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APPENDIX

SECTION 024113.13 – PAVING REMOVAL

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All labor and equipment to remove the existing bituminous concrete pavement, concrete drives, slabs, pavement pads, curbs, gutters, brick or block walls and sidewalk as required by the contract documents.

1.2 RELATED DOCUMENTS

A. Specified Elsewhere:

1. 024113.15 – Saw Cutting Pavement
2. 312000 – Earth Moving
3. 321216 – Asphalt Paving
4. 321383 – Portland Cement Concrete Sidewalks
5. 321613 – Concrete Curbs and Gutters

1.3 QUALITY ASSURANCE

A. The following documents shall provide the standards for construction within the Village of Oak Brook unless otherwise stated in these specifications. In the event of conflict between these specifications and the existing Village codes, the Village codes will prevail.

1. The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition, and the latest editions of Supplemental Specifications and Recurring Special Provisions (herein referred to as the “Standard IDOT Specifications”).

B. Exceptions: All references in the Illinois Department of Transportation Standard Specifications to method of measurements and compensation shall not apply.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

A. The material removed shall be disposed of legally by the Contractor away from the site.

B. Sawing to a full depth of pavement, before removal operations begin, will be required for any joint between surface to be removed and surface to remain.

C. The Trade Contractor shall use extreme care when removing material adjacent to existing construction. Any damage to the brick walls, foundation, or any other building feature or to adjacent pavement, curbs or sidewalks, shall be repaired by the Contractor to the satisfaction of the Construction Manager without additional compensation.

END OF SECTION 024113.13

SECTION 024113.15 – SAW CUTTING PAVEMENT

PART 1 - GENERAL

1.1 WORK INCLUDES

A. This item consists of sawing joints in the pavements in order to separate that portion to be removed from that which will remain in place. This work must be performed at the locations specified on the plans and as otherwise designated by the Engineer.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, including but not limited to:
1. 321206 – Asphalt Paving
2. 321613 – Concrete Curbs and Gutters
3. 321383 – Portland Cement Concrete Sidewalks

B. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions (herein referred to as the “Standard IDOT Specification”). (Method of Measurement and Basis of Payment shall not apply.)

1.3 QUALITY ASSURANCE

A. The following documents shall provide the standards for construction within the Village of Oak Brook unless otherwise stated in these specifications. In the event of conflict between these specifications and the existing Village codes, the Village codes will prevail.
1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)

B. Exceptions: All references in the Illinois Department of Transportation Standard Specifications to method of measurements and compensation shall not apply.

1.4 SUMMARY

A. The Contractor must saw a full depth vertical cut at locations where pavement removal is required as noted on the plans. It is the responsibility of the Contractor to determine the composition and thickness of the existing pavement, and the extent to which it is reinforced. No additional compensation will be allowed because of variations from the assumed thickness or from thickness shown on the plans or for variations in the amount of reinforcement. Should the Contractor deface the edge, a new sawed joint must be constructed and any additional work, including removal and replacement, will be done at the Contractor's expense.

B. The Contractor must make all saw cuts with a concrete sawing machine meeting the approval of the Construction Manager.

END OF SECTION 024113.15

SECTION 033000 – CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.

B. Related Requirements:

1. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
2. Division 32 Section "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

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

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

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

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

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

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

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer with a minimum 5 years similar project experience.

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

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

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

1. ACI 301, "Specification for Structural Concrete,"

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Epoxy-Coated Reinforcing Bars: ASTM A 615, Grade 60, deformed bars, ASTM A 775, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

D. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884, Class A coated, Type 1, plain steel.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Epoxy-Coated Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, ASTM A 775 epoxy coated.

C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

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

B. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I, gray. Supplement with the following:

a. Fly Ash: ASTM C 618, Class C.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

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

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal, except as follows:

a. Slabs-on-Grade: 1-1/2 inches nominal.

D. Water: ASTM C 94 and potable.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

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

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

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Accessories: Provide manufacturer's standard accessories for vapor retarder penetrations, including pipe boots, pressure-sensitive tapes, and mastics.
2. Products: Subject to compliance with requirements, provide products by one of the following:

a. Fortifiber Building Systems Group; Moistop Ultra 15.
b. Meadows, W. R., Inc.; Perminator 15 mil.
c. Poly-America, L.P.; Husky Yellow Guard 15 mil.
d. Raven Industries Inc.; Vapor Block 15.
e. Stego Industries, LLC; Stego Wrap 15 mil Class A.

2.8 CURING MATERIALS

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

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

a. BASF Construction Chemicals - Building Systems; Confilm.
b. ChemMasters; SprayFilm.
c. Conspec by Dayton Superior; Aquafilm.
d. Dayton Superior Corporation; Sure Film (J-74).
e. Edoco by Dayton Superior; BurkeFilm.
f. Euclid Chemical Company (The), an RPM company; Eucobar.
g. L&M Construction Chemicals, Inc.; E-CON.
h. Meadows, W. R., Inc.; EVAPRE.
i. Sika Corporation; SikaFilm.
j. Symons by Dayton Superior; Finishing Aid.

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

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

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating; certified by curing compound manufacturer to not interfere with bonding of floor covering.

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

a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
b. BASF Construction Chemicals - Building Systems; Kure 200.
c. ChemMasters; Safe-Cure Clear.
d. Conspec by Dayton Superior; W.B. Resin Cure.
e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
f. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
g. L&M Construction Chemicals, Inc.; L&M Cure R.
h. Meadows, W. R., Inc.; 1100 Clear.
i. Symons Corporation, a Dayton Superior Company; Resi-Chem Clear Cure.

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A; certified by curing and sealing compound manufacturer to not interfere with bonding of floor covering.

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

a. BASF Construction Chemicals - Building Systems; Kure 1315.
b. ChemMasters; Polyseal WB.
c. Conspec by Dayton Superior; Sealcure 1315 WB.
d. Euclid Chemical Company (The), an RPM company; Super Diamond Clear VOX; LusterSeal WB 300.
e. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
f. Meadows, W. R., Inc.; Vocomp-30.
g. Symons by Dayton Superior; Cure & Seal 31 Percent E.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.10 REPAIR MATERIALS

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

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 400 psi at 28 days when tested according to ASTM C 109.

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

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

2.11 CONCRETE MIXTURES, GENERAL

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

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

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

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

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, and concrete with a water-cementitious materials ratio below 0.50.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: As indicated on Structural Drawings.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Fly Ash and or GGBF Slag Content: Minimum 15 percent, Maximum 25 percent of cementitious materials by weight.
4. Slump Limit: 5 inches, plus or minus 1 inch.

B. Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: As indicated on Structural Drawings.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Fly Ash and or GGBF Slag Content: Minimum 15 percent, Maximum 25 percent of cementitious materials by weight.
4. Slump Limit: 4 inches; 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
5. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size for use where more than 12 inches of wall is exposed such as at exterior retaining walls and dock walls.

C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: As indicated on Structural Drawings.
2. Minimum Cementitious Materials Content: 470 lb/cu. yd.
3. Maximum Water-Cementitious Materials Ratio: 0.45
4. Fly Ash and or GGBF Slag Content: Maximum 15 percent of cementitious materials by weight.
5. Slump Limit: 4 inches, plus or minus 1 inch.
6. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

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

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

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class C, 1/2 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

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

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR RETARDER INSTALLATION

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

1. Lap joints 6 inches and seal with manufacturer's recommended tape.
2. Accessories: Seal penetrations, including pipes, with vapor retarder penetration accessories installed according to manufacturer's written instructions.

3.5 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.6 JOINTS

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

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

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

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

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Saw joints will not be allowed unless approved in writing by the Landscape Architect.
3. Unless otherwise indicated, maximum joint spacing in feet shall not exceed 2.5 times slab thickness in inches, in each direction.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

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

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete, that forms are clear of debris, ice, or excessive water, and that required inspections have been performed.

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

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

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

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

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

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

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

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

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

3.8 FINISHING FORMED SURFACES

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

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

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, or to be covered with a coating or covering material applied directly to concrete.

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

3.9 FINISHING FLOORS AND SLABS

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

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots,

and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish.

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

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.-long straightedge resting on two high points and placed anywhere on the surface does not exceed 1/4 inch.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

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

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

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

3.10 MISCELLANEOUS CONCRETE ITEMS

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

B. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 6 inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum Compressive Strength: 3500 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.

5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.11 CONCRETE PROTECTING AND CURING

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

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

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, apply curing compound and continue curing for the remainder of the curing period.

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

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

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

    a. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

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

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

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

    a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

3.12 CONCRETE SURFACE REPAIRS

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

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

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

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

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

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

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

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

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

3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Placement of embedded items.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

3.14 PROTECTION

A. Protect cast-in-place concrete slabs-on-grade from staining, laitance, and contamination until date of Substantial Completion.

END OF SECTION 033000

SECTION 042000 – UNIT MASONRY

GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units (CMUs).
2. Decorative CMUs.
3. Face brick.
4. Mortar and grout.
5. Steel reinforcing bars.
6. Masonry joint reinforcement.
7. Ties and anchors.
8. Embedded flashing.
9. Miscellaneous masonry accessories.
10. Masonry insulation.

B. Products furnished, but not installed, under this Section include the following:

1. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 05 Section "Structural Steel Framing."

C. Products installed, but not furnished, under this Section include the following:

1. Steel lintels for unit masonry, furnished under Division 05 Section "Metal Fabrications."
2. Cast-stone trim, furnished under Division 04 Section "Cast Stone."

D. Related Requirements:

1. Division 04 Section "Cast Stone" for cast stone.
2. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
3. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.

1.3 DEFINITIONS

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

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

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
2. Control and Expansion Joints: Show locations and details of control and expansion joints, including sizes and spacing.
3. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.

C. Samples for Initial Selection: For the following:

1. Decorative CMUs, in the form of small-scale units.

D. Samples for Verification: For each type and color of the following:

1. Decorative CMUs.
2. Face brick, in the form of straps of five or more bricks.
3. Special brick shapes.
4. Weep holes and vents.
5. Accessories embedded in masonry.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include material test reports substantiating compliance with requirements.
b. For bricks, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include material test report for efflorescence according to ASTM C 67.
d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

2. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
3. Grout mixes. Include description of type and proportions of ingredients.

4. Reinforcing bars.
5. Joint reinforcement.
6. Anchors, ties, and metal accessories.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109 for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, per ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

C. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

D. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1093 for testing indicated, as documented according to ASTM E 548.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

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

D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

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

1. Build mockups for each type of exposed unit masonry construction, in sizes approximately 48 inches long by 48 inches high by full thickness.

    a. Include a sealant-filled joint at least 16 inches long in each exterior wall mockup.
    b. Include through-wall flashing installed for length of Mock-up.

2. Clean one-half of exposed faces of mockups with masonry cleaner.
3. Protect accepted mockups from the elements with weather-resistant membrane.

4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

    a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
    b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

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

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
2. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. 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 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops indicated net-area compressive strengths (f'm) at 28 days.

1. Determine net-area compressive strength (f'm) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

2.2 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not uses units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.3 CONCRETE MASONRY UNITS (CMUs)

A. Shapes: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions
2. Provide bullnose units for exposed outside corners; provide square-edged for concealed outside corners, unless indicated otherwise.

B. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3050 psi.
2. Weight classification: Medium weight.
3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

C. Decorative CMUs: ASTM C 90.

1. Basis-of-Design Product: Subject to compliance with requirements, provide County Materials Corporation; Split-Face Masonry Units in Steel Gray color, or a comparable product by one of the following:

    a. Elston Materials LLC.
    b. Harvey Cement Products.

2. Integral Water Repellent: Provide units made with integral water repellent for exposed units.

    a. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive according to ASTM E 514, with test period extended to 24 hours, show no visible water or leaks on the back of test specimen.
    b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) ACM Chemistries.
        2) BASF Corporation; Construction Systems.
        3) Euclid Chemical Company (The); an RPM company.
        4) GCP Applied Technologies Inc. (formerly Grace Construction Products).

3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
4. Weight classification: Medium weight.
5. Size (Width): Manufactured to dimensions specified in "Concrete Masonry Units" Paragraph above.

6. Pattern and Texture: Standard pattern, split-face finish.
7. Colors: As selected by Architect from manufacturer's full range.

2.4 MASONRY LINTELS

A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.5 BRICK

A. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: ASTM C 216, Grade SW, Type FBS.

1. Unit Compressive Strength: Minimum average net area compressive strength of 5500 psi.
2. Initial Rate of Absorption: More than 5 and less than 30 g/30sq. in. per minute when tested per ASTM C 67.
3. Efflorescence, ASTM C 67: Rated "not effloresced."
4. Size (Actual Dimensions): 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
5. Application: Use where brick is exposed, unless otherwise indicated.

6. Basis-of-Design Product: Subject to compliance with requirements, provide provide County Materials Corporation; Heritage Collection Designer Concrete Brick in Cedar Blend color, or a comparable product by one of the following:

    a. Elston Materials LLC.
    b. Harvey Cement Products.

2.6 MORTAR AND GROU

2.7 T MATERIALS

A. 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.

B. Masonry cement and mortar cement are not permitted.

C. 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 percent passing the No. 16 sieve.

D. Aggregate for Grout: ASTM C 404.

E. Cold-Weather Admixture: Nonchloride, non-corrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

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

a. Addiment Incorporated; Mortar Kick.
b. Euclid Chemical Company (The); Accelguard 80.
c. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Morset.
d. Sonneborn, Div. of ChemRex; Trimix-NCA.

F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs, containing integral water repellent by same manufacturer.

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

a. ACM Chemistries.
b. BASF Corporation; Construction Systems.
c. Euclid Chemical Company (The); an RPM company.
d. GCP Applied Technologies Inc. (formerly Grace Construction Products)

G. Water: Potable.

2.8 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615 or ASTM A 996, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

C. Masonry Joint Reinforcement, General: ASTM A 951.

1. Hot-dip galvanized, carbon steel.
2. Wire Size for Veneer Ties: W1.7 or 0.148-inch diameter.
3. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.

4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

D. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

E. Masonry Joint Reinforcement for Multiwythe Masonry:

1. Adjustable (two-piece) type, ladder design, with one side rod at each face shell of backing wythe and with separate ties that extend into facing wythe. Ties have two hooks that engage eyes or slots in reinforcement and resist movement perpendicular to wall. Ties extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

2.9 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with subparagraphs below, unless otherwise indicated.

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
2. Stainless-Steel Wire: ASTM A 580, Type 304.
3. Galvanized Steel Sheet: ASTM A 653, Commercial Steel, G60 zinc coating.
4. Steel Sheet, Galvanized after Fabrication: ASTM A 1008, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153.
5. Stainless-Steel Sheet: ASTM A 666, Type 304.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dipped galvanized steel wire.
2. Tie Section for Steel Frame: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.188-inch-diameter, hot-dip galvanized steel wire.

D. Cast Stone Anchors: Fabricate dowels, cramps, and other cast stone anchors from stainless steel.

2.10 MISCELLANEOUS ANCHORS

A. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of dimensions indicated.

B. Post-installed Anchors: Provide chemical or torque-controlled expansion anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).
2. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.

2.11 EMBEDDED FLASHING MATERIALS

A. Metal Flashing at Copings: Provide metal flashing where indicated complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A 240, Type 304, 0.016 inch thick.
2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
3. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
4. Fabricate through-wall flashing with drip edge where indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees.
5. Metal Flashing Terminations: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 3/8inch to form a stop for retained sealant backer rod.

B. Flexible Flashing: For flashing not exposed to the exterior, use the following, unless otherwise indicated:

C. Flexible Flashing: Use the following unless otherwise indicated:

1. Self-Adhering Stainless-Steel Flashing: ASTM A 240, Type 304 stainless-steel core, with one side faced with butyl-block co-polymer adhesive.

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

1) Illinois Products, Inc.; IPCO Self-Adhesive Stainless Steel.
2) STS Coatings, Inc.; Gorilla Flash SS Peel & Stick Butyl.
3) TK Products, Inc.; TK Self-Adhering Stainless Steel TWF.
4) York Manufacturing, Inc.; York 304 SS.

b. Tensile Strength: Greater than 90 ksi621 MPa.
c. Puncture Resistance: Greater than 2500 lbf.
d. Mold Resistance: ASTM D 3273, resists growth of mold.

e. Flashing materials shall withstand 400 deg F without changing long term performance of flashing.
f. Recycled Content of Steel Products: Postindustrial recycled content not less than 60 percent.
g. Accessories: Provide splice tapes, preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

2. Termination Bars for Flexible Flashing: Stainless-steel sheet 0.019 inch by 1-1/2 inches with a 3/8 inch sealant flange at top.

3. Elastomeric Sealant: ASTM C 920, polyether sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and remain watertight.

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

1) York Manufacturing, Inc.; UniverSeal US-100.
2) STS Coatings; GreatSeal LT-100.
3) Prosoco, Inc.; R-Guard Joint Seam Sealer.

D. Solder and Sealants for Sheet Metal Flashings:

1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. Elastomeric Sealant: ASTM C 920, chemically curing silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.12 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.

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

a. Mortar Net USA, Ltd.; Mortar Net Weep Vents.

E. Cavity Drainage Material: Free-draining mesh strips, made from polymer strands that will not degrade within the wall cavity, full-depth of cavity and 10 inches high, with dovetail shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings.

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

a. Mortar Net USA, Ltd.; Mortar Net.

F. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

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

a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

2.13 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ProSoCo, Inc.; Sure Klean Vana Trol, or a comparable product by one of the following:

a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.

2.14 MORTAR AND GROUT MIXES

A. General: 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 or grout.
2. Use portland cement-lime unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
4. Add water-repellent admixture to mortar used with decorative CMU according to manufacturer's written instructions.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270 and BIA Technical Notes 8A, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For reinforced masonry, use Type N.
2. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, Table 1, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

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

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

1. CMUs: One-half running bond with vertical joint in each course centered on units in courses above and below.
2. Decorative CMUs: Running bond.
3. Modular Brick: One-half running bond with vertical joint in each course centered on units in courses above and below.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that

are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and fill cores with grout.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.

3.5 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay 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 deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Wet joint surfaces thoroughly before applying mortar.

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

E. Sealant-Pointed Joints: Rake out mortar from sealant-pointed joints to depths not less than 1/2 inch nor less than that required for sealant and sealant backing. Rake joints to uniform depths with square bottoms and clean sides.

1. Set the following cast stone trim units with unfilled head joints for installing joint sealants:

a. Copings.
b. Sills and other projecting courses.

2. Joint-Sealant Installation: Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."

3.6 CAVITY WALLS

A. Bond wythes of cavity walls together using the following method:

1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.

a. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement.
b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement to allow for differential movement regardless of whether bed joints align.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

3.7 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

a. Reinforcement above is in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1/2 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.9 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Install preformed control-joint gaskets designed to fit standard sash block.

C. Form expansion joints in brick made from clay or shale as follows:

1. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

a. Keep joint free and clear of mortar.

3.10 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.11 FLASHING, WEEP HOLES, AND CAVITY DRAINAGE

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows, unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. Coat surfaces to receive flexible flashing with primer and install prefabricated inside and outside corners, and end dams.
3. At multiwythe masonry walls, including cavity walls, extend flashing over metal drip edge, through outer wythe, turned up a minimum of 16 inches, and 1-1/2 inches into the inner wythe.
4. Overlap 4-inches at corners, end dams and other flashings.
5. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and provide prefabricated flashing end dams installed under flexible-flashing membrane, overlapping flashing membrane 4 inches minimum, with 6-inch vertical leg to form a pan.
6. Cut projecting flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing, and as follows:

1. Use specified weep/vent products to form weep holes.
2. Space weep holes 24 inches o.c., unless otherwise indicated.
3. Hold back weep/vent product 1/2 inch from face of wall.

E. Place cavity drainage material at base of wall and over wall openings directly on flashing.

3.12 REINFORCED UNIT MASONRY INSTALLATION

A. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

B. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.
3. Do not substitute mortar for grout.

3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Level B special inspections according to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. CMU Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content.

G. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

3.14 REPAIRING, POINTING, AND 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 Architect's approval of sample cleaning before proceeding with cleaning of masonry.

3. Protect adjacent stone and nonmasonry 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 masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean CMUs by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
7. Clean decorative CMUs according to manufacturer's written instructions.
8. Clean cast stone units as recommended in writing by cast stone manufacturer.

3.15 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. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31 Section "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 047200 – CAST STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast stone units.

B. Related Requirements:

1. Division 04 Section "Unit Masonry" for installing cast stone units in unit masonry.
2. Division 07 Section "Joint Sealers" for sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For cast-stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

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 building elevations showing layout of units and locations of joints and anchors.

C. Samples for Verification:

1. For each color and texture of cast stone required, 10 inches square in size.

D. Full-Size Samples: For each color, texture, and shape of cast stone unit required.

1. Make available for Architect's review at Project site.
2. Make Samples from materials to be used for units used on Project immediately before beginning production of units for Project.
3. Approved Samples may be installed in the Work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute.

B. Comply with requirements of Cast Stone Institute Technical Manual.

C. Mockups: Furnish cast stone for installation in mockups specified in Division 04 Section "Unit Masonry."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone with unit masonry work 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 CAST STONE MATERIALS

A. General: Comply with ASTM C 1364.

B. Portland Cement: ASTM C 150/C 150M, Type I or Type III, containing not more than 0.60 percent total alkali when tested according to ASTM C 114. Provide natural color or white cement as required to produce cast-stone color indicated.

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

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

E. Color Pigment: ASTM C 979/C 979M, 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: Use only admixtures specified or approved in writing by Architect.

1. Do not use admixtures that contain more than 0.1 percent 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. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.
4. Water-Reducing Admixture: ASTM C 494, Type A.
5. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.
6. Water-Reducing, Accelerating Admixture: ASTM C 494, Type E.

G. Reinforcement: Deformed steel bars complying with ASTM A 615, Grade 60. Use galvanized or epoxy coated reinforcing when covered with less than 1-1/2 inches of cast stone material.

1. Epoxy Coating: ASTM A 775.
2. Galvanized Coating: ASTM A 767.

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. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Architectural Cast Stone, Inc.
2. Cary Concrete.
3. Edwards Cast Stone Company.
4. Pacific Cast Stone, Inc.
5. Pineapple Grove Designs.
6. Harvey Cement Products; SavannaStone.

B. Provide cast stone units complying with ASTM C 1364 using either the vibrant dry tamp or wet-cast method.

1. Units shall be resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364.

C. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.

1. Slope exposed horizontal surfaces at least 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.

D. 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.

E. Cure units as follows:

1. Cure units in enclosed moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
2. Keep units damp and continue curing to comply with one of the following:

a. Not less than five days at mean daily temperature of 70 deg F or above.
b. Not less than six days at mean daily temperature of 60 deg F or above.
c. Not less than seven days at mean daily temperature of 50 deg F or above.
d. Not less than eight days at mean daily temperature of 45 deg F or above.

F. Acid etch units to remove cement film from surfaces indicated to be exposed to view.

G. Color and Texture: Match Architect's samples.

2.4 MORTAR MATERIALS

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

2.5 ACCESSORIES

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

B. Dowels: 1/2-inch- diameter round bars, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.

C. Sealant: Provide sealant materials complying with Division 07 Section "Joint Sealants."

2.6 MORTAR MIXES

A. Comply with requirements in Division 04 Section "Unit Masonry" for mortar mixes.

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.

B. 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 Drawings. 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. Coordinate installation of cast stone with installation of flashing specified in other Sections.

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

D. Stone shall be protected from splashing mortar or damage by other trades. Foreign matter splashed on the stone should be removed immediately.

E. Set units in full bed of mortar with full head joints, unless otherwise indicated.

1. Set units with joints 1/4 to 3/8 inch wide, unless otherwise indicated.
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.

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

G. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.

1. Form open joint of width indicated, but not less than 3/8 inch.
2. Keep joints free of mortar and other rigid materials.
3. 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."

a. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant, unless otherwise indicated.

H. Sealant-Pointed Cast Stone:

1. Set the following cast stone with unfilled vertical joints:

a. Cornices, copings, projecting belt courses, steps, platforms and, generally, stone areas either partially or totally horizontal.
b. Only ends of lugged sills and similar stones shall be embedded in mortar. Leave balance of joint open until pointing cast stone, then tuckpoint on face only to a depth of 3/4 inch.

2. After cast stone has been set in mortar, rake mortar joints to a depth of 3/4-inch from face. Sponge off face of stones to remove splashed or smeared mortar.
3. After mortar has set, insert properly-sized back-up material or backer rod to proper depth, prime ends of cast stone, and gun in sealant.

3.3 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

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 where variation is due to warpage of units within tolerances specified.

3.4 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 Architect.

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 Architect'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. Clean cast stone according to manufacturer's written instructions.

END OF SECTION 047200

SECTION 055213 – PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel railings.

B. Related Requirements:

1. Division 03 “Cast in Place Concrete”.

1.3 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Railing brackets.
2. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Illinois-licensed structural engineer.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

A. Professional Engineer Qualifications: An Illinois licensed structural engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of railings that are similar to those indicated for this Project in material, design, and extent.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

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

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on any area of 1 sq. ft.
b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change (Range): 120 deg F, ambient, 180 deg F, material surface.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

C. Source Limitations: Obtain each type of handrail and railing through one source from a single manufacturer.

2.3 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Pipe: ASTM A 53, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

C. Plates, Shapes, and Bars: ASTM A 36.

D. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

2.4 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Intermediate Coats and Topcoats: Provide products that comply with Division 09 Section "Painting."

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Concrete: Normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch maximum aggregate size or dry, packaged, normal-weight concrete mix complying with ASTM C 387 mixed with potable water according to manufacturer's written instructions.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

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 flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Form changes in direction as follows:

1. By bending.

J. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Close exposed ends of railing members with prefabricated end fittings.

L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel and iron railings, including hardware, after fabrication.
2. Comply with ASTM A 123 for hot-dip galvanized railings.
3. Comply with ASTM A 153 for hot-dip galvanized hardware.

4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
5. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required to install railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 INSTALLING POST

A. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 24 inches plus 3 inches for each foot or fraction of a foot that fence height exceeds 4 feet.

B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

    a. Exposed Concrete: Extend 2 inches above grade. Finish and slope top surface to drain water away from post.
    b. Concealed Concrete: Top 2 inches below grade, or as indicated on Drawings, to allow covering with surface material. Slope top surface of concrete to drain water away from post.

3. Posts Set in Concrete: Extend post to within 6 inches of specified excavation depth, but not closer than 3 inches to bottom of concrete.
4. Space posts uniformly at interval indicated, but not more than 6 feet o.c.

3.5 ANCHORING POST

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.

3.6 ATTACHING RAILINGS

A. Attach railing ends to wall with wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface.

1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

B. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed gypsum board assemblies, use hanger or lag bolts set into steel framing, concealed steel reinforcements, or fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.

3.7 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.8 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 055213

SECTION 079200 – JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Solvent-release-curing joint sealants.

B. Related Requirements:

1. Division 04 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

1.6 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Silicone Sealant Warranty Period: 20 years from date of Substantial Completion.

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.

2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

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

a. Dow Corning Corporation; 790.
b. GE Advanced Materials; SilPruf LM SCS2700.
c. Sika Corporation, Construction Products Division; Sikasil 290.
d. Tremco; Spectrem 1.

