 20 feet with slopes of 25 percent or less and all new drainage structures.

001

C. In each phase of construction of a conduit, the *contractor* shall perform the inspection no sooner than 30 days and no later than 90 days after the completion of the finished grade when not below pavement and after the completion of the rough subgrade when any portion of the conduit is below pavement. The *contractor* may permit inspection beyond the 90-day limit. If any corrections are made to the installed pipe after the completion of the finished grade or rough subgrade and prior to the performance inspection, the *contractor* shall wait 30 days after the correction was made to do the performance inspection. If the contract duration will not permit a 30-day waiting period then the *contractor* may adjust the waiting period.

D. Inspections shall be completed and any corrections made prior to pavement construction. No pavement shall be installed until inspections are completed and corrections approved.

001

E. The *contractor* shall visually inspect for surface settlements within the trench limits or within 4 feet of a drainage structure. The *contractor* shall document all locations of surface settlement in the inspection report.

001 F. The *contractor* shall furnish a video recording of all conduit and drainage structure inspections. On the recording, identify the date and time of the inspection, a description of the conduit or drainage structure being inspected, the location, and the viewing direction. The *contractor* shall record the entire run of conduit being inspected. The *contractor* shall provide a source of light that allows all areas of concern to be readily observed on the video recording. The *contractor* shall furnish the video recording in a digital, reproducible format on one of the following media types: Portable hard drive, flash drive or as determined appropriate by the Engineer. The *contractor* shall provide the video files with a naming format consistent with the Installation Plan references or as determine acceptable by the Engineer.

001 G. The *contractor* shall ensure that the condition of the conduit will allow an accurate inspection. The *contractor* shall perform a manual inspection on drainage structures. The *contractor* shall perform either a manual inspection or remote inspection as follows:

1. Non-circular conduits: Manual inspection.
2. Conduits with a rise of 48-inches and greater: Manual inspection.
3. Conduits with a rise of 36-inches up to 48-inches: Manual or remote inspection.
4. Conduits with a rise of 12-inches or greater up to 36-inches: Remote inspection.

001 H. Conduits with a rise less than 12 inches – Remote inspection as directed by the *contractor*.

001 I. Manual Inspection: The *contractor* shall perform a manual inspection by entering the conduit or drainage structure to record video and to make measurements. If the conduit or drainage structure is considered a confined space, the Contractor shall provide entry for all project inspection personnel according to OSHA requirements.

001 1. The *contractor* Shall measure the deflection of the conduit using either a metal tape, fabric tape or equipment accepted by the *contractor* and read to the nearest ½ inch (10 mm). The *contractor* shall measure crack width using either a crack comparator or a feeler gage capable of measuring 0.01 inch (0.25 mm). The *contractor* shall measure joint gaps using a tape or ruler and read to the nearest ½ inch (10 mm). Record the measurements and include them in the performance report. The *contractor* shall measure the following:
   a. For all conduits, measure the location, length, and greatest width of each crack.
   b. For flexible conduit, measure the smallest inside diameter three times for each conduit section in the run. Take the first measurement vertically from the crown to invert (12 o'clock to 6 o'clock positions). Take the second measurement by rotating 60 degrees from vertical (2 o'clock to 8 o'clock positions). Take the third measurement by rotating 120 degrees from vertical (4 o'clock to 10 o'clock positions). For all measurements, stretch tape to full extent across inside of pipe. For corrugated metal conduit, the inside diameter is defined as the distance between the inside peaks of the corrugations.
   c. For all conduits, measure the widest gap at each joint in the run.
   d. For conduit with manufactured seams, measure the location, length, and greatest width of any separation at the seam.
   e. For drainage structures, measure the location, length and greatest width of each crack and the widest gap at each conduit entering the drainage structure.

001 2. The *contractor* shall record the location of any other defect not listed above and describe the defect. For each measurement location in a conduit, the *contractor* shall record the length from the nearest drainage structure.

001 J. Remote Inspection: The *contractor* shall perform a remote inspection by using a crawler mounted camera to record video and using equipment described below to make measurements. Use equipment that meets the requirements of ODOT Supplemental Specification 902. The Contractor shall remove all debris from the conduits being inspected. The Contractor shall dewater the conduit if the water level hinders the performance of the equipment.

001 1. Based on the type of conduit, the *contractor* shall make measurements using the equipment listed in the following table. Also record the location of any other defect not listed below and describe the defect.

Conduit Type	Measurement Equipment	Type of Measurement
Rigid conduit	Crawler mounted camera according to ODOT Item 902.01with crack measuring capabilities according to ODOT Item 902.02 C	1- Joint gaps 2- Crack widths
Plastic conduit and ductile iron pipe	Crawler mounted camera with laser profiler according to ODOT Item 902.02 A, B, and C or Mandrel according to ODOT Item 902.03 and Crawler mounted camera according to ODOT Item 902.01 with crack measuring capabilities according to ODOT Item 902.02 C	1- Joint gaps 2- Crack widths 3- Deflection

3.08 CONDUIT ELEVATION

001 A. The *contractor* shall review the conduit Performance Inspection and record all defects listed below or as otherwise identified from the inspection. The *contractor* shall provide all recorded defects and the *contractor* shall recommend repairs. The *contractor* shall evaluate the defects to ensure structural stability and hydraulic capacity are in conformance with the contract documents and Section 27 for concrete conduit and Section 30 for plastic conduit with modifications according to this specification.

B. When using a laser profiler, the conduit deflection must be calculated from the actual inside diameter at the measured location or calculated by inputting the nominal diameter. When using a mandrel, the mandrel must be sized according to ODOT Supplemental Specification 902.

001 1. If the evaluation determines repairs are not necessary and repairs are not required based on the type or size of the defect in Table below, the *contractor* shall make the following statement in the evaluation:

a. “I certify that repairs are not required to address the defects identified during the conduit evaluation. The conduit will function in accordance with the contract documents.”

001 2. If the evaluation determines repairs are necessary, or if repairs are required based on the type or size of the defect in Table below, the *contractor* shall prepare, sign, seal, and date plans for the repair. The *contractor* shall make the following statement on the repair plans:

b. "I certify that this repair plan was designed to ensure the repaired conduit will function structurally and provide hydraulic capacity in accordance with the contract documents."

Rigid Conduit	Evaluate if infiltration is observed. Evaluate if joint gap exceeds the Manufacture's tolerance*. Evaluate all vertical sags and overall vertical alignment of the conduit recorded in CA-P-1. Repair or replace conduit if the joint gap exceeds the Manufacturers tolerance*. Repair or replace conduit if cracks > 0.10 inch. Repair or replace conduit if spalls or slabbing are observed.
Plastic Conduit	Evaluate if infiltration is observed. Evaluate all racking, bulging or buckling. Evaluate if joint gap exceeds the Manufacturers tolerance*. Evaluate all vertical sags and overall vertical alignment of the conduit recorded in CA-P-1. Evaluate all cracks. Repair or replace conduit if the joint gap exceeds the Manufacturer's tolerance*. Repair or replace conduit if Performance Inspection per 611.12 indicates a deflection > 7.5%. Replace conduit if the Performance Inspection per 611.12 indicates a deflection > 12%

* Note: The tolerance is defined as the maximum joint gap listed in the Manufacturer's Design Guidelines.

001 3. Notify the *contractor* at least 7 days before performing the repairs. Provide written confirmation from the conduit manufacturer that the repair methods are appropriate.

001 4. Perform the repair at no additional cost. The *contractor* shall perform an inspection to evaluate the repaired portion of the conduit and any conduit potentially affected by the repair work 30 days after the repair has been made. Perform the inspections according to these specifications.

3.09 DRAINAGE STRUCTURE EVALUATION

001 A. The *contractor* shall evaluate the drainage structures and any defects listed in the table below.

Defects requiring evaluation
Connection between conduit and drainage structure has free flowing water, infiltration or has not been constructed in accordance with 3.06.
Grate is more than 0.1 ft (30 mm) from horizontal or vertical location.
Invert elevation is more than 5 percent of the conduit diameter or 0.1 ft (30 mm) from plan elevation, whichever is greater.
Grates do not properly seat in the frame.
Grates are not placed on the required slope.
Grates or frames are broken or cracked.
Drainage structure does not match the details on the standard construction drawing.
Steps do not line up.
Manhole top does not match plans.

001 B. If the evaluation determines repairs are not necessary, the *contractor* shall make the following statement in the evaluation:
1. "I certify that repairs are not required to address the defects identified during the drainage structure evaluation. The drainage structure will function in accordance with the contract documents."

001 C. If the evaluation determines repairs are necessary the *contractor* shall prepare, sign, seal, and date plans for the repair. The *contractor* shall make the following statement on the repair plans:
1. "I certify that this repair plan was designed to ensure the structure will function structurally and provide hydraulic capacity in accordance with the contract documents."

001 D. Repair at no additional cost to the project. The *contractor* shall perform an inspection to evaluate the repaired portion of the drainage structure and any conduit potentially affected by the repair work 30 days after the repair has been made. The *contractor* shall perform the inspections according to 3.07.

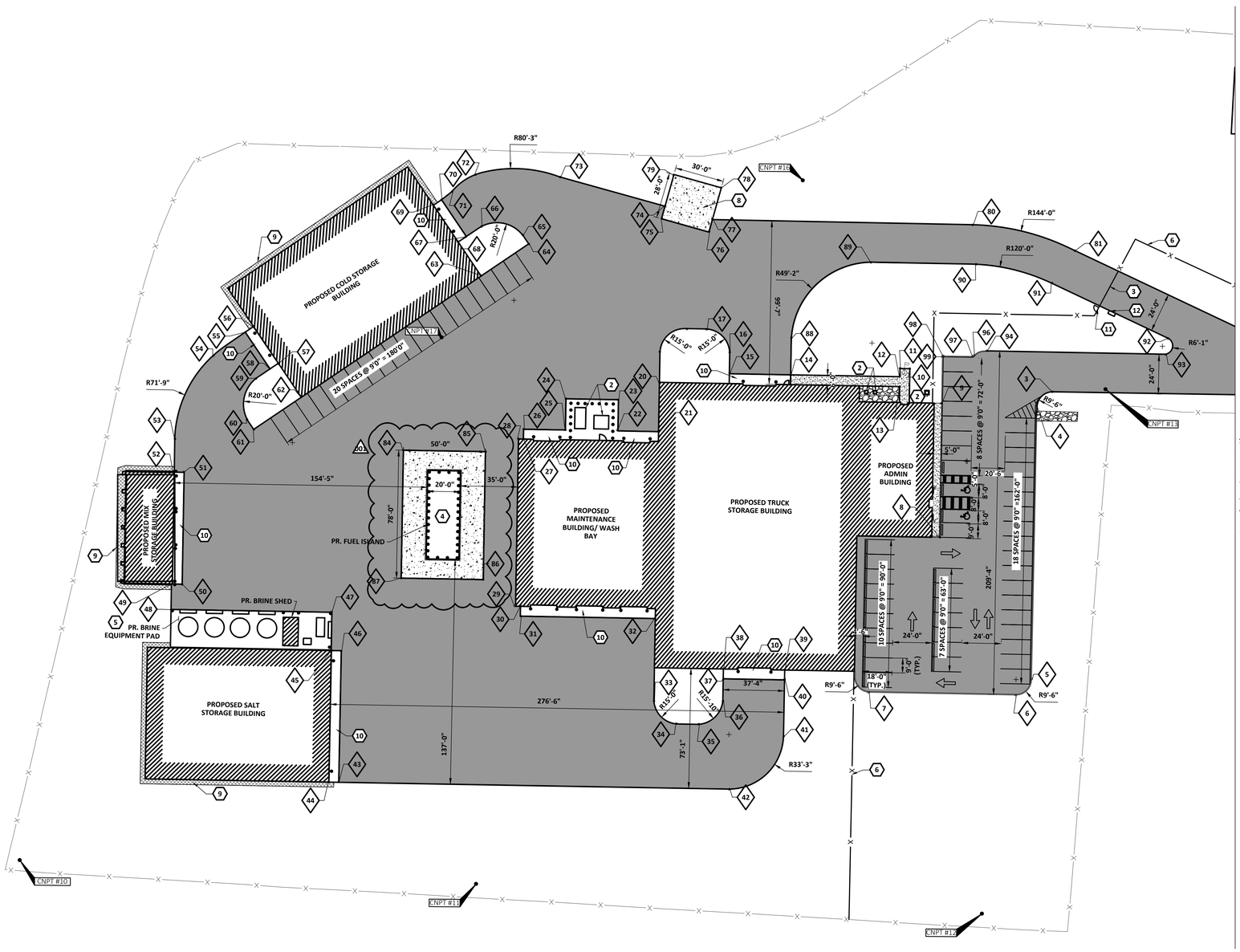
3.10 SURFACE SETTLEMENTS

001 A. Repair any surface settlement within the trench limits or within 4 feet (1.2 m) of a drainage structure. The *contractor* shall evaluate the conduit according to 3.08 or the drainage structure according to 3.09. Perform all repair work at no additional cost to the project.

3.11 PROTECTION

A. Protect finished installation under provisions of Division 1.

END OF SECTION



STAKING LEGEND

EXISTING

REFER TO SURVEY SHEET

PROPOSED

- BUILDING/WALL
- CURB PER DETAIL G/SP-C-104
- PAVEMENT
- FENCE
- BOLLARD PER ARCHITECTURAL DRAWINGS
- PAINTED WHEELCHAIR SYMBOL
- HC — HANDICAPPED PARKING SIGN PER DETAIL A/SP-C-103
- GRAVEL MOW STRIP PER DETAIL H/SP-C-104
- HEAVY DUTY ASPHALT PER DETAIL A/SP-C-104
- SIDEWALK PER DETAIL E/SP-C-103
- GRAVEL PER DETAIL F/SP-C-104
- CONCRETE PAVEMENT PER DETAIL F/SP-C-103
- FLAGPOLE PER DETAIL D/SP-C-104
- PARKING BLOCK PER DETAIL G/SP-C-103
- PAVEMENT MARKING

N

0 30 60 90

GRAPHIC SCALE
SCALE IN FEET

GENERAL NOTES:

1. DIMENSIONS AND COORDINATES ARE GIVEN TO FACE OF CURB AND FACE OF BUILDING UNLESS OTHERWISE NOTED.
2. CURB AND SIDEWALK RADII SHALL BE 5'-0" UNLESS OTHERWISE NOTED.
3. PROVIDE STRIPING AND SYMBOLS AS SHOWN PER ODOT ITEM 641 AND 642. PROVIDE STRIPING PAINT WITH GLASS BEADS. PROVIDE TYPE I OR TYPE IA PAINT IN ACCORDANCE WITH ODOT ITEM 642 DEPENDING ON TEMPERATURE CONDITIONS AT THE TIME OF APPLICATION. TYPICAL LINE WIDTH SHALL BE 4 INCHES, COLOR WHITE. PROVIDE TWO COATS.
4. STANDARD PARKING STALL DIMENSIONS ARE 9'-0" IN WIDTH BY 18'-0" IN LENGTH UNLESS OTHERWISE NOTED.
5. SAWCUT FULL DEPTH SIDEWALK AND PAVEMENT WHERE NEW WORK ABUTS EXISTING CONSTRUCTION. TAKE CARE TO PROVIDE NEAT STRAIGHT LINES. PROVIDE PAVEMENT SEALANT PER ODOT ITEM 516 AT JOINT BETWEEN EXISTING AND NEW ASPHALT. REMOVE CONCRETE TO NEAREST JOINT. PROVIDE 1/2" PREFORMED EXPANSION JOINT FILLER BETWEEN NEW AND EXISTING CONSTRUCTION.
6. ANY PROPERTY PINS DAMAGED AS PART OF CONSTRUCTION SHALL BE RESET BY AN OHIO REGISTERED SURVEYOR.
7. PROVIDE 1 HANDICAP ACCESSIBLE PARKING SIGNS AND 1 VAN ACCESSIBLE PARKING SIGNS AS SHOWN ON DETAIL A/SP-C-103. FINAL LOCATION OF SIGNS TO BE DETERMINED BY ARCHITECT.
8. MAINTAIN PEDESTRIAN AND VEHICULAR ACCESS TO ADJACENT BUILDINGS AT ALL TIMES DURING CONSTRUCTION.
9. REFER TO ARCHITECTURAL DRAWINGS FOR ALL SITE SIGNAGE NOT SHOWN ON THIS SHEET.
10. BUILDING COORDINATES PROVIDED FOR BUILDING LOCATION ONLY. REFER TO ARCHITECTURAL PLANS FOR BUILDING LAYOUT.
11. PROVIDE CONCRETE PARKING BLOCKS AT ALL SPACES SHOWN ON PLANS PER DETAIL G/SP-C-103.
12. PROVIDE CONTROL JOINTS PER DETAIL B/SP-C-103. PROVIDE ISOLATION JOINTS WHERE NEW CONCRETE ABUTS EXISTING STRUCTURES PER DETAIL C/SP-C-103 AND PER SPECIFICATIONS.

