

Addendum No. 1

November 15, 2019

An Addition for:

Grand Oaks Elementary Gymnasium

To: Prime contractors and all others to whom drawings and specifications have been issued. This Addendum forms part of the Contract Documents. It supplements and modifies them as follows:

A. Drawings:

- **Question**

There is no specific controls specification listed for the project, however, there are (2) RTU's that will need to be tied into the existing BAS per drawings M1.1 notation which is Automated Logic. Can someone produce a Sequence of Operations that will be required for these two units including what control points are being sought out.

- **Response**

The following sequence of operation is meant for RTU-1 and RTU-2 for this project:

SEQUENCE OF OPERATION

RTU-1 and RTU2 will be controlled the same way as described below.

Fan

The fan shall be energized during gymnasium occupancy. The fan shall cycle during non occupied times.

Cooling

The BAS shall communicate to the unit microprocessor to control cooling to bring the compressors on during a call for cooling. As the space is satisfied, the compressors will cycle off to maintain a temperature setpoint of 70F in the summer and 68F in the winter.

Heating

The BAS shall communicate with the unit microprocessor to control heating to energize the furnace during a call for heating. As the space satisfies, the furnace will cycle off to maintain an adjustable setpoint.

Economizer

An unit mounted enthalpy economizer shall open the Outside air damper to 100% and energize the power exhaust. The economizer will be locked out at manufacturer standard conditions.

Dehumidification

A duct mounted humidistat shall measure relative humidity of return air. The BAS will communicate with the unit controller to put the unit in dehumidification mode. The cooling will be engaged and the heating will be modulated in order to not over cool the space. The unit leaving air temperature during dehumidification is 70F.

Automated Logic

The BAS shall receive/send the following information:

RTU-1 Fan start/stop/status

RTU-2 Fan start/stop/status

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RTU-1/RTU-2 Outside air temperature
 RTU1/RTU-2 Condensing unit stages
 RTU-1/RTU-2 Space Temperature
 RTU-1/RTU-2 Furnace enable/disable
 RTU-1/RTU-2 Economizer damper enable/disable and power exhaust enable/disable
 RTU-1/RTU-2 Supply and Return Duct Smoke detectors
 RTU-1/RTU-2 Unit Filter differential pressure

- **Question**

On mechanical drawing M1.1 under the equipment schedule, the very last item indicates a thermostat to be compatible with the Automated Logic Control System. There is no control specification for the project, however, there is an existing Automated Logic Control System at the School. The question is does this unit need to tie into the Automated Logic Control system that is on site and if so, what is the Controls Sequence of Operations and Points List that is expected to be provided?

- **Response**

Yes the unit needs to tie into the Automated Logic Control System. See response above for Sequence of Operations.

- **Question**

Can the basic Z100 roof drain be used in lieu of the stainless body. Note too that the Z1715 is available for a butt weld connection or a threaded connection and we are to run cast iron no hub for the additional drain work.

- **Response**

The Z100-NH can be used. Provide no hub fittings.

B. Specifications:

- In the Table of Contents, Division 31, Section 31 31 16 Termite Control is shown including 4 pages. Clarification: The total number of pages included for this section is 3. The Table of Contents is revised to reflect 3 pages.

- In the Table of Contents, Division 5, Section 05 50 73 is listed. This section is omitted from the Table of Contents and **Replaced** with Section 05 50 00 Shop Fabricated Metal. Document is attached.

- **Section 31 05 30**

Question:

The Specification states "Unit Price per square yard of geogrid delivered and installed in the foundation excavation."

There is no place on the Bid Form to provide this Unit Price. Is a Unit Price for this item still required? If yes, where do we provide the Unit Price?

Response:

Omit Section 2.01 Unit Prices. Unit price per square yard of geogrid delivered and installed in the foundation excavation is not required.

- **Section 31 20 00**

Question:

The Specification, under Unit Prices states "The contractor shall include on his Bid Form, any Unit Prices described in Section 01 21 00."

Section 01 21 00 does not exist.

Are we to include a unit price on the Bid Form? If yes, where do we provide the Unit

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Price?

Response:

Paragraph 2.01. A of Specification 31 20 00 is Omitted. Unit Prices are not required for this project. Specification Section 01 21 00 is not provided.

- **Section 31 20 00**

Question:

The Specification, under Allowances states "The contractor shall include on his Bid Form, any Allowances described in Section 01 21 00."

Section 01 21 00 does not exist.

Are we to include an Allowance on the Bid Form? If yes, where do we provide Allowances?

Response:

Paragraph 2.02 A of Specification 31 20 00 is Omitted. Section 01 21 00 is not included. No allowances are required by Specification Section 31 20 00.

- **Section 31 20 00**

Question:

The Specification states "Payment for unsuitable soil...shall be made at the agreed unit price per cubic yard."

Is this unit price to be included on the Bid Form? If yes, where do we provide it?

