SP-152067
(New)

SPECIAL PROVISIONS
FOR
LANDSCAPING

Black Hawk County
STBG-SWAP-1185(657)--SG-07

Effective Date
November 15, 2022

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

152067.00 – LANDSCAPING

This special provision includes all elements of the project associated with the Landscaping not specified elsewhere in the contract documents.

152067.01 CAST STONE SIGN WALLS

PART 1 - GENERAL

1.1 DEFINITIONS

Cast Stone: Architectural precast concrete building units intended to simulate natural cut stone.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for cast stone units.

B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
   1. Include wall elevations showing layout of units and locations of joints and anchors.

C. Samples for Initial Selection: For colored mortar.

D. Samples for Verification:

1. For each color and texture of cast stone required, 6 inches square in size.
2. For colored mortar. Make Samples using same sand and mortar ingredients to be used on project.

E. Qualification Data: For manufacturer.
   1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.

F. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364.
   1. Provide test reports based on testing within previous 2 years.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this project, with sufficient production capacity to manufacture required units.
   1. Manufacturer is a producing member of the Cast Stone Institute.

B. Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.

C. Source Limitations for Cast Stone: Obtain cast stone units through one source from a single manufacturer.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone to minimize the need for on-site storage and to avoid delaying the work.

B. Pack, handle, and ship cast stone units in suitable packs or pallets.
   1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
   2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

C. Store installation materials on elevated platforms, under cover, and in a dry location.

D. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.5 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40º F and above and will remain so until cast stone has dried, but not less than 7 days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.6 MEASUREMENT AND PAYMENT

A. Measurement: Lump sum item, no measurement will be made.

B. Payment: Payment will be at the lump sum contract price.

C. Includes: Lump sum price includes, but is not limited to, furnishing all materials, equipment, and labor necessary for installation as shown in the plans.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, products specified.
   2. Products: Subject to compliance with requirements, provide one of the products specified.
   3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, manufacturers specified.
   4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 CAST STONE MATERIALS

A. General: Comply with ASTM C 1364 and the following:

B. Portland Cement: ASTM C 150, Type I, containing not more than 0.60% total alkali when tested according to ASTM C 114.

C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation as needed to produce required textures and colors as needed to produce required cast stone colors.

D. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation as needed to produce required textures and colors as needed to produce required cast stone colors.

E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures, color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

F. Admixtures: Do not use admixtures unless specified or approved in writing by the Engineer.
   1. Do not use admixtures that contain more than 0.1% water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
   2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
   3. Air-Entraining Admixture: ASTM C 260.
   4. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
   5. Water-Reducing, Retarding Admixture: ASTM C 494/C 494M, Type D.

6. Water-Reducing, Accelerating Admixture: ASTM C 494/C 494M, Type E.

G. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M. Use galvanized or epoxy-coated reinforcement when covered with less than 1 1/2 inches of cast stone material.
   1. Epoxy Coating: ASTM A 775/A 775M.
   2. Galvanized Coating: ASTM A 767/A 767M.

H. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.

2.3 CAST STONE UNITS

A. Provide cast stone units complying with ASTM C 1364 using the vibrant dry tamp or wet-cast method.
   1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364.

B. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.
   1. Slope exposed horizontal surfaces 1:12, unless otherwise indicated.
   2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
   3. Provide drips on projecting elements, unless otherwise indicated.

C. Fabrication Tolerances:
   1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
   2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch , whichever is greater, but in no case by more than 1/4 inch.
   3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
   4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.

D. Cure units by one of the following methods:
   1. Cure units with steam in enclosed curing room at temperature of 105ºF or above and 95 to 100% relative humidity for 6 hours.
   2. Cure units with dense fog and water spray in enclosed warm curing room at 95 to 100% relative humidity for 24 hours.
   3. Cure units to comply with one of the following:
      a. Not less than 5 days at mean daily temperature of 70º F or above.
      b. Not less than 6 days at mean daily temperature of 60º F or above.
      c. Not less than 7 days at mean daily temperature of 50º F or above.
      d. Not less than 8 days at mean daily temperature of 45º F or above.

E. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

F. Colors and Textures: Basis-of-Design color selection is Edwards Cast Stone Company, Color 60-128.

G. Color and Texture: Provide units with fine-grained texture and buff color resembling Indiana limestone.

2.4 MORTAR MATERIALS

A. Provide mortar materials that comply with Division 04 Section "Unit Masonry."

B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

C. Hydrated Lime: ASTM C 207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

E. Masonry Cement: ASTM C 91.

F. Mortar Cement: ASTM C 1329.

G. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

H. Colored Cement Product: Packaged blend made from Portland cement and lime, masonry cement, or mortar cement and mortar pigments, all complying with specified requirements and containing no other ingredients.
   1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
   2. Pigments shall not exceed 10% of Portland cement by weight.
   3. Pigments shall not exceed 5% of masonry cement or mortar cement by weight.

I. Aggregate for Mortar: ASTM C 144.
   1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
   2. For joints less than 1/4 inch thick, use aggregate graded with 100% passing the No. 16 sieve.
   3. White-Mortar Aggregates: Natural white sand or crushed white stone.
   4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

J. Water: Potable.

2.5 ACCESSORIES

A. Anchors: Type and size indicated, fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.

B. Anchors: Type and size indicated, fabricated from steel complying with ASTM A 36/A 36M, and hot-dip galvanized to comply with ASTM A 123/A 123M.

C. Dowels: Round stainless-steel bars complying with ASTM A 276, Type 304, and 1/2 inch diameter.

D. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.6 MORTAR MIXES

A. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
   1. Do not use calcium chloride in mortar.
   2. Limit cementitious materials in mortar to Portland cement, mortar cement, and lime.

B. Comply with ASTM C 270, Proportion Specification.

C. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

2.7 SOURCE QUALITY CONTROL

A. Employ an independent testing agency to sample and test cast stone units according to ASTM C 1364.
   1. Include one test for resistance to freezing and thawing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of cast stone.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SETTING CAST STONE IN MORTAR

A. Install cast stone units to comply with requirements in Division 04 Section "Unit Masonry."

B. Set cast stone as indicated on contract documents. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
   1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.

C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.

D. Set units in full bed of mortar with full head joints, unless otherwise indicated.
   1. If not indicated, set units with joints 1/4 to 3/8 inch wide.
   2. Build anchors and ties into mortar joints as units are set.
   3. Fill dowel holes and anchor slots with mortar.
   4. Fill collar joints solid as units are set.
   5. Build concealed flashing into mortar joints as units are set.
   6. Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
   7. Keep joints at shelf angles open to receive sealant.