(X) CODED NOTES:

1. SAW-CUT EXISTING PAVEMENT WITH NEAT, STRAIGHT LINES. MATCH EXISTING PAVEMENT GRADE AT THIS POINT.
2. PROPOSED MEP EQUIPMENT AND CONCRETE PAD. REFER TO STRUCTURAL, MEP DRAWINGS AND ARCHITECTURAL SITE PLAN FOR DETAILS AND LAYOUT.
3. PROPOSED GATE, REFER TO ARCHITECTURAL DRAWINGS FOR GATE CONTROL PLANS AND DETAILS.
4. PROPOSED FUEL STATION PAD, REFER TO STRUCTURAL AND MEP DRAWINGS AND ARCHITECTURAL DRAWINGS FOR DETAILS AND LAYOUT.
5. PROPOSED BRINE EQUIPMENT PAD, REFER TO STRUCTURAL AND MEP DRAWINGS AND ARCHITECTURAL DRAWINGS FOR DETAILS AND LAYOUT.
6. PROPOSED FENCE, REFER TO ARCHITECTURAL DRAWINGS.
7. PROTECT EXISTING PAVEMENT TO REMAIN.
8. PROPOSED DUMPSTER PAD.
9. PROPOSED GRAVEL MOW STRIP PER DETAIL H/SP-C-104.
10. REFER TO STRUCTURAL DRAWINGS FOR BUILDING APRON DETAILS.
11. PROPOSED PEDESTRIAN GATE, REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS.
12. PROPOSED CARD READER PEDESTAL, REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS AND FINAL LOCATION.

Coordinate Table		
	Northing	Easting
1	321989.55	147580.37
2	321965.49	147579.64
3	321970.05	147289.92
4	321961.59	147280.37
5	321795.03	147277.26
6	321785.23	147267.57
7	321786.91	147177.97
8	321881.36	147221.40
9	321963.07	147222.33
10	321984.14	147202.99
11	321984.32	147197.01
12	321979.33	147196.89
13	321973.19	147196.81
14	321980.31	147130.38
15	321981.43	147093.23
16	321994.08	147093.30
17	322008.15	147079.20
18	322008.29	147067.21
19	321994.44	147050.65
20	321975.76	147050.51

Coordinate Table		
	Northing	Easting
21	321946.14	147049.93
22	321946.70	147024.76
23	321965.13	147025.29
24	321965.90	146993.45
25	321946.84	146993.11
26	321947.29	146967.76
27	321941.43	146967.55
28	321941.48	146964.41
29	321839.60	146962.28
30	321839.53	146966.06
31	321833.35	146965.95
32	321832.01	147047.83
33	321781.61	147047.15
34	321767.83	147060.83
35	321767.51	147074.47
36	321781.71	147089.18
37	321795.21	147089.52
38	321801.39	147089.52
39	321800.63	147126.82
40	321794.87	147126.72

Coordinate Table		
	Northing	Easting
41	321760.17	147126.22
42	321727.86	147093.06
43	321732.35	146854.95
44	321732.24	146848.87
45	321812.49	146850.66
46	321812.08	146856.52
47	321836.06	146850.66
48	321837.29	146752.95
49	321853.19	146753.65
50	321852.67	146759.51
51	321921.25	146760.61
52	321920.94	146754.32
53	321941.35	146755.20
54	321992.11	146778.69
55	322006.32	146798.16
56	322009.70	146803.06
57	321987.23	146818.04
58	321984.16	146813.10
59	321978.13	146804.60
60	321953.22	146799.10

Coordinate Table		
	Northing	Easting
61	321947.11	146803.31
62	321966.91	146832.14
63	322040.80	146941.88
64	322060.11	146970.84
65	322065.54	146967.24
66	322070.74	146942.02
67	322064.44	146932.39
68	322061.48	146927.57
69	322083.98	146912.55
70	322087.06	146917.69
71	322092.10	146924.19
72	322102.33	146938.35
73	322100.86	146989.95
74	322083.27	147053.93
75	322075.65	147051.87
76	322067.73	147080.72
77	322075.29	147082.70
78	322094.42	147088.06
79	322102.13	147059.05
80	322071.73	147241.39

Coordinate Table		
	Northing	Easting
81	322056.01	147303.57
82	322007.01	147407.43
83	321981.14	147477.68
84	321934.45	146894.42
85	321933.57	146944.55
86	321855.62	146943.04
87	321856.50	146893.05
88	322007.88	147150.84
89	322048.90	147179.41
90	322047.74	147243.39
91	322036.32	147289.70
92	322002.55	147360.42
93	321992.70	147359.02
94	321995.02	147250.04
96	321992.13	147242.19
97	321991.63	147241.42
98	321991.95	147223.34
99	321991.46	147222.83

(X01)

JS&P ARCHITECTS
Jerome Scott & Partners Architects
1020 Goodale Blvd., Columbus, Ohio 43212

STATE OF OHIO
GRAHAM J. WATKINS
E-84007
REGISTERED PROFESSIONAL ENGINEER

DOT-250002 KNOX FULL SERVICE MAINTENANCE FACILITY

505 HARCOURT RD., MT. VERNON, OH 43050

MARK	DATE	DESCRIPTION
001	1/28/26	BID ADDENDUM 002
05	1/15/26	BID DOCUMENTS
04	11/21/25	PERMIT DOCUMENTS
03	10/24/25	CONSTRUCTION DOCUMENTS
02	8/26/25	DESIGN DEVELOPMENT
01	6/24/25	SCHEMATIC DESIGN

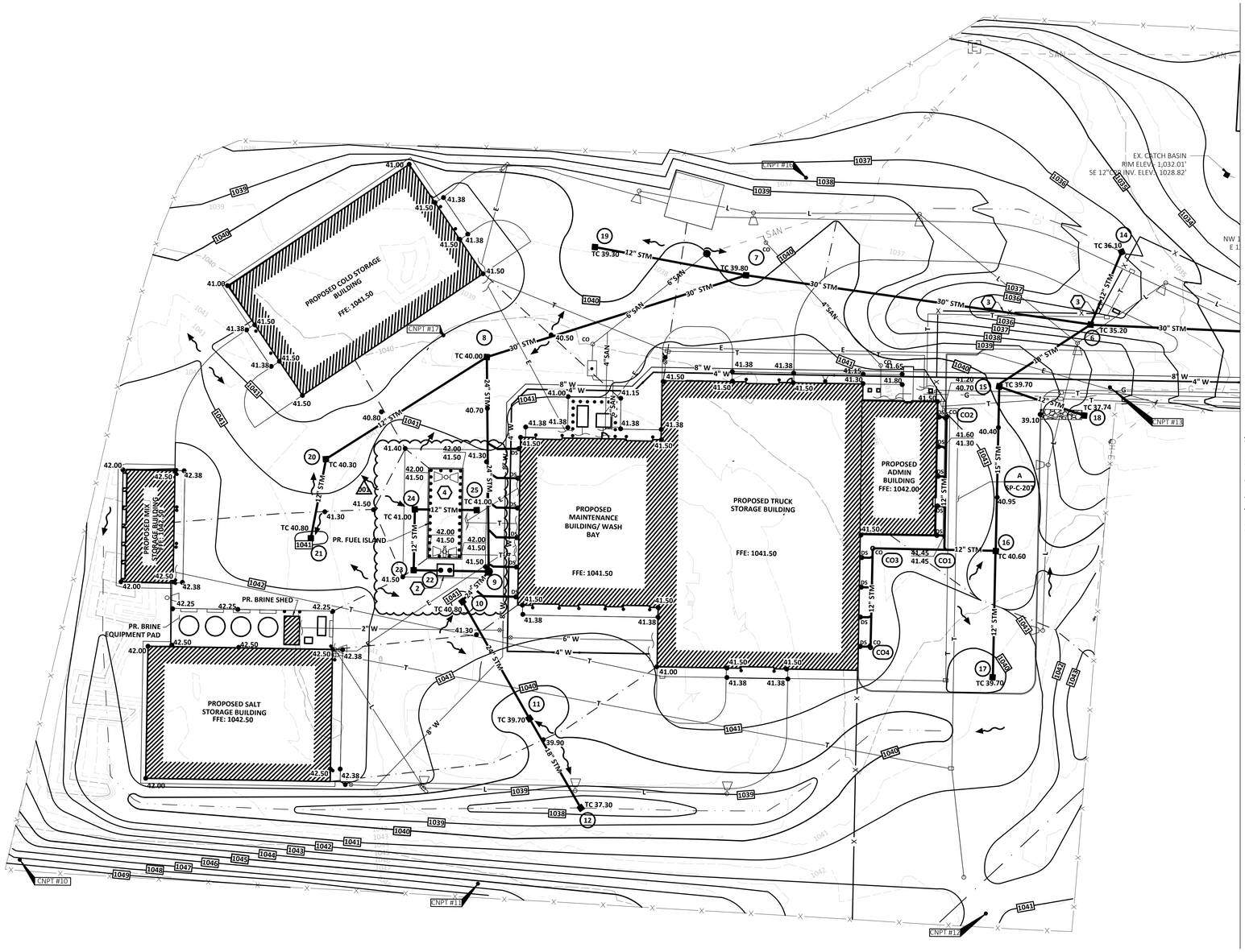
PROJECT NO: DOT-250002
DATE: 1/23/2026
DRAWN BY: KORDA

SHEET TITLE

STAGING PLAN

KORDA
KORDA NEMETH ENGINEERING
WWW.KORDA.COM
DRAWN BY: KATIE VATKE
DESIGNED BY: KATIE VATKE
CHECKED BY: GRAHAM WATKINS
PROJECT NUMBER: 2025-0411

SP-C-101



GRADING LEGEND

EXISTING

REFER TO SURVEY SHEET

PROPOSED

- 800 — INDEX CONTOUR
- 799 — INTERMEDIATE CONTOUR
- BUILDING/WALL
- E — UNDERGROUND ELECTRIC LINE
- T — UNDERGROUND TELEPHONE LINE
- W — WATER LINE
- G — GAS LINE
- STM — STORM SEWER
- UD — UNDERDRAIN
- SAN — SANITARY SEWER
- DITCH
- CATCH BASIN PER DETAIL D/SP-C-203
- MANHOLE PER DETAIL C/SP-C-203
- DS — DOWNSPOUT ADAPTER PER DETAIL A/SP-C-203
- W — FIRE HYDRANT
- GATE VALVE & CURB BOX
- FIRE DEPARTMENT CONNECTION
- CO — CLEAN OUT
- X XXX — STRUCTURE NUMBER
- GRADE BREAK (CROWN) LINE
- 708.53 — SPOT ELEVATION
- TC — TOP OF CASTING
- 700.00 / 699.50 — TOP OF CURB ELEVATION / GUTTER ELEVATION AT FACE OF CURB
- CATCH BASIN PER DETAIL E/SP-C-203
- EMERGENCY OVERFLOW PER DETAIL F/SP-C-205

GENERAL NOTES:

1. PROVIDE 10' UNDERDRAINS IN FOUR DIRECTIONS AT CATCH BASINS IN PAVEMENT PER DETAIL G/SP-C-205.
2. PAVEMENT ELEVATIONS REFER TO FINISHED PAVEMENT ELEVATION AT FACE OF CURB UNLESS OTHERWISE NOTED.
3. ADD 1000 TO SPOT ELEVATIONS TO OBTAIN U.S.G.S. ELEVATIONS.
4. CONSTRUCTION WORK WILL NOT BE PERMITTED WITHOUT APPROVED PLANS AND INSPECTION.
5. PERFORM WORK IN ACCORDANCE WITH CITY OF MT. VERNON MATERIAL SPECIFICATIONS AND STANDARD CONSTRUCTION DRAWINGS. IN CASE OF A DISCREPANCY BETWEEN CITY OF MT. VERNON REQUIREMENTS AND PROJECT SPECIFICATIONS, CITY OF MT. VERNON STANDARDS SHALL GOVERN.
6. STREET CLEANING (ON AN AS-NEEDED BASIS) IS REQUIRED THROUGH THE DURATION OF THIS CONSTRUCTION PROJECT. THIS INCLUDES SWEEPING, POWER CLEANING, AND (IF NECESSARY) MANUAL REMOVAL OF DIRT AND/OR MUD IN THE STREET GUTTERS.
7. REMOVE SEDIMENT FROM DETENTION AREAS, OUTLET STRUCTURES, AND UNDERDRAINS ONCE FINAL SEED HAS BEEN ESTABLISHED.
8. ANY EXISTING STORM INLETS IMPACTED BY THE NEW CONSTRUCTION ACTIVITY WILL NEED THE APPROPRIATE INLET PROTECTION FOR SEDIMENT CONTROL.
9. DIMENSIONS AND COORDINATES ARE TO FACE OF CURB OR FACE OF BUILDING UNLESS OTHERWISE NOTED.
10. EXTEND UTILITIES TO WITHIN 5'-0" OF FACE OF BUILDING UNLESS OTHERWISE NOTED. COORDINATE EXACT LOCATION WITH PLUMBING CONTRACTOR. FINAL CONNECTION BY PLUMBING CONTRACTOR.
11. MAXIMUM FINISH SLOPES SHALL BE 4:1 UNLESS OTHERWISE NOTED.
12. COORDINATES AND ELEVATIONS BASED ON SURVEY PERFORMED BY BUCKLEY GROUP, DATED 4/21/25. REFER TO SURVEY SHEET.
13. CONTRACTOR SHALL STRIP AND STOCKPILE EXISTING TOPSOIL THROUGHOUT THE SITE PRIOR TO EXCAVATION. UPON COMPLETION OF FINAL GRADING, PROVIDE 6 INCHES OF TOPSOIL AND SEED AREAS DISTURBED BY CONSTRUCTION, INCLUDING LAYDOWN AREAS AND TRAILER LOCATIONS IF LOCATED OUTSIDE THE GRADING/SEEDING LIMITS.
14. DISPOSE EXCESS EXCAVATED MATERIALS AND UNACCEPTABLE/UNSUITABLE SOILS OFF SITE IN ACCORDANCE WITH LOCAL CODES. NO PERMANENT STOCKPILES WILL REMAIN ON SITE.
15. EXISTING VALVES, MANHOLES, AND OTHER APPURTANCES TO REMAIN LOCATED WITHIN THE WORK LIMITS SHALL BE ADJUSTED TO FINISH GRADE.
16. OUTLET CURB UNDERDRAINS TO ADJACENT EXISTING UNDERDRAINS OR STORM SEWER SYSTEM.
17. EXPOSE UTILITIES NOTED THUS: **EXPOSE** PRIOR TO BEGINNING WORK ON THAT UTILITY TO DETERMINE EFFECTS ON THE PROPOSED ALIGNMENT AND PROFILE. REPORT ELEVATION AND LOCATION TO THE ENGINEER IN ORDER THAT ANY CORRECTIONS TO THE ELEVATION AND LOCATION CAN BE MADE.
18. CONCRETE ADJACENT TO BUILDING SHALL BE SLOPED AWAY FROM BUILDING AT 2.0% UNLESS OTHERWISE NOTED.
19. ROOF DRAINS, FOUNDATION DRAINS, AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER ARE PROHIBITED.

CODED NOTES:

1. PROVIDE ODOT TYPE D ROCK CHANNEL PROTECTION.
2. PROPOSED OIL/WATER SEPARATOR PER DETAIL E/SP-C-207. (001)
3. ENSURE FENCE POST SPACING IS NOT IN CONFLICT WITH PROPOSED STORM SEWER.
4. PROPOSED FUEL ISLAND. REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS.