Response:

Paragraph 3.03 B of Specification 31 20 00 is Omitted. Unit prices are not included in this project.

- Section 31 20 00 is revised. Revised specification 31 20 00 is attached.

C. Clarifications:

- **Question:**

At the Pre-Bid Conference it was stated that "...attendance is required for subcontractors." Per Specification Section 00 11 16 – Invitation To Bid states that "Attendance at this Prebid Conference is mandatory for Prime Bidders. Representative of all Subcontractors bidding are invited and urged to attend."

Which is correct? If subcontractors are required to attend then the list becomes very limited and incomplete.

- **Response:**

Specification Section 00 11 16 Invitation to Bid is Correct. Attendance at the Prebid Conference is mandatory for Prime Bidders. Representatives of all Subcontractors bidding are invited and urged to attend.

D. Substitution Requests:

- **Specification Section 116623**

Basketball Backstops

A substitution request was received for specification section 11 66 23 proposing to provide products by Draper Inc. Draper Inc. is approved equal manufacturer for Basketball Backstops and Volleyball Net Standards Sleeves. Exact items provided must meet all dimensional and operational requirements as specified in the drawings and project manual.

End of Addendum

Job Number: 170759

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Knoxville, TN 37919
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100 Colonial Center Parkway, Suite 230
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Architecture: AA26000828
Interiors: IB26000665

SECTION 05 50 00 – SHOP FABRICATED METAL

PART I GENERAL

1.01 SCOPE:

- A Furnish all labor, materials, tools, equipment, coordination, supervision services, etc., as required for complete performance of the work as shown on the drawings and specified herein.
- B In General this Section Includes the Following: Fabricate and deliver rough hardware, steel stair framing and stair handrails, and other miscellaneous shop fabricated steel items not supplied with other supplied steel fabrications.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 05 12 00 Structural Steel

1.03 SUBMITTALS:

- A Shop drawings detailing fabrication and erection of each metal fabrication. Include plans, elevations, sections and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections. Welder's certificates signed by Contractor certifying that welders comply with requirements specified herein.

1.04 QUALITY ASSURANCE:

- A Fabrication firm shall have experience at successfully producing metal fabrications similar to those indicated, and have sufficient production capacity to produce required work without causing delay.
- B Installation of each item shall be performed by same firm that fabricated them.
- C Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel", D1.3 "Structural Welding Code – Sheet Steel".
- D Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved, and if pertinent, has undergone re-certification.

PART II PRODUCTS

2.01 MATERIALS:

- A Cast Iron: Clean, tough gray iron free from blow holes, cinder spots or cold shuts. Conforming to ASTM Specifications.
- B Wrought Iron: (1) Plates, ASTM A52; Sheet, ASTM A162; and Bolts, Rods, Bars, ASTM A141.
- C Structural Steel: ASTM A36.
- D Aluminum: Type recommended by manufacturer unless specifically noted.

2.02 SHOP PAINT:

- A All ferrous metal items shall be painted one coat of rust inhibitive shop primer except those with galvanized finish or to be embedded in concrete or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application specification No. 1" for shop painting.

2.03 BOLTS AND ANCHORS:

- A Furnish and install all bolts, anchors, expansion bolts, etc., as needed to properly install all items of work, including woodwork, etc.
- B Joints: Tightly fitted, finished smooth and even concealed where possible, rivets countersunk on exposed surfaces. No drifting.
1. Steel: Riveted or welded.
 2. Castings: Concealed bolts or cap screws counter-sunk on face.
 3. Wrought Iron: Welded or machine screws.
 4. Exterior Work: Shed water and prevent entrance to hollow work.
 5. Aluminum: Welded, ground and buffed for flush machine screws.

2.04 EQUIPMENT SUPPORTS:

- A Provide equipment supports of structural shapes where shown and as detailed and where not furnished by equipment contractors.

2.05 METAL HANDRAILS:

- A Materials: Standard steel pipe and steel bar of size indicated, cast or malleable iron flanges. Provide handrails both sides of all stairs and mechanical walkway, and at one side of the walking track.
- B Joints: Welded, ground smooth.
- C Setting: Weld to structure and provide welded flanges at walls. Expansion bolt all flanges with countersunk flat head bolts.

2.06 STEEL LINTEL ANGLES FOR OPENINGS IN MASONRY:

- A Unless otherwise shown, loose lintels shall be 16 inches larger than the masonry to masonry opening over which they occur. Unless otherwise shown, they shall be 6 inch by 3-1/2 inch by 3/8 inch angles, one for each 4 inches of wall thickness. Furnish other miscellaneous structural shapes to be built by masons or other trades which are not elsewhere specified.

2.07 LADDERS:

- A Rungs: 1 inch diameter steel bar stock with anti-slip, non-gritted, steel metallized abrasive surface. Grade #2 Medium as manufactured by W. S. Molnar Company, Detroit, Michigan or approved substitute.
- B Other Materials: Standard steel bar or miscellaneous shapes of sizes indicated.
- C Joints: Welded, ground smooth.
- D Floor expansion bolts shall be 1/2", equal to Para-sleeve concrete anchors.