E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.

F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

G. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

H. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated. Keep joints free of mortar and other rigid materials.
   1. Form open joint of width indicated, but not less than 3/8 inch.

I. Prepare joints indicated to receive sealant and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."
   1. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant, unless otherwise indicated.

3.3 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

A. Set cast stone as indicated on contract documents. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
   1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
   2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.

B. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.

C. Fill anchor holes with sealant.
   1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.

D. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.

E. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.
   1. Form open joint of width indicated, but not less than 3/8 inch.

F. Prepare joints and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."
   1. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant, unless otherwise indicated.

3.4 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet.

C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.

D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except due to warpage of units within tolerances specified.

3.5 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by the Engineer.

B. Replace units in a manner that results in cast stone matching approved samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses.
   1. Remove mortar fins and smears before tooling joints.
   2. Remove excess sealant immediately, including spills, smears, and spatter.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Engineer’s approval of sample cleaning before proceeding with cleaning of cast stone.
   3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
   5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20.
   6. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

152067.02 UNIT PAVING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Provide all labor, materials, equipment, and supervision required to furnish and install clay and concrete pavers.

1.2 SUBMITTALS

A. Paver manufacturer's material test data certifying pavers comply with specification.

B. Paver sample, one of each specified color.

1.3 CODES, PERMITS AND FEES

Obtain any necessary permits and pay any fees required for permits.

1.4 SITE DISTURBANCES

A. Take precautions to ensure that equipment and vehicles do not disturb or damage existing site grading, walks, drives, utilities, plants, etc.

B. Verify locations and depths of all underground utilities prior to excavation.

C. Repair and/or return to original condition any damage caused by Contractor's negligence at no cost to the Contracting Authority.

D. Provide temporary barricades and warning lights as required for protection of project work and public safety.

1.5 MEASUREMENT AND PAYMENT

A. Measurement: Measurement will be in square feet.

B. Payment: Payment will be in unit price per square foot of pavers.

C. Includes: Unit price includes, but is not limited to, furnishing all materials, equipment, and labor necessary for installation of pavers in accordance with the contract documents.

PART 2 – PRODUCTS

2.1 CONCRETE PAVERS

A. "Holland Premier": interlocking paving stones as manufactured by Unilock, Chicago, Illinois.
   1. 3.14 inch depth
   2. Compressive strength: Average 8000 psi with no individual piece less than 7500 psi.
   3. Water absorption: Not greater than 5%.
   4. Color: Type 1 & Type 3: Rustic Red – Premier Finish (field pavers)
      Type 2: Granite - Premier Finish (chevron pavers)

2.2 CLAY PAVERS

A. Paver as manufactured by Belden, Canton, Ohio.
   1. 2.24 inch depth
   2. Compressive strength: Average 25,000 psi.
   3. Water absorption: Not greater than 5%.
   4. Color: Type 4: Regimental Full Range (4 inch by 8 inch)
      Type 5: Wheatfield (8 inch by 8 inch)
      Type 6 & Type 8: Mix of Carbon Black Blend (50%) and Sienna Blend (50%) (8 inch by 8 inch)
      Type 7: Carbon Black (4 inch by 8 inch)

2.3 SETTING BED SAND

Fine builders sand with a fineness modulus between 1.7 and 2.1.

2.4 NEOPRENE-MODIFIED ASPHALT ADHESIVE

A. Mastic (asphalt adhesive):
   1. Solids (base): 75+1%.
   2. Lbs./Gal.: 8-8.5 pounds.
   3. Solvent: Varsol (over 100º F Flash).

B. Base (2% Neoprene, 10% Fibers, 88% Asphalt):
   1. Melting point - ASTM D-36; 200º F minimum.
   2. Penetration - 77º F, 100 gram load, 5 second (.1 m.m.):

3. Ductility - ASTM D-113-44 at 25º C; 5 cm/per minute: 125 cm minute.

C. After applying neoprene modified asphalt adhesive begin laying pavers from the edge/s referenced on the contract documents.

PART 3 – EXECUTION

3.1 PREPARATION OF CONCRETE SUB-BASE:

A. Inspect concrete sub-base to ensure surface is clean and built in conformance with details.

B. Verify elevation difference between concrete sub-base and adjacent finish concrete surface to ensure concrete pavers can be installed flush with bordering concrete pavement.

3.2 PREPARATION OF ASPHALT BASE:

A. Apply High Performance Bituminous Mix in 7/8 inch layer over concrete base that is 4 inches below the finished surface grade of the concrete pavers.

B. Asphalt slab bed surface must be parallel with (have the same slope as) the finish grade of the concrete pavers.

C. Asphalt surface shall be smooth and free of low spots, voids, and debris.

3.3 PREPARATION OF AGGREGATE SUBBASE:

A. Verify that the subgrade soil is free of standing water.

B. Stockpile Setting Bed Sand, Joint Sand, and Base Aggregate materials such that they are free from standing water, uniformly graded, free of any organic material or sediment, debris, and ready for placement.

C. Place base aggregate to depth as shown in the contract documents.

D. Compact soil subgrade uniformly to at least 95% of Standard Proctor Density per ASTM D 698 for pedestrian areas. Compact soil subgrade uniformly to at least 98% Modified Proctor per ASTM D 1557 for vehicular areas. Stabilization of the subgrade and/or base material may be necessary with weak or saturated subgrade soils.

E. Trim the subgrade to within 0 to 1/2 inch of the specified grades. Do not deviate the surface of the prepared subgrade by more than 3/8 inch from the bottom edge of a 39 inch straight edge laid in any direction.

3.4 PLACEMENT OF PAVERS:

A. Begin laying pavers from the edges referenced on the contract documents.

B. Place pavers by hand.

C. Always work on top of laid pavers.

D. A chalk line may be snapped on asphalt base to assist in alignment of pavers.

E. Complete placement of whole pavers over entire area.

F. Complete placement of pavers by placing cut pavers along edges.

3.5 JOINT FILLING:

Cross directionally sweep a thin layer of sand over the entire paver area.

3.6 CLEAN-UP:

Sweep excess sand from paved surfaces and remove from site.

152067.03 Unit Masonry

PART 1 – GENERAL

1.1 SECTION INCLUDES:

A. Provide unit masonry work as shown and specified. The work includes:
   1. Concrete masonry units.
   2. Unit masonry accessories.
   3. Mortar and grout.