2.3 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.

b. Masonry.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.
b. Glass.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application JS-1 : Jjoints between dissimilar materials; perimeter joints of doors, louvers, and other exterior joints in vertical and horizontal nontraffic surfaces.

1. Silicone Joint Sealant: Single-component, neutral curing, Class 100/50.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

B. Joint-Sealant Application JS-2 : Interior joints between plumbing fixtures and adjoining walls and floors:

1. Joint Sealant: Mildew-resistant, single-component, nonsag, neutral curing, silicone.
2. Joint-Sealant Color: Clear.

C. Joint-Sealant Application JS-3 : Bedding for thresholds.

1. Joint Sealant: Butyl rubber based.

END OF SECTION 079200

SECTION 116800 – PLAYGROUND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Playground Equipment.

B. Related Requirements:

1. Division 03 Section “Cast-in-Place Concrete” for installation of sleeves to be cast in concrete piers.
2. Division 31 Section “Site Excavation.”
3. Division 32 Section “Planting and Landscaping.”
4. Division 33 Section “Subdrainage.”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show location and extent of playfield equipment. Include elevations, sections, and details not shown in Product Data. Show method of field assembly, connections, installation details, mountings, inserts, attachments to other Work, and relationship to adjoining work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Comply with applicable provisions of the Illinois Department of Transportation's (IDOT) “Standard Specifications for Road and Bridge Construction,” current edition, except where more stringent requirements are indicated. Measurement and payment provision included in the IDOT Standard Specifications do not apply to this Section.

B. Installer Qualifications: An experienced installer who has completed installations of site improvements similar in material, design, and extent to those indicated for the project and that has resulted in construction with a record of successful in-service performance.

C. Source Limitations: Obtain each type of playfield equipment through one source from a single manufacturer.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination.”

1.6 WARRANTY

A. Contractor to provide a letter of compliance from manufacturer’s representative completed during physical inspection of final installation.

B. Manufacturer's standard warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete:

1. Concrete for playfield equipment, structures, and footings shall conform to Article 1020 of the “Standard Specifications,” and the following:

   a. Portland Cement: ASTM C 150, Type 1.
   b. Aggregates: Hard, sound, uncoated particles, conforming to ASTM C 33.

      1) Coarse Aggregate: Gravel or crushed rock ranging in size from 1/4 to 3/4 inch, evenly graded, free of clay and other foreign substance.
      2) Fine Aggregates: Clean, sharp, coarse torpedo sand, free of clay, loam or foreign substance.

   c. Water: Potable.

2. Mix Design: Compression strength of 3500 psi in 14 days, minimum of 5 bags of cement per cubic yard of concrete with a maximum of 6 gallons of water to 1 bag of cement.
3. Slump: Maximum slump of 4 inches and a minimum slump of 2 inches.

2.2 PLAYGROUND EQUIPMENT

A. Equipment to be purchased by the owner. The contractor shall be responsible for accepting delivery at his facility or on site, unloading, and inspecting the shipment for completeness and damage. An owners representative shall be present at time of delivery.

B. Composite Structure

1. Manufacturer: Little Tikes Commercial. Available from: Parkreation. Contact: Paul Gozder / (815)735-1497, paul@parkreation.com. This product is being purchased by owner. Contractor to assemble and install.

2. See component list attached to end of section.

C. Concerto Musical Equipment
1. Manufacturer: Little Tikes Commercial. Available from: Parkreation. Contact: Paul Gozder / (815)735-1497, paul@parkreation.com. This product is being purchased by owner. Contractor to assemble and install.
2. Models:
   a. 5-Congas
      1) Quantity: 1
   b. Vibes
      1) Quantity: 1
   c. Spin Cabasa, Large
      1) Quantity: 1

D. Independent Spinner
1. Manufacturer: Little Tikes Commercial. Available from: Parkreation. Contact: Paul Gozder / (815)735-1497, paul@parkreation.com. This product is being purchased by owner. Contractor to assemble and install.
2. Revolution Inclusive Spinner
   a. Quantity: 1
   b. This product has an adjustable revolution governor. It shall be field adjusted, with product representative on site, to comply with a 6’ use zone.

E. Dish Swing
1. Manufacturer: Elephant Play, Available from All Inclusive Rec. Contact: Stewart Mackay/ (572)701-9787, stewart@allinclusiverec.com
2. Single Arch Swing ES1000
   a. Quantity: 1

F. Track Ride
1. Manfacturer: Little Tikes Commercial. Available from: Parkreation. Contact: Paul Gozder / (815)735-1497, paul@parkreation.com. This product is being purchased by owner. Contractor to assemble and install.
2. Custom Double Track ride
   a. Quantity: 1

G. Independent see saw
1. Manufacturer: Landscape Structures, Available from: NuToys Leisure Products. Contact: Kevin Driscoll / (708)579-9055, kevind@nutoys4fun.com. This product is being purchased by owner. Contractor to assemble and install.

2. We-Saw
   a. Quantity: 1

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for playfield layout, alignment of mounting substrates, installation tolerances, and other conditions affecting performance.

1. Verify critical dimensions.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions, and to the referenced competition rulebooks and specifications, for each type of playfield equipment. Complete playfield equipment assembly, where required.

B. Unless otherwise indicated, install playfield equipment after other operations have been completed.

C. Permanently Placed Playfield Equipment and Components: Install rigid, level, plumb, square, and true; anchored securely, positioned at locations and elevations indicated on Shop Drawings; in proper relation to adjacent construction; and aligned with playfield layout.

3.3 CLEANING

A. Repair areas disturbed by playfield installation operations to original conditions. Repair damage to existing roadways, sidewalks, curbs, utilities, plant material and turf, and site furnishings, caused by playfield equipment installation.

B. Remove debris and dispose of legally off site, leaving site clean and undamaged at time of Substantial Completion.

COMPOSITE PLAY EQUIPMENT SCHEDULE

IP	*INDEPENDENT PLAY*	
1.00	200203413	REVOLUTION INCLUSIVE SPINNER
KB	*KID BUILDERS*	
4.00	200201320	KB RAMP 3660 DBL.WD.SFTY RAIL (SM HOLES
1.00	200007121	PANEL ARCH BUBBLE/MIRROR DKMT. KB
6.00	200013797	KB 10' POST PLUS GLV. W/ALUM.CAP
7.00	200015486	KB 176" POST PLUS GLV. W/ALUM.CAP
1.00	200006992	KB SLIDE POLE 1220 MM/48"

1.00	200200252	VALANCE STL. "TICKET BOOTH" KB
9.00	200201200	KB POST ICON BASEBALL
1.00	200200830	KB CLMBR POMM 1830 MM F/LG DK EDGE
1.00	200202253	KB FIRE ESCAPE CLIMBER 72"
7.00	200013812	KB 148" POST PLUS GLV. W/ALUM.CAP
1.00	200201254	KB PANEL "BAT & BALL" DKMT LG.DK.EDGE
2.00	200202503	KB DECK SQUARE SMALL HOLE 11GA
1.00	200200785	KB MONKEY LEANOUT SEAT PANEL
1.00	200200506	PANEL REACH GEAR F/KB
1.00	200202559	KB TRANS STAT 1016 SFTY RL (SM HL)11GA
1.00	200006976	SLIDE DBL.WD. 1220 MM/48" KB
1.00	200034456	CURVED CLIMBING WALL INDEPENDENT
1.00	200200284	DECK BALCONY W/STR.WHL.MT.KB
2.00	200201321	KB TRANS PLATE F/DBL. WD. RAMP
5.00	200202546	KB LARGE SQUARE DECK (SM HL)11GA
1.00	200203441	CONCERTO SPIN CABASA LARGE
14.00	200013800	KB 136" POST PLUS GLV. W/ALUM.CAP
1.00	200203438	CONCERTO VIBES
2.00	200202571	KB DECK TRAPAZOID (SM HL)11GA
1.00	200200687	POST PLUS 200" W/ALUM CAP F/KB
1.00	200200212	KB PANEL ARCH "CUSTOM PCS SYMBOLS DKMT
1.00	200200101	KB BRIDGE "S" CURVE LFT W/SAFE RAILS 8'
8.00	200202501	KB DECK 1/2 SQUARE SMALL HOLE 11GA
6.00	200015483	KB 164" POST PLUS GLV. W/ALUM.CAP
1.00	200202502	KB DECK REST SMALL HOLE 11GA
1.00	200200306	PANEL ARCH FUN W/WORDS PTMT KB
2.00	200013924	LOOP ASSY SAFETY KB
1.00	200203306	KB 88" DOUBLE ENTRY QUANTUM II SLIDE
1.00	200202583	KB LG SQ DK W/RUNG LADD 72" (SM HL)11GA
2.00	200200195	KB LONG DK/DK PLATE 16"/405MM (FACES)
8.00	200203377	KB WIRE MESH PANEL
1.00	200201182	KB POST GALV. 7' W/ALUM CAP
1.00	200203444	CONCERTO 5-CONGAS
1.00	200007124	PANEL ARCH T-T-T PTMT. KB
1.00	200201318	KB RAMP 2440 DBL.WD.SFTY RAIL (SM HOLES
1.00	100001132	KB LONG DK/DK PLATE 405MM/16"
1.00	200016532	PANEL COUNTER F/STORE FRONT KB (STEEL)
1.00	100001139	KB DK/DK PLATE 405MM/16"
5.00	200131014	KB 172" GALV. POST WITH ALUM. CAP
6.00	200131016	KB 180" GALV. POST WITH ALUM. CAP
1.00	200203414	NU-EDGE-X HALF DIAMOND CLIMB F/KB
6.00	200022122	MAST F/KB SHIP
1.00	200202563	KB TRANS STAT 1220 SFTY RL (SM HL)11GA
1.00	200109899	KBP SEAT PANEL PTMT
NAT	*NATURALS*	
3.00	200202397	KB RECYCLED TREEHOUSE SAFETY PANEL

NUE	*NU-EDGE*	
4.00	200202810	KB NU-EDGE BEAM ROOF SINGLE
4.00	200202720	NU-EDGE STUMP PINE SHORT F/KB
1.00	200202760	KB NU-EDGE BEAM ROOF
2.00	200202724	NU-EDGE 3 STUMP CLIMB 40" F/KB
1.00	200202729	NU-EDGE TREE 72" W/KB TREEHOUSE PANEL
SP	*KB /KK /WB/ PB*	
1.00	100010125	INSERT "SIGN LANGUAGE" W/HDWR
1.00	200245768	ASSY RAIL MT.ALUM.STEER.WHL. RED(obs)
6.00	200008729	FLAG DPRED SAMPLE W/NO GRAPHICS
TM	*TIKES IN MOTION*	
1.00	200203386	ROLLER SLIDE OFF A 64" HIGH DECK FOR KB
1.00	200201870	SOLO SPINNER
1.00	200203338	KB SLALOM SLIDE 72"

END OF SECTION 116833

SECTION 133423 – FABRICATED STRUCTURES - ARCHWAY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Prefabricated steel shelters, gazebo and pavilions.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete: Footings and installation of anchor bolts/base plates that are to be provided by shelter manufacturer.

1.3 REFERENCES

A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2003a.

B. ASTM A 325 - Standard Specification for Structural Steel Bolts, Heat Treated, 120,000 PSI Minimum Tensile Strength; 2004.

C. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength; 2003a.

D. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts; 2004.

E. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2003a.

F. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process; 2003.

G. American Institute of Steel Construction (AISC).

H. American Iron and Steel Institute (AISI) Specifications for Cold Formed Members.

I. American Society of Testing Material (ASTM).

J. American Welding Society (AWS).

K. OSHA Steel Erection Standard 29 CFR 1926.750 Part R.

L. SSPC-SP 2 –Hand Tool Cleaning; Society for Protective Coatings; 2000.

M. SSPC-SP 10 -Near-White Blast Cleaning; Society for Protective Coatings; 2000.

N. ICC Evaluation Service, ESR-1006, Structural Insulated Panels.

1.4 System Description

A. Standard Design Loads: International Building Code (IBC 2000), 30 pounds per square foot roof snow load, 120 mile per hour wind speed, Exposure “C”, Seismic Design Category D.

Or

B. Standard Design Loads: Uniform Building Code (UBC 1997), 30 pounds per square foot roof snow load, 100 mile per hour wind speed, Exposure “C”, Seismic Zone 4.

C. Column to footing connection to be in compliance with OSHA Steel Erection Standard CFR 1926.750 Part R, which requires a minimum of four (4) anchor bolts per column.

D. Design Method shall be per applicable local building code requirements. Manufacturer’s design shall utilize a three-dimensional structural analysis to determine all member loads and forces.

E. The pre-engineered package shall be shipped as a pre-cut and pre-fabricated package that shall include the structural framing members, roof material, fasteners, and trim as well as the installation instructions. The structure shall be shipped un-assembled for minimum shipping charges. Field labor shall be only for the assembly of the pre-fabricated parts. No onsite welding shall be required or permitted. Connection bolts shall be concealed within the tubing where possible except at the base.

1.5 SUBMITTALS

A. Submit a minimum of 4 sets of shop drawings and 2 sets of structural calculations signed and sealed by a Professional Engineer in the state of Illinois.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Contractor to accept delivery and verify condition and completeness of shipment.
B. Coordinate delivery requirements with Owner and other installers.
C. Store products in manner to prevent damage prior to installation. Where products need to be stored outdoors, store off the ground and place so that water will drain
D. Inspect parts within 48 hours of delivery, compare with manufacturer’s bill of materials and report any missing or non-conforming parts to the manufacturer within this time frame.

1.7 WARRANTY

A. Provide standard manufacturer's ten year warranty.

PART 2 PRODUCTS

Model:
EA10x1-10-P5 Custom *“*Sandlot*”* entrance arch by ICON Shetlers Inc.

2.1 Provided by Owner

A. ICON Shelter Systems, Inc., 1455 Lincoln Ave, Holland, MI 49423, Telephone 800-748- 0985 or email info@iconshelters.com. Contact: Paul Gozder, (815)735-1497, paul@parkreation.com

PART 3 EXECUTION

A. When unloading, pad the forks and use other precautions to protect the powder-coated finish. Do not use chains to move materials. Handle all materials carefully in the field to avoid scratching the powder-coat finish. Before installing the roof, clean the steel and touch up any scratches and chips in the powder-coat finish using touch up paint from the manufacturer.

B. The archway shall be set on prepared footings or concrete slab (provided by others). Footing details shall be designed by an engineer (retained by other than the manufacturer), based on load information as provided on the manufacturer's supplied drawings. Foundation shall be constructed to all local building code requirements and per good construction practices for the specific site conditions.

C. In accordance with OSHA Steel Erection Standard 29 CFR 1926.750 Part R, anchor bolts shall be installed for proper column stability and shall have a minimum of four (4) anchor bolts per column.

D. Install all parts and pieces per the manufacturer's supplied installation instructions and these specifications. The underside of the tongue and groove decking or sandwich panel roof deck shall be sealed before installation as specified and approved by the landscape architect or owner.

END OF SECTION

SECTION 133423 – FABRICATED STRUCTURES – FABRIC SHADE SHELTERS

Part 1 – General

1.1 Related Documents

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

1.2 Summary

The shade structure contractor shall be responsible for design, engineering, fabrication and supply of the work specified herein. The intent of this specification is to have only one manufacturer be responsible for the aforementioned functions.

1.3 Submittals

1.3.1 Pre-Bid Submittals

A. Provide proof of installed reference sites with structures for similar scope of project and installation that are engineered to International Building Code (IBC) specifications. Include in reference list of structure dimensions with install dates and project locations.

B. Provide information to establish desired fabric color and power coat color.

C. Provide proof of all quality assurance items including:

1. A list of at least three (3) reference projects that have been installed a minimum of five (5) years.

2. Proof of Liability and Umbrella Insurance.

1.3.2 Award of Contract Submittals

A. Make available wet-sealed structural engineering drawings and calculations

B. Provide fabric color and powder coat color selections for final order.

1.4 Project Conditions

A. Field Measurements: verify layout information for shade structures shown on the drawings in relation to the property survey and existing structures. Verify locations by field measurements prior to construction.

1.5 Warranty

A. The successful bidder shall provide a one (1) year warranty on all labor and materials.

B. A supplemental non-prorated warranty from the manufacturer shall be provided for a period of ten (10) years on fabric including stitching and twenty (20) years on the structural integrity of the steel, from date of substantial completion.

C. The warranty shall not deprive the Owner of other rights the Owner may have under the provisions of the Contract Documents, and will be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contractor documents.

D. Because of surety requirements, any performance and payment bond that might be required will cover only the first year of the warranty. The manufacturer's warranty will be a separate document and will be executed at the time of completion of the work.

Part 2 – Products

2.1 General

This product will purchased by the owner. Contractor to accept delivery and verify condition and completeness of order.

The shade products shall be designed and manufactured to the most exacting specifications by skilled craftsmen, and certified by Professional Engineers for structural soundness of designs. All shade products are shipped knocked-down, with complete assembly instructions, and ready for easy in-field installation.

The proposed structure(s) manufactured by Shade Systems, Inc. shall be modular and pre-fabricated, and include the structural steel frame, fabric roof, steel cables and all fasteners.

A. Manufactured and Distributed by:
Shade Systems, Inc.
4150 SW 19th Street

Ocala, FL 34474
(800) 609-6066
(352) 237-2256 Fax
margo@shadesystemsinc.com
www.shadesystemsinc.com

Part 3 – Execution

3.1 Installation

Installations of shade structure(s) shall be performed by an installer who shall comply with the manufacturer's instructions for assembly, installation, and erection, per approved drawings.

A. Concrete

1. Concrete work shall be executed in accordance with the latest edition of the American Concrete Building Code, ACI 318.

2. All reinforcement shall confirm to ASTM A-615, Grade 60.

3. Reinforcing steel shall be detailed, fabricated, and placed in accordance with the latest ACI Detailing Manual, and Manual of Standard Practice.

END OF SECTION

SECTION 311000 – SITE CLEARING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All labor, materials, and equipment required to complete site clearing and disposal shown on the drawings.

1.2 RELATED DOCUMENTS

A. Specified elsewhere within these specifications:
1. 312000 – Earth Moving

1.3 QUALITY ASSURANCE

A. Unless specifically stated in the specifications, the following documents shall provide general requirements and covenants applicable to construction within the Village of Oak Brook. In the event of conflict between the contents of this document and the existing Village codes, the former will supercede the latter and/or the decision of the Village. will prevail.
1. Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)

1.4 JOB CONDITIONS

A. Restore damaged improvements to their specified condition acceptable to the Construction Manager. When required by the drawings, control monuments shall be re-established.

B. Provide protection of property adjoining the project and limit work to the construction area delineated by the silt fence as shown on the drawings.

C. Materials removed from the site shall be disposed of off the site in a legal manner.

1.5 JOINT UTILITY LOCATING INFORMATION FOR EXCAVATORS (JULIE)

A. The Trade Contractor is responsible for calling JULIE at 1-800-892-0123 at least 48 hours prior to beginning any excavation. The Trade Contractor shall notify the Construction Manager with the JULIE dig number at least 48 hours prior to beginning any excavation. The Trade Contractor is responsible for maintaining utility marking throughout construction.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Equipment shall be at the option of the Trade Contractor within the limits of the

"Construction Requirements" of Section 201 of the Standard Specifications.

2.2 DISPOSAL

A. Disposal of surplus materials shall be in accordance with Article 202.03 of the Standard Specifications.

B. Disposal of unstable and unsuitable material shall be off the site in a legal manner at a location provided by the Trade Contractor. Unsuitable and unstable material includes but is not limited to rocks, trees, stumps, and soil not suitable for compaction.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the area where and conditions under which clearing and site preparation are to be performed. Notify Construction Manager in writing of conditions detrimental to proper and timely completion of the work.

3.2 SITE CLEARING

A. Clearing and site preparation shall be performed in accordance with Section 201 of the Standard Specifications.
   1. Remove vegetation, improvements or obstructions interfering with installation of new construction.
   2. Fill depressions caused by clearing operations with satisfactory soil material, unless further excavation or earthwork is indicated. Place fill material in horizontal layers not exceeding six inches loose depth, and thoroughly compact to specified density.
   3. Existing roadways and drainage structures that are to remain shall be protected and maintained in their present condition. All items damaged shall be repaired at the Trade Contractor's expense.

END OF SECTION 311000

SECTION 312000 – EARTH MOVING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All labor, materials, and equipment required to complete site grading as shown on the Grading Plans for this project, including building excavation, and site preparation.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, including, but not limited to:
1. 311000 – Site Clearing
2. 312333 – Trenching and backfill

B. Work under this Section shall be done in accordance with the applicable provisions of the “Code of Ordinances”, latest edition, as adopted by the Village of Oak Brook, Illinois.

1.3 QUALITY ASSURANCE

A. Unless specifically stated in the specifications, the following documents shall provide general requirements and covenants applicable to construction within the Village of Oak Brook. In the event of conflict between the existing Village codes and the contents of this document, the former will supercede the latter and/or the decision of the Village will prevail.
1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)
2. I.S.P.E., Consulting Engineers Council of Illinois, et. al., Standard Specifications for Water and Sewer Main Construction in Illinois, latest revision.

B. Testing Laboratory Services:
1. The Owner shall secure and pay for the services of a Geotechnical Engineer to classify existing soil materials, to recommend and to classify proposed borrow materials when necessary, to verify compliance of materials with specified requirements, and to perform required field and laboratory testing.

C. The Contractor shall not rely on the Owner to provide Source Site Certifications for removal of any materials.

D. Form LPC-663, Uncontaminated Soil Certification by Licensed Professional, can be downloaded from http://www.epa.state.il.us/land/regulatory-programs/permits-and-management/forms/clean-construction-demo-debris/index.html

E. The contractor shall provide the Owner and the engineer with copies of all

executed forms, documents, and correspondences regarding Clean Construction Demolition Debris (CCDD).

1.4 SUMMARY

A. Section Includes:
1. Site clearing.
2. Earth moving and excavation.
3. Utilities trenching.
4. Grading.
5. Backfilling.
6. Filling.
7. Compacting.

1.5 REFERENCES

1. ASTM D 1556-00 -- Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

2. ASTM D 1557-02 -- Test Methods for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

3. ASTM D 2167-94(2004) -- Standard Test Method for Density and Unit Weight of Soil In-Place by the Rubber Balloon Method.

4. ASTM D 2487-00-- Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

5. ASTM D 2922-01 -- Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

6. ASTM D 3017-01 -- Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

7. ASTM D 698-00a --Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).

8. ASTM D448-03a -- Standard Classification for Sizes of Aggregate for Road and Bridge Construction

1.6 SUBMITTALS

A. Test Reports: Testing laboratory will submit the following reports directly to the Construction Manager and shall copy the Trade Contractor:
1. Analysis of soil materials, whether procured on or off site, and including fill, backfill, and borrow materials.
2. Verification of each footing subgrade.
3. In-place density test reports.
4. Moisture-density relationship test reports.
5. Compressive strength or bearing test reports.

1.7 SITE CONDITIONS

A. Traffic: Do not interfere with or close public ways without permission of governing authorities. Do not interfere with adjacent private facilities.

B. Site Utilities:
1. Advise utility companies of excavation activities before starting excavations. Locate and identify underground utilities passing through work area before starting work.
2. If underground utilities are encountered in locations other than indicated, immediately advise Utility Owners before proceeding. Amend project record documents to show actual locations.
3. Protect existing utilities indicated to remain.
4. Do not interrupt existing utilities without advance notice to and written approval from the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Where sufficient approved materials are not available from required excavations on site, obtain and pay for materials from approved sources off site without charge to the Owner.

B. For each soil material proposed for use as fill or backfill, whether obtained on or off site, testing laboratory shall classify soil material, develop Proctor curve, and perform any other tests required.

C. Obtain approval of the Geotechnical Engineer and Construction Manager for each soil material.

D. Topsoil: Refer to landscape drawings.

E. Satisfactory Topsoil: Fertile agricultural soil, typical for locality, capable of sustaining vigorous plant growth; free of subsoil, rocks larger than 2 inches in diameter, clay, toxic matter, plants, weeds, and roots.

F. Backfill and Fill Materials: Materials classified as satisfactory.

G. Satisfactory Soil Material (ASTM D 2487): Free of stones larger than 2 inches in any dimension, trash, debris, organic material, other objectionable material and classified as follows:

1. GW (well-graded gravel).
2. GC (clayey gravel).
3. SW (well-graded sand).
4. SC (clayey sand).
5. CL (lean clay).

H. Unsatisfactory Soil Material (ASTM D 2487):
1. GP (poorly graded gravel).

2. GM (silty gravel).
3. SP (poorly graded sand).
4. SM (silty sand).
5. ML (silt).
6. OL (organic clay).
7. OL (organic silt).
8. CH (fat clay).
9. MH (elastic silt).
10. OH (organic clay).
11. OH (organic silt).
12. PT (peat).

I. Aggregate Fill outside Tree Drip Line: Crushed Concrete; 100 percent passing a 1-1/2-inch sieve; not more than 2 percent passing a No. 4 sieve

J. Aggregate Fill within Tree Drip Line: Clean, crushed rock or gravel or uncrushed gravel; 100 percent passing a 1-1/2-inch sieve; not more than 2 percent passing a No. 4 sieve.

K. Subbase Material: Well-graded, clean, sound, durable particles of crushed concrete, crushed blast furnace slag, and screenings. Obtain the Construction Manager's approval of source, quality, and gradation.

2.2 PLASTIC WARNING TAPE

A. Acid- and alkali-resistant polyethylene film specifically manufactured for marking and identifying underground utilities.
1. Minimum width, 2 inches; minimum thickness, 4 mils.
2. Metallic core encased in protective jacket against corrosion and detectable by metal detector when tape is buried 1 foot deep.
3. Continuous printed inscription shall describe utility. Tape color:
a. Electric: Red.
b. Gas: Yellow.
c. Water system: Blue.
d. Sewer: Green.
e. Phone: Orange

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection: Provide markers indicating limits of work and clear identification of items and areas requiring protection utilizing construction fencing as necessary.

B. Provide barricades, warning signs, and warning lights around open excavations as necessary to prevent injury to persons.

C. The Trade Contractor is solely responsible for determining the potential for injury to persons and damage to property.
1. Where such potential is present, take appropriate protective measures.
2. Protect persons from injury and protect existing and new improvements from damage caused directly or indirectly by construction operations.

D. Do not allow excavation subgrades and soil at foundations to be subjected to freezing temperatures or frost. Provide protective insulating materials as necessary. Should prepared, compacted subgrades be damaged by freezing, remove soil materials to the depth required by the Geotechnical Engineer and replace and recompact in conformance with specified requirements.

3.2 EROSION CONTROL

A. To the maximum extent practicable, prevent erosion or displacement of soils and discharge of soil-bearing water runoff to adjacent properties and waterways.

B. Provide erosion control during the entire project in accordance with applicable regulations, including Section 313500 - Slope Protection, and as shown on the drawings.

3.3 PROTECTION OF TREES

The Contractor shall contract with an Arborist to obtain recommendations for tree preservation alternatives and procedures, as required.