2.08 STEEL STAIRS:

- A Stringers, supports and connections for steel stairs shall be designed to sustain a live load of not less than 100 pounds per square foot. Treads shall be designed to carry a minimum concentrated load of 300 pounds on the centerline of tread span.

- B Stringers shall be 12" x 1-1/2" x 10.6# channels minimum. Exposed open ends of stringers shall be closed by filler plates welded in place.
- C Interior stair treads, unless noted otherwise, shall be designed to receive cement fill.
1. Interior risers shall be closed with #12 gauge sheet steel riser plates secured to treads by bolting.
 2. Stair Treads at equipment mezzanines shall be galvanized rectangular bar steel grate treads with checker plate nosing similar to type SGW treads as manufactured by the McNichols Co. (800) 237-820.
- D Stair railings, unless otherwise noted, shall be fabricated of 1-1/2" O.D. black steel pipe. Railings shall be supported from stringers except where walls are adjacent to railings.
1. At locations indicated to receive wood handrails 2" or less in width, provide Wagner Companies #1806 supports (3-1/4 in. wall-to-center, 1-1/2 in. drop, #4 satin finish, aluminum alloy 535) spaced as recommended by the manufacturer unless otherwise noted on drawings.
 2. At locations indicated to receive steel handrails 2" or less in width, provide Sharpe Products #7335R supports (3-1/4 in. wall-to-center, 1-1/2 in. drop, formed 1/4" steel) finished to match handrails and spaced as recommended by the manufacturer unless otherwise noted on drawings.
 3. Pickets at railings supported from stringers shall be spaced as required to prevent the passage of a 4 inch diameter sphere.
- E Provide any necessary light I-beam, channel, angle or tee framing, hangers, etc., at various floor and platform levels to properly receive the stair construction.
- F Wall stringers shall continue around platforms, forming a base 4" high.
- G Bracket angles for treads and risers shall be at least 1-1/4" x 1-1/4" x 3/16" angles, welded to stringers.
- H Platforms shall be of not less than #12 gauge sheet steel. Support platforms on rolled tees spaced not over 30" on center. Tees shall be WT 2.5 x 8 for spans up to 5'-0". Longer spans shall be designed for a live load of 100 lbs. per sq. ft. Platforms shall be welded to tees.
- I All joints shall be ground smooth.

2.09 HINGES FOR DUMPSTER PAD GATES:

- A Hinges shall be heavy duty barrel hinges similar and equal to BRHC7-212 as manufactured by Tennessee Fabricating Company, 2025 York Avenue, Memphis TN 38104, Phone: (901) 725-1548, Fax: (901) 725-5954. Hinges shall have 7" x 1-1/2" Barrel Diameter, 3/4" stainless steel pin, load capacity per pair: 2,200 lbs.

2.10 GROUT AND ANCHORING CEMENT:

- A Non-Shrink, Non-Metallic Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with CECRD-C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.
- B Interior Anchoring Cement: Factory-prepackaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with water in field to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

- C Erosion Resistant Anchoring Cement: Factory-prepackaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with water in field to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by sealer or waterproof coating and is recommended for exterior use by manufacturer.
- D Subject to compliance with requirements, acceptable products include, but are not limited to, the following:
1. Non-Shrink, Non-Metallic Grouts:
 - "Bonsal Construction Grout": W.R. Bonsal Co.
 - "Diamond-Crete Grout": Concrete Service Materials
 - "Euco N-S Grout": Euclid Chemical Co.
 - "Kemset": Chem-Masters Corp.
 - "Crystex": L & M Construction Chemicals, Inc.
 - "Masterflow 713": Master Builders
 - "Sealtight 588 Grout": W.R. Meadows, Inc.
 - "SonogROUT": Sonneborn Building Products Div. Rexnord Chemical Products Inc.
 - "Five Star Grout": U.S. Grout Corp.
 - "Vibropruf #11": Lambert Corp.
 2. Interior Anchoring Cement:
 - "Bonsal Anchor Cement": W.R. Bonsal Co.
 - "Pro-Rok": Minwax Construction Products Div.
 - "Masterflow 928 and 713": Master Builders
 - "Euco N-S Grout": Euclid Chemical Co.
 - "Sealtight 588 Grout": W.R. Meadows Inc.
 3. Erosion -Resistant Anchoring Cement:
 - "super Por-Rok": Minwax Construction Products Div.
 - "Bonsal Anchor Cement": W.R. Bonsal Co.
 - "Thorogrip": Thoro Systems Products

2.11 FASTENERS:

- A Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for their intended use, type, grade, and class required.
1. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.
 2. Lag Bolts: Square head type, FS FF-B-561.
 3. Machine Screws: Cadmium plated steel, FS FF-S-92.
 4. Wood Screws: Flat head carbon steel, FS FF-S-111.
 5. Plain Washers: Round, carbon steel, FS FF-W-92.
- B Drilled-In Expansion Anchors: Complying with FS FF-S-325, Group VIII (anchors, expansions, {non-drilling}), Type I (internally threaded tubular expansion anchor), and machine bolts complying with FS FF-B575, Grade 5.
1. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.
 2. Lock Washers: Helical spring type, carbon steel, FS FF-W-84.
 3. Ferrous Metal Shop Primer: Manufacturer's or Fabricator's standard, fast-curing, lead-free, universal modified alkyd primer; selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure; complying with performance requirements of FS TT-P-645

4. Galvanized Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.
5. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint-12 except containing no asbestos fibers.