JS&P ARCHITECTS
Jerome Scott & Partners Architects
1020 Goodale Blvd., Columbus, Ohio 43212

STATE OF OHIO
GRAHAM J. WATKINS
E-84007
REGISTERED PROFESSIONAL ENGINEER

DOT-250002 KNOX FULL SERVICE MAINTENANCE FACILITY

505 HARCOURT RD., MT. VERNON, OH 43050

MARK	DATE	DESCRIPTION
001	1/28/26	BID ADDENDUM 002
05	1/15/26	BID DOCUMENTS
04	11/21/25	PERMIT DOCUMENTS
03	10/24/25	CONSTRUCTION DOCUMENTS
02	8/26/25	DESIGN DEVELOPMENT
01	6/24/25	SCHEMATIC DESIGN

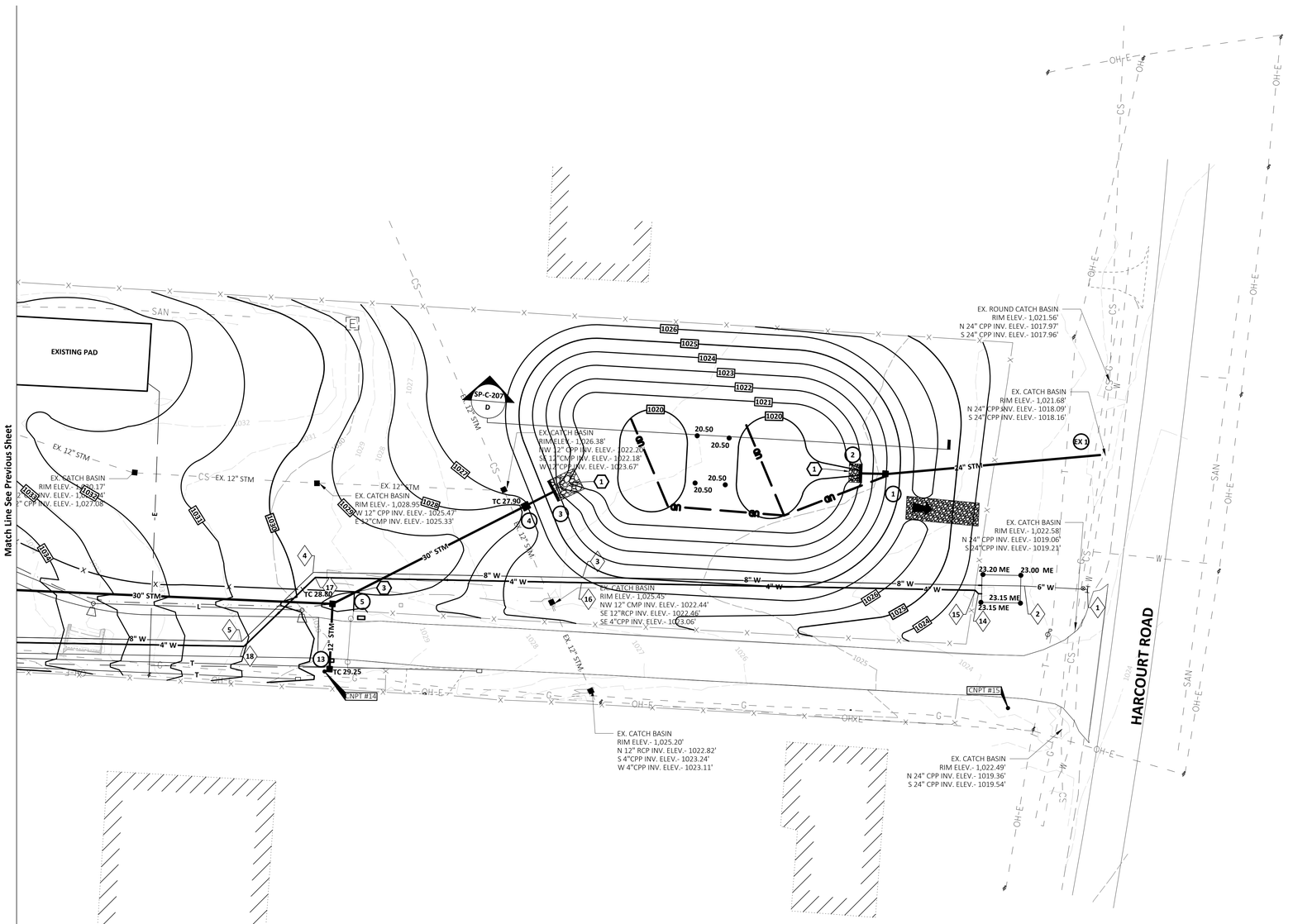
PROJECT NO: **DOT-250002**
DATE: **1/23/2026**
DRAWN BY: **KORDA**

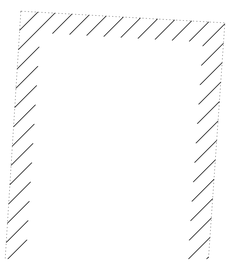
SHEET TITLE

GRADING & STORM SEWER PLAN

SP-C-201

KORDA
KORDA | NEMETH ENGINEERING
WWW.KORDA.COM
DRAWN BY: KATIE VATKE
DESIGNED BY: KATIE VATKE
CHECKED BY: GRAHAM WATKINS
PROJECT NUMBER: 2025-0411





GRADING LEGEND

EXISTING

REFER TO SURVEY SHEET

PROPOSED

- 800 — INDEX CONTOUR
- 799 — INTERMEDIATE CONTOUR
- BUILDING/WALL
- E — UNDERGROUND ELECTRIC LINE
- T — UNDERGROUND TELEPHONE LINE
- W — WATER LINE
- G — GAS LINE
- STM — STORM SEWER
- UD — UNDERDRAIN
- SAN — SANITARY SEWER
- DITCH
- CATCH BASIN PER DETAIL D/SP-C-203
- MANHOLE PER DETAIL C/SP-C-203
- DS — DOWNSPOUT ADAPTER PER DETAIL A/SP-C-203
- W — FIRE HYDRANT
- GATE VALVE & CURB BOX
- FIRE DEPARTMENT CONNECTION
- CO — CLEAN OUT
- X XXX — STRUCTURE NUMBER
- GRADE BREAK (CROWN) LINE
- 708.53 / TC — SPOT ELEVATION / TOP OF CASTING
- 700.00 / 699.50 — TOP OF CURB ELEVATION / GUTTER ELEVATION AT FACE OF CURB
- CATCH BASIN PER DETAIL E/SP-C-203
- EMERGENCY OVERFLOW PER DETAIL F/SP-C-205

GENERAL NOTES:

1. PROVIDE 10' UNDERDRAINS IN FOUR DIRECTIONS AT CATCH BASINS IN PAVEMENT PER DETAIL G/SP-C-205.
2. PAVEMENT ELEVATIONS REFER TO FINISHED PAVEMENT ELEVATION AT FACE OF CURB UNLESS OTHERWISE NOTED.
3. ADD 1000 TO SPOT ELEVATIONS TO OBTAIN U.S.G.S. ELEVATIONS.
4. CONSTRUCTION WORK WILL NOT BE PERMITTED WITHOUT APPROVED PLANS AND INSPECTION.
5. PERFORM WORK IN ACCORDANCE WITH CITY OF MT. VERNON MATERIAL SPECIFICATIONS AND STANDARD CONSTRUCTION DRAWINGS. IN CASE OF A DISCREPANCY BETWEEN CITY OF MT. VERNON REQUIREMENTS AND PROJECT SPECIFICATIONS, CITY OF MT. VERNON STANDARDS SHALL GOVERN.
6. STREET CLEANING (ON AN AS-NEEDED BASIS) IS REQUIRED THROUGH THE DURATION OF THIS CONSTRUCTION PROJECT. THIS INCLUDES SWEEPING, POWER CLEANING, AND (IF NECESSARY) MANUAL REMOVAL OF DIRT AND/OR MUD IN THE STREET GUTTERS.
7. REMOVE SEDIMENT FROM DETENTION AREAS, OUTLET STRUCTURES, AND UNDERDRAINS ONCE FINAL SEED HAS BEEN ESTABLISHED.
8. ANY EXISTING STORM INLETS IMPACTED BY THE NEW CONSTRUCTION ACTIVITY WILL NEED THE APPROPRIATE INLET PROTECTION FOR SEDIMENT CONTROL.
9. DIMENSIONS AND COORDINATES ARE TO FACE OF CURB OR FACE OF BUILDING UNLESS OTHERWISE NOTED.
10. EXTEND UTILITIES TO WITHIN 5'-0" OF FACE OF BUILDING UNLESS OTHERWISE NOTED. COORDINATE EXACT LOCATION WITH PLUMBING CONTRACTOR. FINAL CONNECTION BY PLUMBING CONTRACTOR.
11. MAXIMUM FINISH SLOPES SHALL BE 4:1 UNLESS OTHERWISE NOTED.
12. COORDINATES AND ELEVATIONS BASED ON SURVEY PERFORMED BY BUCKLEY GROUP, DATED 4/21/25. REFER TO SURVEY SHEET.
13. CONTRACTOR SHALL STRIP AND STOCKPILE EXISTING TOPSOIL THROUGHOUT THE SITE PRIOR TO EXCAVATION. UPON COMPLETION OF FINAL GRADING, PROVIDE 6 INCHES OF TOPSOIL AND SEED AREAS DISTURBED BY CONSTRUCTION, INCLUDING LAYDOWN AREAS AND TRAILER LOCATIONS IF LOCATED OUTSIDE THE GRADING/SEEDING LIMITS.
14. DISPOSE EXCESS EXCAVATED MATERIALS AND UNACCEPTABLE/UNSUITABLE SOILS OFF SITE IN ACCORDANCE WITH LOCAL CODES. NO PERMANENT STOCKPILES WILL REMAIN ON SITE.
15. EXISTING VALVES, MANHOLES, AND OTHER APPURTANCES TO REMAIN LOCATED WITHIN THE WORK LIMITS SHALL BE ADJUSTED TO FINISH GRADE.
16. OUTLET CURB UNDERDRAINS TO ADJACENT EXISTING UNDERDRAINS OR STORM SEWER SYSTEM.
17. EXPOSE UTILITIES NOTED THUS: **EXPOSE** PRIOR TO BEGINNING WORK ON THAT UTILITY TO DETERMINE EFFECTS ON THE PROPOSED ALIGNMENT AND PROFILE. REPORT ELEVATION AND LOCATION TO THE ENGINEER IN ORDER THAT ANY CORRECTIONS TO THE ELEVATION AND LOCATION CAN BE MADE.
18. CONCRETE ADJACENT TO BUILDING SHALL BE SLOPED AWAY FROM BUILDING AT 2.0% UNLESS OTHERWISE NOTED.
19. ROOF DRAINS, FOUNDATION DRAINS, AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER ARE PROHIBITED.

(X) CODED NOTES:

1. ~~PROVIDE ODOT TYPE D ROCK CHANNEL PROTECTION~~
2. PROPOSED OIL/WATER SEPARATOR PER DETAIL E/SP-C-207 (02)
3. ENSURE FENCE POST SPACING IS NOT IN CONFLICT WITH PROPOSED STORM SEWER.
4. PROPOSED FUEL ISLAND. REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS.

JS&P ARCHITECTS
Jerome Scott & Partners Architects
1020 Goodale Blvd., Columbus, Ohio 43212

STATE OF OHIO — GRAHAM J. WATKINS E-84007 — REGISTERED PROFESSIONAL ENGINEER

DOT-250002 KNOX FULL SERVICE MAINTENANCE FACILITY

505 HARCOURT RD., MT. VERNON, OH 43050

MARK	DATE	DESCRIPTION
001	1/28/26	BID ADDENDUM 002
05	1/15/26	BID DOCUMENTS
04	11/21/25	PERMIT DOCUMENTS
03	10/24/25	CONSTRUCTION DOCUMENTS
02	8/26/25	DESIGN DEVELOPMENT
01	6/24/25	SCHEMATIC DESIGN

PROJECT NO:	DOT-250002
DATE:	1/23/2026
DRAWN BY:	KORDA

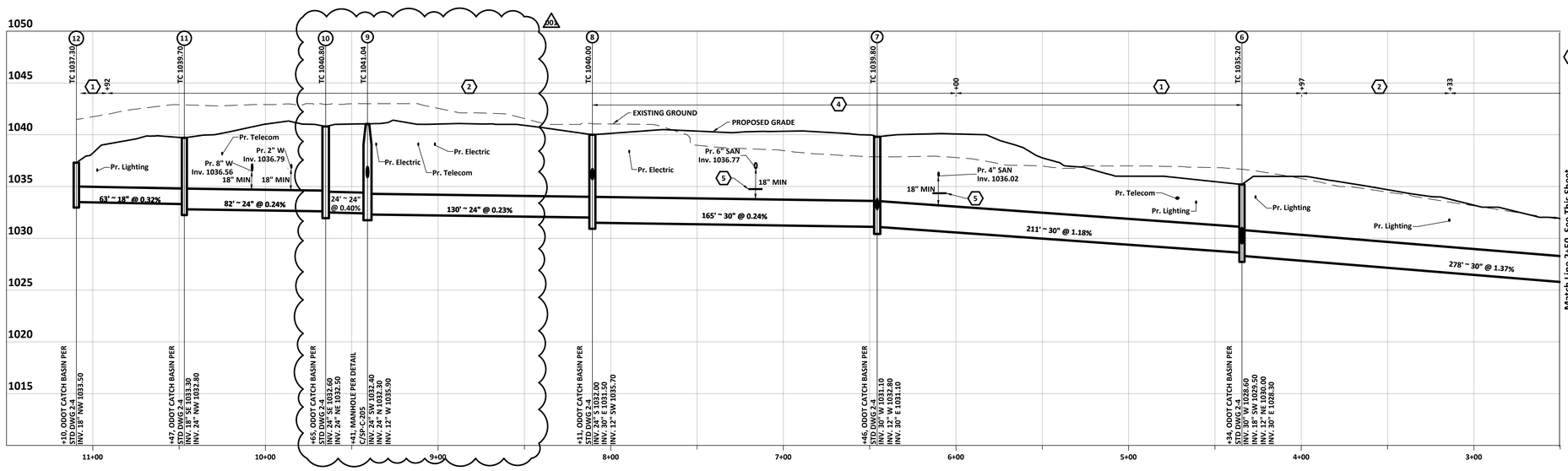
SHEET TITLE

GRADING & STORM SEWER PLAN

SP-C-202

KORDA
KORDA . NEMETH ENGINEERING
WWW.KORDA.COM

DRAWN BY:	KATIE VATKE
DESIGNED BY:	KATIE VATKE
CHECKED BY:	GRAHAM WATKINS
PROJECT NUMBER:	2025-0411



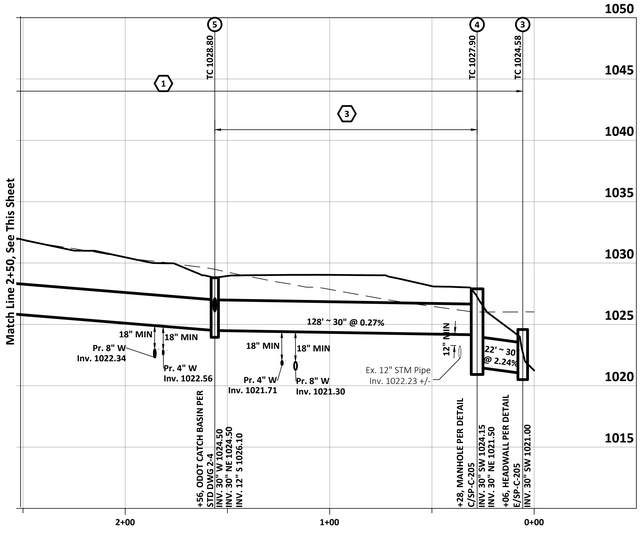
STORM SEWER 3 TO 12 PROFILE
SCALE: 1"=30' HORIZ. 1"=5' VERT.