A. Provide temporary guards to protect trees and vegetation to remain. Place guards so as to prevent all forms of vehicular traffic or parking within drip lines.
   1. Do not allow excess foot traffic within drip lines.
   2. Do not stockpile construction materials, soil, or aggregates within drip lines.
   3. Water trees and other vegetation to remain within limits of the area of construction activities as required to maintain their health during course of construction operations.

B. Excavate within drip line of trees only where indicated.

C. Where underground utilities must pass within drip line, hand-dig tunnels to avoid cutting main lateral roots and taproots. Minor roots may be cut only when necessary.

D. Where excavation must occur within drip line, hand excavate to avoid damage to roots. Minimize over-excavation by providing sheeting in lieu of sloped embankments.
   1. Re-establish exposed roots in areas to be backfilled where practicable. Extend excavation along major roots to facilitate gradual bending of roots into backfill areas. Cut roots only where roots cannot be re-established.
   2. Where root system is damaged or cut back, prune branches to maintain root/branch balance.

E. Immediately protect exposed roots until re-establishment in backfill. Cover with approved mulching material and keep continuously moist.

F. Maintain existing grade within drip line of trees, unless otherwise indicated.

G. Lowering Grades:
   1. Follow recommendations of Arborist to achieve required grades and

optimize chances of survival for trees. Use hand excavation within drip line.

2. Prune branches as recommended by Arborist and provide further maintenance as recommended by Arborist until substantial completion.

H. Raising Grades:
1. Minor fills less than 6 inches: Place specified topsoil without compacting, and finish grade by hand.
2. Moderate fills, 6 to 12 inches:
a. Place aggregate fill on existing grade. On all sides of tree trunk, hand place aggregate fill within an 18 inch radius of trunk up to a level approximately 2 inches above finish grade.
b. Elsewhere within drip line, hand place aggregate fill up to 6 inches below finish grade, then hand place 6 inches of topsoil to finish grade. Slightly over fill to allow for future settlement.
c. Finish grade by hand without compacting fill.

I. Where cutting is required, cut branches and roots using properly sharpened tools and without breaking members.

3.4 CLEARING AND GRUBBING

A. Remove any trash or debris from site, including below-ground portions. Completely remove existing trees indicated to be removed, including stumps and roots.

B. Remove all vegetable matter from within the limits indicated on the drawings.
1. Fill holes thus created with approved, compacted soil.
2. Remove and dispose of grass and other vegetation before stripping topsoil. Strip topsoil down to subsoil without contaminating topsoil with subsoil.
3. Stockpile in a manner to freely drain surface water and to prevent contamination by subsoil or other materials; cover if necessary to prevent wind-blown dust.
4. Do not strip topsoil within driplines of trees indicated to remain.

3.5 DEWATERING

A. Do not allow surface or ground water to flow into or accumulate in excavations.

B. Do not allow water to flow in an uncontrolled fashion across the project site or to erode slopes or to undermine foundations. Do not allow water to be diverted onto adjacent properties. Arrange excavation operations so as to provide continual and effective drainage of excavations.

C. Provide and maintain temporary diversion ditches, dikes, and grading as necessary; do not use trench excavations for this purpose. When required by surface or subsurface water conditions, provide sumps, wellpoints, french drains, pumps, and other control measures necessary to keep excavations free of water. When existence of ground water near or above final excavation level is indicated or suspected, provide control measures prior to excavating to water level and maintain water level continuously below working level.

3.6 EXCAVATION

A. General: Excavation includes the removal of any materials necessary to achieve the required subgrade elevations and includes reuse or disposal of such materials.

B. Unnecessary Excavation: The expense of excavation of materials outside of limits indicated or ordered in writing by the Geotechnical Engineer and the correction thereof to the satisfaction of the Engineer shall be borne by the Trade Contractor.
   1. Unnecessary excavation under footings: Either deepen footings to bear on actual subgrade elevation without changing top elevations or place concrete fill up to required elevation, as required by the Geotechnical Engineer.
   2. Unnecessary excavation other than under footings: Either place compacted fill or otherwise correct conditions, as required by the Engineer.

C. Approval of Subgrade: Notify the Engineer when required elevations have been reached.
   1. When required by the Geotechnical Engineer due to the unforeseen presence of unsatisfactory materials or other factors, perform additional excavation and replace with approved compacted fill material in accordance with the Geotechnical Engineer's instructions.
   2. Payment for unforeseen additional work will be made in accordance with established unit prices or, if none, in accordance with provisions for changes in the work. No payment will be made for correction of subgrades improperly protected against damage from freeze-thaw or accumulation of water, or for correction of otherwise defective subgrades.

D. Excavation Stabilization: Wherever it is possible to slope faces of excavations to achieve stabilization, do so in compliance with requirements of governing authorities. Otherwise, provide shoring and bracing.
   1. Design, provide, maintain, and remove shoring and bracing in compliance with requirements of governing authorities. Remove temporary shoring and bracing when stabilization is no longer required.

E. Excavation for Structures:
   1. Excavate beyond footings and foundations so as to allow proper construction and inspection of concrete formwork and other materials. Excavate to the required elevation.
      a. Tolerance: Plus or minus 0.10 foot.

F. Excavation for Footings and Foundations:
   1. Delay excavation to final grade and final compaction until just before concrete will be placed.
   2. Remove any loose or sloughed material and adjust excavations to conform to required lines, grades, and tolerances and to form a suitable bearing surface. Do not disturb bottom of completed excavations.

G. Excavation for Pavements: Excavate, shape, and compact to the lines,

subgrade elevations, and cross sections indicated.

H. Excavation for Trenches:
1. Unless otherwise required, begin trenching, utility installation, and backfilling at lowest portion of utility line, working toward highest portion of line.
2. Dig trenches to uniform widths indicated.
   a. Where indicated trench widths are exceeded, redesign, stronger pipe, or special installation procedures may be required by the Engineer at no additional cost to the Owner.
3. Unless otherwise indicated, trench walls for piping shall be vertical from trench bottom to one foot above top of pipe or to top elevation of initial backfill, whichever is higher.
4. Excavate trenches to the depths necessary to achieve required flow lines and invert elevations and to prevent freezing of liquids or frost heave during winter.
5. Dig trenches so as to provide not less than the following minimum cover:
   a. Water lines: 5.5 feet.
   b. Gas distribution: 3 feet.
   c. Electric lines: 2 feet.
   d. Sanitary sewer: In accordance with plans.
   Storm sewer: In accordance with plans.
6. Trench bottoms: Unless otherwise indicated, excavate and shape trench bottoms as follows:
   a. Support pipes and conduit up to 5 inches diameter on smooth, accurately graded subgrade. Shape surface by hand to provide continuous support on undisturbed soil for bell and body of pipe and joints, fittings, and body of conduit.
   b. Support pipes and conduit 6 or more inches diameter on 4 inches of approved subbase material. Place and carefully compact additional layer of subbase material of depth required to support pipe haunches. Shape surface to provide continuous support for bell and body of pipe and joints, fittings, and body of conduit.

I. Clean Construction Demolition Debris:

1. The contractor shall be responsible for the lawful removal of all excavated material, soil, clean construction and demolition debris in accordance with Public Act 96-1416. All costs for but not limited to removal, hauling, disposing fees, charges, documenting, testing or certifications related to Public Act 96-1416 shall be incidental to the cost of the contract
2. If the Contractor chooses to dispose of surplus soil material at a registered uncontaminated soil fill location, Form LPC-663 must be executed and submitted to the operator of that location prior to material being delivered to the location. The contractor shall take care not to stockpile or mix together clean material with contaminated material or material from another site before hauling material for off-site disposal.
3. The contractor shall provide the Owner and the engineer with copies of all executed forms, documents, and correspondences regarding Clean Construction Demolition Debris (CCDD).

3.7 STORAGE

A. Stockpile materials to be used for filling and backfilling, including excavated materials classified as satisfactory soil materials, at locations indicated or as directed. Stockpile in a manner to freely drain surface water; cover if necessary to prevent wind-blown dust.
   1. Store soil materials without intermixing. Protect from contamination with other soils or debris.
   2. Do not stockpile materials inside of drip line of trees to remain.
   3. Install silt fence around the perimeter at each stockpile.
   4. If a stockpile is to remain in place for over 30 days, it shall be seeded with temporary seeding.

3.8 PLASTIC WARNING TAPE

A. Install tape directly above utilities, 4 to 6 inches below finished grade.

3.9 BACKFILLING

A. Preparation: Backfill excavations as soon as practicable. Complete the following operations before backfilling:
   1. Inspection and acceptance of below-grade construction.
   2. Inspection, testing, and approval of underground utilities.
   3. Surveying of underground utilities for record documents.
   4. Concrete formwork removal.
   5. Removal of loose material, muck, debris, and trash from excavation.
   6. Installation of temporary or permanent horizontal bracing for structures to receive backfill.

B. Remove temporary shoring and bracing as the work progresses and when its use is no longer necessary.

C. Testing of Piping:
   1. Before performing testing of utilities (specified elsewhere):
      a. Backfill and compact utility trenches to a level as required by local ordinances or IDOT.

D. Backfilling near footings, general: Where trenches occur underneath of footings, or where trench bottoms occur below and within 18 inches horizontally of footing bottoms, backfill trench with concrete to top of footing and up to 4 feet perpendicularly from each face of footing.

E. Installation: Place approved soil materials in layers to required elevations. Do not place material on muddy or frozen surfaces or on surfaces containing frost.

F. Installation: Place satisfactory soil materials in layers to required subgrade elevations.

3.10 FILLING

A. Preparation: Verify that area has been stripped of vegetation including roots below grade. Remove and dispose of any unsatisfactory soils.
   1. When filling slopes steeper than 1 in 4 rise, plow, step, or break up

surfaces to promote bond of new to existing material.

2. Should density of subgrade to receive fill be less than specified for fill, break up and pulverize subgrade to a depth of at least 6 inches, moisture condition if necessary, and recompact to required density at optimum moisture content.

B. Installation: Place fill materials to required elevations in maximum lifts of 6 inches. Provide fill materials beneath each area as indicated.
   1. Planted areas: Satisfactory soil materials.
   2. Paved areas: Combination of subbase material and satisfactory soil materials as indicated on drawings.
   3. Piping/conduit: Subbase material and/or imported trench backfill where indicated and required; otherwise use satisfactory soil materials.

3.11 PAVEMENT SUBBASE COURSE PLACEMENT

A. Place lifts such that compaction true to grade and level is accomplished with a minimum of surface disturbance and segregation or degradation of materials. Maintain grade control and cross section by means of line and grade stakes. Maintain moisture content within prescribed limits during placing and compacting.

B. When the total thickness of subbase is less than the maximum lift thickness permitted, place material in a single lift. When the total thickness of subbase is greater than the maximum lift thickness permitted, place materials in two or more lifts of uniform thickness with no lift less than 3 inches in thickness.

C. Cut any overbuild to grade. Should top elevation be lower than allowable tolerances, scarify to a depth of 3 inches, add new material, and recompact to bring to grade within required tolerances.

3.12 COMPACTION

A. Place materials used in backfilling and filling in layers not exceeding loose depths as follows:
   1. Heavy equipment compaction: 8 inches.
   2. Hand-operated tampers: 4 inches.

B. Place material simultaneously on opposite sides of walls, small structures, utility lines, etc. to avoid displacement or overstressing.

C. In-Place Density Requirements: Compact soil to not less than the values given below, expressed as a percentage of maximum density at optimum moisture content.
   1. Unpaved areas: Top 6 inches of subgrade and subsequent lifts - 90 percent.
   2. Building and Paved areas: Top 12 inches of subgrade and subsequent lifts - 95 percent.
   3. Utility trenches: Compact backfill and fill materials to in-place density specified for applicable area of trench, as required by ISPE Standard Specifications.

D. Moisture Control: During compaction, control moisture of subgrades and subsequent lifts to within tolerances from optimum moisture content as recommended by testing laboratory. Wet surface with water when additional moisture is required. Aerate soil to aid in drying or replace soil when excessive moisture is present.

3.13 GRADING

A. General: Smooth grade to a uniform surface that complies with compaction requirements and required lines, grades, and cross sections and is free from irregular surface changes.

B. Provide smooth transition between existing adjacent grades and changed grades. Cut out soft spots, fill low spots, and cut down high spots to conform to required surfaces tolerances.

C. Slope grades to direct water away from structures and to prevent ponding. Finish subgrade to required elevations within the following tolerance:
1. Unpaved areas: Plus or minus 0.10 foot.
2. Paved areas: Plus or minus 0.1 foot.
3. Exterior steps and ramps: Plus or minus 0.05 foot.

3.14 PROOFROLLING

A. After completion of required compaction and immediately prior to proceeding with subsequent construction, proofroll in the presence of the Construction Manager, Engineer, and testing laboratory representative.

B. The test vehicle for proofrolling shall consist of a tandem axle truck loaded to a minimum gross weight of 40,000 lb, and verification of vehicle weight must be presented at time of proofroll.

C. Proof roll as required by the Enter Municipality Standard Specifications and IDOT Standard Specifications.

D. Proofroll Areas to Receive: Pavement, and any areas required by the engineer

3.15 FIELD QUALITY CONTROL

A. Testing Laboratory Services: Provide timely notice to testing laboratory. Do not proceed with construction until testing of each subgrade and lift of fill or backfill has been performed and required inspections and approvals have been obtained.

B. Maximum Density at Optimum Moisture Content: Determine in accordance with ASTM D 1557, Procedure C.
1. For each subgrade, fill, and backfill material, perform one moisture-density relationship test for each 1500 cubic yards, or fraction thereof, of material used.

C. In-Place Density Tests: ASTM D 1556 (sand cone method), ASTM D 2167

(rubber balloon method), or ASTM D 2922 (nuclear method), as applicable.

1. When ASTM D 2922 is used, check and adjust calibration curves using ASTM D 1556 only. ASTM D 3017 shall be performed to measure water content of soil at the time in-place density tests are conducted. Calibrate density and moisture gages at the start of testing on each type of material encountered and at intervals as directed.

D. Footing Subgrades: Test footing subgrades to determine bearing capacity of each soil stratum encountered. At the option of the Geotechnical Engineer and Construction Manager, visual inspection of subsequent similar subgrades and comparison with tested strata may be allowed.

E. Areas under Slabs and Pavements: Conduct not less than one in-place density test of subgrade and one in-place density test of each compacted fill or backfill layer for every 3000 square feet of overlying paved area, but in no case less than 3 tests per lift.

F. Foundation Wall Backfill: Conduct not less than 2 in-place density tests per lift.

G. Trench Backfill: Conduct not less than 2 in-place density tests per lift per trench.

H. If testing service reports indicate that subgrade or fills are below specified density, scarify or remove and replace to the required depth, recompact, and retest at no cost to the Owner.

3.16 MAINTENANCE

A. Completed Areas: Protect from damage by pedestrian or vehicular traffic, freezing, erosion, and contamination with foreign materials. Repair and re-establish grades to specified tolerances in settled, eroded, or rutted areas.

B. Damaged Areas: Where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction and whether due to subsequent construction operations or weather conditions, restore materials to required conditions: Scarify or remove and replace to the required depth, return to optimum moisture content, and compact materials to the required density before continuing construction.

C. Correction: Should settling occur within the project correction period, remove finished surfacing, add additional approved material, compact material, and reconstruct surfacing. Construct surfacing to match and blend in with adjacent surfacing as nearly as practicable.

3.17 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Stockpile any excess satisfactory topsoil in locations on site as directed by the Construction Manager. Properly dispose of unsatisfactory topsoil off site as directed by the Construction Manager.

B. Remove any material not required for use on the project (including unsatisfactory soil, excess satisfactory soil, trash, and debris) and legally dispose of it off the Owner's property.

B. On-site burning is not permitted.

END OF SECTION 312000

SECTION 312333 – TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All labor, materials, and equipment required for satisfactory trenching, backfilling, compaction and removal of excess excavation for sanitary sewers, storm sewers and water main. Electrical and communications conduits covered elsewhere.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
1. 311000 – Site Clearing
2. 312000 – Earth Moving
3. 334000 – Storm Drainage Utilities
4. 321613 – Concrete Curbs and Gutters
5. 321413 – Porous Unit Paving

B. Work under this Section shall be done in accordance with the applicable provisions of the “Code of Ordinances”, latest edition, as adopted by the Village of Oak Brook, Illinois.

1.3 QUALITY ASSURANCE

A. Unless specifically stated in the specifications, the following documents shall provide general requirements and covenants applicable to construction within the Village of Oak Brook. In the event of conflict between the existing Village codes and the contents of this document, the former will supercede the latter and/or the decision of the Village will prevail.

1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)
2. I.S.P.E., Consulting Engineers Council of Illinois, et. al., Standard Specifications for Water and Sewer Main Construction in Illinois, latest revision.

1.4 PROJECT RECORD DOCUMENTS

A. Record the limits of Trench Backfill.

END OF SECTION 312333

SECTION 313500 – SLOPE PROTECTION

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All labor, materials, and equipment required to construct and maintain permanent and temporary erosion control devices as shown on the drawings.

B. All labor, materials, and equipment required for the application of seeding, fertilizer and straw mulch on all areas within the site construction limits disturbed by construction operations that will not be surfaced as shown on the drawings.

1.2 RELATED DOCUMENTS

A. Specified elsewhere:
1. 311000 - Site Clearing
2. 312000 – Earth Moving
3. 329300 – Lawns and Grasses

1.3 QUALITY ASSURANCE

A. Unless specifically stated in the specifications, the following documents shall provide general requirements and covenants applicable to construction within the Village of Oak Brook. In the event of conflict between the existing Village codes and the contents of this document, the former will supercede the latter and/or the decision of the Village will prevail.

1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)
2. Latest addition of the Illinois Environmental Protection Agency Illinois Urban Manual.

1.4 SUBMITTALS

A. Submit certificates showing manufacturers' or vendors' analysis of seed, materials and fertilizers to be used to the Construction Manager.

B. Submit seed vendors' certified statement for each grass seed mixture stating botanical and common name, percentage by weight, and percentages of purity, germination and weed seed for each grass seed species to the Construction Manager.

1.5 JOB CONDITIONS

A. All disturbed areas to remain pervious shall be hydroseeded and mulched immediately after completing final grading operations.

B. When conflict between these requirements and pollution control laws, rules or regulations of other Federal or State agencies occurs, notify the Owner in writing and suggest a solution. Take sufficient precautions to prevent pollution of streams, lakes and reservoirs with fuels, oils, bitumens, calcium chloride or other harmful materials.

PART 2 - MATERIALS

2.1 EROSION CONTROL

A. Temporary erosion control materials shall be in accordance with the Standard Specifications. All erosion control measures shall comply with the requirements of the Illinois Environmental Protection Agency Illinois Urban Manual, 1995.

B. Mulch and related materials shall be in accordance with Section 251 and Section 1081 of the Illinois Department of Transportation Standard Specifications.

2.2 SEEDING

A. All seeding materials, including mulch, fertilizer and limestone, shall be in accordance with Sections 250, 251 and 1081 of the Illinois Department of Transportation Standard Specifications.

B. For permanent seeding, the seed mixture shall be as specified in Article 250.07 of the Illinois Department of Transportation Standard Specifications, preferably a Class 1, 1B or 3, or as indicated otherwise on the plans and Special Provisions.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the area where and conditions under which slope protection and erosion control work are to be performed. Notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.

3.2 TEMPORARY EROSION CONTROL

A. Incorporate all erosion control features into the project prior to commencing other construction activities as specified in the drawings.

3.3 SEEDING

A. After all work has been completed and approved and after all trenches have been backfilled, the areas to be seeded shall be prepared in accordance with Article 250.05 of the Standard Specifications.

B. The rate of application of permanent seeding mixture shall be as required by the Standard Specifications, or as specified on the plans and Special Provisions.

3.4 FERTILIZER

A. Fertilizer nutrients shall be provided in accordance with Article 250.04 of the IDOT Standard Specifications and the Illinois Urban Manual.

B. Seeding: Fertilizer application shall be made to all areas to be seeded. A second application shall be used if necessary to ensure growth.

3.5 MULCHING

A. All seeded areas shall be mulched. Mulching equipment and construction operations shall be in accordance with Section 251 of the Standard Specifications. Mulch shall be applied uniformly to seeded areas at the rate specified by Method 3 as described in Article 251.03 of the Standard Specifications except where final slopes are in excess of 6:1 grade, or as otherwise noted on the plans.

B. For slopes greater than 6:1 the method of seeding and mulching is the hydromulch method as described by Method 2 Procedure 3 of Article 251.03 of the Standard Specifications. Erosion Control blanket shall be installed in these areas in accordance with Article 251.04 of the IDOT Standard Specifications and as noted in the Special Provisions.

3.6 MAINTENANCE

A. The temporary erosion control systems shall be properly maintained to control siltation at all times during the life of the contract.

END OF SECTION 313500

SECTION 313519.22 – FILTER FABRIC

PART 1 - GENERAL

1.1 WORK INCLUDES

A. This work shall consist of all material, labor and equipment to install filter fabric as shown in the plans and details, or as otherwise directed by the Construction Manager.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, including but not limited to:
   1. 312000 – Earth Moving
   2. 334000 – Storm Drainage Utilities

B. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions (herein referred to as the "Standard IDOT Specification"). (Method of Measurement and Basis of Payment shall not apply.)

C. Work under this Section shall be done in accordance with the applicable construction standards set by the Village of Oak Brook, Illinois.

1.3 QUALITY ASSURANCE

A. The following documents shall provide the standards for construction within the Village of Oak Brook unless otherwise stated in these specifications. In the event of conflict between these specifications and the existing Village codes, the Village codes will prevail.
   1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)

B. Exceptions: All references in the Illinois Department of Transportation Standard Specifications to method of measurements and compensation shall not apply.

1.4 SUMMARY

A. Filter fabric is to be used to as a barrier between soils and aggregate to prevent the shifting of fines into void areas. Product is to completely surround the aggregate area as shown in the plans on all sides with a minimum of 6 inch overlap.

PART 2 - PRODUCT

A. Fabric:
   1. Construction: non - woven resin-bonded polypropylene.
   2. Inert to biological degradation
   3. Minimum weight: 4.0 ounces per square yard.

B. Products:
   1. Mirafi NC-140 or approved equivalent

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Comply with Standard IDOT Specifications and as directed by the Construction Manager.

3.2 CLEAN UP

A. Upon completion of the work, remove all surplus materials, packaging, rubbish and debris resulting from the work and legally dispose of off the site.

END OF SECTION 334419

SECTION 321216 – HOT MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All labor, materials, and equipment required to satisfactorily complete paving as shown on the plans.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, including but not limited to:
   1. 312000 – Earth Moving
   2. 312333 – Trenching and Backfilll

B. Work under this Section shall be done in accordance with the applicable provisions of the "Code of Ordinances", latest edition, as adopted by the Village of Oak Brook, Illinois.

1.3 QUALITY ASSURANCE

A. Unless specifically stated in the specifications, the following documents shall provide general requirements and covenants applicable to construction within the Village In the event of conflict between the contents of this document and the existing Village codes, the former will supercede the latter and/or the decision of the Village will prevail.
   1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)
   2. I.S.P.E., Consulting Engineers Council of Illinois, et. al., Standard Specifications for Water and Sewer Main Construction in Illinois, latest revision.

1.4 SUMMARY

A. This section includes provisions for IDOT Hot Mix Asphalt. Mix shall be IDOT approved design:

PAVEMENT:
1. Base Course - 12" Aggregate Base (CA-6).
2. Binder Course – 2½" HMA Binder Course IL-19.0 N50.
3. Surface Course - 1½" HMA Surface Course IL-9.5 Mix D N50.

PEDESTRIAN PATHS
1. Base Course - 6" Aggregate Base (CA-6).
2. Binder Course – 1½" HMA Binder Course IL-19.0 N50.
3. Surface Course - 1½" HMA Surface Course IL-9.5 Mix D N50.

B. Proofrolling of prepared base is included in Section 312000 – EARTH MOVING

1.5 SUBMITTALS

A. Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections:
   1. Material Certificates: Provide copies of materials certificates signed by material producer and Trade Contractor, certifying that each material item complies with, or exceeds, specified requirements.

END OF SECTION 321216

SECTION 321216.10 – FLEXIBLE PAVING PATCH

PART 1 - GENERAL

1.1 WORK INCLUDES

A. This work shall consist of furnishing all labor, material, and equipment necessary to remove the existing pavement from existing elevation to subbase elevations where pavement removal and replacement is required, as directed by the Engineer. This work shall also consist of removing gravel and preparing the subgrade for installation of a bituminous pavement as directed by the Engineer.

B. Work under this item shall be performed in accordance with Section 442 of the Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision except as herein modified.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, including, not but limited to:
1. 024113.15 – Saw Cutting Pavement
2. 321216 – Hot Mix Asphalt Paving
3. 312300 – Excavation and Fill

B. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions (herein referred to as the “Standard IDOT Specification”). (Method of Measurement and Basis of Payment shall not apply.)

C. Work under this Section shall be done in accordance with the applicable construction standards set by the Village of Oak Brook, Illinois.

1.3 QUALITY ASSURANCE

A. The following documents shall provide the standards for construction within the Village of Oak Brook unless otherwise stated in these specifications. In the event of conflict between these specifications and the existing Village codes, the Village. codes will prevail.
1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)

B. Exceptions: All references in the Illinois Department of Transportation Standard Specifications to method of measurements and compensation shall not apply.

PART 2 – PRODUCT

A. Replacement material shall be 2½“ Hot Mix Asphalt Binder Course, IL 19.0, N50 and 1½” Hot Mix Asphalt Surface Course, Mix “C”, IL 9.5, N50. Full depth patching will include Aggregate Base (CA-6) to a depth matching existing base course. This material shall not be paid for separate but shall be include as part of this item..

The limits of the existing base to be replaced shall be sawcut full depth prior to removal. The saw cutting of the base shall not be paid for separately but considered incidental to CLASS D PATCHES.

PART 3 – EXECUTION

A. Refer to Section 442 of the Standard Specifications.

B. Bituminous concrete shall not be placed in soft, muddy, frozen or non-compacted subgrade or subbase. Preparation of the subgrade or subbase shall not be paid for separately but considered incidental to this item.

END OF SECTION 321216.10

SECTION 321313 – CONCRETE PAVING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All labor, materials, and equipment required to satisfactorily complete the Portland Cement paving, as shown on the plans.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, including, but not limited to:
   1. 312000 – Earth Moving

B. Work under this Section shall be done in accordance with the applicable provisions of the “Code of Ordinances”, latest edition, as adopted by the Village of Oak Brook, Illinois.

1.3 QUALITY ASSURANCE

A. Unless specifically stated in the specifications, the following documents shall provide general requirements and covenants applicable to construction within the Village. In the event of conflict between the contents of this document and the existing Village codes, the former will supercede the latter and/or the decision of Village will prevail.
   1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)
   2. I.S.P.E., Consulting Engineers Council of Illinois, et. al., Standard Specifications for Water and Sewer Main Construction in Illinois, latest revision.

1.4 SUBMITTALS

A. Concrete Mix Design:
   1. Certified copy of the concrete mix design demonstrating conformance with the specified concrete type.

1.5 SPECIAL REQUIREMENTS:

Submittal Requirements – Utilize a lighter concrete with a reflectivity of at least 0.3 to mitigate urban heat island effects for all surface type applications. This requirement will not be necessary for concrete roadway patching applications which will be overlaid with a bituminous binder and surface.