2.12 FABRICATION:

- A Fabricate items from materials of size, thickness, and shapes indicated by not less than that required to comply with performance indicated. Work to dimensions indicated or accepted on shop drawings, using proven details for fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- B Fabricate exposed work true to line and level, with accurate angles and surfaces, and straight sharp edges.
- C Allow for thermal movement through a maximum ambient temperature change (range) of 100° F (55.5° C) in the design, fabrication, and installation of assemblies, without buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations of actual surface temperatures of metals due to both solar heat gain and night time heat loss.
- D Shear and punch metals cleanly and accurately. Remove burrs.
- E Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- F Remove sharp or rough areas on exposed traffic surfaces.
- G Weld corners and seams continuously, complying with AWS recommendations and the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.
- H Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- I Provide anchorages of types indicated, coordinated with supporting substrates. Fabricate and space anchoring devices to provide adequate support for intended use.
- J Assemble items in shop to greatest extent possible. Partially fabricate only as necessary for shipping and handling limitations. Employ connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- K Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- L Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weeps where water may collect.

2.13 ROUGH HARDWARE:

A Furnish/fabricate bent or otherwise custom fashioned bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing/supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Furnish straight bolts and other stock rough hardware items as specified in DIVISION 6 Sections.

B Fabricate items to sizes shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, provide steel washers.

2.14 BEARING AND LEVELING PLATES:

A For steel items bearing on masonry or concrete, provide loose bearing and leveling plates, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.15 FINISHES, GENERAL:

A Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

B Finish metal fabrications after assembly.

2.16 STEEL AND IRON FINISHES:

A Galvanizing: For items indicated to be galvanized, apply zinc-coating by the hot-dip process in compliance with the following requirements:

1. ASTM A 153 for galvanizing iron and steel hardware.
2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.

B Prepare uncoated ferrous metal surfaces for shop priming in compliance with the following requirements for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP6 "Commercial Blast Cleaning".
2. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning".

C Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

PART III EXECUTION

3.01 INSTALLATION:

A Install anchorage devices and fasteners necessary for securing miscellaneous metal fabrications to substrates; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

B Perform cutting, drilling and fitting for installation of miscellaneous metal fabrications. From established lines and levels, locate and align fabrication accurately, at proper elevation, with edges and surfaces level, plumb, true and free of rack.

C Temporarily brace anchors which are to be built into concrete, masonry or similar construction.

- D Fit exposed connections accurately together to form hairline joints. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of exterior galvanized items, and those intended for bolted or screwed field connections.
- E For field welds, comply with AWS Code for procedures of manual shielded metal-arc welding, in appearance and quality of welds made, and methods used in correcting welding work.
- F Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- G Obtain fusion without undercut or overlap. Remove welding flux immediately.
- H At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour matches adjacent surface.

3.02 SETTING LOOSE PLATES:

- A Clean concrete and masonry bearing surfaces of foreign matter and roughen to improve bonding. Clean bonding surface of bearing plates.
- B Set plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. do not remove shims; if protruding, cut-off flush with edge of bearing plate before packing with grout. Pack grout leaving no voids between bearing surface and plate.
- C Use metallic non-shrink grout in concealed locations where not exposed to moisture; use non-metallic, non-shrink grout in exposed locations, unless otherwise indicated.

3.03 ADJUSTING AND CLEANING:

- A Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint and paint exposed areas with same materials as used for shop painting. Comply with SSPC-PA1 requirements for touch-up of field painted surfaces. Apply by brush or spray to provide a minimum dry thickness of 2.0 mils.
- B Clean field welds, bolted connections and abraded areas of galvanized items and apply galvanizing repair paint in compliance with ASTM A 780.

End of Section

SECTION 31 20 00 - EARTHWORK

PART I GENERAL

1.01 SCOPE:

- A Do all excavating, filling, backfilling, grading, and all necessary incidental work in connection therewith, required to install all work shown and specified under the Contract.
- B Work shall include, but not be limited to: Soils Engineer monitoring, topsoiling and fine grading of areas to be seeded; topsoiling and fine grading of planting areas; excavating and grading for building drives and walks, controlled filling and porous fill.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.