B. Related work:
   1. Section 152067.04 Stone Masonry

1.2 DEFINITIONS:

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 QUALITY ASSURANCE:

A. Materials and methods of construction shall comply with the following standards:
   1. Brick Institute of America, (BIA): Technical Notes on Brick Construction.
   2. National Concrete Masonry Association, (NCMA): TEK Bulletins.
   3. ASTM.

B. Comply with the applicable requirements of local governing authorities and ANSI A41.1, Building Code Requirements for Masonry, for the types of unit masonry construction indicated.

C. Installation: Performed only by skilled masons with satisfactory record of performance on completed projects of comparable size and quality.

D. Provide each type of masonry unit from one manufacturing source to ensure uniform texture and color.

E. Do not change source of brands of mortar materials during the course of the work.

1.4 SUBMITTALS:

A. Product Data: For each type of product indicated and accessory required.

B. Test reports shall include:

1. Compressive strength
2. 24 hour cold water absorption
3. 5 hour boil absorption
4. Saturation coefficient
5. Initial Rate of Absorption (IRA)
6. Efflorescence
7. Weather classification

C. Certificate of conformance shall state that brick meets or exceeds applicable ASTM specification.

D. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Unit masonry materials:
1. Deliver, store, and handle masonry materials to prevent damage and soiling.
2. Stack masonry units off the ground on wood pallets or platforms. Exercise particular care in the storage, handling, and installation of masonry units. Exposed masonry is utilized as a "finish material". Do not build soiled or damaged masonry units into the work.

B. Masonry accessories: Deliver, store, and handle masonry accessories to prevent weather damage and deterioration.

C. Mortar materials:
1. Deliver cement, lime, and admixture materials in manufacturer's unopened and undamaged containers with labels intact and legible. Store materials off the ground, under cover, and protect from weather damage and deterioration.
2. Stockpile and handle aggregates to prevent mixing with foreign materials.

1.6 PROJECT CONDITIONS:

A. Do not use metal accessories with loose rust or other coatings, including ice, which will reduce bond.

B. Protect partially-complete masonry work against weather damage and moisture, when work is not in progress. Cover tops of walls with strong, waterproof, non-sustaining membrane. Extend membrane at least 2 feet down both sides of walls and hold securely in place.

C. Brace unsupported and newly-laid masonry walls. Maintain bracing in place until walls reach design strength.

D. Cold weather construction:
   1. Precondition masonry materials to maintain minimum 50º F. temperatures when installed.
   2. Protect masonry from freezing when the temperature of the outside air is 40º F. and falling. Heat materials and provide temporary protection of completed portions of masonry work. Comply with BIA "Construction and Protection Recommendations for Cold Weather Masonry Construction" and NCMA "TEK Bulletin No. 16A".
   3. No masonry work will be permitted when outside air temperature is below 25º F.
   4. Do not use frozen materials or materials mixed or coated with ice or frost.
   5. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.
   6. Do not use anti-freeze or calcium chloride in any mortar.
   7. Protect completed masonry work against freezing for not less than 4 days after laying.

E. Protect ledges and projections from mortar droppings. Remove excess mortar and stains as work progresses.

F. Protect adjacent work from damage, soiling, and staining during masonry work operations.

1.7 MEASUREMENT AND PAYMENT

A. Measurement: Lump sum item, no measurement will be made.

B. Payment: Payment will be at the lump sum contract price.

C. Includes: Lump sum price includes, but is not limited to, furnishing all materials, equipment, and labor necessary for installation as shown in the plans.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL:

Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed work.

2.2 CONCRETE MASONRY UNITS:

A. Regional Materials: CMUs shall be manufactured within 500 miles of project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of project site.

B. Shapes: Provide shapes indicated on contract documents

2.3 MASONRY ACCESSORIES:

A. Horizontal joint reinforcement: Welded truss type with deformed continuous side rods and plain cross rods. Prefabricate in lengths not less than 10 feet with matching corners and tee units. Unit width of 1 1/2 inches to 2 inches less than wall thickness.
   1. Multiple wythe masonry: Single 9 gage side rods; 9 gage cross rods.
   2. Finish: 1.5 ounce hot-dip galvanized finish.

B. Reinforcing bars: ASTM A615, Grade 60, new domestic deformed steel bars of sizes indicated.

C. Cleaning agents: Commercial cleaning solutions which will not harm masonry or adjacent materials and is acceptable to the masonry manufacturer. Muriatic acid is not acceptable as a cleaning agent.

2.4 UNIT MASONRY MORTAR AND GROUT MIXES:

A. Regional Materials: Aggregate for mortar and grout shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles of project site.

B. Type M mortar: ASTM C270 proportions by volume. Minimum average compressive strength at 28 days of 2500 psi, either:

1. 1 part Portland cement, 1/4 part hydrated line, not less than 2 1/4 and not more than 3 times the sum of the volumes of cement used of damp, loose sand.

C. Coarse grout: ASTM C476 proportions by volume. Minimum average compressive strength at 28 days of 2500 psi:

1. 1 part Portland cement, 0 to 1/10 part hydrated lime, not less than 1 and not more than 2 times the volume of cement used of damp, loose coarse aggregate.

D. Measure and batch material either by volume or weight. Use accurate measuring devices to ensure uniformity and coloration of mix. Shovel count measurement of sand is not acceptable.

E. Mix cementitious material and aggregate in a clean mechanical mixer for at least 5 minutes. Add water in amount to provide satisfactory workable consistency of mortar.

F. Proportion colored mortar pigment with other ingredients to match the approved samples.

G. Retemper mortar as required within 2 hours of mixing to replace water lost by evaporation. Use and place mortar in final position within 2 1/2 hours of the initial mixing. Discard mortar after 2 1/2 hours of the initial mixing.

PART 3 - EXECUTION

3.1 INSPECTION:

Examine substrates and installation conditions. Do not start unit masonry work until unsatisfactory conditions are corrected.

3.2 PREPARATION:

A. Establish lines, levels, and coursing.

B. Wet brick having ASTM C67 absorption rates greater than 0.025 ounces per square inch per minute. Use wetting methods which ensure that each masonry unit is nearly saturated but surface dry when laid. During freezing weather, comply with the recommendations of the BIA for wetting.

C. Except for absorbent units specified to be wetted, lay masonry units dry. Do not wet concrete masonry units.

3.3 INSTALLATION:

A. Install Bricks with 3/8 inch joints as shown in the contract documents.

B. Build masonry construction to the full thickness indicated. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness.

C. Cut masonry units with masonry saws to provide clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work. Where cutting is required, use the largest size units possible. Provide 100% solid units where webs would be exposed.