1.6 MATERIALS:

A. Cement

For all Concrete Pavements – Blended Hydraulic Cement: ASTM C 595, Type 1 (SM) using a mixture of Portland Cement and not more than 25% by weight of ground granulated blast furnace slag to achieve a white looking concrete with a reflectivity of at least 0.3.

END OF SECTION 321313

SECTION 321383 – PCC SIDEWALKS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All labor, materials, and equipment required to complete in place the P.C. Concrete Sidewalk as indicated on the drawings, as hereinafter specified or as required to properly complete the WORK.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, including, but not limited to:
1. 311000 – Site Clearing
2. 312000 – Earth Moving
3. 321216 – HMA Paving
4. 321313 – Concrete Paving
5. 321613 – Concrete Curbs and Gutters

B. Work under this Section shall be done in accordance with the applicable provisions of the “Code of Ordinances”, latest edition, as adopted by the Village of Oak Brook, Illinois.

1.3 QUALITY ASSURANCE

A. Unless specifically stated in the specifications, the following documents shall provide general requirements and covenants applicable to construction within the Village of Oak Brook, Illinois. In the event of conflict between the contents of this document and the existing Village codes, the former will supercede the latter and/or the decision of the Village will prevail.
1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)
2. I.S.P.E., Consulting Engineers Council of Illinois, et. al., Standard Specifications for Water and Sewer Main Construction in Illinois, latest revision.

1.4 SPECIAL REQUIREMENTS:

Submittal Requirements – Utilize a lighter concrete with a reflectivity of at least 0.3 to mitigate urban heat island effects for all surface type applications. This requirement will not be necessary for concrete roadway patching applications which will be overlaid with a bituminous binder and surface.

1.5 MATERIALS:

A. Cement

For all Concrete Pavements – Blended Hydraulic Cement: ASTM C 595, Type 1 (SM) using a mixture of Portland Cement and not more than 25% by weight of ground granulated blast furnace slag to achieve a white looking concrete with a reflectivity of at least 0.3.

PART 2 - EXECUTION

2.1 CONSTRUCTION

A. Handicap ramps shall be constructed where shown on the plans and as per the latest Illinois Accessibility Code Standards.
B. Control joints shall be tooled in modules to match walk width or as shown on plans.

END OF SECTION 321383

SECTION 321413 – POROUS UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Porous paving consisting of concrete pavers set in aggregate setting beds.
2. Cast-in-place concrete edge restraints.

B. Related Sections include the following:

1. Division 31 Section "Earthwork" for excavation and compacted subgrade.
2. Division 32 Section "Concrete Paving" for cast-in-place concrete curbs that serve as edge restraints for porous paving.

1.3 SUBMITTALS

A. Samples for Initial Selection:

1. Each type of unit paver indicated.
2. Aggregate fill.

B. Samples for Verification:

1. Full-size units of each type of unit paver indicated.
2. Aggregate fill.

C. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.

1. For solid interlocking paving units, include test data for freezing and thawing according to ASTM C 67.

E. Utilize a lighter Paver with a reflectivity of at least 0.3 to mitigate urban heat island effects for all surface type applications. Provide manufacturer test data to document SRI.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of porous paver from one source that has resources to provide materials and products of consistent quality in appearance and physical properties.

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

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 CONCRETE UNIT PAVERS

A. Solid Concrete Pavers for Porous Paving: Solid interlocking paving units of shapes that provide openings between units, complying with ASTM C 936 and made from normal-weight aggregates.

1. Available Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following, or approved equal:

a. Eco-Priora by Unilock, Aurora, IL. Contact: Mike Anderson (630) 892-9191.
1. Edge Paver – Single soldier course brick, 5” x 10”.
2. Thickness: 3-1/8 inches (80 mm).
3. Face Size and Shape: 5” x 10” and 10” x 10”
4. Color: Sierra.
5. Field pattern for parking lot: Pattern H
6. Filed pattern for pedestrian area: Herringbone

b. Or approved equal.

2.2 AGGREGATE SETTING-BED MATERIALS

A. Graded Aggregate for Subbase: Sound crushed stone or gravel complying with CA-1, subbase material.

B. Graded Aggregate for Base Course: Sound crushed stone or gravel complying with CA-7, base-course material.

C. Graded Aggregate for Leveling Course: Sound crushed stone or gravel complying with CA-16.

D. Graded Aggregate for Porous Paver Fill: Sound crushed stone or gravel complying with CA-16.

PART 3 - EXECUTION

3.1 PREPARATION

A. Proof-roll prepared subgrade according to requirements in Division 2 Section "Earthwork" to identify soft pockets and areas of excess yielding. Proceed with porous paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for porous paving.

B. Pedestrian area pavers may have engraving. Contractor to coordinate with owner. Owner will arrange for the desired number of pavers to be delivered to the engraver

3.2 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be structurally unsound or visible in finished work.

B. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

C. Tolerances:

1. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/16-inch (1.5-mm) unit-to-unit offset from flush.
2. Variation from Level or Indicated Slope: Do not exceed 1/2 inch in 10 feet (12 mm in 3 m). Leave pavers approximately 1/4 inch to 3/8 inch above curb.

D. Provide curbs as indicated. Install curbs before placing unit pavers.

3.3 SETTING-BED INSTALLATION

A. Compact soil subgrade uniformly to at least 90% percent of ASTM D 698 laboratory density.

B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Construction Manager, and replace with compacted backfill or fill as directed.

C. Place aggregate subbase in six (6) inch lifts, compact with 12-ton vibratory roller compactor.

D. Place aggregate base, compact to 100% percent. Proof-roll the area, upon completion, to confirm no movement or depressions in base.

E. Place leveling course and screed to a thickness of 2 inches, taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

3.4 PAVER INSTALLATION

A. Set unit pavers on leveling course, being careful not to disturb leveling base. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size pavers.

1. When installation is performed with mechanical equipment, use only equipment that lifts an entire face-pallet load at one time.

B. Compact pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf (16- to 22-kN) compaction force at 80 to 90 Hz. Use vibrator without a neoprene mat on face of plate. If pavers crack or chip, remove and replace that paver. Perform at least three passes across paving with vibrator.

1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches (900 mm) of uncompacted pavers adjacent to temporary edges.
2. Before ending each day's work, compact installed concrete pavers except for 36-inch (900 mm) width of uncompacted pavers adjacent to temporary edges (laying faces).
3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches (90 mm) of laying face.

C. Place graded aggregate fill immediately prior to the first compaction pass. After compaction has been complete, sweep additional aggregate into the voids of the pavers as required.

1. Before ending each day's work, place aggregate fill in installed porous paving except for 42-inch (1067-mm) width of unfilled paving adjacent to temporary edges (laying faces).
2. As work progresses to perimeter of installation, place aggregate fill in installed paving that is adjacent to permanent edges unless it is within 42 inches (1067 mm) of laying face.

D. Remove and replace pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

END OF SECTION 321443

SECTION 321613 – CONCRETE CURBS AND GUTTERS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All labor, material, and equipment required to complete the construction of concrete curb and combination concrete curb and gutter as indicated on the drawings, as hereinafter specified; or as required to properly complete the WORK.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, including but not limited to:
1. 311000 – Site Clearing
2. 312000 – Earth Moving

B. Work under this Section shall be done in accordance with the applicable provisions of the “Code of Ordinances”, latest edition, as adopted by the Village of Oak Brook, Illinois.

1.3 QUALITY ASSURANCE

A. Unless specifically stated in the specifications, the following documents shall provide general requirements and covenants applicable to construction within the Village of Oak Brook. In the event of conflict between the existing Village. codes and the contents of this document , the former will supercede the latter and/or the decision of the Village will prevail.

1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)

2. I.S.P.E., Consulting Engineers Council of Illinois, et. al., Standard Specifications for Water and Sewer Main Construction in Illinois, latest revision.

END OF SECTION 321613

SECTION 321723 – PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All labor, material, and equipment required for the placement of pavement markings for parking stalls or other pavement marks as indicated on the drawings, as hereinafter specified, or as required to properly complete the work.

1.2 RELATED DOCUMENTS

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, including, but not limited to:
   1. 321216 – Asphalt Paving.

2. Work under this Section shall be done in accordance with the applicable provisions of the “Code of Ordinances”, latest edition, as adopted by the Village of Oak Brook, Illinois.

1.3 QUALITY ASSURANCE

A. Unless specifically stated in the specifications, the following documents shall provide general requirements and covenants applicable to construction within the Village. In the event of conflict between the contents of this document and the existing Village codes, the former will supercede the latter and/or the decision of the Village will prevail.
   1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)
   2. I.S.P.E., Consulting Engineers Council of Illinois, et. al., Standard Specifications for Water and Sewer Main Construction in Illinois, latest revision.
   3. FHWA, Manual of Uniform Traffic Control Devices, latest revision.

B. The Illinois Department of Transportation Supplemental Specifications and Recurring Special Provisions, latest revision.

C. Exceptions: All reference in the IDOT Specifications to method of compensation shall not apply.

1.4 GUARANTEE

A. Guarantee the new markings under this section to serve for a minimum of two years.

Service shall be considered satisfactory only if the lines remain visible at the end of the specified period.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pavement marking shall be paint, meeting the requirements of Article 1095.02 of the IDOT Specifications noted herein.

B. The color shall be yellow, unless otherwise specified on the plans.

C. The glass beads will not be required and may be omitted.

PART 3 - EXECUTION

3.1 CONSTRUCTION OF MARKING LINES

A. Before commencing pavement marking work, examine substrata surfaces to determine
that they are free of conditions which might be detrimental to proper and timely completion of the work. Start of work shall indicate acceptance of the substrata.

B. Properly clean all areas to receive paint immediately before applications begin.

C. Lines shall be machine painted to the length and patterns shown on the drawings. Lines
shall be straight and true. Lines shall be 4 in. wide or as otherwise required.

D. The lines and figures shall not be exposed to traffic until they have dried.

E. Painted symbols shall be constructed as detailed on the drawings or as detailed in the
IDOT Highway Standards.

3.2 CLEAN UP OF MARKING PAINT

A. Remove any paint spills or drips that occur outside the marking lines on the finished pavement.

END OF SECTION 321723

SECTION 321726 - TACTILE WARNING SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cast-in-place detectable warning tiles.

B. Related Requirements:

1. Section 321313 "Concrete Paving" for concrete walkways serving as substrates for tactile warning surfacing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product cut sheets for Initial Selection: For each type of exposed finish requiring color selection.

C. Product specifications for Initial Selection: For each type of exposed finish requiring color selection.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For tactile warning surfacing, to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Products shall be installed according to manufacturers specifications and level with surrounding concrete.

1.6 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

B. Weather Limitations for Mortar and Grout:

1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks, and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and higher.

a. When ambient temperature exceeds 100 deg F (38 deg C), or when wind velocity exceeds 8 mph (13 km/h) and ambient temperature exceeds 90 deg F (32 deg C), set unit pavers within 1 minute of spreading setting-bed mortar.

1.7 WARRANTY

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

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

a. Deterioration of finishes beyond normal weathering and wear.
b. Separation or delamination of materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

A. Accessibility Requirements: Comply with applicable provisions in Illinois Accessibility Code and local codes for tactile warning surfaces.

1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

B. Source Limitations: Obtain each type of tactile warning surfacing from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 DETECTABLE WARNING TILES

A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles with replaceable surface configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.
   1. Color: As selected by Architect from manufacturer's standard line.
   2. Shapes and Sizes:
      a. Rectangular panel, 24” wide by length per plan, multiple tiles may be required.
   3. Dome Spacing and Configuration: Manufacturer's standard compliant spacing in manufacturer's standard pattern.
   4. Mounting:
      a. Permanently embedded detectable warning tile wet-set into freshly poured concrete.
      b. Replaceable detectable warning tile wet-set into freshly poured concrete and surface-fastened to permanently embedded anchors.
   5. Approved Product:
      a. Duratek, heavy duty ½” thick warning tile as manufactured by Detectile, 603 Mallard Lane, Oak Brook, IL 60523. Contact: Roger Nelson, 312-213-1507, nelson@detectile.com
      b. Or equal

2.3 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.

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

3.2 INSTALLATION OF TACTILE WARNING SURFACING

A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.

B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

3.3 INSTALLATION OF DETECTABLE WARNING TILES

A. Removable Cast-in-Place Detectable Warning Tiles:

1. Concrete Paving Installation: Comply with installation requirements in Section 321313 "Concrete Paving." Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of removable tile.
2. Set each detectable warning tile accurately and firmly in place with embedding anchors and fasteners attached, and firmly seat tile back in wet concrete by tamping or vibrating. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding plus or minus 1/8 inch (3 mm) from flush.
4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
5. Clean tiles using methods recommended in writing by manufacturer.

B. Surface-Applied Detectable Warning Tiles:

3.4 CLEANING AND PROTECTION

A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.

B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 321726

SECTION 321816.16 – POURED-IN-PLACE PLAYGROUND PROTECTIVE SURFACING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Poured-in-Place Playground Surfacing

B. Related Sections: Materials and Methods, Excavation, Asphalt Paving, Concrete Paving, Sub-Drainage, Storm Drainage, Fencing, Playground Equipment and Structures.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
   2. ASTM D624 Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
   3. ASTM D2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
   4. ASTM D2859 Standard Test Method for Flammability of Finished Textile Floor Covering Materials.
   5. ASTM E303 Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.
   6. ASTM F1292 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment.
   7. ASTM F1951 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment.

1.03 SYSTEM DESCRIPTION

A. Performance Requirements: Provide a 2-layer rubber-urethane playground surfacing system which has been designed, manufactured and installed to meet the following criteria:

   1. Shock Attenuation (ASTM F1292):
      a. Gmax: Less than 200.
      b. Head Injury Criteria: Less than 1000.
   2. Flammability (ASTM D2859): Pass.
   3. Tensile Strength (ASTM D412): 60 psi (413 kPa).
   4. Tear Resistance (ASTM D624): 140%.
   5. Water Permeability: 0.4 gal/yd2/second.
   6. Accessibility: Comply with requirements of ASTM F1951.

1.04 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit manufacturer's product data and installation instructions.

C. Verification Samples: Submit manufacturer's standard verification samples of 3" x 3" (229 x 229 mm) minimum for poured in place surfacing and tile color samples.

D. Quality Assurance/Control Submittals: Submit the following:

1. Certificate of qualifications of the playground surfacing installer.

E. Closeout Submittals: Submit the following:

1. Warranty documents specified herein.

1.05 QUALITY ASSURANCE

A. Qualifications: Utilize an installer approved and trained by the manufacturer of the playground surfacing system, having experience with other projects of the scope and scale of the work described in this section.
B. Certifications: Certification by manufacturer that installer is an approved applicator of the playground surfacing system.
C. International Play Equipment Manufacturers Association (IPEMA) certified.

1.06 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.
B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at a minimum temperature of 40 degrees F (4 degrees C) and a maximum temperature of 90 degrees F (32 degrees C).

1.07 PROJECT/SITE CONDITIONS

A. Environmental Requirements: Install surfacing system when minimum ambient temperature is 40 degrees F (1 degree C) and maximum ambient temperature is 90 degrees F (32 degrees C). Do not install in steady or heavy rain.

1.08 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.
C. Proper drainage is critical to the longevity of the Poured-in-Place surfacing system. Inadequate drainage will cause premature breakdown of the poured system in affected areas; and void the warranty.
D. Warranty Period: 10 years from date of completion of work.

PART 2 - PRODUCTS

2.01 POURED-IN-PLACE PLAYGROUND SURFACING SYSTEM

A. Manufacturer:
   1. Pro Techs Surfacing, LLC P.O. Box 301 Sharon Center, OH, OH 44274 George K. Tomko (330)-328-8294 gtomko@pro-techssurfacing.com, http://www.pro-techssurfacing.com
   2. Contact Parkreation, Paul Gozder, (815)-735-1497, paul@parkreation.com
B. Proprietary Products/Systems. Poured-in-place playground surfacing system, including the following:
   1. Perma-Lay 2 Layer Poured in Place Surfacing:
      a. Poured-in-Place Basemat:
         1. Material: Blend of 100% recycled SBR (styrene butadiene rubber) and aromatic polyurethane.
            (a) Thickness: Contractor to verify critical fall height of proposed equipment to determine appropriate thickness: Formulation Components: Blend of strand and granular material.

      b. Poured-In-Place Top Surface:
         1. Material: Blend of recycled EPDM (ethylene propylene diene monomer) rubber and aliphatic urethane binder.
         2. Thickness: Nominal 1/2" (12.7 mm), minimum 3/8" (9.5 mm), maximum 5/8" (15.9 mm).
         3. Colors:
            (a) Color 1- Green: 33% each S1, P5, S31
            (b) Color 2- Tan: 33% each S1, P4, S43
            (c) Color 3- Blue: 33% each S1, P3, S49
            (d) Color 4- White: 33% each S1, P11, S36
            (e) Color 5- Red: 50% each S1, P2
         4. Dry Static Coefficient of Friction (ASTM D2047): 1.0.
      c. Wet Static Coefficient of Friction (ASTM D2047): 0.9.
      d. Dry Skid Resistance (ASTM E303): 89.
      e. Wet Skid Resistance (ASTM E303): 57.

   2. Rubber Tile:
      a. Material: factory-molded surface composed of high-quality, 100% post-consumer SBR (Styrene Butadiene Rubber) tire rubber and EPDM colored granules bound together by a wear and weather resistant polyurethane and a 3 mm top wear layer with tapered, conical support legs. Depending on ASTM F1292 requirements for critical fall height 6’ (1.8 m), use just 2-1/2" (63.5 mm) tile. For critical fall heigh of 8’ or 10’ (2.4 or 3.0 m), install 2-1/8” (55.3 mm) Ecore polyfoam pad under 2-1/2" (63.5 mm) tile.
      b. Thickness and Weight: 2-1/2" thick: 26 lbs. (12 kg) per tile.
      c. Colors:
         1. Tile Colors: Tile colors to be similar to surrounding poured in place material.

2.02 PRODUCT SUBSTITUTIONS

A. Substitutions: All Substitutions shall be subject to review of manufacturer’s specifications and details by the Landscape Architect. Submit substitutions according to Section 012500.

2.03 MIXES

A. Required mix proportions by weight:
   1. Basemat: 14-16% polyurethane, 100lbs rubber
   2. Top Surface: 22-26% polyurethane, 100-110lbs rubber

2.03 BASE

A. Quarry process, crushed limestone. Stone to be homogenous mix of ¾" stone to fines.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Comply with the instructions and recommendations of the playground surfacing manufacturer.

3.02 EXAMINATION

A. Substrate preparation must be in accordance with surfacing manufacturer's specification. New asphalt must be fully cured – up to 30 days. New concrete must be fully cured – up to 7 days.
B. Proper drainage is critical to the longevity of the Poured-in-Place surfacing system. Inadequate drainage will cause premature breakdown of the poured system in affected areas; and void the warranty.

3.04 INSTALLATION

A. Do not proceed with playground surfacing installation until all applicable site work, including substrate preparation, fencing, playground equipment installation and other relevant work, has been completed.
B. Base:
   1. Crushed stone base typical thickness to be 5.5", minimum of 4".
   2. Compact to 95% Standard Proctor Compaction.
   3. 4" concrete slab beneath tiles
C. Basemat Primer:
   1. Using a bristle brush, apply ample urethane primer to all curbing and or vertical substrates, which the rubber surfacing system will contact.
D. Basemat Installation:
   1. Using screed sticks and gauge poles, install the basemat rubber materials to 1/8" – 1/4" higher than required thickness. Using pool trowels, pull the basemat material together using consistent pressure throughout. Repeat the process until all areas, including use zones, comply with the architectural plans and specification requirements. Allow basemat to cure for sufficient time (24 hours) so that indentations are not left in the basemat material. Installation contractor must verify that the basemat has cured sufficiently before applying the finished topcoat
E. Topcoat Primer Application:

1. Using a bristle brush apply urethane binder to the existing 1/2” of curbing and any other vertical structures within the installation areas, and also to the basemat material at a minimum of 2” around the perimeter of the topcoat area.

F. Top Surface Installation:
1. Screed the EPDM topcoat rubber granules to a nominal 5/8” thickness to allow for compaction. Using a pool trowel, pull together material using consistent pressure throughout to produce the end result of 1/2” thickness. Any area in excess of 2500 sf may be seamed as deemed necessary by Pro-Techs Surfacing, LLC. Any area less than 2500 sf will be completed seamlessly as conditions allow.
2. Allow topcoat to cure for 24 hours to 72 hours contingent on the humidity and temperature. Protect newly installed topcoat from foot traffic or equipment usage until the Perma-Play 2-Layer Poured-In-Place Playground Surfacing has fully cured. Complete installation recommendations are available from a ProTechs Surfacing LLC representative.
3. At the end of the minimum curing period, verify that the top surface is sufficiently dry and firm to allow foot traffic and use without damage to the surface.
4. Do not allow foot traffic or use of the surface until it is sufficiently cured.

3.05 PROTECTION

A. Protect the installed playground surface from damage resulting from subsequent construction activity on the site.

END OF SECTION 321816.13

SECTION 321823 – ATHLETIC SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Clay infield mix
2. Calcined clay soil amendment
3. Clay bricks

B. Related Sections

1. Division 31 Section “Earth Moving”

1.2 QUALITY ASSURANCE

A. Contractor’s qualifications for athletic field fine grading: Minimum 5 years experience successfully installing and grading athletic fields. Provide a minimum of 3 references for comparable work if requested.

B. Comply with applicable state, federal and local regulations.

C. Comply with the following standards:

1. Illinois Department of Transportation “Standard Specifications for Road and Bridge Construction”.
2. American Society for Testing and Materials, (ASTM).
3. American Association of State Highway and Transportation Officials, (AASHTO).
4. OSHA.

1.3 SUBMITTALS

A. Provide 1 qt. samples of the following:
1. Clay infield mix
2. Calcined clay soil amendment

B. Provide shop drawing of location and quantity of clay bricks, based on manufacturer’s recommendation.

1.4 PROJECT CONDITIONS

A. Known underground and surface utility lines are indicated on the drawings.

B. Protect existing trees, plants, lawns, and other features designated to remain as part of the work.

C. Promptly repair and pay for damage to adjacent facilities caused by fine grading operations.

PART 2 - PRODUCTS

2.1 CLAY INFIELD MIX

A. Shall be clean, stone free, clay / sand mixture as supplied by Sportsfields, Inc. (708) 371-0917 or approved equal.
1. Clay: (70% by volume).

Sieve	Percent Passing
No. 10	100
No. 200	70 - 100

All clay passing a No. 40 sieve shall have a minimum 4, maximum 15 plasticity index and a maximum liquid limit of 35%.
2. Sand: (30% by volume) ASTM C 33.

2.2 CALCINED CLAY SOIL AMENDMENT

A. Shall be DURAPLAY brand soil amendment as supplied by Sportsfields, Inc. (708) 371-0917 or approved equal.

2.3 CLAY BRICKS

A. Clay bricks shall be DURABRICKS as supplied by Sportsfields, Inc. (708)371-0917 or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Establish extent of fine grading by area and elevation. Designate and identify datum elevation and project engineering reference points. Set required lines, levels, and elevations.

3.2 EXISTING UTILITIES

A. Exercise care to protect utilities during fine grading operations including under drain system and irrigation system.

3.3 INFIELD MIX INSTALLATION

A. Mix Clay and Sand in proportions specified with mechanically driven rotary mixer.

B. Spread Mixture on skinned area to a minimum thickness of 4 inches. Do not allow mixture to segregate.

C. Moisten and compact to 90 percent of maximum density.

D. Reapply mixture as required to fill all pockets and depressions. Moisten and compact as specified.

3.4 CALCINED CLAY INSTALLATION

A. Grade fields to required elevations and obtain Landscape Architect's review of fine grading prior to placement of Calcined Clay soil amendment in athletic field turf areas.

B. Install 15 tons soil amendment per field. Blend soil amendment into the top 2-3" of infield mix.

C. Thoroughly incorporate Calcined Clay soil amendment into infield mix. Maintain looseness of the material. Do not over compact.

3.5 FINE GRADING

A. Fine grade topsoil and infield mix following placement of Calcined Clay soil amendment within the field area and 15' perimeter of the field by eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles, contours and tolerances to plus or minus 1/2" of proposed grades in infield areas and plus or minus 1"of proposed grade in athletic field turf areas

3.6 CLAY BRICK INSTALLATION

A. Obtain Owner / Owner's Representative review of clay brick installation prior to placement of infield mix.

3.7 MAINTENANCE

A. Protect finish graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and damaged areas.

B. Where completed areas are disturbed by construction operations or adverse weather, scarify, re-shape, and compact to required density.

3.8 CLEANING

A. Upon completion of fine grading operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for site work operations.

END OF SECTION 321823

SECTION 323113 – CHAINLINK FENCE AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Chain-Link Fences: Industrial.
2. Gates: Swing.

B. Related Sections include the following:

1. Division 31 Section "Earthwork" for site excavation, fill, and backfill where chain-link fences and gates are located.
2. Division 32 Section “Hot Mixed Asphalt Paving” for coordination and installation of vehicle loop detector.
3. Division 3 Section "Cast-in-Place Concrete” for concrete equipment bases/pads for gate operators, drives, and controls.
4. Division 4 Section “Masonry Assemble” for coordination and installation of gates on the dumpster enclosures.
5. Division 26 Sections for electrical service and connections for motor operators, controls, limit and disconnect switches, and safety features and for system disconnect switches.

C. Alternates: Refer to Division 1 Section "Alternates" for description of Work in this Section affected by alternates.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide chain-link fences and gates capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Minimum Post Size and Maximum Spacing for Wind Velocity Pressure: Determine based on mesh size and pattern specified, and on the following minimum design wind pressures and according to CLFMI WLG 2445:

a. Wind Speed: 80 mph

b. Fence Height: as shown on plans and details.
c. Line Post Group: Schedule 40 steel pipe.
d. Wind Exposure Category: B.

2. Determine minimum post size, group, and section according to ASTM F 1043 for framework up to 12 feet (3.66 m) high, and post spacing not to exceed 10 feet
(3 m).

B. Lightning Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.

1. Fence, gateposts, rails, and fittings.
2. Chain-link fabric, reinforcements, and attachments.
3. Gates and hardware.
4. Accessories: All manufactured considered accessories as required to comply with this specification.
5. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.

B. Shop Drawings: Show locations of fences, gates, posts, rails, tension wires, details of extended posts, extension arms, gate swing, or other operation, hardware, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, gate elevations, sections, details of post anchorage, attachment, bracing, and other required installation and operational clearances.

C. Samples for Initial Selection: Manufacturer's color charts or 6-inch (150-mm) lengths of actual units showing the full range of colors available for components with factory-applied color finishes.

D. Product Certificates: For each type of chain-link fence, operator, and gate, signed by product manufacturer.

1. Strength test results for framing according to ASTM F 1043.

E. Maintenance Data: For the following to include in maintenance manual.

1. Gate operator.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1. Engineering Responsibility: Preparation of data for chain-link fences and gates, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. UL Standard: Provide gate operators that comply with UL 325.