Section	00 31 32	Subsurface Investigation
Section	01 40 00	Quality Control
Division	22	Plumbing
Division	26	Electrical
Division	33	Utilities

B

OMITTED

1.03 EXAMINATION OF THE SITE:

- A Bidders upon work under this section, before submitting bids, shall visit and carefully examine the site so as to familiarize themselves with the existing conditions, including amount of topsoil available, and the difficulties that will affect the execution of the work. The submission of a bid will be construed as evidence that such an examination has been made.

REV02

B

OMITTED

1.05 SUBMITTALS:

A

OMITTED

- B Obtain and submit certification of adequacy of site grading and filling from Testing Laboratory, signed and sealed by the Geotechnical Engineer of record, registered in the state in which the work is performed, stating that work is in accordance with Contract Documents, and that soils are capable of supporting the structure to be constructed under the Contract.

C OMITTED

D

1.06 PROJECT CONDITIONS:

A OMITTED

B

- C Notify Owner's representative when excavations have reached required elevations. If it is determined that bearing materials are unsuitable, continue excavations until suitable bearing is encountered. Contract Amount may be adjusted by an appropriate Contract modification.

- D Locate and, where indicated to remain, protect and support existing utilities. If uncharted or incorrectly charted items are encountered, immediately notify utility company and cooperate with utility company's directives. Cooperate with Owner and utility companies in order to keep services and facilities in operation. Repair any damages caused by Work to the satisfaction of the affected utility company.

- E If utility service must be interrupted, give 72-hour notice to Owner's representative, and obtain written approval prior to such interruption.

- F Provide barricades and warning lights for open excavations. Operate warning lights as and when recommended by authorities having jurisdiction. Remove such protective items when no longer required.

- G Protect structures, utilities, sidewalks, paving, and other facilities from damage due to settlement, lateral movement, undermining, washout, and other hazards resulting from earthwork operations.

- H Root systems of trees to remain are to be protected from damage or drying out; cover exposed roots with burlap.

PART II PRODUCTS

2.01 OMITTED

A

2.02

A

2.03 DRAINAGE FABRIC:

A Non-woven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

1. Grab Tensile Strength: 110 lbf (490 N); ASTM D 4632.
2. Tear Strength: 40 lbf (178 N); ASTM D 4533.
3. Puncture Resistance: 50 lbf (222 N); ASTM D 4833.
4. Water Flow Rate: 150 gpm per sq. ft. (100 L/s per sq. m); ASTM D 4491.
5. Apparent Opening Size: No. 50 (0.3 mm); ASTM D 4751.

2.04 BURIED WARNING AND IDENTIFICATION TAPE:

A. Polyethylene plastic and metallic core or metallic-faced, acid and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read "CAUTION BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes:

Red	Electric
Yellow	Gas, Oil, Dangerous Materials
Orange	Telephone and Other Communications
Blue	Water Systems
Green	Sewer Systems
White	Steam Systems

B. Warning Tape for Metallic Piping: Acid and Alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.05 BACKFILL MATERIAL:

A Backfill material shall be a type that can be compacted to the densities specified under the conditions existing at the site at the time it is placed.

B Stone for compacted backfill under slabs shall be evenly graded mixture of crushed stone or crushed or uncrushed gravel, with one hundred percent (100%) passing a 1-1/2" sieve and not more than five percent (5%) passing a No. 4 sieve.

C Earth for compacted backfill and engineered fill shall consist of clean granular soils, clay soils, or shale soils having a plasticity index of less than 30 and a minimum density of 90 pounds per cubic foot when compacted to one hundred percent (100%) of its maximum dry density per standard proctor test. (ASTM D698) Material shall be free of vegetation, roots, rocks larger than 2" in any dimension, debris and other deleterious materials. Residual soil excavated at the site may be used for backfill if it meets the specification requirements. The moisture content of the fill soils should be maintained within +3 and -3 percentage points of optimum moisture content determined from the standard Proctor compaction test.

D Cohesive soils that have become hard and lumpy or that have been piled and become dry shall be broken up and properly conditioned for optimum moisture content immediately before using as backfill. However, in no case shall earth backfill be wetted or puddled in place.

E Backfill at retaining walls (if any) shall be ASTM #57 or #67 stone.

2.06 ENGINEERED FILL:

- A All fill in areas to be occupied by the building(s) and paving, including an area 10 feet outside the perimeters thereof, and any areas noted on the site plan as "Future Expansion" shall be controlled (engineered) fill and the compaction shall be tested by an Agency as specified in Section 01 40 00 Quality Control. Controlled fill in areas of buildings shall be compacted in thin lifts to at least 98% of maximum dry density within 3% of optimum moisture content in accordance with ASTM Specification D-698 (standard proctor). Fill in areas of asphalt paving shall be compacted in thin lifts to at least 98% of maximum dry density within 3% of optimum moisture content in accordance with ASTM Specification D 698. The upper 12 inches of fill beneath pavements and upper 24 inches beneath footings and grade slabs shall be compacted to 100%.
- B Where rock is excavated to 24 inches below footings, the footing excavations shall be refilled from top of rock to bottom of footings with controlled compacted fill.