D. Layout walls in advance for accurate spacing of surface bond patterns, with uniform joint widths, and to properly locate openings, movement-type joints, returns, and offsets.

E. Lay masonry plumb and true. Provide corners and angles square, with courses level, accurately spaced, and coordinated with other work. Use double lines at multiple wythe walls.

F. Pattern bond: Lay exposed masonry in running bond with vertical joint in each course centered on units in courses above and below. Bond and interlock each course of each wythe at corners. Do not use units with less than 4 inch of horizontal face dimensions at corners or jambs.

G. Lay face brick and other solid masonry units with completely filled bed and head joints. Butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

H. Compress and cut joints flush for masonry walls which are to be concealed or to be covered by other materials.

I. Tool joints in all exposed masonry work to a concave joint.

J. Remove masonry units disturbed after laying; clean and reset in fresh mortar.

K. Step back unfinished work for joining new work. Rake back 1/2 unit length in each course; do not tooth. Clean exposed surfaces and remove loose masonry units and mortar prior to laying fresh masonry.

L. Provide interlocking masonry bond in each course at corners and intersecting walls.

M. As the work progresses, build in items furnished by other trades. Fill in solidly with masonry around built-in items.

    1. Where built-in items are to be embedded in cores of hollow masonry units, please a layer of metal lath in the joints below and rod grout into core.

    2. Provide solid masonry bearing for all load-bearing members. Provide solid masonry units or hollow units filled solid.

    3. Take particular care to embed conduits and pipes within concrete masonry without fracturing exposed shells. Where electric conduit, outlets, switch boxes, and similar items occur, grind, and cut units before building in services.

    4. Install reinforcing steel and grout where indicated. Comply with drawing details for reinforcing steel size, spacing, and grouting.

N. Horizontal joint reinforcing: Provide continuous joint reinforcing as indicated.

    1. Lap reinforcement where sections but into each other.

2. Fully embed side rods in mortar.

3.4 CLEANING:

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Engineer’s approval of sample cleaning before proceeding with cleaning of masonry. Before applying any cleaning agent to the entire area, clean a sample area of approximately 20 square feet in a location acceptable to the Engineer. Do not proceed with cleaning until the sample area has been approved.
   3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
   5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
   6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
   7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
   8. Clean stone trim to comply with stone supplier's written instructions.
   9. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

E. Acid cleaning of masonry not permitted. Install and protect installed masonry so that acid cleaning is not required at completion of work.

F. Upon completion of work, remove from site all excess materials, debris, tools, and equipment. Repair damage resulting from unit masonry work operations.

3.5 MASONRY WASTE DISPOSAL:

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from project site.

B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste and legally dispose of off the Contract Authority’s property.

152067.04 Stone Masonry

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Provide masonry work as shown and specified. The work includes:
   1. Stone masonry.

1.2 RELATED REQUIREMENTS:

A. Section 152067.03 Unit Masonry

1.3 QUALITY ASSURANCE:

A. Materials and methods of construction shall comply with the following standards and association recommendations:
   1. American Society for Testing and Materials, (ASTM).

B. Comply with the applicable requirements of local governing authorities and ANSI A41.1, Building Code Requirements for Masonry, for the types of stone masonry construction indicated.

C. Source Limitations for Stone: Obtain stone units through one source from a single manufacturer.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

E. Installation: Performed only by experienced masons with satisfactory record of performance on complete projects of comparable size and quality.

F. Provide each type of material from only one quarry or manufacturer to ensure consistent color range and texture.

1.4 SUBMITTALS:

A. Submit manufacturer's product data for each type of stone and accessory required.

B. Submit cutting and setting drawings for cut and cast stone work showing dimensions and arrangement.

C. Submit samples of each type and color of stone required. Include the full range of exposed color and texture proposed for the work. Provide cut stone samples not less than 12 inch by 12 inch in size. Final approval of all colors must be obtained prior to any fabrication beginning.

D. Provide 4 feet by 4 feet mock-up panel to remain on site during construction.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Stone masonry materials: Deliver, store, and handle materials in accordance with stone fabricators recommendations. Use non-staining materials for blocking and packing. Stack

materials off the ground on non-staining skids. Protect from damage and soiling. Coordinate delivery of materials to minimize the need for on-site storage and to avoid delaying the work.

B. Pack, handle, and ship stone units in suitable packs or pallets.
   1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone units, if required, using dollies with wood supports.
   2. Store stone units on wood skids or pallets with non-staining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

C. Masonry accessories: Deliver, store, and handle masonry accessories to prevent weather damage and deterioration.

1.6 PROJECT CONDITIONS:

A. Do not use metal accessories with loose coatings, including ice, which will reduce bond.

B. Protect partially-completed stone masonry work against weather damage and moisture, when work is not in progress. Cover tops of walls with strong, waterproof, non-staining membrane. Extend membrane at least 2 feet down both sides of walls and hold securely in place.

C. Brace unsupported and newly laid masonry walls. Maintain bracing in place until walls reach design strength.

D. Cold weather construction:
   1. Precondition masonry materials to maintain 50º F when installed.
   2. Do not install stone masonry work when the temperature of the outside air is below 40º F and falling unless suitable means acceptable to the Engineer are provided to protect work from cold and frost and ensure that mortar will set without freezing. Comply with International Masonry Industry All-Weather Council cold weather construction and protection recommendations.
   3. No masonry work will be permitted when outside air temperature is below 25º F.
   4. Do not use frozen materials or materials mixed or coated with ice or frost.
   5. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.
   6. Protect completed masonry work against freezing for not less than four days after laying.

E. Protect adjacent work from damage, soiling, and staining during masonry work operations.

1.7 MEASUREMENT AND PAYMENT

A. Measurement: Lump sum item, no measurement will be made.

B. Payment: Payment will be at the lump sum contract price.

C. Includes: Lump sum price includes, but is not limited to, furnishing all materials, equipment, and labor necessary for installation as shown in the plans.

PART 2 - PRODUCTS

2.1 STONE MATERIALS:

A. Brick Veneer - Face Brick, Economo Modular Size, Color: 470-479 Dark Range Smooth, Belden Brick Company, Canton, Ohio 44702. (330) 456-0031

B. Cast Stone Veneer and Caps – Match product requirements outlined in Section 9.15.1 Cast Stone Sign Walls. Basis-of-Design color selection is Color 60-128 – meant to match color and texture from University Avenue sign walls. Edwards Cast Stone Company, Dubuque, Iowa 52003. (563) 556-0535

C. Provide sound stone uniform in color and texture, free from mineral stains, other foreign matter, and defects detrimental to appearance and durability. Color range, texture, and finish of cut stone materials shall be within range of Engineer's accepted samples.

D. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276,

2.2 CUT STONE FABRICATION:

A. Fabricate stone work as indicated or as accepted and detailed on final shop drawings.

B. Fabrication Tolerances:
1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.

C. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces

D. Cut accurately to shape and dimensions indicated or accepted final shop drawings.
1. Dress joints, bed, and vertical, straight at 90 degree angle to face. Provide drips and washes as indicated.
2. Joint width: Cut to allow uniform 1/4 inch wide joints unless previously stated otherwise.
3. Thickness: Provide thickness indicated.
4. Jointing: Provide as indicated; when not indicated, in accordance with industry standards and practices.

2.3 MORTAR MATERIALS:

A. Portland cement: ASTM C150, Type I, natural color.

B. Masonry cement: ASTM C91.

C. Hydrated lime: ASTM C207, Type S.

D. Aggregate:
1. Masonry mortar: ASTM C144, clean masonry sand, not over 10% to pass No. 100 sieve.
2. Masonry grout: ASTM C404, clean pea gravel, maximum 3/8 inch size.

E. Water: Clean, fresh, and potable.

F. Colored mortar pigment: Lime-proof and alkalai-proof mineral oxide pigments. Color as indicated on contract documents. Submit color samples with shop drawings.

2.4 MORTAR AND GROUT MIXES:

A. Type N mortar: ASTM C270 proportions by volume. Minimum average compressive strength at 28 days of 2500 psi, either:

1. 1-part Portland cement, 1/4 part hydrated line, not less than 2 1/4 and not more than 3 times the sum of the volumes of cement used of damp, loose sand.

B. Coarse grout: ASTM C476 proportions by volume. Minimum average compressive strength at 28 days of 2500 psi:
   1. 1-part Portland cement, 0 to 1/10-part hydrated lime, not less than 1 and not more than 2 times the volume of cement used of damp, loose coarse aggregate.

C. Measure and batch material either by volume or weight. Use accurate measuring devices to ensure uniformity and coloration of mix. Shovel count measurement of sand is not acceptable.

D. Mix cementitious material and aggregate in a clean mechanical mixer for at least 5 minutes. Add water in amount to provide satisfactory workable consistency of mortar.

E. Proportion colored mortar pigment with other ingredients to match the approved samples.

F. Retemper mortar as required within 2 hours of mixing to replace water lost by evaporation. Use and place mortar in final position within 2 1/2 hours of the initial mixing. Discard mortar after 2 1/2 hours of the initial mixing.

2.5 ACCESSORIES

A. Anchors: Type and size indicated, fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.

B. Dowels: Round stainless-steel bars complying with ASTM A 276, Type 304, and 1/2 inch diameter.

PART 3 - EXECUTION

3.1 INSPECTION

Examine substrates and installation conditions. Do not start stone masonry work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Establish lines, levels, and coursing.
   1. Clean cut stone work before setting by thoroughly scrubbing with fiber bristle brushes and clean water. Drench stone with clean water just prior to setting.

B. Do not use masonry units with chips, cracks, voids, stains, or other visible defects.

C. Excavation
   1. Contractor shall excavate to the lines and grades shown on the plans. Contractor shall take precautions to minimize over-excavation. Over-excavation shall be filled with compacted infill material, or as directed by the Engineer, at the Contractor's expense.
   2. Contractor shall verify location of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation. Excavation support, if required, is the responsibility of the Contractor.

D. Foundation Preparation

1. Following the excavation, the foundation soil shall be examined by the Engineer to assure actual foundation soil strength meets or exceeds the assumed design bearing strength. Soils not meeting the required strength shall be removed and replaced with infill soils, as directed by the Engineer.
2. Foundation soil shall be proof-rolled and compacted to 95% standard Proctor density and inspected by the Engineer prior to placement of leveling pad materials.

E. Leveling Pad Construction
1. Leveling pad shall be placed as shown on the plans. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lower most masonry unit.
2. Granular leveling pad material shall be compacted to provide a firm, level bearing surface on which to place the first course of units. Well-graded sand can be used to smooth the top 1/2 to 1/4 inch of the leveling pad. Compaction will be with mechanical plate compactors to achieve 95% of maximum standard Proctor density (ASTM D 698).

3.3 INSTALLATION OF CUT STONE

A. Set stone in accordance with drawing details and final shop drawings for stone work. Provide anchors, supports, and other attachments shown, or necessary to secure stonework in place. Shim and adjust accessories as required for proper setting of stone.

B. Erect cut stone work plumb and true with joints uniform in width and accurately aligned.

3.4 CLEANING

A. Remove and replace stone units which are loose, broken, stained, or otherwise damaged. Provide new matching units, install as specified.

B. Clean stonework not less than 6 days after completion of work, using clean water and stiff-bristle brushes. Do not use wire brushes, acid type cleaning agents or other cleaning compounds with caustic or harsh fillers.

C. Cleaning agents and methods shall be acceptable to the Engineer.

D. Upon completion of the work, remove from site all excess materials, debris, tools, and equipment. Repair damage resulting from stone masonry work operations.

152067.05 SITE FURNISHINGS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes.
1. Bus Shelter
2. Trash Receptacles
3. Benches

1.2 SUBMITTALS

A. Product Data: Provide manufacturer's data for each type of product indicated.

B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

C. Size: Not less than 4 inch square sheet components.

D. Manufacturer's Instructions: Indicate conditions requiring special procedures.

E. Maintenance Data: For site furnishings to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of site furnishing(s) through one source from a single manufacturer.

B. Installer Qualifications: Company specializing in performing the work of this section and approved by manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver products to site in manufacturer's original, unopened containers and packaging. Upon delivery, examine packages immediately to ensure all products are complete and undamaged.

B. Storage: Store products in a protected, dry area in manufacturer's unopened containers and packaging.

C. Handling: Protect product's finish from damage during handling and installation.

1.5 MEASUREMENT AND PAYMENT

A. Measurement: Measurement will be per count basis of each site furnishing item.

B. Payment: Payment will be in unit price per each site furnishing item.

C. Includes: Unit price includes, but is not limited to, furnishing all materials, equipment, and labor necessary for installation in accordance with the contract documents.

PART 2 PRODUCTS

2.1 BUS SHELTERS

A. Subject to compliance with requirements, provide the product indicated on the contract documents:
   1. Duo-Gard Industries, Canton, MI: 6 foot by 12 foot 3-sided Reverse Barrel Vault Standing Seam Metal Roof, Black Anodized Aluminum Framing, 1/4 inch Clear Tempered Safety Glass Walls, Surface mount per manufacturers requirements. Ph.: 734-207-9700.