D. Emergency Access Requirements: Comply with requirements of this specification.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

B. Interruption of Existing Utility Service: Do not interrupt utility services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Design/Builder no fewer than two days in advance of proposed interruption of utility services.
2. Do not proceed with interruption of utility services without Design/Builders' written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

1. Chain-Link Fence and Manual Gates:

a. Merchants Metals Inc.: Waukegan, IL 847-249-4086 or approved equal.

b. Substantial Equipment

2.2 CHAIN-LINK FENCE FABRIC

A. General: Height indicated on Drawings and limited to 10 feet. Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle. Comply with ASTM A 392, CLFMI CLF 2445, and requirements indicated below:

1. Steel Wire Fabric: Class 2B Vinyl Color Coated (fused and adhered) black.
   a. Mesh Size: 2 inch.
   b. Weight of Metallic (Zinc) Coating: ASTM A 392, Type II, Class 1, 1.2 oz./sq. ft. (366 g/sq. m) with zinc coating applied before weaving.
   c. Coat selvage ends of fabric that is metallic coated before the weaving process with manufacturer's standard clear protective coating.

2. Selvage: Knuckled top and bottom.

2.3 INDUSTRIAL FENCE FRAMING

A. Posts and Rails: Comply with ASTM F 1043 for framing, ASTM F 1083 for Group IC round pipe, and the following:

1. Group: SS 40 High Strength Fence Framework.
2. Fence Height: 4-10 feet, see plan details.
3. Strength Requirement: Light industrial according to ASTM F 1043.
4. Post Diameter and Thickness: According to ASTM F 1043. See plan details.

   a. Line Post: See plan details or per ASTM requirements (more stringent)
   b. End, Corner and Pull Post: See plan details or per ASTM requirements (more stringent).
   c. Swing Gate Post: According to ASTM F 900 or per plan details (more stringent).

5. Coating for Steel Framing:

   a. Metallic Coating:

      1) Type B, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.

6. Polymer Coated Pipe: Class 2B Vinyl Color Coated (fused and adhered) black to the exterior zinc coating of the pipe in accordance with ASTM F1043.

2.4 INDUSTRIAL SWING GATES

A. General: Comply with ASTM F 900 for double swing gate types.

1. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1043 and ASTM F 1083 for materials and protective coatings or per plan details (more stringent).

B. Frames and Bracing: Fabricate members from round, galvanized steel tubing with outside dimension and weight according to ASTM F 900 and the following:

1. Gate Fabric Height: 2 inches less than adjacent fence height.
2. Leaf Width: As indicated on drawings.
3. Frame Members:
   a. Tubular Steel: Per design details.

C. Frame Corner Construction:

1. Assembled with corner fittings and 5/16-inch- (7.9-mm) diameter, adjustable truss rods for panels 5 feet (1.52 m) wide or wider.

D. Hardware: Latches permitting operation from both sides of gate, hinges, center gate stops and keepers for each gate leaf more than 5 feet (1.52 m) wide.

E. All gates and hardware shall be polymer coated; Class 2 B Vinyl Color Coated (fused and adhered) black

2.5 FITTINGS

A. General: Comply with ASTM F 626.

B. Post and Line Caps: Provide for each post.

1. Line post caps with loop to receive tension wire or top rail.

C. Rail and Brace Ends: Attach rails securely to each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:

1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches (152 mm) long.
2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate rails in the fence line-to-line posts.

E. Tension and Brace Bands: Pressed steel.

F. Tension Bars: Steel, length not less than 2 inches (50 mm) shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.

H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.

1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:

a. Hot-Dip Galvanized Steel: 0.148-inch- (3.76-mm-)] diameter wire galvanized coating thickness matching coating thickness of chain-link fence fabric].

I. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. (366 g /sq. m) zinc.

2. All Fittings shall be Polymer Coated Pipe: Class 2B Vinyl Color Coated (fused and adhered) black.

2.6 PRODUCTS

A. Backstop
1. Model 1234-00 Black Vinyl Coated manufactured by Patterson Williams. Contact NuToys Leisure Products, Kevin Driscoll, (708)579-9055, kevind@nutoys4fun.com

B. Safety Cap
1. Model 125-245-229 Economy Fence Cap from Beacon Athletics, 1-800-747-5985, or,
2. Approved equal, or,
3. Salvaged material.

C. Custom Barrier Net System
1. Model N5892 from Beacon Athletics, 1-800-747-5985, reference order #0285282, or
2. Approved equal

D. Dugout Covering
1. 18 oz. vinyl with grommets on all 4 sides from DH Atheltics, (507)327-8173. Color: Dark Green, or
2. Approved equal

2.7 GROUT AND ANCHORING CEMENT

A. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Erosion-Resistant Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

2.8 FENCE GROUNDING

A. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.

1. Material above Finished Grade: Copper or Aluminum.
2. Material on or below Finished Grade: Copper.
3. Bonding Jumpers: Braided copper tape, 1 inch (25 mm) wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.

B. Connectors and Grounding Rods: Comply with UL 467.

1. Connectors for Below-Grade Use: Exothermic welded type.
2. Grounding Rods: Copper-clad steel.
   a. Size: 5/8 by 96 inches (16 by 2440 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance.

1. Do not begin installation before final grading is completed, unless otherwise permitted by Design/Builder.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152.5 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION, GENERAL

A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.

1. Install fencing on established boundary lines inside property line.

3.4 CHAIN-LINK FENCE INSTALLATION

A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

B. Post Setting: Set posts in concrete with mechanical anchors for posts supporting sliding or swinging gates and by mechanically driving into soil for posts supporting only fencing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
   a. Conceal Concrete: Top 2 inches (50 mm) below grade to allow covering with surface material.
   b. Posts Set into Concrete in Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
   c. Posts Set into Voids in Concrete: Form or core drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
3. Mechanically Driven Posts: Drive into soil to depth of 36 inches (914 mm). Protect post top to prevent distortion where posts meet refusal of ledge stone contact Construction Manager for procedure of installation.

C. Terminal Posts: Locate terminal end, corner, and gateposts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.

D. Line Posts: Space line posts uniformly at 10 feet (2.44 m) o.c.

E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gateposts and at both sides of corner and pull posts.

1. Locate horizontal braces at mid-height of fabric 6 feet (1.83 m) or higher, on fences with top rail and at 2/3-fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

F. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- (3.05-mm-) diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches (610 mm) o.c. Install tension wire in locations indicated before stretching fabric.

1. Bottom Tension Wire: Install tension wire within 6 inches (150 mm) of bottom of fabric and tie to each post with not less than same diameter and type of wire.

G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

H. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave [2 inches (50 mm)] between finish grade or surface and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

I. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches (380 mm) o.c.

J. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at 1 end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches (300 mm) o.c. and to braces at 24 inches (610 mm) o.c.

K. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts at gates and operators only.

3.5 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.6 GROUNDING AND BONDING

A. Fence Grounding: Install at maximum intervals of 1500 feet (450 m) except as follows:

1. Fences within 100 Feet (30 m) of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet (225 m).

a. Gates and Other Fence Openings: Ground fence on each side of opening.

1) Bond metal gates to gateposts.
2) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches (460 mm) below finished grade.

B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet (45 m) on each side of crossing.

C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2, unless otherwise indicated.

D. Bonding Method for Gates: Connect bonding jumper between gatepost and gate frame.

E. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

F. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780.

3.7 ADJUSTING

A. Gate: Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Lubricate hardware, gate operator, and other moving parts.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain gates. Refer to Division 1 Section.

END OF SECTION 323113

SECTION 323119 – DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Decorative metallic-coated steel tubular picket fences.
2. Swing gates.

B. Related Requirements:

1. Division 03 Section "Cast-in-Place Concrete" for concrete post concrete fill.
2. Division 31 Section "Earthwork" for site excavation, fill, and backfill where decorative metal fences and gates are located.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For gates. Include plans, elevations, sections, details, and attachments to other work.

1. Include diagrams for power, signal, and control wiring.

C. Samples: For each fence material and for each color specified.

1. Provide Samples 12 inches in length for linear materials.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for decorative metallic-coated steel tubular picket fences, including finish, indicating compliance with referenced standard.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For gate operators to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Include 10-foot length of fence complying with requirements.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Wind Loading: Comply with requirements of ASCE.SEI 7.

2.2 DECORATIVE METALLIC-COATED STEEL TUBULAR PICKET FENCES

A. Decorative Metallic-Coated Steel Tubular Picket Fences: Comply with ASTM F 2408, for light industrial (commercial) application (class) unless otherwise indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Ameristar Fence Products; Montage II, Majestic 3-Rail Style, or comparable product by one of the following:

a. Fortress Iron; a division of Woodmark International, LP.
b. Iron Eagle Industries, Inc.
c. Master Halco.
d. Merchants Metals; a division of MMI Products, Inc.
e. Payne Fence Products; a division of Payne Metal Works, Inc.
f. Xcel Fence.

B. Metallic-Coated Steel Sheet: Galvanized-steel sheet, ASTM A 653, G90 coating, steel sheet.

C. Interior surface of tubes formed from uncoated steel sheet shall be hot-dip zinc coated same as exterior.

D. Posts:

1. Line Posts: Square tubes 2-1/2 by 2-1/2 inches formed from 12 gauge steel sheet and hot-dip galvanized after fabrication.

2. End and Corner Posts: Square tubes 2-1/2 by 2-1/2 inches formed from 12 gauge steel sheet and hot-dip galvanized after fabrication.
3. Swing Gate Posts: Square tubes 6-inches square formed from 12 gauge steel sheet and hot-dip galvanized after fabrication.

E. Post Caps: Formed from steel sheet and hot-dip galvanized after forming.

F. Rails: Double-wall channels.

1. Size: 1-3/4 by 1-3/4 inches.
2. Metal and Thickness: 0.105-inch nominal-thickness, metallic-coated steel sheet or 0.075-inch nominal-thickness, uncoated steel sheet, hot-dip galvanized after fabrication.

G. Pickets: Square tubes.

1. Size: 1-inch square by 14 gauge tubing.
2. Extend pickets beyond top rail as indicated and terminate with UV-resistant plastic caps.
3. Picket Spacing: 4 inches clear, maximum.

H. Fasteners: Manufacturer's standard concealed fastening system.

I. Galvanizing: For components indicated to be galvanized and for which galvanized coating is not specified in ASTM F 2408, hot-dip galvanize to comply with ASTM A 123. For hardware items, hot-dip galvanize to comply with ASTM A 153.

J. Finish: High-performance coating.

2.3 SWING GATES

A. Basis-of-Design Product: Subject to compliance with requirements, provide Ameristar Fence Products; Montage II, Majestic 3-Rail Style, Architectural Metal Swing Gates, or a comparable product by one of the other listed fence manufacturers.

B. Gate Configuration: Single leaf and double leaf.

C. Gate Frame Height: As indicated.

D. Gate Opening Width: As indicated.

E. Galvanized-Steel Frames and Bracing: Fabricate members from square tubes 1-3/4 by 1-3/4 inches formed from 14 gauge steel sheet and hot-dip galvanized after fabrication, G90 coating.

F. Frame Corner Construction: Welded.

G. Additional Rails: Provide as indicated, complying with requirements for fence rails.

H. Picket Size, Configuration, and Spacing: Comply with requirements for adjacent fence.

I. Spring Hinges: BHMA A156.17, Grade 1, suitable for exterior use.

1. Function: 320 - Gate spring pivot hinge. Adjustable tension.
2. Material: Malleable iron; galvanized.

J. Exit Hardware: BHMA A156.3, Grade 1, Type 1 (rim exit device), with push pad actuating bar, suitable for exterior use.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Detex Corporation; V40xEBxWx711 Weatherized Alarmed Rim Exit Device.
2. Function: 04 - Entrance by trim when latch bolt is released by key or set in a retracted position by key.
3. Mounting Channel: Bent-plate channel formed from 1/8-inch- thick, steel plate. Channel spans gate frame. Exit device is mounted on channel web, recessed between flanges, with flanges extending 1/8 inch beyond push pad surface.

K. Cylinders: Mortise type for dogging and rim type for outside trim. Comply with requirements of Division 08 Section "Door Hardware."

L. Finish exposed welds to comply with NOMMA Guideline 1, Finish #2 - completely sanded joint, some undercutting and pinholes okay.

M. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123 unless otherwise indicated. For hardware items, hot-dip galvanize to comply with ASTM A 153.

N. Metallic-Coated Steel Finish: High-performance coating.

2.4 STEEL AND IRON

A. Plates, Shapes, and Bars: ASTM A 36.

B. Tubing: ASTM A 500, cold formed steel tubing.

C. Galvanized-Steel Sheet: ASTM A 653, structural quality, Grade 50, with G90 coating.

D. Castings: Either gray or malleable iron unless otherwise indicated.

1. Gray Iron: ASTM A 48, Class 30.
2. Malleable Iron: ASTM A 47.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Concrete: Normal-weight, air-entrained, ready-mix concrete complying with requirements in Division 03 Section "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch maximum aggregate size.

2.6 METALLIC-COATED STEEL FINISHES

A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a zinc-phosphate conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

B. Powder Coating: Immediately after cleaning and pretreating, apply 2-coat finish consisting of zinc-rich epoxy prime coat and TGIC polyester topcoat, with a minimum dry film thickness of 2 mils for topcoat. Comply with coating manufacturer's written instructions to achieve a minimum total dry film thickness of 4 mils.

1. Color and Gloss: As selected by Architect from manufacturer's full range.
2. Comply with surface finish testing requirements in ASTM F 2408.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.

B. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

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

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

1. Construction layout and field engineering are specified in Division 01 Section "Execution Requirements."

3.3 DECORATIVE FENCE INSTALLATION

A. Install fences according to manufacturer's written instructions.

B. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 24 inches plus 3 inches for each foot or fraction of a foot that fence height exceeds 4 feet.

C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts and sleeves and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

    a. Exposed Concrete: Extend 2 inches above grade. Finish and slope top surface to drain water away from post.

3. Posts Set in Concrete: Extend post to within 6 inches of specified excavation depth, but not closer than 3 inches to bottom of concrete.
4. Space posts uniformly at 8 feet o.c.

3.4 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.5 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Lubricate hardware and other moving parts.

END OF SECTION 323119

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Modular concrete retaining wall units.
2. Geotextile reinforcement.

B. Division 31 Section "Earth Moving" for excavation and compacted subgrade under retaining walls.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Retaining wall system design, including "tiebacks" and drainage provisions.

1. Delegated-Design Submittal: For segmental retaining walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified Illinois-licensed structural engineer responsible for their preparation.

C. Samples for Initial Selection: Manufacturer's color charts for color selection.

D. Samples for Verification:

1. Furnish one unit in color and face pattern specified. Upon approval, unit may be incorporated into finished work.
2. 12-inches-square Sample of geotextile reinforcing.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Illinois-licensed structural engineer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for segmental retaining wall units and soil reinforcement.

1. Include test data for freeze-thaw durability of segmental retaining wall units.

2. Include test data for shear strength between segmental retaining wall units according to ASTM D 6916.
3. Include test data for connection strength between segmental retaining wall units and soil reinforcement according to ASTM D 6638.

C. Research/Evaluation Reports: For segmental retaining wall units and soil reinforcement, from ICC.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish 3 replacement units identical to those installed on project.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed installations of modular concrete retaining wall systems similar in material, design, and extent to those indicated for the project and that has resulted in construction with a record of successful in-service performance.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle materials in such manner as to prevent damage. Store above ground on wood pallets or blocking. Remove damaged or otherwise unsuitable material from the site. Faces of the concrete units shall be free of chips, cracks and stains.

B. Store geosynthetics in manufacturer's original packaging with labels intact. Store and handle geosynthetics to prevent deterioration or damage due to sunlight, chemicals, flames, temperatures above 160 deg F or below 32 deg F, and other conditions that might damage them. Verify identification of geosynthetics before using and examine them for defects as material is placed.

1.8 SEQUENCING AND SCHEDULING

A. Sequence accessory installation with other work to minimize possibility of damage and soiling during remainder of construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Modular Concrete Retaining Wall Units:
   a. Pisa2® Segmental Retaining Wall System as supplied by Unilock®, 301 E. Sullivan Road, Aurora, IL 60505

2. Geotextile Soil Reinforcement:

   a. Mirafi Construction Products; Ten Cate Nicolon.
   b. Risigrid, RISI.
   c. Tensar Earth Technologies, Inc.

B. Single-Source Responsibility: Obtain each color, type, and variety of modular concrete retaining wall units from a single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying progress of the work.

2.2 SEGMENTAL RETAINING WALL UNITS

A. Concrete Units: ASTM C 1372, high strength, dense concrete units, freeze-thaw resistant with rear alignment flange. Concrete wall units shall meet requirements of ASTM C 90 except compressive strength shall be a minimum 28-day compressive strength of 3,000 psi and the maximum water absorption shall be limited to 8.0 percent. The concrete shall have adequate freeze-thaw resistance according to ASTM C 666 for a minimum of 60 cycles.

1. Product: Subject to compliance with requirements, provide Pisa 2 as manufactured by Unilock or equal.
2. Color: Sierra.
3. Shape and Texture: Provide units of basic shape and dimensions indicated.
4. Bond Configuration: Running with bonds nominally located at midpoint vertically adjacent units, in both straight and curved alignments.
5. Exposed surfaces of units shall be free of chips, cracks, or other imperfections when viewed from a distance of 10 feet under diffused lighting.

B. Cap Units: Proved manufacturer's standard cap units, with smooth, as-cast top surfaces without holes or lugs, adhered to top of retaining wall utilizing paver adhesive recommended by retaining wall manufacturer.

C. Special Units: Provide corner units, end units, and other shapes as needed to produce segmental retaining walls of dimensions and profiles indicated and to provide texture on exposed surfaces matching face.

2.3 INSTALLATION ACCESSORIES

A. Pins and clips: Pins and clips shall have a protective coating from contact with soil utilizing the ASTM testing procedure ASTM A 525 hot-dipped zinc and a 164 zinc electro-deposited on steel and a minimum yield strength of 50 ksi.

B. Cap Adhesive: Product supplied or recommended by segmental retaining wall unit manufacturer for adhering cap units to units below.

C. Leveling Base: Washed gravel complying with ASTM C 33 for Size No. 8 for course aggregate, and Division 31 Section "Earth Moving."

D. Drainage Fill: Refer to Division 31 Section "Earth Moving" for drainage fill and backfill materials.

E. Soil Reinforcement: Product specifically manufactured for use as soil reinforcement of polyester woven fiber geotextile or polyethylene expanded sheet geogrid, and acceptable to segmental retaining wall manufacturer.

2.4 DRAIN TILE

A. Perforated-Wall PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 35, bell-and-spigot ends, for gasketed joints.

1. Gaskets: ASTM F 477, elastomeric seal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for excavation tolerances, condition of subgrades, and other conditions affecting performance of segmental retaining walls.

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

3.2 PREPARATION

A. Leveling Base: Place and compact 6 inch layer of crushed rock base material over subgrade, with not less than 95-percent compacted in 2inch to 3-inch lifts according to ASTM D 698, prior to setting the first course of modular concrete retaining wall.

3.3 DRAIN TILE

A. Provide 4-inch diameter drain tile behind retaining wall as indicated on Drawings.

3.4 INSTALLATION

A. General: Place units according to NCMA's "Segmental Retaining Wall Installation Guide" and segmental retaining wall unit manufacturer's written instructions.

B. Align the first course by using a string level and level each face unit side to side and front to back. Install units with clips and pins to maintain alignment. Backfill and compact soil behind the units in maximum 6 inch lifts. Repeat procedure to the top of the wall.

1. Compact each lift of backfill with mechanical compactor to 95 percent of standard Proctor, determined according to ASTM D 698 or ASTM D 1557, as applicable.

C. Install geotextile reinforcement soil reinforcement in horizontal joints of retaining wall where indicated and according to retaining-wall manufacturer's engineering design and soil-reinforcement manufacturer's written instructions. Coordinate installation with backfill operations. Anchor soil reinforcement before placing fill.

1. Place additional soil reinforcement at corners and curved walls to provide continuous reinforcement.
2. Place geosynthetics with seams, if any, oriented perpendicular to segmental retaining walls.
3. Do not dump fill material directly from trucks onto geosynthetics.
4. Place at least 6 inches of fill over reinforcement before compacting with tracked vehicles or 4 inches before compacting with rubber-tired vehicles.
5. Do not turn vehicles on fill until first layer of fill is compacted and second layer is placed over each soil-reinforcement layer.

3.5 ADJUSTING, REPAIR, CLEANING, AND PROTECTION

A. Remove and replace units damaged during erection with new units.

B. Remove debris and dispose of legally. Clean dirt and sand from top and face of walls. Broom clean adjacent paved areas.

C. Protection: Provide final protection and maintain conditions in a manner acceptable to installer, which ensures retaining wall system work is without damage or deterioration at time of Substantial Completion.

END OF SECTION 323223

SECTION 323300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Seating.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for concrete footings.
2. Section 312000 "Earth Moving" for excavation for installing concrete footings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

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

D. Samples for Verification: For each type of exposed finish, manufacturer’s standard color chips.

E. Product Schedule: For site furnishings.

1.4 INFORMATIONAL SUBMITTALS

1.5 CLOSEOUT SUBMITTALS

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

PART 2 - PRODUCTS

2.1 STADIUM STYLE SEATS

A. Legend style seats as manufactured by Hussey Seating Company, represented by Carroll Seating. Contact Alex Klopp, (847)434-0909, aklopp@carrollseating.com
   1. Colors: Dark Blue
   2. Quantity: 12 total seat, in three sets of four
   3. Surface mount per manufacturers specification

2.2 BY OWNER ITEMS

A. Items purchased and installed by the owner:
   1. Bronze Plaque – gateway, Quantity: 2
   2. Fitness Stations
      a. GT Fit Lat Pull Down
      b. GT Fit Chest Press
   3. Benches, Quantity 4
   4. Trash receptacles, quantity 2
   5. Player Benches, quantity 2
   6. Bat racks, quantity 2
   7. Helmet bins, quantity 2

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 of the Work.

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

3.2 INSTALLATION

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 Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that

posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION 323300

SECTION 329100 – SOIL AND LANDSCAPE BED PREPARATION, LANDSCAPE EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Section Includes

1. Stockpile excavated topsoil and relocate on site to meet finished grade elevations.
2. Furnish and place of subsoil, topsoil, and organic compost to meet finished grade elevations.
3. Soil testing of supplemental topsoil.
4. Preparation and placement of topsoil in landscape planting beds and turf areas to required finished grades including all soil amendments.
5. Finished grading of all landscape beds and turf areas.

1.02 RELATED SECTIONS

A. Section 312100 – Rough Grading

B. Section 329200 – Lawns and Grasses

C. Section 329300 – Woody and Herbaceous Plant Installation

1.03 QUALITY ASSURANCE

A. Qualifications

1. The contractor shall be a company specializing in landscape construction with a minimum of five (5) years of experience on comparable projects.

B. Code and Standards Compliance

1. All materials and work shall comply with applicable codes, standards and with the requirements of local agencies. The Contractor shall obtain all permits required.

1.04 SUBMITTALS

A. Topsoil Data

1. Provide, to the Landscape Architect, the location(s) and name(s) of topsoil sources from which supplemental topsoil is to be obtained for the project, approximate quantities obtained at each site, depth at which soil was taken and indicate whether crops had grown on site(s).

B. Other Samples

1. The following materials shall be submitted to the Architect for approval prior to delivery to the site.

    a. Submit 1 quart samples of imported topsoil, sand, and organic compost to be used.
    b. Submit manufacturer’s data for fertilizers and amendments recommended by the soil testing analysis.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Topsoil and Organic Compost

1. Coordinate and deliver topsoil and organic compost to pre-approved staging areas. Inform the Architect of all delivery schedules, twenty-four (24) hours in advance of delivery.
2. All deliveries of topsoil and organic compost which in any way fails to meet the requirements of these specifications will be rejected, and the Contractor shall immediately remove such rejected material from the premises and supply suitable material in its place.
3. No deliveries will be permitted when weather conditions are unsatisfactory, or if the approved staging area is not in a satisfactory condition to receive material. No frozen material will be accepted. Do not deliver or handle soil in wet, muddy or frozen conditions. Protect stockpiles from winds and disturbance with landscape fabric or other material.
4. Trucks making deliveries shall use routes as directed to avoid damage to property. The Contractor shall deliver material in dump trucks having pneumatic tires and shall be unloaded from the trucks where directed. All material that is deposited other than in the place designated shall be moved.

B. Other Materials

1. Handle and store all other materials according to manufacturer's recommendations.

1.06 JOB CONDITIONS

A. General

1. Prior to beginning work, the Contractor shall examine and verify the acceptability of the job site and notify the Landscape Architect of unsatisfactory conditions. The Contractor shall not proceed with the work until unsatisfactory conditions have been corrected or resolved.
2. Where soil preparation occurs in close proximity to other site improvements, adequate protection shall be given to all features prior to commencing work. Any items damaged during soil preparation operations shall be promptly repaired to their original condition at no additional cost to the Owner.

B. Utilities

1. Have all underground utilities located by servicing agencies. In the vicinity of utilities, hand excavate to minimize the possibility of damage to underground utilities.

C. Excavation

1. When conditions detrimental to plant growth are encountered such as limestone, rubble fill, adverse drainage conditions, or obstruction, notify the Landscape Architect prior to placement of any soil.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Subsoil Fill

1. Where site conditions require a layer of fill below the specified bed depth, provide a clean, debris-free mineral material with a brown sandy clay content and granular material with no stones measuring larger than one inch in diameter. The pH should range between 5.5 to 6.5 with no limestone present. Gray clay soils shall not be accepted.

B. Topsoil

1. Utilize on-site topsoil to complete work. Provide imported topsoil material as needed to supplement on-site topsoil.
2. Topsoil, whether on site or imported, shall be uniformly pulverized and blended.
3. Topsoil shall be a sandy loam mineral soil, uniform in color and texture; corresponding to native soils; containing no grass roots, sod, weeds, rocks, stiff clay, clods, or any other substance undesirable to plant growth. The soil shall be loose, friable, and of good tilth. The pH shall range between 5.5 to 6.5.
4. Nutrient data as follows. All soil sampling and testing shall comply with procedures in the USDA Ag. Handbook 60: Diagnosis and Improvement of Saline and Alkali Soils.

Phosphorus	Min. 75 lbs./ac.
Potassium	Min. 300 lbs./ac.
Calcium	Min. 1,500 ppm
Cation Exchange Capacity	Min. 20 mea/100g
Soluble Salt	Max. 1,000 ppm

a. Organic content shall not be less than 3 percent and not greater than 5 percent determined by loss of ignition.
b. Gradation:

Sieve Designation	Percent Passing
No. 4 (4.76 mm)	100
No. 10 (2.00 mm)	95 - 100
No. 18 (1.00 mm)	90 - 100
No. 35 (500 micron)	65 - 100
No. 60 (250 micron)	0 - 50
No. 140 (105 micron)	0 -20
No. 270 (53 micron)	0 -10

c. Textural Grades:

Fine gravel, course sand, medium sand	20 - 40 %
Silt	25 - 60 %
Clay	5 - 20 %

Clay content shall be determined by Bouyoucous hydrometer Test.