2.07 TOPSOIL:

- A Shall be natural, fertile, agricultural soil, capable of sustaining vigorous plant growth. It shall be of uniform friable clay loam composition throughout, without admixture of subsoil. Soil shall be free of stones, lumps, live plants and their roots, sticks and other extraneous matter. The soil shall not be contaminated with substances harmful to the growth of plants and humans. It shall have a pH range of 5.0 to 7.0, and contain not less than five percent (5%) organic matter. The topsoil shall be free of noxious weeds, grasses or other foreign vegetation which would cause maintenance problems for the Owner after the contract is complete. Contractor shall assume full responsibility for control of noxious species introduced by the addition of soil infested with such species for a period of one year from Provisional Acceptance of the Work.

2.08 UNDERCUT AT FOUNDATIONS:

- A Undercut and backfill with compacted stone at foundations shall be performed if directed by the Engineer, based on the results of in place testing of earth at foundation sub-grades. In areas where unsuitable soils are encountered at or near foundation level, the foundation shall be undercut to a depth and width of two times the foundation bearing level or to competent bearing soils. The trench shall be backfilled with compacted stone to the level of foundation bearing.

2.09 OMITTED

A

B

2.10 CLASSIFICATION OF EXCAVATED MATERIALS:

- A Materials to be excavated shall be unclassified. Excavating shall include the removal of all materials encountered, both natural and artificial.
- B It is understood that full compensation has been included in the Base Bid amount for all excavation work, including the furnishing and installing of all filling and backfilling materials required, the removal of rock and excavating and backfilling of areas of unsuitable soil except work required because of differing site conditions as defined hereinafter.

2.11 OMITTED

A

OMITTED

2.12 DIFFERING SITE CONDITIONS:

A The Contractor shall promptly, and before such conditions are disturbed, notify the Engineer in writing of sinkholes or caves encountered in excavations.

B The Engineer and the Soil Engineer will promptly investigate the conditions, and if they find such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for performance of any part of the work under this Contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the Contract modified in writing accordingly by a change order.

C

OMITTED

D

PART III EXECUTION

3.01 ROCK EXCAVATION:

A

OMITTED

B

C

D Before placing concrete or masonry or rock surfaces, the surfaces shall be leveled off, or shelved, to a slope not exceeding one inch per foot.

E

OMITTED

F

If the use of explosives is required or desired by the Contractor, Contractor shall present written evidence of appropriate insurance, have written permission from the Engineer and all authorities having jurisdiction prior to bringing explosives onto job site or using in the work and shall implement all precautionary measures deemed necessary by all authorities having jurisdiction.

G

If rock is encountered, it shall be excavated to the following limits:

1. Two feet outside of concrete work for which forms are required, except footings.
2. One foot outside the perimeter of footings and two feet below bottom of footings.
3. One foot below concrete floor slabs on grade.
4. In all pipe trenches, 6" below invert elevation of pipe and 2 feet wider than the inside diameter of the pipe, but not less than three feet trench width. Contractor shall notify officials prior to detonation of explosives or beginning noisy drilling operations.
5. In all other excavated areas: 2 feet below finished grade.

3.02 EXCAVATIONS:

A

Excavation shall be to depth and of form and size required for installation of work shown on the drawings. Excavations for foundation walls shall be large enough to provide sufficient working space to permit the proper placing and inspection of forms, waterproofing, sleeves, and similar items, and the installation of foundation drains where such drains are shown. Excavation for slabs on grade shall be deep enough to allow for placing porous fill of depths specified under the slabs.

B

Excavation for wall and column footings shall be to firm undisturbed earth or engineered earth fill, sides square and bottoms level. Changes in level of wall footings shall be made by stepping and not by sloping. Trenches, if excavated properly, may be used to maintain the concrete for all footings without the use of forms.

C

Excavations in earth for footings, slabs, walks, and other structures shall not be made to full depths required when freezing temperatures or rain may be expected. Concrete footings shall be placed immediately after excavation is completed. Freezing or water damaged excavations shall be carried deeper as required and backfilled as necessary at no additional cost to the Owner. The Soils Engineer shall observe all footing excavations immediately prior to placing reinforcing steel or concrete.

D

After excavating and rough grading the building areas, and areas to be paved which are in cut, to the required subgrade elevations, and after topsoil has been removed from building areas and areas to be paved which are to receive engineered fill, these areas shall be proof-rolled by the Contractor in the presence of the Soils Engineer using a fully-loaded dump truck or similar pneumatic-tired equipment. Any areas exhibiting significant deflection, in the opinion of the Soil Engineer, shall be stabilized as directed prior to placing any fill. If areas exhibiting deflection cannot be stabilized by compaction, the unsuitable soil shall be undercut as directed by the Soil Engineer and replaced with engineered fill.