GENERAL NOTES:

1. REFER TO DETAIL D & G/SP-C-205 FOR ALL CATCH BASINS IN PAVEMENT

(X) CODED NOTES:

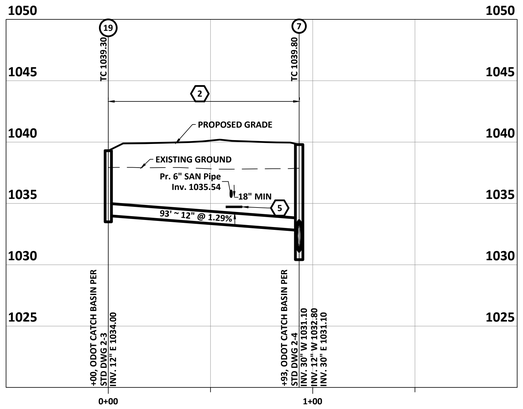
1. BACKFILL WITH COMPACTED BACKFILL PER SPECIFICATION SECTION 31 23 33.
2. BACKFILL WITH COMPACTED GRANULAR MATERIAL PER ODOT ITEM 304.
3. INSTALL REINFORCED CONCRETE PIPE PER ODOT ITEM 706.02.
4. SEWER PIPE WITH WATERTIGHT JOINTS PER ODOT ITEM 901.15
5. INSTALL ANTI-INFILTRATION LAYER.
6. OIL/WATER SEPARATOR PER DETAIL E/SP-C-205 (001)
7. FUEL ISLAND. REFER TO ARCHITECTURE AND MEP DRAWINGS.



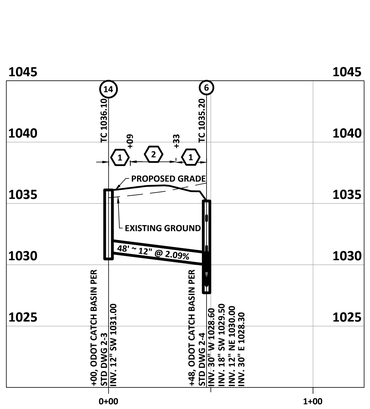
STORM SEWER EX 1 TO 2 PROFILE
SCALE: 1"=30' HORIZ. 1"=5' VERT.

STORM SEWER 6 TO 17 PROFILE
SCALE: 1"=30' HORIZ. 1"=5' VERT.

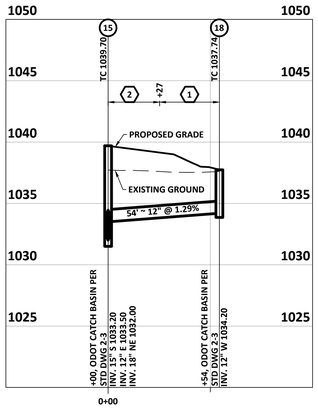
STORM SEWER 7 TO 19 PROFILE
SCALE: 1"=30' HORIZ. 1"=5' VERT.



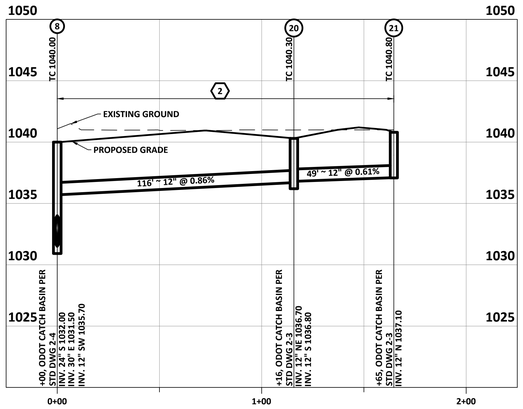
STORM SEWER 6 TO 14 PROFILE
SCALE: 1"=30' HORIZ. 1"=5' VERT.



STORM SEWER 15 TO 18 PROFILE
SCALE: 1"=30' HORIZ. 1"=5' VERT.



STORM SEWER 8 TO 21 PROFILE
SCALE: 1"=30' HORIZ. 1"=5' VERT.



J S & P ARCHITECTS
Jerome Scott & Partners Architects
1020 Goodale Blvd., Columbus, Ohio 43212

STATE OF OHIO
GRAHAM J. WATKINS
E-84007
REGISTERED PROFESSIONAL ENGINEER

DOT-250002 KNOX FULL SERVICE MAINTENANCE FACILITY

505 HARCOURT RD., MT. VERNON, OH 43050

MARK	DATE	DESCRIPTION
001	1/28/26	BID ADDENDUM 002
05	1/15/26	BID DOCUMENTS
04	11/21/25	PERMIT DOCUMENTS
03	10/24/25	CONSTRUCTION DOCUMENTS
02	8/26/25	DESIGN DEVELOPMENT
01	6/24/25	SCHEMATIC DESIGN

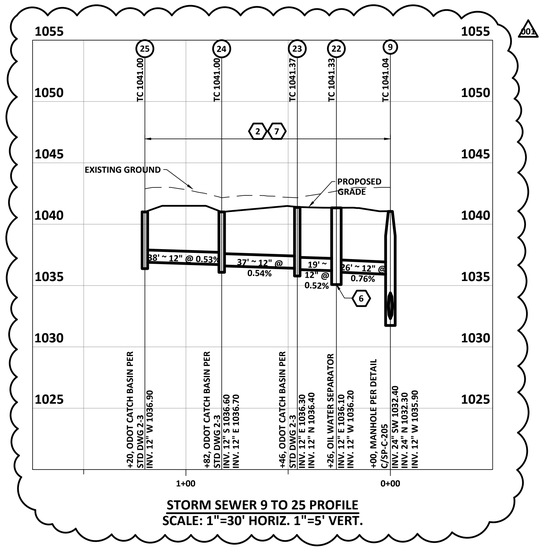
PROJECT NO: DOT-250002
DATE: 1/23/2026
DRAWN BY: KORDA

SHEET TITLE

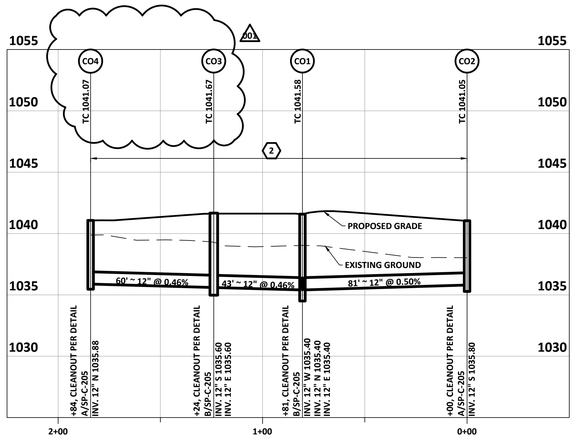
STORM SEWER PROFILES

SP-C-203

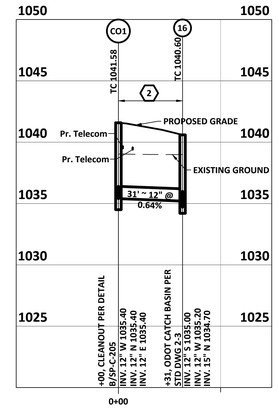
KORDA
KORDA NEMETH ENGINEERING
WWW.KORDA.COM
DRAWN BY: KATIE VATKE
DESIGNED BY: KATIE VATKE
CHECKED BY: GRAHAM WATKINS
PROJECT NUMBER: 2025-0411



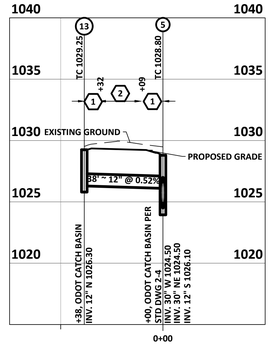
STORM SEWER 9 TO 25 PROFILE
SCALE: 1"=30' HORIZ. 1"=5' VERT.



STORM SEWER CO1 TO CO4 PROFILE
SCALE: 1"=30' HORIZ. 1"=5' VERT.



STORM SEWER 16 TO CO1 PROFILE
SCALE: 1"=30' HORIZ. 1"=5' VERT.



STORM SEWER 5 TO 13 PROFILE
SCALE: 1"=30' HORIZ. 1"=5' VERT.

STORM SEWER STRUCTURE COORDINATES

Structure	TC	Northing	Easting	Northing As-Built	Easting As-Built
1	1024.00	322074.50	147915.80		
2	1022.00	322074.65	147901.55		
3	1024.58	322065.45	147722.85		
4	1027.90	322055.33	147702.98		
5	1028.80	321997.45	147588.47		
6	1035.20	322009.70	147310.59		
7	1039.80	322039.66	147101.43		
8	1040.00	321990.00	146944.09		
9	1041.04	321859.74	146945.20		
10	1040.80	321841.53	146929.24		
11	1039.70	321770.50	146969.93		
12	1037.30	321716.20	147001.03		
13	1029.25	321959.03	147586.71		
14	1036.10	322053.79	147329.41		
15	1039.70	321972.12	147255.09		
16	1040.60	321872.33	147253.07		

STORM SEWER STRUCTURE COORDINATES

Structure	TC	Northing	Easting	Northing As-Built	Easting As-Built
17	1039.70	321795.54	147250.97		
18	1037.74	321954.42	147306.53		
19	1039.30	322056.77	147009.67		
20	1040.30	321928.01	146846.35		
21	1040.80	321879.98	146837.24		
22	1041.33	321860.23	146918.80		
23	1041.37	321860.52	146899.66		
24	1041.00	321897.50	146900.35		
25	1041.00	321897.06	146937.92		
CO1	1041.58	321873.03	147221.69		
CO2	1041.05	321953.52	147223.12		
CO3	1041.67	321873.84	147178.33		
CO4	1041.07	321813.61	147176.97		
EX 1	1022.84			322085.42	148043.95

GENERAL NOTES:

1. REFER TO DETAIL D & G/SP-C-205 FOR ALL CATCH BASINS IN PAVEMENT

X CODED NOTES:

1. BACKFILL WITH COMPACTED BACKFILL PER SPECIFICATION SECTION 31 23 33.
2. BACKFILL WITH COMPACTED GRANULAR MATERIAL PER ODOT ITEM 304.
3. INSTALL REINFORCED CONCRETE PIPE PER ODOT ITEM 706.02.
4. SEWER PIPE WITH WATERTIGHT JOINTS PER ODOT ITEM 901.15
5. INSTALL ANTI-INFILTRATION LAYER.
6. OIL/WATER SEPARATOR PER DETAIL E/SP-C-205 (001)
7. FUEL ISLAND. REFER TO ARCHITECTURE AND MEP DRAWINGS.

JS&P ARCHITECTS
Jerome Scott & Partners Architects
1020 Goodale Blvd., Columbus, Ohio 43212

STATE OF OHIO
GRAHAM J. WATKINS
E-84007
REGISTERED PROFESSIONAL ENGINEER

DOT-250002 KNOX FULL SERVICE MAINTENANCE FACILITY

505 HARCOURT RD., MT. VERNON, OH 43050

MARK	DATE	DESCRIPTION
001	1/28/26	BID ADDENDUM 002
04	1/15/26	BID DOCUMENTS
03	11/21/25	PERMIT DOCUMENTS
02	10/24/25	CONSTRUCTION DOCUMENTS
01	8/26/25	DESIGN DEVELOPMENT

PROJECT NO: **DOT-250002**
DATE: **1/23/2026**
DRAWN BY: **KORDA**

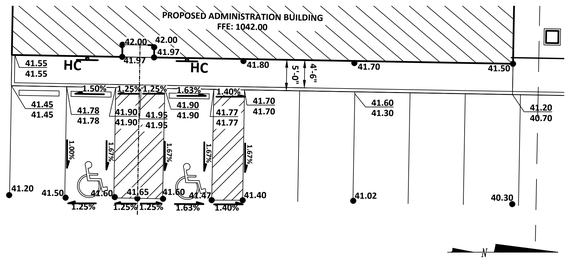
SHEET TITLE

STORM SEWER PROFILES

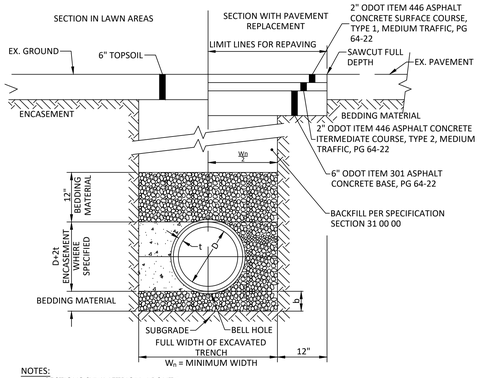
SP-C-204

KORDA
KORDA / NEMETH ENGINEERING
WWW.KORDA.COM

DRAWN BY:	KATIE VATKE
DESIGNED BY:	KATIE VATKE
CHECKED BY:	GRAHAM WATKINS
PROJECT NUMBER:	2025-0411



A DETAIL
HANDICAP PARKING AREA GRADING DETAIL **1:10**



NOTES:
1. SECTIONS SYMMETRICAL ABOUT ℄.
*2. DIMENSIONS ARE EXPRESSED IN INCHES.
3. BACKING OR ENCASEMENT TO BE ODOT CLASS "QC1" CONCRETE.
4. ON SANITARY SEWER CONSTRUCTION TRENCH DAMS ARE REQUIRED AS SPECIFIED UNDER 901.
5. PAYMENT FOR CONCRETE BACKING AND ENCASEMENT SHALL BE BASED ON MINIMUM TRENCH WIDTH (W_n).

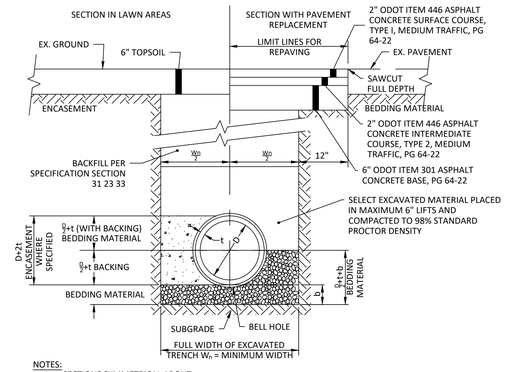
SMALL DIAMETERS b = 4"

D*	W_n*
6	24
8	27
10	30
12	32
15	36
18	40
21	44
24	48
27	52

MID DIAMETERS b = 6"

D*	W_n*
30	57
33	61
36	64
42	71
48	78
54	87
60	96

B DETAIL
TYPE 1 BEDDING FOR FLEXIBLE SEWER PIPE & PERMANENT PAVEMENT REPLACEMENT **N.T.S.**



NOTES:
1. SECTIONS SYMMETRICAL ABOUT ℄.
*2. DIMENSIONS ARE EXPRESSED IN INCHES.
3. BACKING OR ENCASEMENT TO BE ODOT CLASS "QC1" CONCRETE
4. ON SANITARY SEWER CONSTRUCTION TRENCH DAMS ARE REQUIRED AS SPECIFIED UNDER 901
5. PAYMENT FOR CONCRETE BACKING AND ENCASEMENT SHALL BE BASED ON MINIMUM TRENCH WIDTH (W_n).