C. Sand shall be clean, sharp, course sand passing 1/4” mesh screen and free of foreign and organic matter. The pH shall range between 5.5 to 6.5.

D. Organic Compost shall be thoroughly decomposed organic waste produced at an IEPA registered composting facility. The compost shall have no glass or metal shards present. Any plastic or other man made material shall be no larger than 1/4 in. and sieved out to be less than one percent of the total dry weight. A copy of the compost test results complying with IEPA standards for General Use Compost and certification of IEPA registration shall be provided to the Engineer with each shipment of compost. Compost shall be capable of supporting and germinating vegetation.

E. pH Adjustment

Soil pH adjustments will be made based on soil test lab recommendations.

1. Limestone: Calcium carbonate (ground limestone) with 50% passing a No. 200 mesh sieve, 90% passing a N0. 100 mesh sieve and 100% passing a No.10 mesh sieve. Total carbonates shall not be less than 80%.
2. Sulfur: Granular sulfur.

PART 3 - EXECUTION

3.01 PREPARATION

Protection of Site Improvements: Protect all existing site improvements during excavation. If any existing improvements are damaged, replace or make arrangements with the proper authorities for repair.

3.02 PERFORMANCE

A. Permanent Grass and Sod Bed Preparation: Place topsoil to the required depths per the plans. Distribute required soil amendments evenly and thoroughly per soil test results and incorporate fertilizer into the top 2 inches of dry topsoil as described in Section 329200 – Lawns and Grasses.

B. Landscape Bed Preparation: Prior to installation of any shrubs and herbaceous material, incorporate 2 inches minimum of organic compost into the top 10 inches of topsoil by disking or tilling.

C. Landscape Planter Preparation: Prior to the installation of any shrubs and herbaceous material, place the soil mixture consisting of 2 parts topsoil and 1 part sand to the required depths per the plans. The sand, in the amount required to produce an acceptable planter soil blend, shall be mechanically blended during the pulverization process prior to placement into the planter. The planter soil mixture shall be placed in two lifts. The first lift shall be 2/3 of the planter soil depth. After placing each lift, moisten the surface at a rate sufficient to hydraulically settle the soil. Allow the water to thoroughly percolate through the soil before placing the next lift.

D. Landscape Excavation and Backfill

1. Planting pits shall be round, with vertical sides and flat bottoms, and sized in accordance with the dimensions shown on the drawings.
2. If rotating augers or other mechanical diggers are used to excavate holes, the vertical sides of the pits shall be scarified, fractured, or otherwise broken down to eliminate impervious surfaces.
3. Loosen or scarify soil in the bottom of all plant pits to a depth of four (4”) inches.
4. Existing native soils are to be used as backfill during plant installation. The existing native topsoil and sub-soils used for herbaceous or shrub backfill shall meet the requirements as specified within this section. Landscape beds shall be excavated to proper depths and amended as specified. Landscape beds shall be brought to a smooth and even surface conforming to established grades.
5. Where pavement and other structures have been removed, bring planting bed to sub-grade with suitable subgrade fill.

3.03 CLEANUP AND PROTECTION

A. Clean Up

1. Debris and excess material shall be removed from the site immediately after installation.
2. When an excavation or backfill area is completed, completely clean up all soil piles and sweep all walks and drives.
3. All existing sidewalks and driveways providing access to on-site buildings shall be kept clean and free of obstructions. Other paved areas shall be cleaned when work in adjacent areas is completed

B. Protection

1. Protect all completed work from disturbance from operations of other trades and trespassers. Replace damaged work to specified conditions at no additional cost to the owner.

3.04 ACCEPTANCE

A. Completion of the Work

1. Upon completion of work, the Contractor shall notify the Landscape Architect and the Owner at least ten (10) days prior to requested date of substantial completion of all or portions of the work. Landscape Architect will review all of the work and prepare a punch list of work not installed or not installed in conformance with the contract documents. All work in the punch list must be completed within five (5) working days from date of issue. Where work does not comply with requirements, replace rejected work and continue specified protection and maintenance until reviewed by Landscape Architect and found to be acceptable.

B. Certificate of Substantial Completion

1. Certificate of substantial completion will be issued for acceptable work at sole discretion of the Landscape Architect. If punch list items are issued with the certificate, they must be corrected within five (5) working days. If items are not corrected within five (5) working days than the certificate of substantial completion will be revoked and reissued when the punch list items are corrected.

C. Final Acceptance

1. After the certificate of substantial completion the Landscape Architect and the Owner will review the work for final acceptance. Upon satisfactory completion of repairs and / or replacements the Landscape Architect will certify, in writing, final acceptance of the work, which will serve as evidence that Contractor's obligations have been met.

END OF SECTION 329100

SECTION 329200 – LAWNS AND GRASSES

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work includes furnishing and placing black earth (topsoil), fertilizer, seed and/or sod as stated in the project specifications, and performing all operations in connection with seeding and sodding, all complete and subject to the terms and conditions of the contract.

1.2 RELATED SECTIONS

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

1. Section 311000 – Site Clearing
2. Section 312000 – Earth Moving
3. Section 329100 – Soil and Landscape Bed Preparation, Landscape Excavation and Backfill
4. Section 329300 – Woody and Herbaceous Plant Installation

1.3 DESCRIPTION

A. Work includes furnishing all labor, materials and equipment required to complete the work described herein in strict accordance with the drawings and terms of the Contract.

B. The landscape contractor shall be familiar with the project premises and how the existing conditions will affect the work.

C. All previous grading to conform with the Drawings and Specifications

1.4 INSPECTION

A. Become familiar with project requirements, site and existing conditions impact on scope of work

B. Inspect existing conditions prior to commencing any work under this Section. Report any discrepancies to Landscape Architect.

C. Failure to report discrepancies to Landscape Architect implies acceptance of existing conditions.

1.5 REFERENCES

A. Illinois Department of Transportation “Standard Specifications for Road and Bridge Construction” (Standard Specifications) most recent edition

B. ASTM International: ASTM C602 - Standard Specification for Agricultural Liming Materials.

1.6 DEFINITIONS

A. Weeds: Vegetative species other than specified species to be established in given area.

1.7 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data for seed mix, fertilizer, mulch, and other accessories.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

D. Samples and Analysis:

1. Submit, for review, samples and certified analysis by approved laboratory for seed,

2. fertilizer, and lime prior to delivery to the site.

3. Manufacturer's analysis for standard products will be acceptable.

E. Acceptance of samples shall not be construed as final acceptance. The Landscape Architect reserves the right to have samples taken of the materials delivered to the site of the Work and analyzed for compliance with the Specifications.

1.8 CLOSEOUT SUBMITTALS

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

B. Operation and Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.9 QUALITY ASSURANCE

A. Provide at least one person thoroughly trained and experienced in the skills required completely familiar with the design and application of the work described in this Section, and who shall be present at all times during progress of the work under this Section and shall direct all work required and performed under this Section.

B. Provide seed mixture in containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging.

C. Seed: Conform to current U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act of August 9, 1939 and all subsequent revisions thereto, and the requirements of the state seed laws.

D. Perform Work in accordance with Standard Specifications.

1.10 QUALIFICATIONS

A. Seed Supplier: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum five years documented experience.

1.11 WORKMANSHIP

A. During seeding, keep all areas neat and clean and with precautions taken to avoid damage to existing plants, turf and structures.

B. Remove all debris and waste material resulting from seeding operations from the project and the area cleaned up upon completion of seeding operation.

C. Repair or restore to original condition any damaged areas caused by the landscape contractor.

1.12 PROTECTION AND REPAIR

A. Use all means necessary to protect site seeding areas before, during, and after installation and to protect the installed work and materials of all other trades.

B. In the event of damage to the site seeding areas including mulch or erosion control blanket, immediately make all repairs or replacements necessary to the approval of the Owner and at all no additional cost to the Owner.

C. Install necessary barricades, temporary fences or signs to protect newly seeded or hydro-seeded/mulched areas until acceptance of the Work.

1.13 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

D. Protect seed, and other required materials against weather conditions and injuries during transit and job storage.

E. Deliver all items to the site in their original containers with all labels intact and legible at time of Owners representative inspection.

F. Use all means necessary to protect all items before, during and after installation and to protect the installed work and materials of all trades

G. Replacements:

1. Repair all damaged or rejected materials immediately
2. Make all repairs and replacements necessary to the approval of the Owners Representative at no additional cost to the owner.

1.14 GAURANTEE

A. Guarantee this portion of the through the maintenance period and until final acceptance (See Paragraph 3.6 this section.)

B. Within the guarantee period, replace all lawn areas which have failed to flourish and produce a stand of turf acceptable to the Owner due to defective materials or workmanship, or unfavorable weather conditions.

C. The decision of the Owner for replacement Work shall be conclusive and binding upon the Contractor.

D. The Contractor is responsible for all damage to persons or property caused by defective materials or workmanship or by the re-working of areas not acceptable.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil – See Section 329100 – Soil and Landscape Bed Preparation, Landscape Excavation and Backfill.

B. Fertilizer

1. Commercial Fertilizer shall be delivered to the site in unopened, original containers, each bearing name and address of the manufacturer, name brand or trademark and manufacturer's guaranteed analysis.
2. Any fertilizer which becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted.
3. The fertilizer formula shall contain a minimum basis percentage by weight of the following:
   Nitrogen, 33% insoluble in water 24%
   Phosphoric Acid 4%
   Potash 8%

4. The balance of the fertilizer shall be made up of materials usually present in such a product, and shall contain IBDU (Isobutylidene Urea).
5. Fertilizer shall be of the inorganic type in composition, dry and free flowing, equal to "PAREX" IBDU. Not more than 2% shall be retained on a 14-mesh sieve and not more than 25% shall pass thru a 65-mesh sieve. It shall be free from dust, sticks, sand, stone and other debris.

C. Permanent Grass Seed

1. Grass Seed shall be recleaned seed of seed crop from the year stipulated in the project specification. All seed shall meet the requirements established by the State and Federal Seed and Weed Control Laws, covering law on “Agricultural Seed.”
2. Packing and Marking: All seed shall be delivered in sacks unmixed. Seeds shall be packed for delivery in suitable bags in accordance with standard commercial practice. Each bag shall be tagged or labeled as required by the law of the State of Illinois. The vendor’s name shall show on or be attached to each bag, together with a statement signed by the vendor, showing:

    a. The kind of seed contained;
    b. The percentage of purity and germination;
    c. The percentage of hard seed, if any;
    d. A statement conforming to the laws of the State of Illinois as hereinbefore mentioned, showing percentage of weed seeds if any.

3. Grass Seed Mixes: The seed shall be mixed thoroughly in the following proportions, by weight. Where specified varieties are not available, alternative varieties must be approved in writing by the Landscape Architect prior to ordering.

    a. Permanent Turf Grass Seed Mix

        1. Mix shall be 50% Kentucky Bluegrass, 30% Perennial Ryegrass, and 20% turf type tall fescue. Kentucky Bluegrass amount shall be of a minimum of three improved varieties.

    b. Permanent Low Mow Seed Mix

        1. Mix shall be a fescue blend consisting of minimum of six varieties, at least two shall be ‘creeping’ type.

    c. Low Profile Prairie Seed Mix

        1. Mix shall be Low-Profile prairie seed mix by Cardno or approved equal.

    d. Low Profile Modified Bioswale Seed Mix by Cardo

		PLS		
Botanical Name	**Common Name**	**Ounces/Acre**	**Seeds/Oz**	**Seeds/SQ FT**
Permanent Grasses/Sedges:				
Andropogon virginicus	Broom Sedge	6.00	15625	2.15
Carex comosa	Bristly Sedge	3.00	41183	2.84
Carex lurida	Bottlebrush Sedge	3.00	12000	0.83
Carex molesta	Field Oval Sedge	8.00	27500	5.05
Carex vulpinoidea	Brown Fox Sedge	4.00	125000	11.48
Elymus virginicus	Virginia Wild Rye	16.00	4375	1.61

Glyceria striata	Fowl Manna Grass	2.00	125000	5.74
Scirpus cyperinus	Wool Grass	1.00	562500	12.91
	Total	**37.00**		**42.60**
Temporary Cover:				
Avena sativa	Common Oat	360.00	8125	67.15
Lolium multiflorum	Annual Rye	100.00	14188	32.57
	Total	**460.00**		**99.72**
Forbs:				
Alisma spp.	Water Plantain (Various Mix)	1.00	70175	1.61
Echinacea purpurea	Purple Coneflower	4.00	6600	0.61
Eupatroium perfoliatum	Common Boneset	1.00	125000	2.87
Iris virginica	Blue Flag	4.00	1400	0.13
Liatris spicata	Marsh Blazing Star	1.00	12000	0.28
Lobelia cardinalis	Cardinal Flower	0.50	437000	5.02
Lobelia siphilitica	Great Blue Lobelia	0.50	520000	5.97
Lycopus americanus	Common Water Horehound	1.00	235000	5.39
Penstemon digitalis	Foxglove Beard Tongue	1.00	115000	2.64
Pycnanthemum virginianum	Common Mountian Mint	1.00	331250	7.60
Rudbeckia triloba	Brown-Eyed Susan	2.00	33000	1.52
Sagittaria latifolia	Common Arrowhead	1.00	56700	1.30
Tradescantia ohiensis	Ohio Spiderwort	2.00	8000	0.37
Zizia aurea	Golden Alexanders	2.00	12000	0.55
	Total	**22.00**		**35.85**

Or approved equal.

D. Erosion Control Blanket

1. Seed areas

a. North American Green DS150 or approved equal for turf grass areas.

b. North American Green S75BN or approved equal for low mow seed areas.

c. North American Green C125BN or approved equal for low profile prairie and bioswale seed areas.

2. Biodegradable anchor stakes
   a. GreenStake by Vivagreen, or approved equal
   b. Complies with ASTM Biodegradability Standards ASTM D6400.
   c. Length: 4 inch minimum

PART 3 - EXECUTION

3.1 SITE PREPARATION

A. Spreading and Rough Grading of topsoil as specified in Section 329100: Soil and Landscape Bed Preparation, Landscape Excavation, and Backfill. The Contractor shall spread and rough grade the areas to an elevation approximately 0.2 feet plus or minus below the finish grade as directed by the engineer. All equipment used for spreading and rough grading work shall be as approved by the engineer.

B. Tilling: All areas to be seeded or sodded shall be thoroughly prepared to the required depth of approximately three inches, by disking, harrowing or by other approved means. Limited areas shown on the drawing, which are too small to make these operations practicable shall receive special scarification prior to final tilling. Tilling shall continue until the condition of the soil is acceptable to the engineer as suitable for the specified type of seeding or sodding. When conditions are such, by reason of drought, excess moisture, or other factors that satisfactory results are not likely to be obtained, the work will be stopped by the engineer and shall be resumed only when directed. Undulations or irregularities in the surface that would interfere with further Contractor's operations or maintenance shall be leveled before the next specified operation.

C. Cleanup: After completion of tilling operations, the surface shall be cleared of all stones, stumps or other objects larger than 1-inch in thickness of diameter and of roots, brush, wire, grade stakes and other objects that may be a hindrance to maintenance operations. Adjacent paved areas shall be kept clean and soil or other dirt that may be brought upon the surface shall be removed promptly.

D. Fine Grading: Final grades on the areas to be seeded or sodded are shown on the drawings by contour lines. The surfaces shall be left at the indicated grades in an even and properly compacted condition which insofar as practicable, will not provide dips and pockets where water may stand. Upon completion of tilling operations and immediately prior to sowing seed or placing sod, the area shall be finish graded as needed to correct surface irregularities produced by the preceding operations or by other cause and to restore design grades.

3.2 SPREADING FERTILIZER

A. Fertilizer shall be distributed uniformly at a rate of 300 pounds per acres, over the areas indicated to be seeded or sodded, and shall be incorporated into the soil to a depth at least

2-inches by disking, harrowing or other acceptable methods. The incorporation of fertilizer may be a part of the tillage operation specified above.

3.3 SEEDING

A. Seeding

1. No seeds shall be sown during high winds. Seed shall be broadcast either by hand or sowing equipment. Method of sowing and equipment shall be approved by the engineer.
2. Application Rate:
   a. Turf grass seed: 6lbs/ 1000 s.f.
   b. Low Mow seed mix: 5lbs/ 1000 s.f.
   c. Low profile prairie seed mix: per manufacturers specifications.
   d. Low profile bioswale see mix: per manufacturers specifications.
3. Half the seed shall be sown with the sower moving in one direction and the remainder shall be sown with the sower moving at right angles to the first sowing.
4. The seeded area shall be lightly raked, being careful not to rake seed from one area to another thus causing an uneven seeding. The seed shall be covered to a depth from 1/8-inch to 1/4-inch.
5. Seeding shall be done by workers experienced in this type of work.
6. No seeding shall be done on an area compacted by rain until the soil is brought back to a friable condition.

B. Erosion Control Blanket

1. The Contractor shall install erosion control blanket as specified in the plans for all seeded areas.
2. Within 24 hours of seed placement, blanket shall be placed on the areas specified. Prior to placing the blanket, the areas to be covered shall be relatively free of rocks or clods over 1 1/2 inches in diameter, and sticks or other foreign material which will prevent the close contact of the blanket with the seed bed.
3. If, as a result of rain, the prepared seed bed becomes crusted or eroded, or if eroded places, ruts, or depressions exist for any reason, the Contractor shall rework the soil until it is smooth and reseed such areas which are reworked. After the area has been properly shaped, fertilized, and seeded, the blanket shall be laid out flat, evenly, and smoothly, without stretching the material. The erosion control blanket shall be placed so that the netting is on the top and the fibers are in contact with the soil.
4. For placement in ditches, the erosion control blanket shall be applied parallel to the centerline of the ditch so that there are no longitudinal seams within 2 feet of the bottom centerline of the ditch. The blanket shall be toed in on the upslope edge and shingled or overlapped with the flow.
5. On slopes, the blanket shall be applied either horizontally or vertically

C. Maintenance During Seed Establishment

1. Maintenance including watering of grass shall continue until all seeding work under this contract has been completed and accepted by the Owner.
2. Watering

   a. The seed bed shall be kept moist but not wet during the period of seed germination. Care must be taken that the seed bed does not dry out in spots.

b. During germination, the water shall penetrate to a depth of 1-inch into the seed bed.
c. After germination, as the grass roots go deeper into the soil, the quantity of water shall be increased so that the depth of penetration is a minimum of 3-inches.
d. If water is not available on site, the Contractor shall supply water from his own source. The Contractor shall furnish the hose and proper equipment for watering purposes.

3. Mowing

a. The Contractor shall be solely responsible for mowing during construction.

D. Seeded lawn areas to be acceptable shall be in a green and healthy condition, devoid of bare spots.

E. Protection

1. The Contractor is responsible for the proper care of the seeded areas during the period when the vegetation is being established.
2. Newly seeded areas shall be protected against traffic or other use, by enclosing the areas with snow fencing or other approved barrier.
3. “NEWLY SEEDED” or other appropriate approved warning placards shall be posted until all work under the contract is completed and accepted.

F. Repair

1. If at any time before completion and acceptance of the entire work covered by this contract, any portion of the surface becomes gullied or otherwise damaged following seeding, dies due to lack of water, becomes rutted due to improper protection, has been winter-killed or otherwise damaged or destroyed, the affected portion shall be repaired to re-establish the condition and grade of the soil prior to seeding and shall then be reseeded as specified herein by the Contractor, at no additional cost to the Owner.

3.5 MAINTENANCE

A. Maintenance

1. The Contractor shall be responsible for maintenance until 30 days after the certificate of substantial completion. After the 30-day period from the date on the certificate of substantial completion, the Owner shall be responsible for all aspects of the maintenance.
2. Maintenance during this time period shall include all requirements aforementioned within this specification.
3. The contractor is responsible for the control of weeds during establishment and the maintenance period. Weeds shall be spot treated with a broad-leaved herbicide that is safe for grass or hand pulled. Do not broadcast herbicide applications. The contractor shall remedy all damage resulting from improper herbicide use.

3.6 ACCEPTANCE

A. Completion of the Work

1. Upon completion of work, the Contractor shall notify the Landscape Architect and the Owner at least ten (10) days prior to requested date of substantial completion of all or portions of the work. Landscape Architect will review all of the work and prepare a punch list of work not installed or not installed in conformance with the contract documents. All work in the punch list must be completed within five (5) working days from date of issue. Where work does not comply with requirements, replace rejected work and continue specified protection and maintenance until reviewed by Landscape Architect and found to be acceptable.

B. Certificate of Substantial Completion

1. Certificate of substantial completion will be issued for acceptable work at sole discretion of the Landscape Architect. If punch list items are issued with the certificate, they must be corrected within five (5) working days. If items are not corrected within five (5) working days than the certificate of substantial completion will be revoked and reissued when the punch list items are corrected.

C. Final Acceptance

1. After the 30-day maintenance period following the date of substantial completion the Landscape Architect and the Owner will review the work for final acceptance. Upon satisfactory completion of repairs and / or replacements the Landscape Architect will certify, in writing, final acceptance of the work, which will serve as evidence that Contractor's obligations have been met.

END OF SECTION 329200

SECTION 329300 – WOODY AND HERBACEOUS PLANT INSTALLATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide, install, and maintain trees, shrubs, vines, and herbaceous materials as shown and specified in the contract plans. The work includes:

1. Woody plant material including trees, shrubs, and vines
2. Herbaceous plant material including annuals, biennials, perennials, ornamental grasses, vines, bulbs, and plugs
3. Mulch and Planting Accessories
4. Existing Tree Care
5. Maintenance and Warranty Period

1.02 RELATED SECTIONS

A. Section 329100 – Soil and Landscape Bed Preparation, Landscape Excavation and Backfill

B. Section 329200 – Lawns and Grasses

1.03 QUALITY ASSURANCE

A. Qualifications

1. The Contractor shall be a company specializing in landscape installation with a minimum of five (5) years of experience on comparable projects.

B. Code and Standards Compliance

All materials and work shall comply with applicable sections of the following references:

1. American Association of Nurserymen, Inc. (MN) Standard: American Standard for Nursery Stock (ANSI Z60.1 -1990)

2. Hortus Third, Cornell University, 1976

C. Source Quality Control

1. All landscape materials shall be from stock inspected and certified by authorized governmental agencies. The stock shall comply with governmental regulations prevailing at the supply source and the job site. The Architect reserves the right to ask for certification by authorized governmental agencies.
2. All landscape materials that have been treated with herbicides, pesticides, insecticides, fungicides, etc. should have been applied by a licensed applicator and been treated with products that comply with governmental regulations. The Architect reserves the right to ask for certification.

3. Products packaged in sealed containers shall be labeled with manufacturer's certified analysis. The composition of bulk materials shall be tested by an approved laboratory in accordance with procedures established by the Association of Official Agricultural Chemists, wherever applicable, or as specified by product specifications referenced herein.

4. Plant Material Selected by Contractor

    a. Contractor shall locate all plant material to be supplied for the project and inform the Landscape Architect and Owner in writing of plant location(s) at least thirty (30) days prior to scheduled installation date.
    b. In the event plant material is found to be unacceptable after review by the Landscape Architect, the Contractor shall pursue other sources until acceptable plant material is found, at no additional cost to the Owner and Landscape Architect.
    c. Selection or lack of selection at the plant source does not impair the right of the Landscape Architect to review and reject material at the time of shipping, during installation of the work, or after the installation of the work.

D. Substitutions

1. If specified landscape material is not obtainable, notify the Landscape Architect, who will identify alternate sources or substitutes. If substitutions are smaller in size than the specified material, credits to the base bid contract will be made based on comparable cost differentials customary for materials and sizes involved.

1.04 SUBMITTALS

A. Qualifications

1. The Contractor shall submit qualifications.

B. Nursery List

1. Submit nursery list that complies with the above items under Section 1.03, Quality Assurance.

C. Samples and Product Data

1. Submit samples and/or product data for all items listed below in Section 2.01, Materials.

D. Schedule

1. Upon authorization to proceed with the work, a schedule indicating the dates of each of the following items will be prepared by the Contractor and submitted to the Landscape Architect:

    a. Tagging of plant material in nurseries.
    b. Staking of plant locations on the site.
    c. Digging and preparation of plant pits and beds.
    d. Delivery of plant material to the site.

e. Planting schedule.
f. Substantial completion of the work.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. General

1. Notify the Landscape Architect and the Owner forty-eight hours in advance of all delivery times for plant material.
2. Store materials only in locations approved by the Landscape Architect and the Owner.

B. Packaged Materials

1. Deliver packaged materials in unopened containers showing weight, analysis, and name of manufacturer. During shipment and storage on site, protect materials from breakage, moisture, heat, or other damage and according to manufacturer's recommendations.

C. Woody and Herbaceous Plant Materials

1. Schedule shipping to minimize on site storage of plants. Stock shall not be shipped until the planting preparations have been completed.
2. Label the size and variety of plant and securely attach to individual plants or to bundles of like variety and size.
3. During shipment, plants shall not be bent, stacked, or bound in a manner that damages bark, breaks branches, deforms root balls, or destroys natural shape.
4. Plant material shall be transported within enclosed trailers or covered by tarpaulin to protect the material from damage caused by drying winds, heat, freezing, or other exposure that may be harmful to the plants. Plant material arriving at the site in a damaged condition shall be rejected and removed from the site.
5. If delays beyond the Contractor's control occur after delivery, plants shall be kept watered and protected from sun, wind, and mechanical damage; root balls shall be covered with topsoil or mulch. Container-grown stock shall not be removed from containers until planting time. Keep the roots constantly moist until planted.
6. Handle plants at all times in accordance with the best horticultural practices. Lift balled and burlapped materials from the bottom of the ball only. Balled and burlapped plants which have cracked or broken balls shall be rejected and removed from the site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Woody and Herbaceous Plant Material

1. Provide plant materials true to name and variety established by the American Joint Committee on Horticultural Nomenclature Standardized Plant Names, Second Edition, 1942, as indicated on the Drawings.
2. All planting stock shall be nursery-grown in accordance with good horticultural practice. Plants shall be free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injures, abrasions, or disfigurement. They shall be sound, healthy and

vigorous, of uniform growth, typical of the species and variety, well formed, free from irregularities, with the minimum quality conforming to American Standard for Nursery Stock.

3. Plants indicated, as “specimen plants” shall be exceptionally heavy, symmetrical, and tightly knit, cultured, to be unquestionably superior in form, branching, compactness, and symmetry.
4. Plants indicated as plugs shall be, at a minimum, grown in 2 ½ inch diameter containers with sidewall grooves, ribs, or slits.
5. The minimum acceptable sizes of all plants shall be measured before pruning and with branches in normal position. Unless otherwise designated on the drawings, all plant dimensions shall conform to those listed in ANSI Z60.1, American Standard for Nursery Stock.

    a. Where height is indicated within a range, the smaller dimension is the minimum acceptable; the larger dimension represents the maximum permissible except with approval of the Landscape Architect. The average dimension of all plants must at least equal the average of the height range specified.
    b. Spread shall meet the minimum dimension specified in all directions and must be considered as pivoting on the center of the plant. Where range is shown between two spread dimensions, the smaller dimension is the minimum acceptable. Spreads shall at least average on the average of the range indicated.
    c. Caliper is the trunk diameter taken at a specified distance above root collar as described in ANSI Z60.1.
    d. Branching point is the distance above ground where balanced branching occurs or where a dimension on trunk appears to form the head of the tree.
    e. Provide plant material of sizes shown or specified. Plant material of a larger size may be used, if acceptable to the Landscape Architect, and if sizes of roots or root-balls are increased proportionately in accordance with ANSI Z60 standards or greater. Increased size shall result in no additional cost to the Owner.