E

Any existing underground pipes or electrical conduits that are in service encountered during the excavation shall be temporarily supported and maintained until permanent support has been restored, or until other disposition has been made as directed by the Engineer. Existing underground pipes encountered that have been abandoned or are to be abandoned shall be removed to a point outside the construction excavation and plugged.

F

All non-engineered fill shall be removed in the area of the new construction and replaced with engineered fill. All footing excavations shall be examined and approved by a senior engineering technician working under the direct supervision of a Geotechnical engineer immediately prior to placing reinforcing steel or concrete. Modifications shall be made to the excavation if the Soils Engineer determines that the excavation is not in compliance with the drawings or specifications.

- G In cut areas, excavation shall extend below any deleterious materials or unsatisfactory soil as specified.
- H Cut shall not be carried deeper than necessary to reach required elevations. Fill shall be clean earth as specified for backfilling. Fill shall be placed evenly over the entire area to be filled, in layers. Each layer shall be thoroughly compacted to sufficient density to prevent unsightly settlement.
- J. Foundation Bearing Materials Testing: The Soils Engineer shall observe all footing excavations immediately **prior to placing reinforcing steel or concrete.**
1. For foundations bearing on residual (natural) soils, the bearing materials shall be probed with a minimum 1/2 inch diameter steel probe rod to detect weaker materials. Weaker materials detected by probing shall be tested with dynamic cone penetrometer to verify the design bearing capacity. Test frequency shall be one cone penetrometer test per four individual foundations and per 100 linear feet of strip foundations.
 2. For foundations bearing on fill (under the present contract) soils, the bearing materials shall be probed with a minimum 1/2 inch diameter steel probe rod to detect weaker materials. Weaker materials detected by probing shall be tested with a nuclear density gauge to verify the in-place percent compaction conforms to the applicable compaction criteria. Test frequency shall be one nuclear density test per four individual foundations and per 100 linear feet of strip foundations.

3.03 UNSUITABLE SOIL:

- A In building or paving areas where unsuitable soil conditions are encountered which cannot be stabilized by compaction, or where in the opinion of the Soil Engineer attempting stabilization by compaction would be unsuccessful, the unsuitable soil shall be excavated and removed from the site and the area backfilled with engineered fill specified hereinafter.

B

OMITTED

3.04

A

3.05 PROTECTION OF EXISTING WORK AND LANDSCAPE FEATURES:

- A Excavating, filling, backfilling and grading shall be performed in such a manner and by such methods that will not damage existing structures, existing underground piping, existing overhead wiring, existing trees (unless noted to be removed), and other landscaping planting.
- B Protect, maintain and restore benchmarks, monuments, and other reference points affected by this work. If bench marks, monuments or other permanent reference points are displaced or destroyed, points shall be re-established and markers reset under supervision of a licensed surveyor

OMITTED

3.06 PROTECTION OF EXCAVATION:

- A Excavation and grading operations shall be performed in a manner that will ensure positive and rapid surface run off of water away from the building area at all times.
- B Banks, slopes and adjacent structures shall be fully protected against harmful sluffing and erosion, by the use of shoring or other temporary construction, if necessary. The excavations shall be kept free of water by temporary dams or drains, pumping or other adequate means, until backfilling is completed.

3.07 STABILITY OF EXCAVATION

- A. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.
- B. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

D. OMITTED

3.08 BACKFILLING:

- A Excavation below the finished grade shall be backfilled after removing forms, shoring and similar temporary work and after waterproofing, piping, and other underground work has been installed, inspected and approved. Any caving of excavations or any backfill placed before inspections are completed shall be removed as the Engineer or Engineer may deem necessary.
- B Material and compaction of backfill for excavations in controlled fill shall conform to requirements specified for controlled fill.
- C Backfill material for use in areas to be seeded or planted shall be clean earth, free from large stones or rock fragments, large roots and debris, but may contain loam or similar organic matter. Backfill in these areas shall be compacted to a density that will prevent unsightly settlement after the finished grading is completed.
- D All backfill, not otherwise specified, shall be deposited in layers not over 10" loose thickness and each layer shall be compacted by light compaction equipment as it is placed.
- E Install porous backfill under concrete slabs on grade. Porous backfill thickness shall be not less than 4" under slabs. Where rock is excavated to 12 inches below concrete floor slabs on grade excavations shall be refilled from top of rock to bottom of slab with porous backfill.
- F Finish grade shall slope away from the structure on all sides.
- G After all turf, topsoil, roots, debris and other objectionable materials that would cause interference with the compaction of the fill have been removed, the area to be filled shall be scarified and broken to a depth of 8 inches. A thin layer, 3 inches thick, of the specified fill material shall be spread on the scarified base and the whole compacted as specified.