2.2 TRASH RECEPTACLES

A. Subject to compliance with requirements, provide the product indicated on the contract documents:
   1. Victor Stanley, Inc., Dunkirk, MD: “SD-42 Ironsites Collection” Model, surface mount, side-opening, 36 gallon with polyethylene liner. Finish: Powdercoat Black. Ph: 800-368-2573.

2.3 BENCHES

A. Subject to compliance with requirements, provide the product indicated on contract documents:
   1. DuMor Inc., Mifflintown, PA: “Model 58-60” Model, surface mount, 69 inch length, backed, Finish: Powdercoat Black. Ph: 800-598-4018.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on the contract documents.

3.3 CLEANING

After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

3.4 WASTE MANAGEMENT

Separate and dispose of waste in accordance with the Project’s Waste Management Plan.

152067.06 PLANTS

PART 1 - GENERAL

1.1 WORK INCLUDED

Provide all labor, materials, equipment and supervision required for the installation of all proposed plant material.

1.2 DELIVERY, HANDLING AND TEMPORARY STORAGE

A. Install plant material on the day of delivery to the site; in the event this is not possible, protect that stock not planted.

B. Keep plant material that cannot be planted immediately after delivery in the shade, well protected with soil, wet moss or other acceptable material and well watered.

C. Do not bind plants with wire or rope at any time so as to damage the bark or break branches.

D. Lift and handle plants from the bottom of the ball only.

E. Plants moved with a ball will not be accepted if the ball is cracked, loose or broken before or during planting operations.

F. Deliver fertilizer to site in original, unopened containers, each bearing manufacturer's guaranteed analysis.

G. Store packaged materials off ground and protect from moisture.

1.3 CODES, PERMITS AND FEES

Obtain any necessary permits and pay any fees required for permits.

1.4 JOB CONDITIONS

A. Existing Utilities:
   1. Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during this work.
   2. Underground utilities shown on the drawings have been taken from existing public records, Contract Authority's records available as-built drawings and are correct to the best of our knowledge, provided for information only.
   3. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult Utility Owner immediately for directions. Cooperate with Contract Authority and utility companies in keeping respective services and facilities in operation. Repair damaged utilities caused by Contractor's negligence to the satisfaction of Utility Owner at no cost to the Contract Authority.
   4. Do not interrupt existing utilities serving facilities occupied and used by Contract Authority or others, during occupied hours, except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided.
   5. Provide minimum of 48 hour notice to the Engineer and receive written notice to proceed before interrupting any utility.

B. Protection of Persons and Property:
   1. Barricade open excavations occurring as part of this work and post with warning lights.
   2. Operate warning lights as recommended by authorities having jurisdiction.
   3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by this work.
   4. Perform excavation within drip-line of large trees to remain by hand, and protect the root system from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1 inch diameter and larger with emulsified asphalt tree paint.

1.5 INSPECTION AND APPROVAL

A. All materials described and specified herein are subject to inspection and approval by the Engineer.

B. Materials may be inspected by the Engineer at source of supply or the Engineer may require the Contractor to submit color slides and/or photographs which illustrate the specified plant material at the source of supply.

C. This inspection does not waive the right to reject any material after it has been delivered to the site and/or installed.

1.6 INITIAL INSPECTION AND ACCEPTANCE

A. Initial inspection of the planting to determine completion of contract work, exclusive of possible replacement of plants, will be made by the Engineer upon completion of the work.

B. Initial inspection will not be conducted unless all items of work as outlined in 3. EXECUTION have been completed.

C. Five days prior to the anticipated date of inspection submit written notice requesting inspection to the Engineer.

D. After inspection, the Contractor will be notified in writing, by the Engineer, of initial acceptance of inspected work exclusive of the possible replacement of plants and correction of deficiencies in the requirements for completion of the work.

E. Maintain, as specified, areas not acceptable until corrections are completed and reinspection is conducted.

F. If a significant time delay (60 to 90 days) is encountered, through no fault of the Contractor, inspection and initial acceptance of a major portion of the plantings may be granted.

G. All plants shall be alive and healthy at the time of initial acceptance.

H. Replacement of rejected plants before initial acceptance to meet the terms of initial acceptance shall not be considered a part of the guaranty and replacement requirement of this Specification.

1.7 GUARANTEE, REPLACEMENT AND FINAL INSPECTION:

A. Guarantee plants for the duration of 1 full year after they are initially accepted as defined herein.

B. Plants shall be alive and in good, healthy and flourishing condition of growth at the end of the guaranty period.

C. At the end of the guaranty period, final inspection will be made by the Engineer upon written notice requesting such inspection; submit notice to the Engineer at least 10 days before the anticipated date of inspection.

D. Any plant, required under this project, that is dead or not in a vigorous, thriving condition, as determined by the Engineer at the time of Final Inspection, will be removed from the site.

E. Plants that are missing at the time of Final Inspection are to be installed during the specified planting season when weather and site conditions permit.

F. In case of any questions regarding the condition and satisfactory establishment of a rejected plant, the Contractor may elect to allow such plant to remain through another complete growing season. If at that time the rejected plant is found to be dead, in an unhealthy or badly impaired condition, it shall be replaced.

G. After Initial Acceptance, replace plants (once during or at the end of the guaranty period) that are observed to be dead or in a badly impaired condition.

H. One replacement after initial acceptance shall constitute fulfillment of Contractor's guaranty for the particular plant replaced.

I. Replacement Plants: Plants of the same kind and size as specified in the Plant Schedule; furnished and planted as specified herein.

J. Replacement Plants: Guyed or staked, mulched, wrapped, fertilized, pruned and restored to original condition as originally specified at no cost to Contract Authority.

K. Make all necessary repairs to grades, lawns and paving required because of plant replacements, at no cost to the Contract Authority.

L. Plant Replacement Cost: Borne by Contractor except for possible replacements resulting from removal, loss or damage due to occupancy of project in any part, vandalism, civil disobedience, or acts of neglect on the part of others, physical damage by animals, vehicles, fire, etc., or losses due to curtailment of water by local authority, or to "Acts of God". Floods, tornadoes, wind of hurricane force, and hail are not normal and the damage they do cannot be calculated in a bid.

1.8 MEASUREMENT AND PAYMENT

A. Measurement: Measurement will be per count basis of each plant/flower and tree grate.

B. Payment: Payment will be in unit price per each plant/flower and tree grate.

C. Includes: Unit price includes, but is not limited to, furnishing all materials, equipment, and labor necessary for installation in accordance with the contract documents.