SMALL DIAMETERS b = 4"

D*	W_n*	W_e*
6	24	48
8	27	48
10	30	48
12	32	48
15	36	50
18	40	53
21	44	57
24	48	60
27	52	64

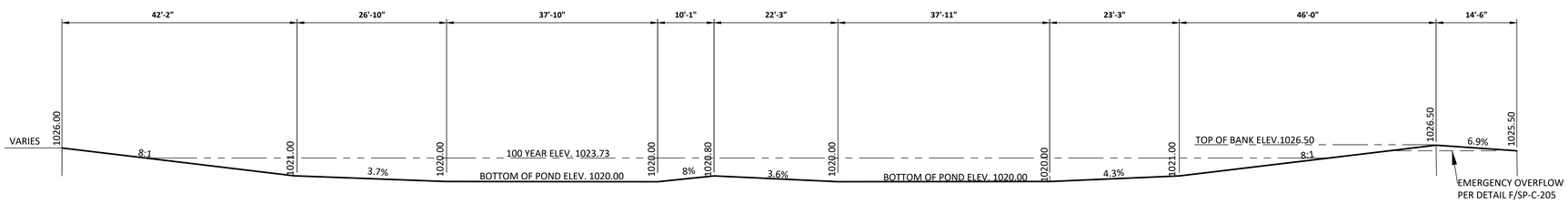
MID DIAMETERS b = 6"

D*	W_n*	W_e*
30	57	67
33	61	71
36	64	74
42	71	81
48	78	88
54	87	95
60	96	102
66	105	127

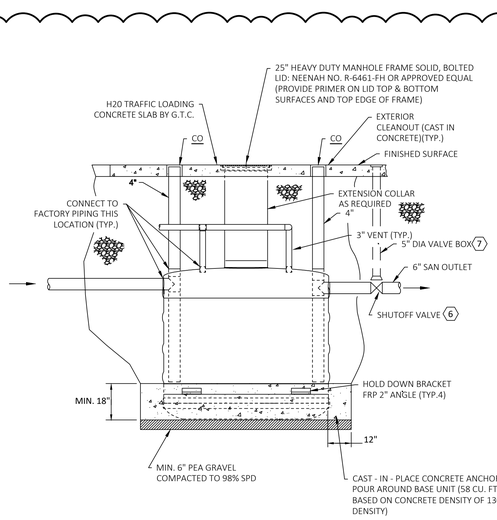
LARGE DIAMETERS b = 6"

D*	W_n*	W_e*
72	116	134
78	123	141
84	130	148
91	136	155
96	143	162
102	151	169
108	160	176

C DETAIL
TYPE 1 BEDDING FOR RIGID SEWER PIPE & PERMANENT PAVEMENT REPLACEMENT **N.T.S.**



D DETAIL
DETENTION BASIN SECTION **1:10**



OIL/WATER SPARATOR INSTALLATION NOTES:

1. INSTALL OIL / WATER SEPARATOR PER THE MANUFACTURER'S WRITTEN INSTRUCTIONS.

DETAIL NOTES

1. UNIT SHOWN (BASIS OF DESIGN) SHALL BE MAUFACTURED WITH FIBERGLASS REINFORCED PLASTICS (POLYESTER RESIN AND E GLASS, ASTM D 883-ULC THIRD PARTY TESTED) ¼" MINIMUM WALL THICKNESS & ⅜" TOP AND BOTTOM BOWL THICKNESS; 1500 GALLON TOTAL WET VOLUME; 819 GALLON MAX. OIL CAPACITY; 540 MAX. SOLIDS CAPACITY.
2. PIPE STUBS SHALL BE SDR 35 PVC SEWER PIPE MATERIAL WITH SCHEDULE 40 ADAPTERS.
3. EXTENSION COLLAR TO BE ORDERED TO FINISHED GRADE. CUT ON SITE FOR FINAL ADJUSTMENT AND CAULK WITH SIKAFLEX.
4. UNIT SHALL BE FACTORY TESTED.
5. 30 YEAR FACTORY WARRANTY AGAINST LEAKAGE AND STRUCTURAL FAILURE.
6. NON - RISING STEM GATE VALVE.
7. CAST IRON VALVE BOX, BINGHAM & TAYLOR NO. 4908 OR APPROVED EQUAL. PROVIDE HEAVY DUTY COVER.

GENERAL NOTES:

1. PROVIDE OIL/WATER INTERCEPTOR AT FUEL ISLAND WHERE SHOWN ON DRAWINGS, COMPLETE WITH ALL WASTE PIPING, VENT PIPING AND EXTERIOR CLEANOUTS. CATCH BASINS AND PIPING UP TO THE INTERCEPTOR ARE PROVIDED BY SITE UTILITY CONTRACTOR.
2. PROVIDE SHUT OFF VALVES DOWNSTREAM OF OIL/WATER INTERCEPTORS WHERE SHOWN ON DRAWINGS.
3. TEST COMPLETE SYSTEM.

PRODUCTS:

OIL/WATER INTERCEPTORS:

1. PROVIDE ZURN "PROCEPTOR" MODEL OMC 1500. GLASS-FIBER WITH AN ISOTHALIC RESIN, COMPLETE WITH TAPPINGS, VENTS,MANHOLE EXTENSION(S) TO FINISHED GRADE, SINGLE TANK, 1,500 GALLONS TOTAL CAPACITY. 30 YEAR WARRANTY.
2. INTERCEPTOR SHALL COMPLY WITH COUNTY AND STATE REQUIREMENTS.
3. OTHER ACCEPTABLE MANUFACTURERS: APPROVED EQUAL BY CONTAINMENT SOLUTIONS, INC., OR XERXES.

EXTERIOR CLEANOUTS:

1. ZURN #Z 1400 HD. ADJUSTABLE CAST IRON BODY, HEAVY-DUTY LOAD RATING, CAST IRON VANDAL-RESISTANT SCORIATED COVER, THREADED ABD PLUG, LINE SIZE, CAULK OUTLET.
2. OTHER ACCEPTABLE MANUFACTURERS: APPROVED EQUAL BY WADE, JAY R. SMITH, JOSAM, OR ANCON.

E DETAIL
OIL / WATER SEPARATOR **N.T.S.**

JS&P ARCHITECTS
Jerome Scott & Partners Architects
1020 Goodale Blvd., Columbus, Ohio 43212

STATE OF OHIO
GRAHAM J. WATKINS
E-84007
REGISTERED
PROFESSIONAL ENGINEER

DOT-250002 KNOX FULL SERVICE MAINTENANCE FACILITY

505 HARCOURT RD., MT. VERNON, OH 43050

MARK	DATE	DESCRIPTION
001	1/28/26	BID ADDENDUM 002
03	1/15/26	BID DOCUMENTS
02	11/21/25	PERMIT DOCUMENTS
01	10/24/25	CONSTRUCTION DOCUMENTS

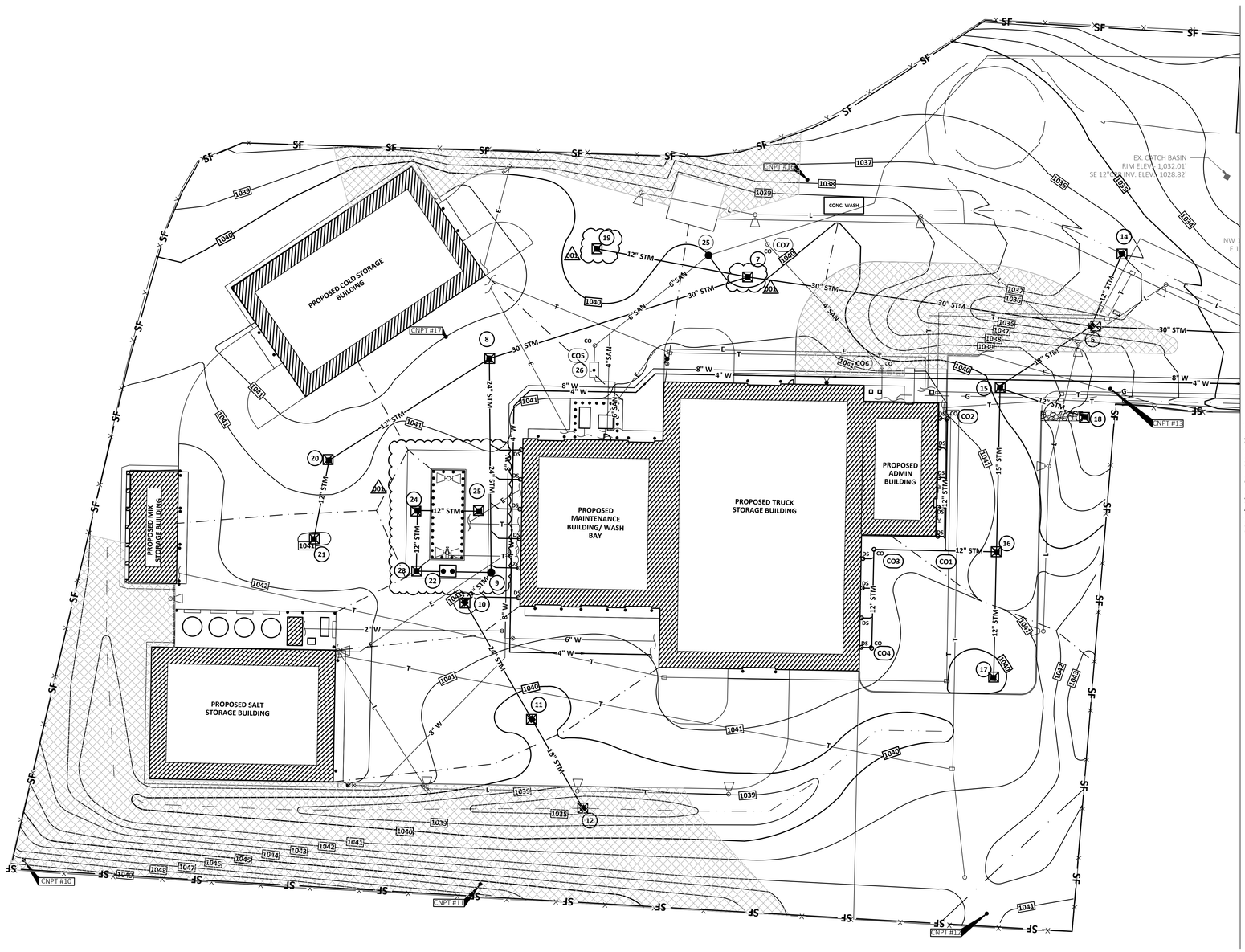
PROJECT NO: **DOT-250002**
DATE: **1/23/2026**
DRAWN BY: **KORDA**

SHEET TITLE

GRADING & STORM SEWER DETAILS

SP-C-207

KORDA
KORDA NEMETH ENGINEERING
WWW.KORDA.COM
DRAWN BY: KATIE VATKE
DESIGNED BY: KATIE VATKE
CHECKED BY: GRAHAM WATKINS
PROJECT NUMBER: 2025-0411



0 30 60 90

GRAPHIC SCALE
SCALE IN FEET

EROSION AND SEDIMENT CONTROL LEGEND

EXISTING
REFER TO SURVEY SHEET

PROPOSED

- 800 — INDEX CONTOUR
- 799 — INTERMEDIATE CONTOUR
- BUILDING/WALL
- STM — STORM SEWER
- CATCH BASIN
- CURB & GUTTER INLET
- MANHOLE
- DS — DOWNSPOUT ADAPTER
- SF — SILT FENCE PER DETAIL B/SP-C-209
- INLET FILTER PER DETAIL A/SP-C-209
- EROSION CONTROL MATTING PER DETAIL E/SP-C-209
- STABILIZED CONSTRUCTION ENTRANCE PER DETAIL C/SP-C-209
- CONC. WASH — CONCRETE WASHOUT PER DETAIL D/SP-C-209
- LIMITS OF SEDIMENT BASIN

JS&P ARCHITECTS
Jerome Scott & Partners Architects
1020 Goodale Blvd., Columbus, Ohio 43212

STATE OF OHIO
GRAHAM J. WATKINS
E-84007
REGISTERED PROFESSIONAL ENGINEER

DOT-250002 KNOX FULL SERVICE MAINTENANCE FACILITY

505 HARCOURT RD., MT. VERNON, OH 43050

MARK	DATE	DESCRIPTION
001	1/28/26	BID ADDENDUM 002
03	1/15/26	BID DOCUMENTS
02	11/21/25	PERMIT DOCUMENTS
01	10/24/25	CONSTRUCTION DOCUMENTS

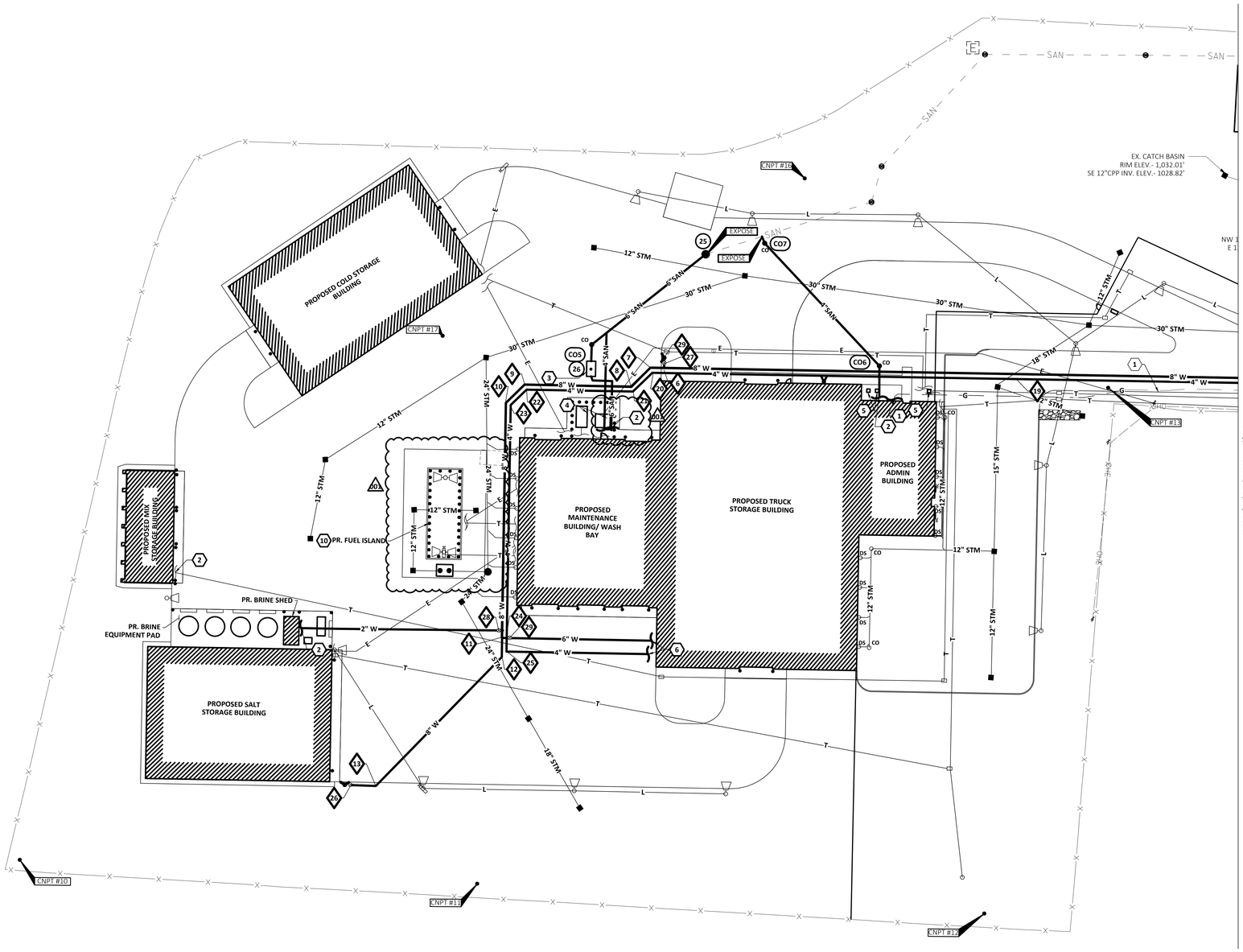
PROJECT NO: **DOT-250002**
DATE: **1/23/2026**
DRAWN BY: **KORDA**

SHEET TITLE

EROSION & SEDIMENT CONTROL PLAN

SP-C-208

KORDA
KORDA/NEMETH ENGINEERING
WWW.KORDA.COM
DRAWN BY: KATIE VATKE
DESIGNED BY: KATIE VATKE
CHECKED BY: GRAHAM WATKINS
PROJECT NUMBER: 2025-0411