H. OMITTED

- I During the fill operation, field compaction tests by means of the Ottawa Sand and Cone Method, ASTM D1556, or other acceptable method, shall be made as often as deemed necessary by the selected testing agency to determine the percent compaction of any completed layer. There shall be taken not less than one compaction test for every 900 square feet for each foot depth to fill. There shall be a representative of the testing agency present on site at all times when engineered fill is being placed. If such test shows failure to meet the required compaction due to insufficient moisture, too much moisture, insufficient rolling or other causes, the Contractor shall remedy the condition by bringing the material to optimum moisture content or by continued rolling and re-compaction. In no case shall the Contractor be permitted to continue filling if the underlying layers fail to meet compaction requirements.
- J The Contractor shall maintain drainage and dryness so that there will be no undue saturation of the fill while the work is in progress. If an area becomes saturated, the Contractor shall remove all soft materials, scarify and re-compact to the required density.
- K Fill in areas other than those where controlled fill is specified shall be earth fill compacted to a density of approximately ninety-five percent (95%) standard proctor to prevent harmful or unsightly settlement of the finished grade, but need not be tested for specific percentage of compaction.
- L Additional fill dirt shall be taken from on-site or off-site locations as agreed to by the Engineer. Any such borrow areas shall be smoothed and left finished with topsoil, fertilizer and seeded as specified.

3.09 ROUGH GRADING:

- A Do all grading inside building to bring subgrade to proper level at underside of floor slab.
- B Do all grading outside the building required to bring the site to the finished grades indicated on the drawings. Subgrade in areas to be seeded and planted shall be brought to within 5" of finished grades.
- C Sub-grades under walks and paved areas shall be brought to proper elevations at bottom of surfacing material to within two-tenths of one foot, plus or minus, of the required grades and profiles.
- D Grades not otherwise shown shall be uniform levels or slopes between points where elevations are given, or between such points and existing finished grades.


3.10 EXCAVATION FOR UTILITY TRENCHES:

- A Excavate trenches to indicated gradients, lines, depths, and elevations.
 - 1. In the absence of a local code requirement or standard detail, beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B Excavate trenches to uniform widths to provide a working clearance on each side of pipe. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe, unless otherwise indicated.
 - 1. Clearance: As indicated in standard detail
- C Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes. Remove projecting stones and sharp objects along trench subgrade.


OMITTED

1. For ductile or cast iron pipe, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
2. For PVC or other flexible pipe provide 6" bedding layer of #57 stone.
3. For all pipe, excavate trenches 6" deeper than elevation required in rock or other unyielding bearing material to allow for #57 stone bedding layer. Provide specified stone.

3.11 UTILITY TRENCH BACKFILL:

- A Place and compact bedding course on trench bottoms where indicated as fill area on plans. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B Backfill trenches excavated under footings and within 18 inches of bottom of footings with concrete to elevation of bottom of footings.
- C  OMITTED
- D For typical site installation of ductile or cast iron pipe, place and compact initial backfill of sub-base material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping to avoid damage or displacement of utility system. For PVC or other flexible pipe, backfill with #57 stone (or to plans specifications if differs) to 6" above top of pipe to provide complete stone envelope. Backfill to subgrade with #57 stone in all paved areas.
- E Coordinate backfilling with utilities testing.
- F Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.
- G Place and compact final backfill of satisfactory soil material to final sub grade.
- H Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 FINE GRADING:

- A All areas where existing grass lawn cover is damaged or disturbed by construction operations. Areas indicated on the site plan to be grass shall be surfaced with topsoil not less than 5" thick after compacting. If the quantity of topsoil existing on the site is insufficient for these purposes, or if the existing topsoil does not conform to the requirements specified above for topsoil, additional topsoil shall be brought to the job or the existing topsoil shall be amended as required to provide the specified quantity and quality of topsoil.
- B After the rough grading and other construction operations have been completed to the point where these areas will not be disturbed by subsequent work, the subgrade shall be cleaned free from waste materials of all kinds, large rocks, and other objectionable material; scarified and pulverized to a depth of 4"; graded to remove remaining surface irregularities; and then covered with the topsoil which was previously removed and stockpiled.
- C  OMITTED
- D Finished grades shall slope away from the building in all cases and shall contain no sinks or dams. Hand trim and rake topsoil to finished grades and leave ready for seeding or planting.

3.13 DISPOSAL OR SURPLUS MATERIAL AND VEGETATION:

- A Surplus dirt and rock not required for site improvements shall be removed from the site at the Contractor's expense and to a place of his choosing but only after the Engineer has determined it cannot be used on the site. The Owner shall be given the opportunity to keep surplus dirt on site to use as he sees fit. Only after the Owner has stated that they do not wish to retain surplus dirt shall it be removed from the site.
- B All vegetation, roots, trees, etc., are to be hauled away from the site and **legally disposed of by the Contractor at his expense.**
- C Placement of any materials listed in Paragraphs A & B above on any off-site location shall be done only after prior approval of the Owner of the land involved and it shall be the full responsibility of the Contractor and Owner of such land to agree on location, distribution and condition in which such materials are left.

End of Section