6. Root Treatment

    a. Root treatments on all plants shall conform to the requirements of ANSI Z60.1. Plants shall be dug and prepared for shipment in a manner that will not cause damage to branches, shape, and future development after planting.
    b. Balled and burlapped (B & B) plants shall have a firm, natural ball of earth of sufficient diameter and depth to encompass the fibrous and feed root systems necessary for full recovery of the plant. Ball shall be securely wrapped with burlap and bound with cord. Ball sizes shall meet the requirements of the ANSI Z60.1.
    c. Plants furnished in containers shall have the roots well established in the soil mass and shall have grown in the container for at least one growing season. Containers shall be large enough to provide earth-root mass of adequate size to support the plant tops being grown. Plants, other than ground covers, over-established in the container, as evidenced by pot-bound root ends, will not be accepted.

7. Plant materials shall be subject to final approval by the Landscape Architect at the site. The Landscape Architect reserves the right to reject any plant material that does not meet project specifications at the time of planting.

B. Topsoil

1. Topsoil for landscape work shall be amended as specified in specification section 329100, Soil and Landscape Bed Preparation, Landscape Excavation and Backfill.

C. Backfill

1. Backfill for landscape work shall be amended as specified in specification section 329100, Soil and Landscape Bed Preparation, Landscape Excavation and Backfill.

D. Shredded Hardwood Bark Mulch

1. Hardwood bark mulch shall be shredded or double-ground, composted hardwood, not to exceed two (2) inches in its largest dimension, free of foreign matter, sticks, stones, roots, soil and/or other unacceptable material.
2. Proportion of fines (material passing sieve size #60) shall not exceed 10% as determined by weight.
3. Contractor shall provide a 1 quart (minimum) sample of mulch to the Landscape Architect project manager for review and approval, before starting work.

E. Anti - Transpirant

1. Anti - transpirant shall be a protective film emulsion providing protective film over evergreen plant surfaces only, permeable to permit transpiration, as manufactured by Wilt Pruf Products, Inc. or approved equal. Mix and apply in accordance with manufacturer's instructions.

F. Herbicide

1. Herbicides shall be products with rates of application that conforms to registered uses and is applied by a licensed professional applicator.

    a. For woody materials ten (10') feet or further from a water body: Garlon 4 herbicide as manufactured by DowElanco or approved equal.
    b. For woody and/or herbaceous material ten (10') feet or further from a water body: Roundup Pro herbicide as manufactured by DowElanco or approved equal.
    c. For woody and herbaceous materials within ten (10') feet of a water body: Rodeo herbicide as supplied by DowElanco or approved equal.

G. Pesticides, Insecticides, Fungicides, etc.

1. If plant material becomes infected with any pests or insects, the most practical and environmentally benign methods should be utilized to control the problem. All products should comply with government regulations and be applied by a licensed applicator. The Landscape Architect reserves the right to ask for certification.

H. Water

1. If water is not available on site, the Contractor shall supply water from his own source. The Contractor shall furnish the hose and proper equipment for watering purposes.

I. Tree Watering Bags

1. Tree watering bags shall be by Treegator or approved equal. Bags shall be installed for all trees installed from June 1 through September 15.

J. Guying and Staking Materials

1. Guying and staking shall only be performed as noted on the plans or as directed by the Landscape Architect.
2. Stakes for tree support shall be hardwood free from knot, rot, cross grain or other defects that would impair strength. Stakes shall be a minimum of 2” by 2” in diameter by 8’-0” long and pointed on one end.
3. Ground anchors for guying shall be 2” x 2” x 3’-0” long wood stake, pointed on one end.
4. Guying wire shall be 12 gauge annealed galvanized steel.
5. Guying cable shall be a minimum of five strands, making a 3/16” diameter steel cable.
6. Hose chafing guards shall be new or used 2-ply, one half inch reinforced rubber or plastic hose and shall be the same color on the project. Length shall be one and one-half times the circumference of the plant at its base.
7. Survey flags to be fastened to guys shall be white plastic surveyor’s tape, 6” in length.
8. Turnbuckles shall be galvanized or cadmium-plated steel and have a 3” minimum lengthwise opening fitted with screw eyes.

PART 3 - EXECUTION

3.01 PROJECT CONDITIONS

A. General

1. Prior to beginning work, the Contractor shall examine and verify the acceptability of the job site and notify the Owner of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected or resolved.
2. Where planting occurs in close proximity to other site improvements, provide adequate protection for all site areas prior to commencing work. Any items damaged during planting operations shall be promptly replaced or repaired to their original condition at the Contractor’s expense and no additional cost to the Owner.
3. A list of plants, including a schedule of sizes, quantities, and other requirements is shown on the drawings for convenience of the Owner. Verify and supply the quantities required to complete the work as drawn.

B. Utilities

1. Contractor shall be solely responsible for determining location of all utilities. Contractor shall be responsible for obtaining site utility plans and contacting local utility locator service, and shall perform no work on site until utility locator service has marked site utilities. Perform work in a manner that will avoid possible damage. Excavate to avoid underground utilities including hand digging as required. All damage to utilities resulting from work covered in these contract documents will be repaired at the Contractor's expense and no additional cost to the Owner. No time extension will be allowed due to delay in utility location.

C. Planting Season

1. Plant material shall be dug and planted only during the planting season appropriate for each individual plant species. Pre-digging of plants with proper storage may extend the planting season. However, the installation of plant material outside the normal planting season shall be done only with the approval of the Landscape Architect.
2. Evergreen Material: Plant evergreen materials between September 2 and November 1 or in spring before new growth begin. If project timeline requires planting at other times, spray plants with anti-transpirant prior to planting operations.
3. Deciduous Trees: Plant deciduous trees in a dormant condition. If deciduous trees are planted in-leaf, spray with an anti-transpirant prior to planting operations.
4. Woody Material: Plant woody plant materials in Spring between April 1 to June 30 or in Fall between September 1 to November 30.
5. Herbaceous Material: Plant herbaceous materials (including plugs) in Spring between April 15 (with no threat of frost) and June 30 or in Fall between September 1 to October 15.
6. Bulbs: Plant bulbs in a dormant condition between November 1 and 30.
7. When the ground is frozen, no planting activities shall occur.

D. Coordination with Other Work

1. Proceed with complete landscape work as rapidly as portions of the site become available, working within the season limitations for each kind of landscape work is required.

3.02 PREPARATION

A. Layout

1. Layout and plant installation cannot begin until all landscape bed preparation, as detailed within Section 329100, and final grading has been achieved. Once complete, the Contractor must layout all planting areas as shown on the contract drawings/plan. The layout must be performed by qualified personnel. The tree and shrub locations must be marked by staking and all bed limits must be painted. The Landscape Architect must approve the layout prior to installation.
2. Individual plant locations for trees and shrubs as noted on the plan shall be staked on the project site by the Contractor and approved by the Landscape Architect before any planting operations commence. The Landscape Architect reserves the right to adjust plant material locations to meet field conditions, without additions to the base contract price.
3. Accurately stake plant material according to the drawings. Where location or spacing dimensions are not clearly shown, request clarification from the Landscape Architect.
4. If obstructions are encountered that are not indicated, do not proceed with planting operations until alternate plant locations have been selected and approved in writing by the Landscape Architect.
5. If alternate locations are not possible, notify the Landscape Architect of the adverse conditions so the Landscape Architect can request a proposal from the Contractor for method of correction. The Contractor shall obtain approval from the Owner for the additional work prior to continuing work in the affected area.

3.03 PERFORMANCE

A. General

1. Rocks/underground obstructions shall be removed and proper planting depths shall be established to conform to Section 329100 – Soil and Landscape Bed Preparation, Landscape Excavation and Backfill.
2. Plant Pit Excavation

    a. Planting pits shall be round, with vertical sides and flat bottoms, and sized in accordance with the specification and dimensions shown on the drawings.
    b. If rotating augers or other mechanical diggers are used to excavate holes, the vertical sides of the pits shall be scarified, fractured, or otherwise broken down to eliminate impervious surfaces.
    c. Loosen or scarify soil in the bottom of all plant pits to a depth of four (4”) inches.

3. Existing native topsoil are to be used as backfill during installation. The existing native topsoil used for herbaceous or shrub backfill shall meet the requirements as specified within Section 329100 – Soil and Landscape Bed Preparation, Landscape Excavation and Backfill. Landscape beds shall be excavated to proper depths and amended as specified. Landscape beds shall be brought to a smooth and even surface conforming to established grades.

B. Planting Operations

1. When the ground is frozen, no planting activities shall occur.
2. Balled and burlapped (B & B) trees and large shrubs:

    a. Set the plant in the pit to the same relationship to the grade as in the original container or at the top of the burlap ball, faced to give the best appearance or relationship to one another and adjacent structures. Cut away burlap, rope, wire, or other wrapping materials one-third (1/3) of the way from the top of the ball and remove from pit. Do not remove burlap or ties from sides or bottom of ball. If plastic wrap or other non-biodegradable materials are used in lieu of burlap, completely remove them before placing of backfill. Cleanly cut off broken or frayed roots. Place approved topsoil and fertilizer around the ball and carefully compact to avoid injury to the roots and to fill the voids. Apply fertilizer at a rate recommended by the manufacturer. After backfilling planting pit, approximately two-thirds full, add water and allow planting mixture to settle. After the water has been absorbed, fill the planting pit with topsoil tamp light to grade and form a watering basin of the size indicated. In tree grates, set top of root ball to allow a two-inch air space between the mulch layer and the bottom of the grate.
    b. Plant container-grown shrubs as specified above for balled and burlapped plants and as modified herein. Remove containers before planting and loosen the sides of root ball in several places, freeing the roots on the outside of the ball sufficiently to encourage rapid root extension into the surrounding soil and to prevent girdling of root mass.

3. Plant groundcover, perennials, plugs and annuals so that the top of the root mass is even with the surrounding grade. Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants. Backfill planting with specified planting mixture and fertilizer at a rate recommended by manufacturer.
4. Where erosion control blanket is specified on the plan documents, plant herbaceous plugs after placement of erosion control blanket. Contractor will be required to carefully slit installed erosion control blanket for plug installation. Contractor shall ensure minimal disturbance to the erosion control blanket during installation.
5. Plant bulbs to the depths and spacing as indicated on the plans and details.
6. Planting of shrubs, groundcovers, bulbs and annuals around tree root balls shall occur beyond the perimeter of the root ball. Do not plant directly over any root balls.

C. Mulching

1. General

   a. Mulch shall be applied by hand, with appropriate tools and equipment, in such a way as to prevent and preclude damage to the plant material being mulched. Plant material damaged or destroyed due to improper mulching operations will be replaced by the contractor, at his expense.
   b. Plant material shall be mulched with approved mulch to the following depths:
   c. Shredded Hardwood Bark Mulch

      1. Woody plant material to receive a maximum depth 4”; minimum 3” of shredded hardwood bark mulch

   d. Mulch shall be applied evenly over the entire area to be mulched with the following exceptions:

      1. Mulch shall be held back a minimum of 1” from the base of tree trunks, and tapered up to the adjacent depth.
      2. Mulch shall not be placed against, among or between the trunks or stems of multi-stemmed trees, shrubs, perennials, or any other plant material.
      3. Leafy stems of groundcover or vines shall not be buried under mulch material.
      4. Plant material requiring differing depths of mulch which are present in one planting bed shall be mulched to each plant type’s required depth; transitions between areas of differing depths of mulch shall be accomplished as to minimize uneven surfaces.

   e. Prior to installation of new mulch, old decomposed mulch is to be removed as necessary to proper depth of new mulch.
   f. “Volcano” mulching, the practice of heaping mulch against the stems or trunks of plant material is strictly forbidden. Plant material with bark or trunk damage due to this practice will be replaced by the Contractor, at his expense.

2. Mulch tree rings

   a. Maintain and/or re-establish existing mulched tree rings

1. Remove excess or decomposed mulch to prevent build up over tree roots and/or against the trunk
2. Mulched tree rings shall be a minimum of 6 ft diameter on trees of 8” caliper or less; larger trees shall have mulch rings a minimum of 3 ft radius, measured from the outside of the base of the tree (for a tree 24” in caliper, the mulch ring will be 8 ft in diameter: 3 ft + 24” + 3 ft = 8 ft).
3. Supply and install approved shredded hardwood mulch to trees rings as needed to bring mulch depth to that specified.
4. Edge mulch rings as necessary to maintain a clean, crisp edge.

b. Establish new mulched tree rings

1. Remove grass, weeds and all other existing cover, including surface roots, from areas to be developed as mulch rings.
2. Mulched tree rings shall be a minimum of 6 ft diameter on trees of 8” caliper or less; larger trees shall have mulch rings a minimum of 3 ft radius, measured from the outside of the base of the tree (for a tree 24” in caliper, the mulch ring will be 8 ft in diameter: 3 ft + 24” + 3 ft = 8 ft).
3. Edge mulch rings as specified on drawings.
4. Supply and install approved shredded hardwood mulch to depth as specified.

c. Edging of tree rings
1. All tree rings within lawn or turf areas are to be edged as necessary to maintain a clean, crisp appearance.
2. Edging is to be accomplished by hand with an edging tool, or by using a rotating or vibrating blade power driven machine which produces a maximum 2” deep x 2” wide trench at the transition edge. Edging machines which produce a cut deeper than 2” are not acceptable.
3. All edging work is to be performed and accomplished in such a way as to prevent and preclude damage or injury to surface roots.
4. All debris generated by edging activities is to be removed from adjacent surfaces.

3. Mulch Perennial and Shrub Landscape Beds

a. Maintain and/or re-establish existing mulched landscape beds

1. Remove excess or decomposed mulch to prevent build up over crown of plant
2. Supply and install approved shredded hardwood to landscape beds as needed to bring mulch depth to that specified.
3. Edge existing landscape beds as necessary to maintain a clean, crisp edge.

b. Establish new landscape beds

1. Remove grass, weeds and all other existing cover in areas shown in plans, including surface roots as directed by landscape architect, from areas to be developed as planting beds.
2. Mulched landscape beds shall have a clearance buffer of (6) six inches between the first row of planting and landscape bed edge.
3. Supply and install approved organic shredded leaf mulch to depth as specified.

c. Edging of landscape beds

1. All landscape beds within lawn or turf areas are to be edged to maintain a clean, crisp appearance.
2. Edging is to be accomplished by hand with an edging tool, or by using a rotating or vibrating blade power driven machine which produces a maximum 2” deep x 2” wide trench at the transition edge. Edging machines which produce a cut deeper than 2” are not acceptable.
3. All edging work is to be performed and accomplished in such a way as to prevent and preclude damage to existing and installed plant material.
4. All debris generated by edging activities is to be removed from adjacent surfaces.

D. Pruning

1. General

a. Pruning is to be performed by Certified Arborists only. Plant material is to be pruned only to remove damaged or broken material. The Architect shall approve pruning techniques and appearance before proceeding with all pruning.
b. Trimmings shall be removed from the site and legally disposed.

2. Trees

a. Prune trees by removing all dead wood, badly formed, interfering limbs, and sufficient other growth to ensure healthy and symmetrical growth of new wood. The proportion is, in all cases, subject to the approval of the Architect. The central leader shall not be removed.
b. In the case of multiple leaders, preserve the one which will best promote the symmetry of the tree, and remove or cut back the remainder so that they will not compete with the selected leader. Cut back surrounding top branches to conform to the leader.
c. Specified multi-Stem trees are to be pruned per the direction of the landscape architect to help maintain canopy clearance for accessibility and room for lower landscape plantings.
d. Contractor to contact landscape architect at least 24 hours before installation and before commencement of pruning activities.

3. Shrubs

a. Prune shrubs by removing all dead wood and broken branches, thinning out canes and cutting back or removing asymmetrical branches. Pruning shall result in a loose outline conforming to the natural shape of the shrub type. Shearing to unnatural shapes will not be accepted.

3.04 CLEAN UP AND PROTECTION

A. Clean Up

1. Excess and waste material shall be removed daily. Keep pavement clean and work area in an orderly condition.
2. When planting in an area has been completed, the area shall be cleared of all debris, soil piles, containers and all paved areas swept.
3. At least one paved pedestrian access route and one paved vehicular access route to each building shall be kept clean at all times. Other paving shall be cleaned when work in adjacent areas is completed.

B. Repairs

1. Any damage to existing landscape, paving, or other such features as a result of work related to this contract shall be repaired by the responsible Contractor to its original condition. Treat, repair, or replace damaged work at the Contractor's expense and at no additional cost to the Owner.

C. Protection

1. Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods.

D. Insurance

1. Insurance on plant material and other materials stored or installed is the responsibility of the Contractor. Such insurance shall cover fire, theft, vandalism, and any other damage that may occur to the plant material. Should the Contractor elect not to provide such insurance, the Contractor will in no way hold the Owner responsible for any losses incurred during the project. The Contractor is responsible for all costs incurred in replacing materials prior to date of substantial completion.

3.05 MAINTENANCE

A. Maintenance

1. The Contractor shall be responsible for maintenance until 1 year after the certificate of substantial completion. After the 1 year period from the date on the certificate of substantial completion, the Owner shall be responsible for all aspects of the maintenance. The Contractor should review the site periodically during the warranty period to determine what changes, if any, should be made in the maintenance program.
2. Maintenance during this time period shall include pruning, cultivating, weeding, watering, and application of appropriate insecticides and fungicides necessary to maintain plants free of insects and disease.

    a. Re-set settled plants to proper grade and position. Restore and replenish mulch beds per specifications.
    b. Water-in woody and herbaceous plant material at the time of initial planting. Water should be enough to saturate the soil and provide adequate coverage to settle the soil and remove any air pockets or voids within the planting bed. If settling occurs add additional topsoil and mulch as necessary to restore the final grade as shown on

plans taking care to not cover crowns. Additional material needed to perform this work shall come at no additional cost to the Owner.

c. After initial water-in, the Contractor is responsible to water the plant material at a minimum of twice per week until 1 year after substantial completion during the first growing season.

3. Maintenance review should occur at a minimum of 1 time per month during the warranty period to confirm the condition of plant material.

3.06 ACCEPTANCE

A. Completion of the Work

1. Upon completion of work, the Contractor shall notify the Landscape Architect and the Owner at least ten (10) days prior to requested date of substantial completion of all or portions of the work. Landscape Architect will review all of the work and prepare a punch list of work not installed or not installed in conformance with the contract documents. All work in the punch list must be completed within five (5) working days from date of issue. Where work does not comply with requirements, replace rejected work and continue specified protection and maintenance until reviewed by Landscape Architect and found to be acceptable.

B. Certificate of Substantial Completion

1. Certificate of substantial completion will be issued for acceptable work at sole discretion of the Landscape Architect. If punch list items are issued with the certificate, they must be corrected within five (5) working days. If items are not corrected within five (5) working days than the certificate of substantial completion will be revoked and reissued when the punch list items are corrected.

C. Warranty

1. Maintain and warrant for a period of one (1) year, following the certificate of substantial completion, all work, against any defects (including death and unsatisfactory growth) as determined by the Landscape Architect. Defects resulting from neglect by the Owner, abuse or damage by others, or unusual phenomena or incidents beyond the Contractor's control are exceptions. Should questions arise concerning the responsibility of replacement, the Landscape Architect shall be the sole judge of the need for replacement.
2. Remove and replace all work found to be dead or in unhealthy condition during warranty period as determined by Landscape Architect.
3. Replacements shall match adjacent specimens of same species. Replacements are subject to all requirements stated in the contract documents and are subject to review by the Landscape Architect at the project site and should be installed during appropriate planting seasons.
4. Repair grades, paving and any other damage resulting from replacement planting operations, at no additional cost to the Owner.
5. Replacements made during the warranty period or following review for final acceptance will carry an additional one (1) year warranty beginning at the time of replacement.

D. Final Acceptance

1. One (1) years after date of substantial completion the Landscape Architect and the Owner will review the work for final acceptance. Upon satisfactory completion of repairs and / or replacements the Landscape Architect will certify, in writing, final acceptance of the work, which will serve as evidence that Contractor's one (1) year warranty obligations have been met.

END OF SECTION 329300

SECTION 330513 – MANHOLES AND STRUCTURES

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Storm sewer manholes, catch basins and inlets, sanitary sewer manholes and water main valve vaults, as specified on the plans.

1.02 RELATED WORK

A. Specified elsewhere:
1. 312333 – Trenching and Backfill
2. 333000 – Sanitary Sewerage Utilities
3. 331000 – Water Utilities
4. 334000 – Storm Drainage Utilities

1.03 QUALITY ASSURANCE

A. The following documents shall provide the standards for construction within the Village of Oak Brook unless otherwise stated in these specifications. In the event of conflict between these specifications and the existing Village codes, the Village codes will prevail.
1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)
2. I.S.P.E., Consulting Engineers Council of Illinois, et. al., Standard Specifications for Water and Sewer Main Construction in Illinois, latest revision.

B. Utility Compliance: Comply with local utility regulations and standards pertaining to storm sewerage systems.

C. Exceptions: All references in the Illinois Department of Transportation Standard Specifications and the Standard Specifications for Water and Sewer Main Construction in Illinois to method of measurements and compensation shall not apply.

1.04 SUBMITTALS

A. Manufacturer's Data.
1. Manufacturer's standard data sheet showing compliance with applicable codes and specifications. Data shall indicate joint material for joining of precast sections. Submit data on: sanitary sewer manholes, storm sewer manholes, storm sewer catch basins, water main valve vaults and other associated structures.

PART 2 - PRODUCTS

2.01 PRECAST SECTIONS

A. Sanitary and storm sewer manholes and precast storm sewer inlets shall be precast concrete in accordance with ASTM C478. Manholes less than four feet in depth shall have precast concrete flat slab top while manholes greater than four feet in depth shall have precast concrete cone sections unless shown otherwise on the drawings. All joints between precast sections shall be made with a rubber gasket. Manhole steps shall be cast iron or reinforced plastic. Manhole frame shall be sealed to top precast section with bitumastic material. Access hatches where shown on the drawings shall be cast in place. Pipe openings shall be equipped with a cast in place flexible pipe seal. Storm Sewer Manholes shall meet the requirements of IDOT Standard Specifications Section 602.

2.02 FRAMES AND COVERS

A. Storm Manhole Frames and Covers: Type as specified on the plans, from East Jordan Foundry Company, Neenah Foundry Company, or approved equal. Solid lids are to have the word “STORM” indented and cast into the lid.

B. Sanitary Manhole Frames and Lids: Lids are to be solid, self-sealing with a pick hole. Product is to be from East Jordan Foundry Company, Neenah Foundry Company, or approved equal. The word “SANITARY” is to be indented and cast into the lid.

C. Water Valve Vaults Frames and Lids: Lids are to be solid, self-sealing with a pick hole. Product is to be from East Jordan Foundry Company, Neenah Foundry Company, or approved equal. The word “WATER” is to be indented and cast into the lid.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the area where and conditions under which manholes, catch basin or vaults are to be installed. Notify Engineer in writing of conditions detrimental to proper and timely completion of the work.

3.02 COORDINATION

A. Schedule work and notify all crafts in time so that provisions for their work can be made without delaying the project.

3.03 INSTALLATION

A. Excavation
1. In order to permit the joints to be installed properly and also to permit proper compaction of the backfill material, the excavation shall be made to a diameter of at least two feet greater than the outside diameter of the structure.

B. Subbase Preparation

1. Adequate foundation for all manhole structures shall be obtained by removal and replacement of unsuitable material with well-graded granular material, by tightening with coarse ballast rock, or by such other means provided for foundation preparation of the connected sewers.

C. Manhole Base Installation (Precast Base)
1. A well-graded granular bedding course conforming to the requirements for aggregate for trench backfill (Section 312300), not less than four inches in thickness and extending to the limits of the excavation, shall be firmly tamped and made smooth and level to assure uniform contact and support of the precast element. A precast base section shall be carefully placed on the prepared bedding so as to be fully and uniformly supported in true alignment and making sure that all entering pipes can be inserted on proper grade.

D. Precast Manholes
1. Precast manholes may be constructed with a precast base section or a monolithic base structure as specified. Precast sections shall be placed and aligned to provide vertical sides and vertical alignment of the ladder rungs. The completed manhole shall be rigid, true to dimensions and shall be watertight.
2. All lift holes on precast elements shall be completely filled with an approved bitumastic material. All joints between precast elements on sanitary sewer manholes shall be made with an O-ring rubber or neoprene gasket.

E. Construction Details
1. Inlet and Outlet Pipes for Break-in Connections. Pipe or tile placed in the masonry for inlet or outlet connections shall extend through the wall and beyond the outside surface of the wall a sufficient distance to allow for connections, and the masonry shall be carefully constructed around them so as to prevent leakage along the outer surfaces. Special care shall be taken to see that the openings through which pipes enter the structure are completely sealed by use of nonshrink, non-metallic grout. A rubber gasket shall be installed on the barrel of the pipe prior to grouting it in place. No break-in connections will be allowed without written authorization from the Construction Manager.

2. Placing Castings: Casting adjustments of less than two inches shall be with mortar. The mortar shall be mixed in proportion of one part cement to three parts sand, by volume, based on dry materials. Castings shall be set accurately to the finished elevation so that no subsequent adjustment will be necessary. Castings shall be sealed to concrete sections with bitumastic material.
3. Manhole Inverts: Construct manhole flow channels of concrete of sewer pipe, which shall be of semicircular section conforming to the inside diameter changes in size or grade gradually, and changes in direction shall be by true curves. Provide channels for all connecting sewers to each manhole and benching shown on the drawings.

F. Backfill
1. The space between the sides of the excavation and the outer surfaces of the manhole shall be backfilled with aggregate for trench backfill when the

manhole is within a pavement area or when the nearest point of the excavation for the manhole falls within two feet of the pavement edge.

G. Cleaning
1. All newly constructed manholes shall be cleaned of all accumulation of silt, debris or foreign matter of any kind and shall be free of such accumulations at the time of final inspection.

END OF SECTION 330513

SECTION 334000 – STORM DRAINAGE UTILITIES

PART I - GENERAL

1.1 WORK INCLUDES

A. All labor, materials, and equipment required to satisfactorily install the storm sewer and appurtenances as shown on the plans.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, including, but not limited to:
   1. 312333 – Trenching and Backfill

B. Work under this Section shall be done in accordance with the applicable provisions of the “Code of Ordinances”, latest edition, as adopted by the Village of Oak Brook, Illinois.

1.3 QUALITY ASSURANCE

A. Unless specifically stated in the specifications, the following documents shall provide general requirements and covenants applicable to construction within the Village. In the event of conflict between the existing Village codes and the contents of this document, the former will supercede the latter and/or the decision of the Village will prevail.

   1. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest revision, along with the Supplemental Specifications and Recurring Special Provisions. (Method of Measurement and Basis of Payment shall not apply.)
   2. I.S.P.E., Consulting Engineers Council of Illinois, et. al., Standard Specifications for Water and Sewer Main Construction in Illinois, latest revision.