PART 2 - PRODUCTS

2.1 PLANT MATERIALS

A. Plant Schedule: A list of plant materials is scheduled on the contract documents. In the event of any discrepancy between this schedule and the contract documents showing the plants, the contract documents shall govern.

B. Certification of inspection of plant materials required by Federal, State or other governmental agencies to accompany all shipments to be furnished to the Engineer.

C. Nomenclature: The names of plants required under this project conform to those given in the "Standardized Plant Names", 1942 Edition, prepared by the American Joint Committee on Horticultural Nomenclature. Names of varieties not included therein conform generally with names accepted in the nursery trade.

D. Standards: All plant materials, grading, sizes, methods, etc., are to conform to the Standards of the American Association of Nurserymen, Inc., as contained in their current publication "American Standard for Nursery Stock", (ANSI Z60.1-1996). In the event there is a discrepancy between these standards and this Specification, the most restrictive requirement shall govern.

E. Labeling: Legibly tag all plants as to name and size.

F. Species and Variety: True to name as specified. Plants approved as true to name at time of initial acceptance which, during the guaranty period, exhibit characteristics indicating they are not true to name will be replaced at no cost to the Contract Authority.

G. Availability: Before submitting his bid, the Contractor shall have investigated the sources of supply and satisfied himself that he can supply the listed plants in the size, variety and quality listed and specified. Failure to take this precaution will not relieve the Contractor from his responsibility for furnishing and installing all plant materials in strict accordance with the contract documents without additional cost to the Contract Authority.

H. Quality:
   1. Growth habit typical for species and as indicated on the Plant Schedule.
   2. Sound, healthy, vigorous, and free from insect pests, plant diseases and injuries.
   3. One sided plants or plants taken from tightly planted nursery rows will be rejected.

I. Size and Form:
   1. Equivalent or exceed measurements specified in the Plant Schedule.
   2. Measured before pruning with branches in normal position. Height and spread specified refers to main body of plant and not from tip to tip of branches or roots.
   3. Caliper of trees less than 4 inches - taken 6 inches above ground level. Trees 4 inches and over - measured 1 foot above ground level.
   4. Specified trunk height can be obtained by pruning lower branches of a plant after the plant has been installed; however, pruning to achieve specified trunk height is to occur only after the Engineer has inspected plant and directed Contractor as to the amount of pruning required.
   5. Where specified by caliper, no one stem of a specific multi-stemmed plant shall be smaller than the caliper size specified.

J. Balled and Burlapped Plants:
   1. Designated as "B&B"; dug with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant.
   2. In compliance with ANSI Z60.1-1996.
   3. Balls: Firmly wrapped with burlap or similar biodegradable material and bound with twine, cord, or wire mesh.
   4. Where necessary to prevent breaking or cracking of the ball during the process of planting, the ball may be secured to a platform. Broken or loose balls will not be accepted.

5. A container grown plant, in lieu of a "B&B" plant, will be accepted provided it meets specified sizes and complies with ANSI Z60.1-1996.
6. A machine moved plant, in lieu of a "B&B" plant, will be accepted provided it meets specified sizes and complies with ANSI Z60.1-1996.

K. Container Grown Plants:
1. Container size as specified in Plant Schedule.
2. In compliance with ANSI Z60.1-1996.

2.2 PLANTING SOIL

A. PLANTING AREAS WITHIN ROUNDABOUT
1. 8 inch minimum depth throughout roundabout planting areas.
2. Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction where topsoil occurs at least 4 inches deep; do not obtain from bogs, or marshes.
3. ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 4% organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with compost at a ratio of Mix with one part of compost to four parts of soil.
4. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15% when moisture is present at field capacity. Soil shall have a field capacity of at least 15% on a dry weight basis.
5. The Engineer will approve the source of off-site topsoil. Surface soils from ditch bottoms, drained ponds, and eroded areas, or soils that are supporting growth of noxious weeds or other undesirable vegetation, will not be accepted. The Engineer will determine if testing is necessary. The Contractor will be responsible for payment of the testing if the off-site topsoil does not meet the above requirements.

B. TREE PLANTING PITS

1. Soil excavated from planting pits that is similar in nature to topsoil and is determined to be suitable for planting soil shall be thoroughly mixed with one part of compost to four parts of existing soil.
2. Very poor soils of clay, gumbo, gravel, hard-pan, or other soils injurious to plants shall not be used.
3. Dispose of soil excavated from planting hole that is determined not to be of quality required.
4. If quantity of soil excavated from planting pits is not adequate for planting, furnish planting soil consisting of partially decomposed vegetable matter of natural occurrence; black, clean, low in content of mineral or woody material, mildly acid, fertile and friable. Mix with one part of compost to four parts of soil.

2.3 PEAT

A domestic product consisting of partially decomposed vegetable matter of natural occurrence; black, clean, granulated or shredded.

2.4 FERTILIZER

A. Similar or equivalent to Milorganite (6-3-0).

B. Uniform in composition, dry and free flowing.

C. Fertilizer which becomes caked or otherwise damaged making it not suitable for use, will not be accepted.

2.5 MULCH

A. River Rock Mulch, 1 inch to 3 inch diameter.

B. Depth and locations as shown on the contract documents.

C. Furnish in bags or bulk.

D. Submit sample for approval by the Engineer.

2.6 STAKING, GUYING AND WRAPPING MATERIALS:

A. Stakes: Similar or equivalent to steel farm fence posts, green vinyl coated or painted black with a rust inhibiting paint. All stakes the same color.

B. Wire: No. 11 gauge pliable galvanized wire.

C. Hose: New green or black 2-ply 1/2 inch diameter reinforced rubber garden hose; all hose the same color.

D. Guying cable: Five-strand, 3/16 inch diameter, steel cable. Attach wire cable clamps and turnbuckles (galvanized or aluminum).

E. Steel auger type screw anchor with 24 inch rod length and 3 inch plate.

F. Wrapping material: Heavy crinkle crepe tree wrapping paper in strips 4 inches to 10 inches wide.

2.7 WEED PREVENTER:

A. Dacthal or equivalent.

B. For groundcovers and shrub plant beds only.

C. Apply as per manufacturer's recommendation.

PART 3 - EXECUTION

3.1 COMMENCEMENT DATE:

At the earliest possible date site conditions permit.