0 30 60 90

GRAPHIC SCALE
SCALE IN FEET

UTILITY LEGEND

EXISTING

REFER TO SURVEY SHEET

PROPOSED

- E — UNDERGROUND ELECTRIC LINE
- L — UNDERGROUND LIGHTING LINE
- T — UNDERGROUND TELEPHONE LINE
- W — WATER LINE
- G — GAS LINE
- STM — STORM SEWER
- UD — UNDERDRAIN
- SAN — SANITARY SEWER
- G — GAS LINE (BY OTHERS)
- W — FIRE HYDRANT PER DETAIL A/SP-C-305
- GATE VALVE & CURB BOX
- FIRE DEPARTMENT CONNECTION
- CO — CLEAN OUT
- MANHOLE
- 1 / 101 — STRUCTURE NUMBER
- HANDHOLE PER MEP DRAWINGS
- LIGHTPOLE PER MEP DRAWINGS
- REPLACE PAVEMENT IN KIND

GENERAL NOTES:

1. DIMENSIONS AND COORDINATES ARE FROM FACE OF CURB OR EXTERIOR FACE OF BUILDING, UNLESS OTHERWISE NOTED.
2. EXTEND UTILITIES TO WITHIN 5' OF FACE OF BUILDING, UNLESS OTHERWISE NOTED. COORDINATE EXACT LOCATION WITH PLUMBING CONTRACTOR. FINAL CONNECTION BY PLUMBING CONTRACTOR.
3. REFER TO SHEETS C-201 - C-204 FOR STORM SEWER INFORMATION.
4. MAINTAIN MINIMUM 4'-0" COVER OVER ALL WATERLINES.
5. MAINTAIN MINIMUM 18" VERTICAL CLEARANCE FROM THE OUTSIDE OF ANY WATERLINE PIPE TO THE OUTSIDE OF ANY STORM OR SANITARY SEWER.
6. PROVIDE THRUST BLOCKS OR RESTRAINED MECHANICAL JOINT PIPE AT EACH VALVE, TEE, FITTING, OR CHANGE IN DIRECTION OF WATERLINE.
7. ROOF DRAINS, FOUNDATION DRAINS, AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER ARE PROHIBITED.
8. CONNECTION TO EXISTING WATER MAINS SHALL NOT BE PERFORMED UNTIL THE NEW LINES HAVE BEEN SANITIZED AND ALL TESTS HAVE BEEN COMPLETED AS SPECIFIED BY THE CITY OF MT. VERNON AND THESE CONTRACT DOCUMENTS.
9. ALL COORDINATES AND ELEVATIONS BASED ON SURVEY PERFORMED BY BUCKLEY GROUP DATED 4/21/25. REFER TO SURVEY SHEET.
10. WHERE PLANS PROVIDE FOR A PROPOSED UTILITY TO BE CONNECTED TO, OR CROSS OVER, OR UNDER AN EXISTING UNDERGROUND UTILITY, THE CONTRACTOR SHALL LOCATE THE EXISTING PIPES OR UTILITIES, BOTH AS TO LINE AND GRADE BEFORE STARTING TO LAY THE PROPOSED UTILITY. THESE LOCATIONS ARE NOTED THUS: **EXPOSE**. IF IT IS DETERMINED THAT THE ELEVATION OF THE EXPOSED UTILITY DIFFERS FROM THE PLAN ELEVATION, RESULTS IN A CHANGE IN THE PLAN SEWER SLOPE, OR WILL INTERSECT AN EXISTING UTILITY AS SHOWN ON THE PLAN, THE ENGINEER SHALL BE NOTIFIED BEFORE STARTING CONSTRUCTION OF ANY PORTION OF THE PROPOSED UTILITY WHICH WILL BE AFFECTED BY THE VARIANCE IN THE EXISTING ELEVATIONS.
11. SUPPORT AND PROTECT ALL UTILITIES EXPOSED DURING EXCAVATION AND TRENCHING.
12. ANY REQUIRED WATERLINE SHUT-DOWNS SHALL BE COORDINATED WITH THE OWNER AND/OR THE CITY.

(X) CODED NOTES:

1. GAS TAP, SERVICE LINE, AND CURB BOX TO THE METER INSIDE RIGHT-OF-WAY BY COLUMBIA GAS. MECHANICAL CONTRACTOR TO INSTALL METER SETTING AND SERVICE LINE FROM THE METER SETTING. PROTECT GAS METER SETTING WITH BOLLARDS ON THREE SIDES AS SHOWN.
2. CAP AND MARK FOR FINAL CONNECTION. COORDINATE FINAL LOCATION AND ELEVATION WITH PLUMBING CONTRACTOR. FINAL CONNECTION BY PLUMBING CONTRACTOR.
3. PROPOSED OIL/WATER SEPARATOR. REFER TO PLUMBING DRAWINGS.
4. PROPOSED TRANSFORMER AND GENERATOR. REFER TO STRUCTURAL AND MEP DRAWINGS AND ARCHITECTURAL SITE PLAN FOR DETAILS AND LAYOUT.
5. PROPOSED CONDENSING UNIT. REFER TO STRUCTURAL AND MEP DRAWINGS AND ARCHITECTURAL SITE PLAN FOR DETAILS AND LAYOUT.
6. WATER SERVICE TERMINATION PER DETAIL E/SP-C-304.
7. PROPOSED WATER METER PIT PER DETAIL D/SP-C-305.
8. PROVIDE SUMP PIT WITH SUBMERSIBLE PUMP WITH THE FOLLOWING CHARACTERISTICS:
   - 8.1. CAST IRON CONSTRUCTION
   - 8.2. ½ HP, 60 Hz, 1½ NPT DISCHARGE
   - 8.3. INTEGRATED WITH FLOAT OPERATED MECHANICAL SWITCH, NO EXTERNAL CONTROL REQUIRED.
   - 8.4. NON-CLOGGING ENGINEERED THERMOPLASTIC VORTEX IMPELLER DESIGN.
   - 8.5. COMPLETED UL/CSA CERTIFIED.
   - 8.6. BASIS OF DESIGN: ZOELLER "FLOW-MATE" MODEL 98
9. REMOVE EXISTING METER PIT AND ABANDON EXISTING SERVICE.
10. REFER TO ARCHITECTURAL AND MEP PLANS.
11. CONFIRM EXISTING SANITARY SERVICE LINE EXTENDS TO ROAD.

WATER SERVICE FITTINGS COORDINATES

NO.	TYPE	NORTHING	EASTING	NORTHING AS-BUILT	EASTING AS-BUILT	CENTERLINE ELEVATION
1	TAPPING SLEEVE	322005.9992	148035.1300			
2	6" SERVICE INLET	322008.0250	147997.6639			
3	8" 45° HORZ. BEND	322013.3989	147735.9626			
4	8" 45° HORZ. BEND	322016.0970	147577.1101			
5	8" 45° HORZ. BEND	321975.3060	147534.8918			
6	8" X 8" TEE	321983.6035	147052.3182			
7	8" 45° HORZ. BEND	321983.7470	147043.9730			
8	8" 45° HORZ. BEND	321972.3745	147032.2026			
9	8" 45° HORZ. BEND	321973.4870	146967.4996			
10	8" 45° HORZ. BEND	321962.4551	146956.0818			
11	8" X 6" TEE	321819.7420	146953.5861			
12	8" 45° HORZ. BEND	321807.8818	146953.6567			
13	8" 45° HORZ. BEND	321729.5426	146877.0542			
14	4" 45° HORZ. BEND	322003.4578	147970.6193			
15	4" 45° HORZ. BEND	322005.4952	147968.6585			
16	VERT. DEFLECTION	322010.0122	147735.9829			
17	4" 45° HORZ. BEND	322013.0731	147578.2982			
18	4" 45° HORZ. BEND	321972.2851	147536.0827			
19	VERT. DEFLECTION	321976.9270	147266.1136			
20	4" 45° HORZ. BEND	321980.7260	147045.1639			
21	4" 45° HORZ. BEND	321969.3535	147033.3934			
22	4" 45° HORZ. BEND	321970.4661	146968.6905			
23	4" 45° HORZ. BEND	321961.1611	146959.0600			
24	4" X 2" TEE	321824.0989	146956.7035			
25	4" 90° HORZ. BEND	321811.2832	146956.4830			

WATER SERVICE VALVE COORDINATES

NO.	TYPE	NORTHING	EASTING	NORTHING AS-BUILT	EASTING AS-BUILT	CENTERLINE ELEVATION
26	8" VALVE	321729.7205	146861.5733			
27	8" VALVE	321986.8131	147052.3453			
28	2" VALVE	321824.1547	146951.8970			
29	6" VALVE	321819.6483	146958.4369			
30	FIRE HYDRANT	321989.8324	147052.3708			

JS&P ARCHITECTS
Jerome Scott & Partners Architects
1020 Goodale Blvd., Columbus, Ohio 43212

STATE OF OHIO
GRAHAM J. WATKINS
E-84007
REGISTERED PROFESSIONAL ENGINEER

DOT-250002 KNOX FULL SERVICE MAINTENANCE FACILITY

505 HARCOURT RD., MT. VERNON, OH 43050

MARK	DATE	DESCRIPTION
001	1/28/26	BID ADDENDUM 002
05	1/15/26	BID DOCUMENTS
04	11/21/25	PERMIT DOCUMENTS
03	10/24/25	CONSTRUCTION DOCUMENTS
02	8/26/25	DESIGN DEVELOPMENT
01	6/24/25	SCHEMATIC DESIGN

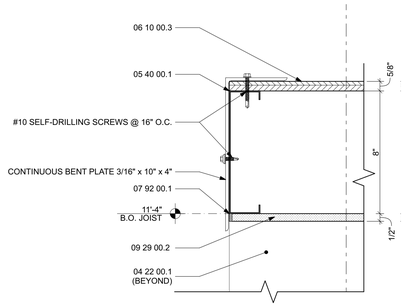
PROJECT NO: **DOT-250002**
DATE: **1/23/2026**
DRAWN BY: **KORDA**

SHEET TITLE

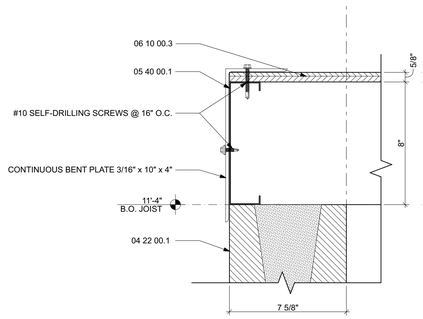
UTILITY PLAN

SP-C-301

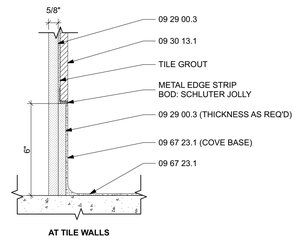
KORDA
KORDA / NEMETH ENGINEERING
WWW.KORDA.COM
DRAWN BY: KATIE VATKE
DESIGNED BY: KATIE VATKE
CHECKED BY: GRAHAM WATKINS
PROJECT NUMBER: 2025-0411

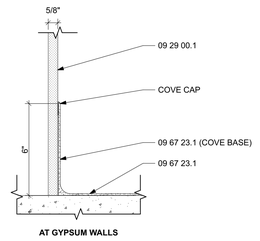


1 OM-A-508 MECH. ALCOVE CAP SECTION DETAIL
SCALE: 3" = 1'-0"

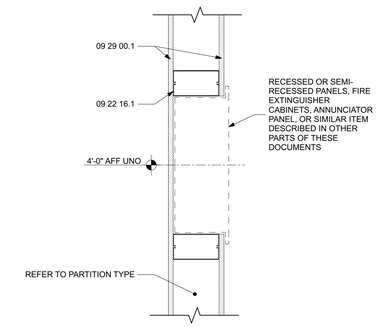


2 OM-A-508 PARTS STORAGE CAP SECTION DETAIL
SCALE: 3" = 1'-0"

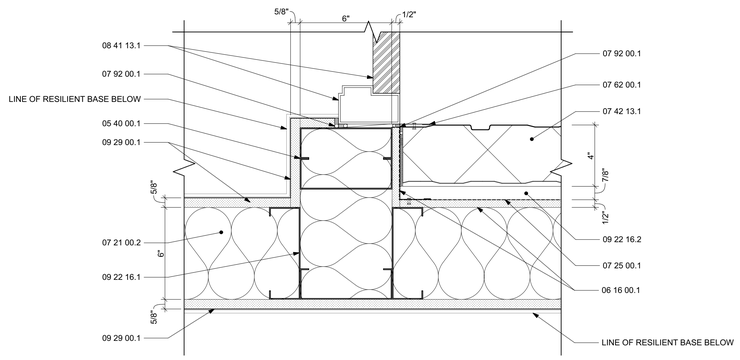




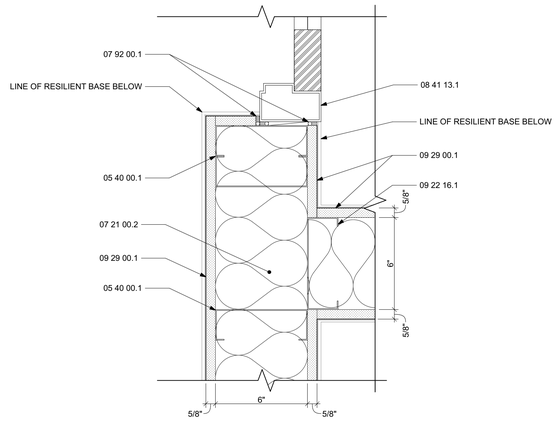
3 OM-A-508 EPOXY COVE BASE DETAILS
SCALE: 3" = 1'-0"



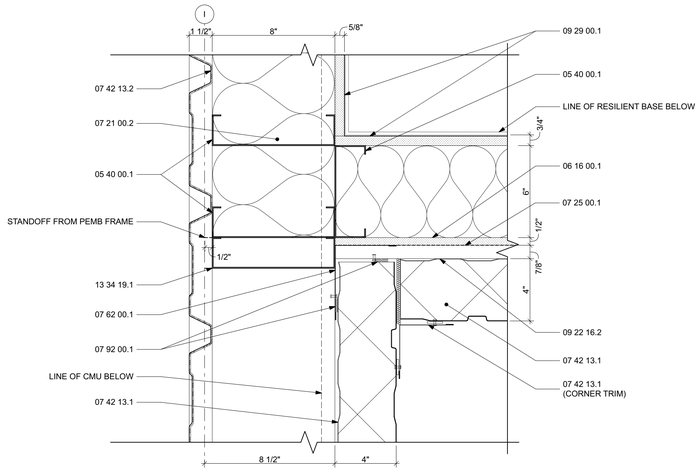
4 OM-A-508 IN-WALL RECESS DETAIL
SCALE: 1 1/2"= 1'-0"



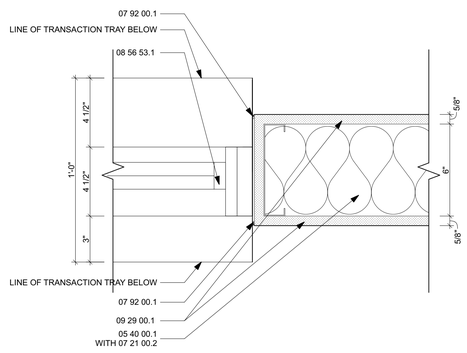
5 OM-A-508 EXTERIOR STOREFRONT DOOR JAMB
SCALE: 3" = 1'-0"



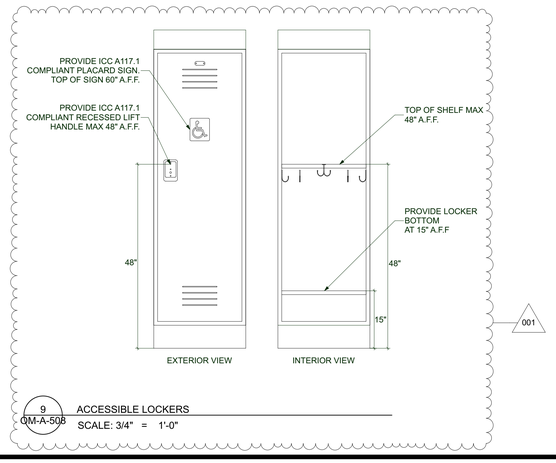
6 OM-A-508 INTERIOR STOREFRONT JAMB DETAIL
SCALE: 3" = 1'-0"