3.2 PLANTING SEASON FOR BALLED AND BURLAPPED AND CONTAINER GROWN PLANTS:

A. Deciduous trees and shrubs: April 1 to June 1 and August 15 to November 15.

B. Evergreen trees and shrubs: April 1 to June 1 and August 15 to October 15.

3.3 PREPARATION:

A. Stake out on the ground the locations of all plants and obtain approval of the Engineer before excavation is begun.

B. Relocate incorrectly located plants at no expense to the Contract Authority.

3.4 EXCAVATION:

A. Excavate the plant pit, centered at the location stake.

B. Planting soil for backfilling shall be kept separate from excavated subsoil.

B. Excavate the plant pit large enough to provide for at least 6 inches of planting soil backfill around and beneath the root system.

C. Where surface or subsurface conditions prevent digging a plant pit to specified dimensions, obtain approval from the Engineer to modify location of pit dimensions.

3.5 DRAINAGE TEST:

A. Randomly select a representative number of shrub plant pits in each shrub planting area and test for drainage prior to planting.

B. Test all tree plant pits for drainage.

D. Fill each selected plant pit with water and let stand for 24 hours.

E. Do not proceed with planting where drainage problems are apparent.

F. Report to the Engineer areas which do not drain within 24 hours.

3.6 PLANTING:

A. Groundcover:
   1. Cultivate groundcover areas 6 inches deep and grade smooth immediately before planting groundcover plants.
   2. Before planting, spread commercial fertilizer at the rate of 1/8 pound per plant over entire groundcover area, and cultivate into top 6 inches of soil.
   3. Plant groundcover to within 1 foot of trunk of tree or shrub planted within the area unless noted otherwise on the contract documents.

4. After planting and before mulching, spread weed preventer over plant bed soil surface as per manufacturer's recommendation.
5. Install mulch to depth of 3 inches over entire groundcover bed.

B. Balled and Burlapped and Container Grown Plants:
1. Center the root ball in the plant pit resting on 6 inches of well tamped planting soil.
2. Backfill the plant hole with planting soil placed in layers around the root ball.
3. Carefully tamp each layer in place in a manner to avoid injury to roots or ball.
4. When approximately two-thirds of the plant hole has been backfilled, fill the hole with water and allow the soil to settle around the roots.
5. Set top of root ball level with the surrounding grade as shown in the contract documents.
6. Place mulch as indicated in the contract documents.
7. Cut cord or wire securing burlap at base of tree.

3.7 FERTILIZING B&B AND CONTAINER GROWN PLANTS:

A. Trees and Shrubs: Mix with backfill.

B. Large shade trees: 2 pounds per inch of caliper.

C. Small trees: 1 pound per inch of caliper.

D. Shrubs: 1/4 pound per foot height.

E. Evergreens: 1/8 pound per foot height or spread.

F. Vines and groundcover: 1/8 pound per plant; place in bottom of plant pit.

G. Herbaceous plants: 1/8 pound per plant.

3.8 STAKING:

A. Stake evergreen trees 8 feet in height and less and deciduous trees having a trunk caliper of 3 inches or less.

B. Use two stakes driven vertically to depth to provide a firm structure.

C. Attach wire to the stake at a point approximately 4 feet from the ground and attach to the tree at the same height.

D. Encase the wire in rubber hose to avoid direct contact between wire and bark of tree.

E. Place stakes opposite each other in an east-west direction and drive with a slight tilt away from each at the top so that slight tension can be placed on the wires when attached.

F. All staking material may be salvaged by the Contractor 12 to 18 months after planting.

3.9 GUYING:

A. Anchor and guy evergreen trees over 8 feet in height and deciduous trees having a trunk caliper of more than 2 1/2 inches with three guying cables, unless shown otherwise on the contract documents.

B. Space three guys equally about each tree.

C. Each guy will consist of 3/16 inch cable attached to the tree trunk at an angle of 30 to 45 degrees at about two thirds of the height of the tree and anchored at the ground to earth anchors as specified.

D. Make all cable fastenings with an approved cable clamp and turnbuckle.

E. All guying materials may be salvaged by the Contractor 12 to 18 months after planting.

3.10 WRAPPING:

A. Promptly after planting, wrap trunks of all deciduous trees with tree wrapping paper spirally from ground line to bottom branches.

B. Neat and snug; materials held in place by a suitable cord; tapes are unacceptable.

3.11 EROSION CONTROL NETTING:

A. Install in accordance with manufacturer's recommendations.

B. Install at the location shown on drawings.

3.12 PRUNING AND REPAIR:

A. Prior to initial inspection, prune all trees and shrubs and repair any injuries.

B. Limit the amount of pruning to the minimum necessary to remove dead or injured branches and twigs.

C. Maintain the natural habit, shape and specified size of the plant.

D. Make all cuts flush; leave no stubs.

E. On all cuts over 3/4 inch in diameter and bruises or scars on the bark, trace the injured cambium back to living tissue and remove; smooth and shape wounds so as not to retain water and coat the treated area with an approved antiseptic tree paint.

3.13 MULCH:

A. Install at consistent depth as shown on drawings.

B. Sub-grade surface of areas to receive mulch shall be sloped to drain, smooth and free of ruts and clods.

3.14 WATERING:

A. Water each plant and tree immediately after planting.

B. Water shrubs and flowers a minimum of 1 gallon per shrub/flower per week and trees a minimum of 10 gallons per tree per week when less than 1 inch of precipitation is received in the immediate location. Apply sufficient water to soak the plant’s and tree’s root zone. Follow this watering procedure throughout the guaranty period.

3.15 CLEAN UP:

A. Remove any soil, peat or similar material that has been brought onto paved areas by planting operations keeping those areas clean at all times.

B. Upon completion of the planting, dispose of all excess soil and stones resulting from the planting operation.

C. Remove all debris, resulting from planting operations, from the site.

3.16 MAINTENANCE:

A. Begin immediately following installation of plants and continue until initial acceptance.

B. Include watering, weeding, cultivating, mulching, removal of dead material, resetting plants to proper grades or upright position and restoration of the planting saucer, and other necessary operations.

C. If any planting is done after lawn preparation, provide proper protection to lawn areas and repair any damage resulting from planting operation promptly at no cost to the Contract Authority.

D. Contractor is responsible for maintaining plants from their arrival on site until the punch list approval and initial acceptance. Maintenance after initial acceptance of the planting will be performed by the Engineer.

E. Furnish detailed written recommended maintenance program to the Engineer prior to initial acceptance of the various planting areas.

F. Maintenance performed by the Contract Authority in accordance with recommended program will not affect the Contractor's obligation to guarantee and replace defective plants as herein described.