7 OM-A-508 ADMIN/TRUCK STORAGE INTERSECTION
SCALE: 3" = 1'-0"



8 OM-A-508 PASS-THRU WINDOW JAMB DETAIL
SCALE: 3" = 1'-0"



9 OM-A-508 ACCESSIBLE LOCKERS
SCALE: 3/4" = 1'-0"

SPECIFICATION LEGEND

03 30 00.1	CAST-IN-PLACE CONCRETE	05 50 00.2	METAL FABRICATIONS	07 41 16.5	CAST IRON DOWNSPOUT BOOTS	08 41 13.1	ALUMINUM-FRAMED STOREFRONTS AND ENTRANCES	09 77 00.1	FIBER-REINFORCED PLASTIC PANELING	10 28 00.7	18" VERTICAL GRAB BAR	11 11 00.5	TRENCH DRAINS AND CATCH BASINS	11 11 10.11	AIR COMPRESSOR	22 10 00.1	FLOOR DRAIN - REFER TO PLUMBING DWGS
03 30 00.2	VAPOR BARRIER	06 10 00.1	WOOD BLOCKING	07 41 16.6	ROOF RIDGE CLOSURE	08 51 13.1	ALUMINUM WINDOWS	09 96 00.1	HIGH-PERFORMANCE COATING	10 28 00.8	36" HORIZONTAL GRAB BAR	11 11 00.6	WATER REEL SYSTEM	11 30 13.1	MICROWAVE	22 40 00.1	PLUMBING FIXTURE - REFER TO PLUMBING DWGS
03 30 00.3	GRAVEL BASE	06 10 00.2	PLYWOOD BACKING PANELS	07 41 16.7	UNDERLAYMENT	08 56 53.1	SECURITY WINDOWS	10 11 00.1	4' MARKER BOARD/TACK BOARD	10 28 00.9	42" HORIZONTAL GRAB BAR	11 11 00.7	IN-LINE CATCH BASIN	11 30 13.2	REFRIGERATOR/FREEZER	23 00 00.1	HVAC - REFER TO MECH. DWGS
03 30 00.4	EXPANSION JOINT	06 10 00.3	5/8" FRT PLYWOOD	07 42 13.1	EXTERIOR INSULATED METAL WALL PANELS	08 71 00.1	DOOR HARDWARE	10 11 00.2	8' MARKER BOARD	10 28 00.10	SANITARY NAPKIN DISPOSAL	11 11 00.8	12"x36" METAL SHEVELS	12 21 13.1	HORIZONTAL LOUVER BLINDS	23 30 00.1	HVAC LOUVERS AND VENTS - REFER TO MECH. DWGS
03 30 00.5	GROUT	06 16 00.1	GLASS-MAT GYPSUM SHEATHING	07 42 13.2	INTERIOR METAL WALL LINER PANELS	08 80 00.1	GLAZING	10 12 00.1	4' BULLETIN BOARD DISPLAY CASE	10 28 00.11	2' X 3' MIRROR	11 11 00.9	METAL CHARGING CABINET	12 51 00.1	TASK CHAIR	26 00 00.1	ELECTRICAL - REFER TO ELECTRICAL DWGS
03 30 10.1	SILICA FUME CONCRETE	06 16 00.2	5/8" PLYWOOD SHEATHING	07 42 13.3	METALLIC COATED STEEL SHEET	09 22 16.1	NON-STRUCTURAL METAL STUD FRAMING	10 14 23.1	PANEL SIGNAGE	10 28 00.12	UNFRAMED MIRROR	11 11 00.10	18"x36" METAL SHELVES	12 51 00.2	GUEST CHAIR	26 50 00.1	LIGHT FIXTURE - REFER TO ELECTRICAL DWGS
04 22 00.1	CONCRETE MASONRY UNIT	06 41 16.1	PLASTIC LAMINATE	07 62 00.1	SHEET METAL FLASHING AND TRIM	09 22 16.2	7/8" HAT-CHANNEL FURRING	10 21 13.1	PHENOLIC-CORE TOILET ENCLOSURE	10 28 00.13	UNDERLAVATORY GUARD	11 11 10.1	PRESSURE WASHER	12 51 00.3	STACKING CHAIR	27 00 00.1	COMMUNICATIONS - REFER TO TECH. DWGS
04 21 13.00	MASONRY AIR SPACE	06 41 16.2	SOLID SURFACE	07 72 53.1	SNOW GUARDS	09 29 00.1	5/8" TYPE "X" GYPSUM BOARD	10 21 13.2	PHENOLIC-CORE URINAL SCREEN	10 28 00.14	MOP AND BROOM HOLDER	11 11 10.2	PRESSURE WASHER TROLLEY SYSTEM	12 51 00.4	DESK	32 32 15.1	PRECAST MODULAR LOCK BLOCKS
04 26 13.1	MASONRY VENEER	07 21 00.1	EPS BOARD INSULATION	07 92 00.1	JOINT SEALANT AND BACKER ROD	09 29 00.2	1/2" GYPSUM BOARD	10 22 13.1	WIRE MESH PARTITIONS	10 44 13.1	FIRE PROTECTION CABINETS	11 11 10.3	PRESSURE WASHER WAND	12 51 00.5	RECTANGULAR TABLE	41 22 13.1	BRIDGE CRANE
05 12 00.1	STRUCTURAL STEEL FRAMING - REFER TO STRUCT. DWGS	07 21 00.2	BATT INSULATION	08 11 13.1	HOLLOW METAL DOORS	09 29 00.3	TILE BACKER PANELS	10 26 00.1	WALL AND DOOR PROTECTION	10 44 16.1	FIRE EXTINGUISHERS	11 11 10.4	SIDE WASH	12 51 00.6	FOLDING TABLE	41 22 14.1	MONORAIL CRANE
		07 21 00.3	FOAMED-IN-PLACE INSULATION	08 11 13.2	HOLLOW METAL DOOR FRAMES	09 29 00.4	1/2" GLASS-MAT GYPSUM BOARD	10 28 00.1	TOILET TISSUE ROLL DISPENSER (OFCI)	10 51 13.1	METAL LOCKERS	11 11 10.5	UNDERCARRIAGE WASH	12 51 00.7	LATERAL FILE	41 23 23.1	MOBILE COLUMN VEHICLE LIFTS
05 40 00.1	COLD-FORMED METAL FRAMING - REFER TO STRUCT. DWGS	07 25 00.1	AIR BARRIER	08 22 20.1	FIBERGLASS DOORS	09 29 00.5	SUSPENDED CEILING FRAMING	10 28 00.2	PAPER TOWEL (FOLDED) DISPENSER (OFCI)	10 75 16.1	GROUND-SET FLAGPOLES	11 11 10.6	VEHICLE WASH SYSTEM CONTROL PANEL	12 51 00.8	PEDESTAL FILE	43 22 56.1	SALT BRINE PRODUCTION SYSTEM
		07 41 16.1	INSULATED METAL ROOF PANELS	08 22 20.2	FIBERGLASS DOOR FRAMES	09 30 13.1	PORCELAIN TILE	10 28 00.3	SM PAPER TOWEL (FOLDED) DISPENSER (OFCI)	11 11 00.1	PORTABLE WELDING CURTAIN	11 11 10.7	VEHICLE WASH SYSTEM TANK	12 51 00.9	LARGE WASTE RECEPTACLE	43 22 56.2	SBPS VERTICAL STORAGE TANK
05 44 00.1	COLD-FORMED METAL TRUSSES - REFER TO STRUCT. DWGS	07 41 16.2	METAL GUTTERS	08 33 23.1	OVERHEAD COILING DOORS	09 51 13.1	ACOUSTICAL TILE CEILING	10 28 00.4	RECESSED WASTE RECEPTACLE	11 11 00.2	WELDING TABLE	11 11 10.8	PRESSURE WASHER REMOTE SWITCH	12 51 00.10	SMALL WASTE RECEPTACLE	43 22 56.3	SBPS HOPPER
		07 41 16.3	DOWNSPOUTS	08 36 13.1	OVERHEAD SECTIONAL DOORS	09 65 13.1	RESILIENT BASE	10 28 00.5	SM WASTE RECEPTACLE	11 11 00.3	LUBRICATION EQUIPMENT	11 11 10.9	VEHICLE WASH ON/OFF SELECTOR	13 31 23.1	TENSION FABRIC STRUCTURE	43 22 56.4	SBPS CHEMICAL BLENDER
05 50 00.1	METAL BOLLARDS	07 41 16.4	METAL FASCIA	08 36 14.1	WASH BAY OVERHEAD SECTIONAL DOORS	09 67 23.1	RESINOUS FLOORING	10 28 00.6	LIQUID SOAP DISPENSER (OFCI)	11 11 00.4	WORK BENCHES	11 11 10.10	TROLLEY SYSTEM STANDOFF ANCHOR	13 34 19.1	PRE-ENGINEERED METAL BUILDING		

J S & P ARCHITECTS
Jerome Scott & Partners Architects
1020 Goodale Blvd., Columbus, Ohio 43212

STATE OF OHIO
DANIEL BOYNE
12165592
REGISTERED ARCHITECT

DOT-250002
KNOX FULL SERVICE MAINTENANCE FACILITY

505 HARCOURT RD., MT. VERNON, OH 43050

MARK	DATE	DESCRIPTION
04	1/28/26	BID ADDENDUM 002
03	1/15/26	BID DOCUMENTS
02	11/21/25	PERMIT DOCUMENTS
01	10/24/25	CONSTRUCTION DOCUMENTS

PROJECT NO: **DOT-250002**
DATE: **2/24/2025**
DRAWN BY: **CMC**

SHEET TITLE

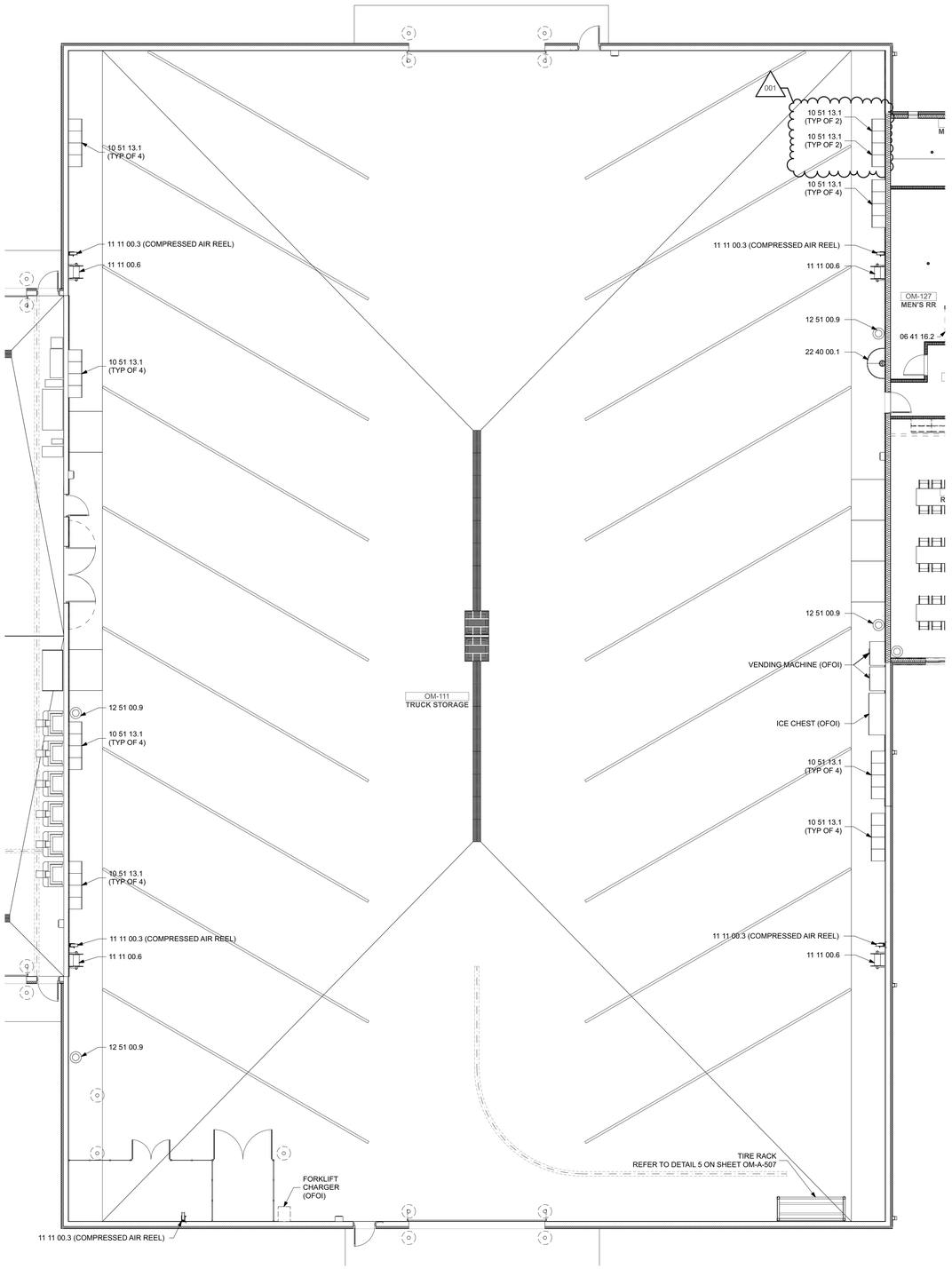
INTERIOR DETAILS

OM-A-508

CODED NOTES:

1 ACCESSIBLE LOCKER. REFER TO DETAIL 9/OM-A-508.

001



OM-A-1301 FF&E PLAN (TRUCK STORAGE)
SCALE: 1/8" = 1'-0"

SPECIFICATION LEGEND

03 30 00.1	CAST-IN-PLACE CONCRETE	05 50 00.2	METAL FABRICATIONS	07 41 16.5	CAST IRON DOWNSPOUT BOOTS	08 41 13.1	ALUMINUM-FRAMED STOREFRONTS AND ENTRANCES	09 77 00.1	FIBER-REINFORCED PLASTIC PANELING	10 28 00.7	18" VERTICAL GRAB BAR	11 11 00.5	TRENCH DRAINS AND CATCH BASINS	11 11 10.11	AIR COMPRESSOR	22 10 00.1	FLOOR DRAIN - REFER TO PLUMBING DWGS
03 30 00.2	VAPOR BARRIER	06 10 00.1	WOOD BLOCKING	07 41 16.6	ROOF RIDGE CLOSURE	08 51 13.1	ALUMINUM WINDOWS	09 96 00.1	HIGH-PERFORMANCE COATING	10 28 00.8	36" HORIZONTAL GRAB BAR	11 11 00.6	WATER REEL SYSTEM	11 30 13.1	MICROWAVE	22 40 00.1	PLUMBING FIXTURE - REFER TO PLUMBING DWGS
03 30 00.3	GRAVEL BASE	06 10 00.2	PLYWOOD BACKING PANELS	07 41 16.7	UNDERLAYMENT	08 56 53.1	SECURITY WINDOWS	10 11 00.1	4' MARKER BOARD/TACK BOARD	10 28 00.9	42" HORIZONTAL GRAB BAR	11 11 00.7	IN-LINE CATCH BASIN	11 30 13.2	REFRIGERATOR/FREEZER	23 00 00.1	HVAC - REFER TO MECH. DWGS
03 30 00.4	EXPANSION JOINT	06 10 00.3	5/8" FRT PLYWOOD	07 42 13.1	EXTERIOR INSULATED METAL WALL PANELS	08 71 00.1	DOOR HARDWARE	10 11 00.2	8' MARKER BOARD	10 28 00.10	SANITARY NAPKIN DISPOSAL	11 11 00.8	12"x36" METAL SHEVELS	12 21 13.1	HORIZONTAL LOUVER BLINDS	23 30 00.1	HVAC LOUVERS AND VENTS - REFER TO MECH. DWGS
03 30 00.5	GROUT	06 16 00.1	GLASS-MAT GYPSUM SHEATHING	07 42 13.2	INTERIOR METAL WALL LINER PANELS	08 80 00.1	GLAZING	10 12 00.1	4' BULLETIN BOARD DISPLAY CASE	10 28 00.11	2' X 3' MIRROR	11 11 00.9	METAL CHARGING CABINET	12 51 00.1	TASK CHAIR	26 00 00.1	ELECTRICAL - REFER TO ELECTRICAL DWGS
03 30 10.1	SILICA FUME CONCRETE	06 16 00.2	5/8" PLYWOOD SHEATHING	07 42 13.3	METALLIC COATED STEEL SHEET	09 22 16.1	NON-STRUCTURAL METAL STUD FRAMING	10 14 23.1	PANEL SIGNAGE	10 28 00.12	UNFRAMED MIRROR	11 11 00.10	18"x36" METAL SHELVES	12 51 00.2	GUEST CHAIR	26 50 00.1	LIGHT FIXTURE - REFER TO ELECTRICAL DWGS
04 22 00.1	CONCRETE MASONRY UNIT	06 41 16.1	PLASTIC LAMINATE	07 62 00.1	SHEET METAL FLASHING AND TRIM	09 22 16.2	7/8" HAT-CHANNEL FURRING	10 21 13.1	PHENOLIC-CORE TOILET ENCLOSURE	10 28 00.13	UNDERLAVATORY GUARD	11 11 10.1	PRESSURE WASHER	12 51 00.3	STACKING CHAIR	27 00 00.1	COMMUNICATIONS - REFER TO TECH. DWGS
04 21 13.00	MASONRY AIR SPACE	06 41 16.2	SOLID SURFACE	07 72 53.1	SNOW GUARDS	09 29 00.1	5/8" TYPE "X" GYPSUM BOARD	10 21 13.2	PHENOLIC-CORE URINAL SCREEN	10 28 00.14	MOP AND BROOM HOLDER	11 11 10.2	PRESSURE WASHER TROLLEY SYSTEM	12 51 00.4	DESK	32 32 15.1	PRECAST MODULAR LOCK BLOCKS
04 26 13.1	MASONRY VENEER	07 21 00.1	EPS BOARD INSULATION	07 92 00.1	JOINT SEALANT AND BACKER ROD	09 29 00.2	1/2" GYPSUM BOARD	10 22 13.1	WIRE MESH PARTITIONS	10 44 13.1	FIRE PROTECTION CABINETS	11 11 10.3	PRESSURE WASHER WAND	12 51 00.5	RECTANGULAR TABLE	41 22 13.1	BRIDGE CRANE
05 12 00.1	STRUCTURAL STEEL FRAMING - REFER TO STRUCT. DWGS	07 21 00.2	BATT INSULATION	08 11 13.1	HOLLOW METAL DOORS	09 29 00.3	TILE BACKER PANELS	10 26 00.1	WALL AND DOOR PROTECTION	10 44 16.1	FIRE EXTINGUISHERS	11 11 10.4	SIDE WASH	12 51 00.6	FOLDING TABLE	41 22 14.1	MONORAIL CRANE
		07 21 00.3	FOAMED-IN-PLACE INSULATION	08 11 13.2	HOLLOW METAL DOOR FRAMES	09 29 00.4	1/2" GLASS-MAT GYPSUM BOARD	10 28 00.1	TOILET TISSUE ROLL DISPENSER (OFCI)	10 51 13.1	METAL LOCKERS	11 11 10.5	UNDERCARRIAGE WASH	12 51 00.7	LATERAL FILE	41 23 23.1	MOBILE COLUMN VEHICLE LIFTS
05 40 00.1	COLD-FORMED METAL FRAMING - REFER TO STRUCT. DWGS	07 25 00.1	AIR BARRIER	08 22 20.1	FIBERGLASS DOORS	09 29 00.5	SUSPENDED CEILING FRAMING	10 28 00.2	PAPER TOWEL (FOLDED) DISPENSER (OFCI)	10 75 16.1	GROUND-SET FLAGPOLES	11 11 10.6	VEHICLE WASH SYSTEM CONTROL PANEL	12 51 00.8	PEDESTAL FILE	43 22 56.1	SALT BRINE PRODUCTION SYSTEM
		07 41 16.1	INSULATED METAL ROOF PANELS	08 22 20.2	FIBERGLASS DOOR FRAMES	09 30 13.1	PORCELAIN TILE	10 28 00.3	SM PAPER TOWEL (FOLDED) DISPENSER (OFCI)	11 11 00.1	PORTABLE WELDING CURTAIN	11 11 10.7	VEHICLE WASH SYSTEM TANK	12 51 00.9	LARGE WASTE RECEPTACLE	43 22 56.2	SBPS VERTICAL STORAGE TANK
05 44 00.1	COLD-FORMED METAL TRUSSES - REFER TO STRUCT. DWGS	07 41 16.2	METAL GUTTERS	08 33 23.1	OVERHEAD COILING DOORS	09 51 13.1	ACOUSTICAL TILE CEILING	10 28 00.4	RECESSED WASTE RECEPTACLE	11 11 00.2	WELDING TABLE	11 11 10.8	PRESSURE WASHER REMOTE SWITCH	12 51 00.10	SMALL WASTE RECEPTACLE	43 22 56.3	SBPS HOPPER
		07 41 16.3	DOWNSPOUTS	08 36 13.1	OVERHEAD SECTIONAL DOORS	09 65 13.1	RESILIENT BASE	10 28 00.5	SM WASTE RECEPTACLE	11 11 00.3	LUBRICATION EQUIPMENT	11 11 10.9	VEHICLE WASH ON/OFF SELECTOR	13 31 23.1	TENSION FABRIC STRUCTURE	43 22 56.4	SBPS CHEMICAL BLENDER
05 50 00.1	METAL BOLLARDS	07 41 16.4	METAL FASCIA	08 36 14.1	WASH BAY OVERHEAD SECTIONAL DOORS	09 67 23.1	RESINOUS FLOORING	10 28 00.6	LIQUID SOAP DISPENSER (OFCI)	11 11 00.4	WORK BENCHES	11 11 10.10	TROLLEY SYSTEM STANDOFF ANCHOR	13 34 19.1	PRE-ENGINEERED METAL BUILDING		

JS&P ARCHITECTS
Jerome Scott & Partners Architects
1020 Goodale Blvd., Columbus, Ohio 43212

STATE OF OHIO
DANIEL BOYNE
1216592
REGISTERED ARCHITECT

DOT-250002
KNOX FULL SERVICE MAINTENANCE FACILITY

505 HARCOURT RD., MT. VERNON, OH 43050

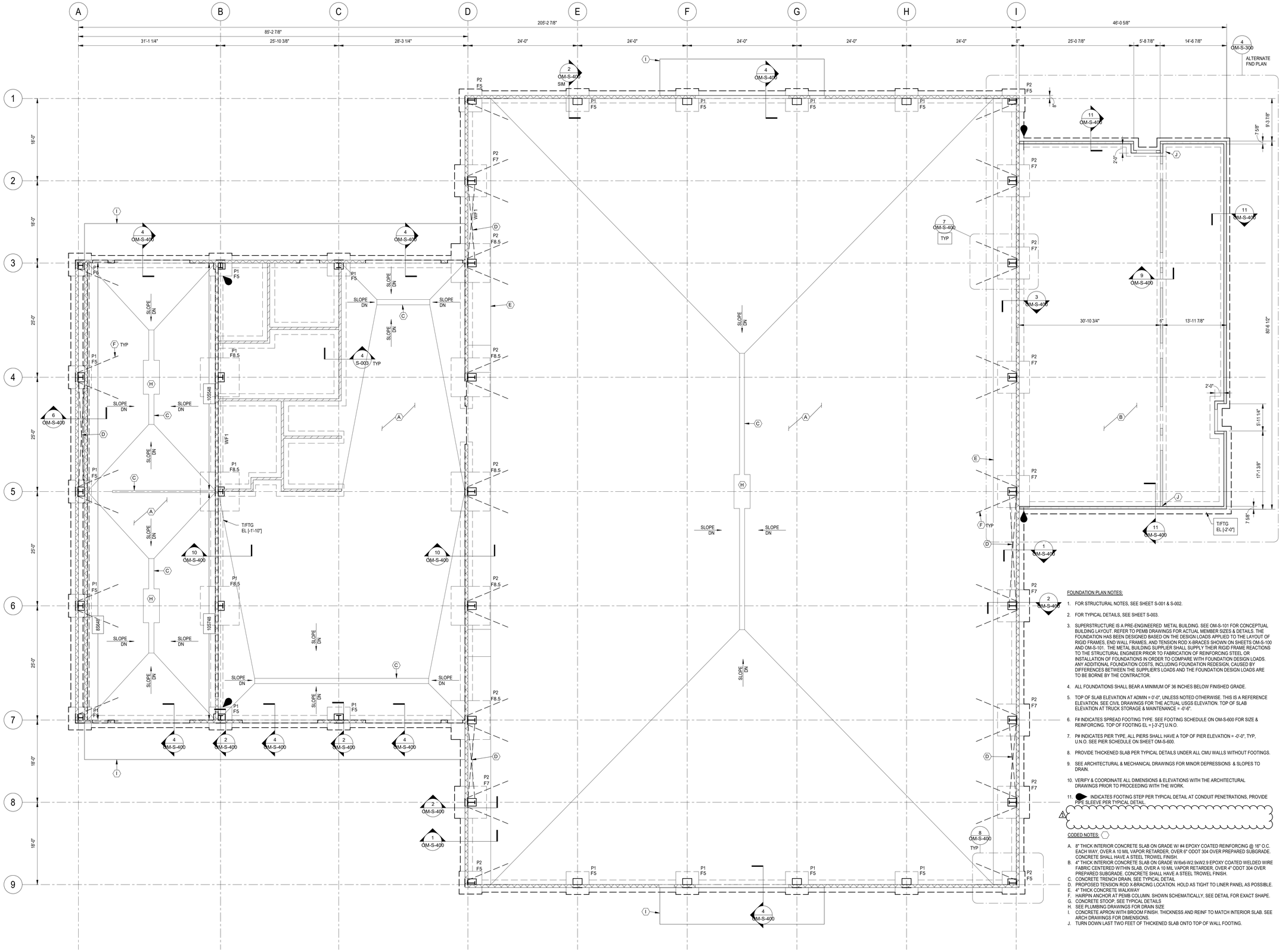
MARK	DATE	DESCRIPTION
05	1/28/26	BID ADDENDUM 002
04	1/15/26	BID DOCUMENTS
03	11/21/25	PERMIT DOCUMENTS
02	10/24/25	CONSTRUCTION DOCUMENTS
01	8/26/25	DESIGN DEVELOPMENT

PROJECT NO: **DOT-250002**
DATE: **2/24/2025**
DRAWN BY: **CMC**

SHEET TITLE

TRUCK STORAGE FF&E PLAN

OM-A-1301



1 FOUNDATION PLAN
OM-S-100 SCALE: 1/8" = 1'-0"

FOUNDATION PLAN NOTES:

1. FOR STRUCTURAL NOTES, SEE SHEET S-001 & S-002.
2. FOR TYPICAL DETAILS, SEE SHEET S-003.
3. SUPERSTRUCTURE IS A PRE-ENGINEERED METAL BUILDING. SEE OM-S-101 FOR CONCEPTUAL BUILDING LAYOUT. REFER TO PEMB DRAWINGS FOR ACTUAL MEMBER SIZES & DETAILS. THE FOUNDATION HAS BEEN DESIGNED BASED ON THE DESIGN LOADS APPLIED TO THE LAYOUT OF RIGID FRAMES, END WALL FRAMES, AND TENSION ROD X-BRACES SHOWN ON SHEETS OM-S-100 AND OM-S-101. THE METAL BUILDING SUPPLIER SHALL SUPPLY THEIR RIGID FRAME REACTIONS TO THE STRUCTURAL ENGINEER PRIOR TO FABRICATION OF REINFORCING STEEL OR INSTALLATION OF FOUNDATIONS IN ORDER TO COMPARE WITH FOUNDATION DESIGN LOADS. ANY ADDITIONAL FOUNDATION COSTS, INCLUDING FOUNDATION REDESIGN, CAUSED BY DIFFERENCES BETWEEN THE SUPPLIER'S LOADS AND THE FOUNDATION DESIGN LOADS ARE TO BE BORNE BY THE CONTRACTOR.
4. ALL FOUNDATIONS SHALL BEAR A MINIMUM OF 36 INCHES BELOW FINISHED GRADE.
5. TOP OF SLAB ELEVATION AT ADMIN = 0'-0", UNLESS NOTED OTHERWISE. THIS IS A REFERENCE ELEVATION. SEE CIVIL DRAWINGS FOR THE ACTUAL USGS ELEVATION. TOP OF SLAB ELEVATION AT TRUCK STORAGE & MAINTENANCE = -0'-6".
6. F# INDICATES SPREAD FOOTING TYPE. SEE FOOTING SCHEDULE ON OM-S-600 FOR SIZE & REINFORCING. TOP OF FOOTING EL = [-3'-2"] U.N.O.
7. P# INDICATES PIER TYPE, ALL PIERS SHALL HAVE A TOP OF PIER ELEVATION = -0'-0", TYP, U.N.O. SEE PIER SCHEDULE ON SHEET OM-S-600.
8. PROVIDE THICKENED SLAB PER TYPICAL DETAILS UNDER ALL CMU WALLS WITHOUT FOOTINGS.
9. SEE ARCHITECTURAL & MECHANICAL DRAWINGS FOR MINOR DEPRESSIONS & SLOPES TO DRAIN.
10. VERIFY & COORDINATE ALL DIMENSIONS & ELEVATIONS WITH THE ARCHITECTURAL DRAWINGS PRIOR TO PROCEEDING WITH THE WORK.
11. INDICATES FOOTING STEP PER TYPICAL DETAIL AT CONDUIT PENETRATIONS, PROVIDE PIPE SLEEVE PER TYPICAL DETAIL.

CODED NOTES:

A. 8" THICK INTERIOR CONCRETE SLAB ON GRADE W/ #4 EPOXY COATED REINFORCING @ 16" O.C. EACH WAY, OVER A 10 MIL VAPOR RETARDER, OVER 6" ODOT 304 OVER PREPARED SUBGRADE. CONCRETE SHALL HAVE A STEEL TROWEL FINISH.
B. 4" THICK INTERIOR CONCRETE SLAB ON GRADE W/6x6-W2.9xW2.9 EPOXY COATED WELDED WIRE FABRIC CENTERED WITHIN SLAB, OVER A 10 MIL VAPOR RETARDER, OVER 4" ODOT 304 OVER PREPARED SUBGRADE. CONCRETE SHALL HAVE A STEEL TROWEL FINISH.
C. CONCRETE TRENCH DRAIN, SEE TYPICAL DETAIL
D. PROPOSED TENSION ROD X-BRACING LOCATION. HOLD AS TIGHT TO LINER PANEL AS POSSIBLE.
E. 4" THICK CONCRETE WALKWAY
F. HAIRPIN ANCHOR AT PEMB COLUMN. SHOWN SCHEMATICALLY, SEE DETAIL FOR EXACT SHAPE.
G. CONCRETE STOOP, SEE TYPICAL DETAILS
H. SEE PLUMBING DRAWINGS FOR DRAIN SIZE
I. CONCRETE APRON WITH BROOM FINISH. THICKNESS AND REINF TO MATCH INTERIOR SLAB. SEE ARCH DRAWINGS FOR DIMENSIONS.
J. TURN DOWN LAST TWO FEET OF THICKENED SLAB ONTO TOP OF WALL FOOTING.

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 · Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com
A80125-0001

JS&P ARCHITECTS
Jerome Scott & Partners Architects
1020 Goodale Blvd., Columbus, Ohio 43212

STATE OF OHIO
JEFFREY E. McCUTCHEN
E-61727
REGISTERED PROFESSIONAL ENGINEER

DOT-250002
KNOX FULL SERVICE MAINTENANCE FACILITY

BID DOCUMENTS

505 HARCOURT RD., MT. VERNON, OH 43050

MARK	DATE	DESCRIPTION
05	1/28/26	BID ADDENDUM 002
04	1/15/26	BID DOCUMENTS
03	11/21/25	PERMIT DOCUMENTS
02	10/24/25	CONSTRUCTION DOCUMENTS
01	8/26/25	DESIGN DEVELOPMENT

PROJECT NO: **DOT-250002**
DATE: **01/16/2026**
DRAWN BY: **SMA**

SHEET TITLE

FOUNDATION PLAN - OFFICE MAINTENANCE BUILDING

OM-S-100