B. Environmental Compliance: Comply with applicable portions of local Environmental Agency regulations pertaining to storm sewerage systems.

C. Utility Compliance: Comply with local utility regulations and standards pertaining to storm sewerage systems.

1.4 SUMMARY

A. This Section includes storm sewerage system piping and appurtenances as indicated on the plans outside the building to the point of disposal.

1.5 SUBMITTALS

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

1. Product data for drainage piping specialties.
2. Shop drawings for precast concrete storm drainage manholes, catch basins and inlets, including frames, covers, and grates.

1.6 PROJECT CONDITIONS

A. Site Information: Perform site survey, research public utility records, and verify existing utility locations. Verify that storm sewerage system piping may be installed in compliance with original design and referenced standards.

1.7 PROJECT RECORD DOCUMENTS

A. Record location of pipe runs, service connections, manholes, cleanouts, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

END OF SECTION 334000

ECS Midwest, LLC

Subsurface Exploration and

Geotechnical Engineering Report

Oak Brook Central Park Site Improvements

1300 Forest Gate Road
Oak Brook, Illinois

ECS Project Number 16:12009

August 2, 2017

ECS MIDWEST, LLC
"Setting the Standard for Service"
Geotechnical • Construction Materials • Environmental • Facilities

August 2, 2017

Mr. Bob Johnson
Director of Parks / Planning
Oak Brook Park District
1450 Forest Gate Road
Oak Brook, Illinois 60532

C/C: Mr. Byron Wyns
Wight & Company
Email: bwyns@wightco.com

ECS Project No. 16:12009

Reference: Subsurface Exploration and Geotechnical Engineering Report
Oak Brook Central Park Site Improvements
1300 Forest Gate Road
Oak Brook, Illinois

Mr. Johnson:

ECS Midwest, LLC (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our Proposal No. 16:17047-GP, dated June 7, 2017. This report presents our understanding of the geotechnical aspects of the project along, the results of the field exploration and laboratory testing conducted, and our design and construction recommendations.

It has been our pleasure to be of service to Oak Brook Park District and Wight & Company during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify the assumptions of subsurface conditions made for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

ECS Midwest, LLC

Bernardo Martinez-Tarin
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Renews 11/30/17

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062-064318
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signature
8/2/2017
date

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APPENDICES

EXECUTIVE SUMMARY

The following summarizes the main findings of the exploration, particularly those that may have a cost impact on the planned development. Further, our principal foundation recommendations are summarized. Information gleaned from the executive summary should not be utilized in lieu of reading the entire geotechnical report.

- We understand the proposed construction at the project site will consist of a single-story, slab-on-grade structure located at the north central portion of the project site, several high-mast sports lighting structures and parking lot improvements. Details/actual locations of the proposed structures were not known. Given the moderate grade changes throughout the site and for the purposes of this report, we have assumed that the proposed FFE will approximately match the existing site grades, requiring nominal cut and fill operations. Based on our experience with similar developments, we have assumed that the structural loads (i.e., wall and column loads) will be in the range of 2 to 3 kips per linear foot and 50 to 75 kips, respectively.

- The geotechnical exploration performed for the planned development included twenty (20) soil test borings drilled to depths ranging between 5 to 15 feet below existing site grades. Standard penetration tests (SPTs) were conducted in the borings at regular intervals in general accordance with ASTM D 1586.

- The surficial materials encountered at the boring locations were observed to consist of about 3 to 6 inches of bituminous pavement underlain by about 6 to 9 inches of gravel base (Borings B-9, B-19 and B-20) or about 12 inches of topsoil. The surficial materials were observed to be underlain by FILL materials (consisting of Sand with Gravel FILL at B-1 or Silty Clay FILL) to depths in the range of 2½ to 5 feet below grades (Stratum I). The FILL materials were observed to be underlain by natural very stiff to hard Silty Clay to depths in the range of 8 to 15 feet below grades (Stratum II). At Borings B-1, B-2, B-4 and B-6 through B-9, Stratum II was observed to be underlain by Silty Sand or Sand with Gravel to depths in the range of 12 to 15 feet below grades. At Boring B-6, Stratum III was observed to be underlain by materials similar to Stratum II to a depth of about 15 feet below grades (i.e., termination depth of the soil borings).

- The planned structure can be supported by conventional shallow foundations (i.e., column and wall footings) on competent natural Silty Clay soils (Stratum II) or granular engineered fill/lean concrete overlying Stratum II. A shallow foundation system designed as detailed in the corresponding sections of this report can be proportioned for a maximum allowable bearing pressure of 3,000 pounds per square foot.

- Recommendations for the design and construction of foundations for the proposed lighting structures are included in the body of the text. Please refer to the corresponding section for more details.

1.0 INTRODUCTION

1.1 GENERAL

The purpose of this study was to provide geotechnical information for the design of the building foundations, lighting mast foundations, floor slabs subgrade preparation and groundwater information and underslab drainage recommendations for the proposed improvements to be constructed within the existing Central Park located at 1450 Forest Gate Road in Oak Brook, Illinois.

The recommendations developed for this report are based on project information supplied by Wight & Company. This report contains the results of our subsurface explorations and laboratory testing programs, site characterization, engineering analyses, and recommendations for geotechnical aspects of the design and construction for the planned structure and site amenities.

1.2 SCOPE OF SERVICES

To obtain the necessary geotechnical information required for design of the proposed residential structure, twenty (20) soil test borings were performed at locations selected by the project team based on the existing site features and the proposed development. A laboratory-testing program was also implemented to characterize the physical and engineering properties of the subsurface soils. This report discusses our exploratory and testing procedures, presents our findings and evaluations and includes the following.

- A brief review and description of our field and laboratory test procedures and the results of testing conducted.
- A review of surface topographical features and site conditions.
- A review of subsurface soil stratigraphy with pertinent available physical properties.
- Final copies of our soil exploration/test boring logs.
- Recommendations for site preparation and construction of compacted fills, including an evaluation of on-site soils for use as compacted fills and delineation of potentially unsuitable soils and/or soils exhibiting excessive moisture at the time of sampling.
- Recommended foundation type(s).
- Evaluation and recommendations relative to groundwater control, including recommendations for pavement underdrains, if needed.

1.3 AUTHORIZATION

Our services were provided in accordance with our Proposal No. 16:17047-GP, dated June 7, 2017 and authorized by you and includes the Terms and Conditions of Service outlined with the Consultant Agreement between ECS Midwest, LLC and Oak Brook Park District.

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION

The site is located at 1300 Forest Gate Road in Oak Brook, Illinois and is bound to the north by stormwater ponds to the east by Jorie Boulevard, to the south by Forest Gate Road and to the west by Kingery Highway South. Of specific interest for the scope of services outlined herein are the baseball/softball fields located at the southeastern corner of the project site, where the proposed improvements will take place. At the time this proposal was written, a site specific topographic survey was not available. Based on our review of available online resources (i.e., DuPage County GIS), the existing site grades appear to range from about EL. +666 feet to EL. +680 feet above MSL (±), gently sloping downward in the northeast direction. **Grade elevations determined without a professional survey are approximate and should not be utilized in the final design of structures or site features.**

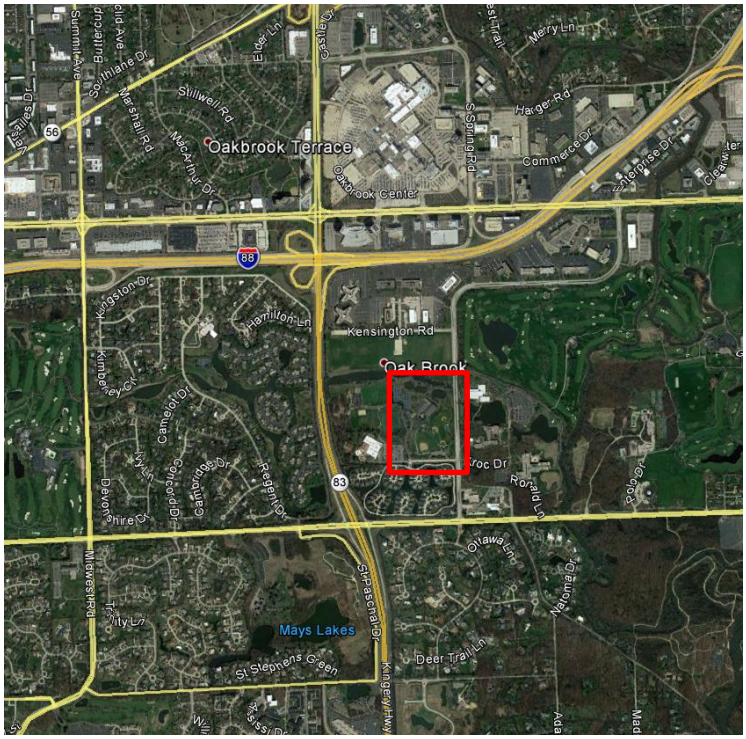


Figure 2.1.1. Site Location

2.2 PROPOSED CONSTRUCTION

Based on our review of the project documents and our conversation with the general contractor's representative, we understand the proposed construction will consist of a single-story, slab-on-grade structure located at the north central portion of the project site, several high-mast sports lighting structures and parking lot improvements. At the time this report was written, we understand the project was in a preliminary stage and details/actual locations of the proposed improvements were not known. Given the moderate grade changes throughout the site and for the purposes of this report, we have assumed that the proposed FFE will approximately match the existing site grades, requiring nominal cut and fill operations. Based on our experience with similar developments, we have assumed that the structural loads (i.e., wall and column loads) will be in the range of 2 to 3 kips per linear foot and 50 to 75 kips, respectively. With regards to the proposed high-mast sports lighting, maximum loads were not provided to ECS. Based on the

information provided, the high-mast sport lighting will consist in 60- and 70-foot high mast structures.

If our understanding of the project is inaccurate, if the design changes or if the actual structural loads become available, please contact ECS immediately so we can review and revise (if necessary) this report and the geotechnical recommendations included herein.

3.0 FIELD EXPLORATION

3.1 FIELD EXPLORATION PROGRAM

The field exploration was planned with the objective of characterizing the project site in general geotechnical and geological terms and to evaluate subsequent field and laboratory data to assist in the determination of geotechnical recommendations.

3.1.1 Test Borings

The subsurface conditions were explored by drilling twenty (20) soil test borings throughout the project site. An ATV-mounted drill rig was utilized to drill the soil test borings. Borings B-1 through B-9 were advanced to a depth of about 15 feet below existing grades. The remaining eleven (11) borings, designated as B-10 through B-20, were advanced to a depth of about 5 feet below existing grades. The soil borings were scattered throughout the project site. The subsurface exploration was completed under the direction of an ECS geotechnical engineer.

Boring locations were identified in the field by ECS personnel measuring from existing features prior to mobilization of our drilling equipment. The approximate as-drilled boring locations are shown on the Boring Location Diagram in Appendix A. Ground surface elevations noted on our boring logs were provided by the interpolated from online (USGS) topographic contours. Elevations from USGS contours are approximate and should not be utilized for final design.

Standard penetration tests (SPTs) were conducted in the borings at regular intervals in general accordance with ASTM D 1586. Small representative samples were obtained during these tests and were used to classify the soils encountered. The standard penetration resistances obtained provide a general indication of soil shear strength and compressibility.

3.2 SUBSURFACE CHARACTERIZATION

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil strata encountered during our subsurface exploration. For subsurface information at a specific location, refer to the Boring Logs in Appendix B.

Table 3.2.1 Subsurface Stratigraphy

Approximate Depth Ranges		Stratum	Description	Unconfined Compressive Strength (tsf)	Water Content (%)	SPT[(2)] N-values (bpf)
From	To					
0 ft[(1)]	1 ft	Surface Materials	**Borings B-9, B-19 and B-20:** 3 to 6 inches of Bituminous Pavement over 6 to 9 inches of Gravel Base course **Remaining borings:** 12 inches of topsoil	NA	NA	NA
1 ft	2½ to 5 ft	I	**Boring B-1:** Sand with Gravel FILL (SP), Loose **Remaining borings:** Silty Clay FILL (CL/ML), Very Stiff to Hard	2½ - 4½+	10 - 24	NA[(3)]
2½ - 5 ft	8 to 15 ft	II	Silty Clay (CL/ML), Firm to Hard	½ - 4½+	12 - 36	3 – 32
7½ – 13½ ft	12 – 15 ft[(4)]	III[(5)]	Silty Sand (SM) or Sand with Gravel (SP), Loose to Dense	NA	NA	8 – 44

Notes: (1) Approximate depths relative to the local grade elevation at the boring location.
(2) Standard Penetration Test
(3) SPT N-Values in fill are not representative of actual in situ conditions.
(4) At boring B-6, Layer III was observed to be underlain by materials similar to Layer II to 15 ft (termination depth of B-6)
(5) Encountered only at borings B-1, B-2, B-4, B-6, B-7, B-8 and B-9.

3.3 GROUNDWATER OBSERVATIONS

Water levels were measured in our borings as noted on the soil Boring Logs in Appendix B. Groundwater conditions are summarized in the table below:

Table 3.3.1 Groundwater Conditions

Groundwater encountered…	Location	Depth Below Current Grades	Elevation above MSL (±)	Notes
While Drilling	B-2 and B-8	8½ to 13½ ft ±	+657½ ft to +664½ ft ±	--
After Casing Removal	Not Encountered			
Seasonal High Groundwater Table	B-1 through B-9	12 ft to 14½ ft ±	+656½ ft to +665 ft ±	See below[1]

Notes: 1. Soils in the Midwest frequently oxidize from gray to brown above the level where the soil remains saturated. The seasonal high groundwater table is frequently interpreted to be located near this zone of change. In boring locations where granular soils were encountered, it was observed the color change was very close to the observed free flowing groundwater while drilling.

The highest groundwater observations are normally encountered in late winter and early spring and our current groundwater observations are expected to be close to the seasonal maximum water table. It should be noted that the groundwater level can vary based on precipitation, evaporation, surface run off and other factors not immediately apparent at the time of this exploration. Surface water runoff will be a factor during general construction, and steps should be taken during construction to control surface water runoff and to remove water that may accumulate in the proposed excavations as well as floor slab and pavement areas.

4.0 LABORATORY TESTING

The laboratory testing performed by ECS for this project consisted of selected tests performed on samples obtained during our field exploration operations. The following paragraphs briefly discuss the results of the completed laboratory testing program. Classification and index property tests were performed on representative soil samples obtained from the test borings in order to aid in classifying soils according to the Unified Soil Classification System (USCS) and to quantify and correlate engineering properties.

An experienced geotechnical engineer/engineering geologist visually classified each soil sample from the test borings on the basis of texture and plasticity in accordance with the USCS and ASTM D 2488 (Description and Identification of Soils-Visual/Manual Procedures). After classification, the geotechnical engineer/engineering geologist grouped the various soil types into the major zones noted on the boring logs in Appendix B. The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs are approximate; in situ, the transitions may be gradual.

Unconfined compressive strength (Qp) tests were performed on cohesive soil samples with the use of a calibrated hand penetrometer. In the hand penetrometer test, the unconfined compressive strength (Qp) of a soil sample is estimated, to a maximum of 4½ tons per square foot (tsf), by measuring the resistance of a soil sample to penetration of a small, calibrated spring-loaded cylinder.

The soil samples will be retained in our laboratory for a period of 60 days, after which, they will be discarded unless other instructions are received as to their disposal.

5.0 DESIGN RECOMMENDATIONS

5.1 BUILDING DESIGN

The following sections provide recommendations for building and lighting structures' foundation design, soil supported slabs and pavements.

5.1.1 Foundations

Provided subgrades and structural fills are prepared as discussed herein and the maximum compressive column and wall loads are in the range of 50 to 75 kips and 2 to 3 kips per foot, respectively, the proposed structure can be supported by conventional shallow foundations extended through the existing Fill to suitable natural Silty Clay or granular engineered fill. The design of the foundations shall utilize the following parameters:

Table 5.1.1.1 Foundation Design

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure[1]	3,000 psf	3,000 psf
Acceptable Bearing Soil Material	Firm to Hard Silty CLAY (CL/ML) - Stratum II Granular Engineered Fill overlying Stratum II	Firm to Hard Silty CLAY (CL/ML) - Stratum II Granular Engineered Fill overlying Stratum II
Minimum Width	30 inches	18 inches
Minimum Footing Embedment Depth (below slab or finished grade)	Exposed: 42 inches Interior: 24 inches	Exposed: 42 inches Interior: 24 inches
Estimated Total Settlement[2]	1 inch or less	1 inch or less
Estimated Differential Settlement[2]	½ inches between adjacent columns	½ inches over 50 feet

1. Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
2. Based on assumed loads. Please contact ECS when the loading information is available in order to determine if the predicted settlement value is still valid.

If soft or unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut and removed. Any undercut should be backfilled with granular engineered fill/lean concrete up to the original design bottom of footing elevation. The zone of the granular engineered fill placed below the foundations should extend 1 foot beyond the outside edges of the footings and from that point, outward laterally 1 foot for every 2 feet of fill thickness below the footing. If lean concrete is utilized, lateral overexcavation is typically not considered necessary. However, the excavation should be at least 1 foot wider than the proposed footing (6 inches on each side). Lean concrete should be allowed to harden prior to the placement of any structural concrete.

5.1.2 Floor Slabs

For the design and construction of the slabs-on-grade for the building, the recommendations provided in the **Subgrade Preparation** and **Earthwork Operations** sections of this report should be followed. The building floor slab thicknesses can be determined utilizing an assumed modulus of subgrade reaction of 150 pounds per cubic inch (pci) if the existing fill soils are removed and

replaced with new engineered fill and 100 pci if the existing fill soils are left in place, provided the materials encountered at the subgrade elevation proofroll satisfactorily. We recommend the slabs be designed with a minimum thickness of 5 inches. As the slab will be sued for parking and may be exposed to the weather, we recommend an air entrained concrete. The following graphic depicts our soil-supported slab recommendations:

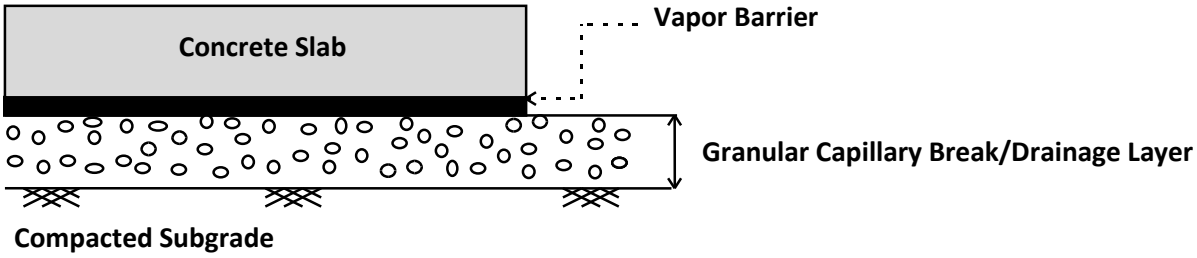


Figure 5.1.2.1

1. Drainage Layer Thickness: 6 inches
2. Drainage Layer Material: Aggregate (CA-6) (virgin or recycled concrete)
3. Subgrade compacted to at least ***95%*** of the maximum dry density in accordance with ASTM D1557

Slab Isolation: Ground-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the use of a free-floating slab, the slab should be designed with suitable reinforcement and load transfer devices to preclude overstressing of the slab.

5.1.3 Underslab Subdrainage

Based on the groundwater levels observed at the building area boring locations during the subsurface exploration, we do not anticipate a significant volume of water will persist at the slab subgrade elevation. However, it should be noted that surface runoff and limited groundwater seepage may accumulate at the slab subgrade such as a perched water condition. As such, we recommend that positive drainage be implemented around the perimeter of the proposed structure to reduce the potential for water accumulation under the floor slab and foundation elements, which could potentially weaken the bearing soils and if exposed to freezing weather, cause slab heave.

5.1.4 Seismic Design Considerations

Seismic Site Classification: Based on the 2015 International Building Code (IBC), Section and Table 1613.5.2 Site Class Definitions, the project site can be classified in accordance of the estimated shear wave velocity in the upper 100 feet of a soil profile. Three methods are utilized in classifying sites, namely the shear wave velocity (v_s) method; the unconfined compressive strength (s_u) method; and the Standard Penetration Resistance (N-value) method. The seismic site class definitions for the weighted average of shear wave velocity or SPT N-value in the upper 100 feet of the soil profile are shown table 5.1.4.1 below:

Table 5.1.4.1: Seismic Site Classification

Site Class	Soil Profile Name	Shear Wave Velocity, Vs, (ft./s)	N value (bpf)
A	Hard Rock	Vs > 5,000 fps	N/A
B	Rock	2,500 < Vs ≤ 5,000 fps	N/A
C	Very dense soil and soft rock	1,200 < Vs ≤ 2,500 fps	>50
D	Stiff Soil Profile	600 ≤ Vs ≤ 1,200 fps	15 to 50
E	Soft Soil Profile	Vs < 600 fps	<15

Since the borings performed for this project were drilled to a maximum depth of 15 feet, and based on our experience with the soils in the general site vicinity, it is our opinion the site soils can be characterized as Site Class D. Site Class D is described as Stiff Soil Profile for the top 100 feet of the site soil profile.

The Site Class definition should not be confused with the Seismic Design Category designation, which the Structural Engineer typically assesses. If a higher site classification is beneficial to the project, ECS would be pleased to discuss additional testing capabilities in this regard.

5.2 LIGHT POLE FOUNDATIONS PRELIMINARY RECOMMENDATIONS

Based on the RFP documents and our conversation with you, we understand the project includes several high-mast sports lighting structures. At the time this report was written, the proposed locations and characteristics of the proposed structures were not available for our review. As such, we are providing preliminary recommendations for the design/construction of the proposed lighting structures.

The maximum loads were not provided to ECS. ECS requests the anticipated loading information for the proposed sports lighting be provided (including maximum axial loads, shear and overturning moment), so we can revise the preliminary recommendations given below.

Drilled Pier Foundations: Based on considerations of the general subsurface conditions indicated by the borings and the project characteristics, the horizontal (shear) force and overturning moment will likely govern the design (depth and size) of the drilled shafts. If the assumptions stated above remain valid, the proposed lighting structures can be supported by drilled pier foundations extended through the existing Fill to suitable natural Silty Clay (Stratum II) or natural Sand (Stratum III). The design of the drilled pier foundations shall utilize the following parameters:

Table 5.1.1.1 Drilled Pier Foundation Design

Design Parameter	Drilled Pier
Net Allowable Bearing Pressure[1]	3,000 psf
Side Friction[2]	400 psf
Acceptable Bearing Soil Material	Firm to Hard Silty CLAY (CL/ML) - Stratum II Silty Sand (SM) or Sand with Gravel - Stratum III
Minimum Width	18 inches
Minimum Embedment Depth (below finished grade)	3 times the diameter of the pier into natural soils and no less than 10 feet below existing grades
Estimated Total Settlement	1 inch or less

1. Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
2. Determined using NAVFAC DM 7-02 and assuming a factor of safety of 2½. Due to the frost depth in this area being at about 3½ feet below grades, skin friction above the frost line should be ignored for design.

Reinforcing steel and concrete strength requirements for the drilled shafts should be determined by the project Structural Engineer. We recommend an ECS representative should be on site during drilled shaft construction to verify the soil conditions, visually examine the exposed surface at the bottom of the shaft excavations and verify if the design bearing pressure has been obtained.

During the installation phase of the drilled piers, we recommend the use of temporary protective top steel casing sealed into the cohesive natural Silty CLAY at a depth of approximately 3½ feet below the existing grade. The use of a temporary protective steel casing sealed into the cohesive Silty CLAY (Stratum II) during drilled pier excavation can provide protection from sloughing of soils and control groundwater seepage. The temporary steel casing should be extended a minimum 3½ feet above the ground surface for safety and to help reduce the potential risk of accidental fall-in of foreign materials and personnel into the excavation hole. Advancement of temporary protective steel casing by telescoping method should be anticipated during drilled pier excavation.

Once the bearing level is reached all loose soil should be removed prior to placement of drilled shaft reinforcing cage and concrete. Based on the soil conditions obtained from the boring, with the use of temporary steel casing and proper construction techniques, we believe water seepage if any can be pumped out and the drilled pier concrete can be placed in the dry.

Provided the water seepage is minimal, our experience and research in the field indicates that the drilled shaft can be constructed by "free fall" placement of concrete without affecting the strength and quality of concrete. The concrete should "free fall" without hitting the sides of the casing or reinforcing. The use of a hopper or other suitable device is recommended to control concrete placement and direct it towards the center of the drilled shaft excavation.

One of the most critical aspects of drilled pier installation is removal of the casing. The temporary steel casing can be extracted as the concreting operation progresses. Specifically, concrete will have a tendency to "arch" within the casing lining, creating the possibility of voids or discontinuities within the pier. During concreting operations, we recommend that special

attention be paid to the pour and pull operations, to help ascertain that discontinuities are not created within the drilled pier. The light pole drilled pier concrete should be placed in intimate contact with undisturbed natural soil. A positive head of concrete should be maintained prior to pulling out the temporary steel casing to prevent water and soil outside the steel casing from contaminating the concrete. To reduce the potential for arching, we recommend the drilled pier concrete mix be designed for a slump of 5 to 7 inches. We also recommend that the drilled pier concrete perimeter side-walls be as smooth as possible within the frost depth zone (i.e., upper 3½ feet) to help reduce the potential movements of the piers due to frost heave cycles.

6.0 SITE CONSTRUCTION RECOMMENDATIONS

6.1 SUBGRADE PREPARATION

6.1.1 Stripping and Initial Site Preparation

The initial subgrade preparation should generally consist of stripping/removing the existing pavements, gravel base, topsoil, and any other soft or unsuitable materials from the 10-foot expanded building, 5-foot expanded pavement limits, and to 5 feet beyond the toe of structural fills, where feasible. The project team may choose to stockpile the existing gravel base materials for later reuse as engineered fill.

ECS does not recommend the final slab subgrade soils remain exposed to the elements or construction traffic for a prolonged period of time as the subgrade may be disturbed and/or softened. If the slab section is not planned to be constructed within a few days after exposing the final design subgrade, consideration should be given to leaving the subgrade approximately 1 foot above the final design subgrade to help prevent disturbance of the subgrade soils (if feasible).

Based on our observations at the boring locations and the variable soil profile at the project site, we anticipate the soils at the slab/pavement subgrade elevation will consist of FILL. We typically recommend removing and replacing the existing fill soils from the project areas. However, removing and replacing the existing fill soils will likely require undercuts in the range of about 3 to 5 feet below existing grades at some locations. If the project team deems as unfeasible the option of complete removing and replacing the existing fill soils, the project team may choose to leave the existing fill materials in place provide they proofroll satisfactorily as described below. If the owner decides to leave any existing FILL in place, an increased risk of long term distress and increased maintenance costs should be expected.

6.1.2 Proofrolling

Within the footprint of the proposed single-story, slab-on-grade structure, after removing all unsuitable surface materials, cutting to the proposed grade, and prior to the placement of any structural fill or other construction materials, the exposed subgrade should be examined by the Geotechnical Engineer or authorized representative. The exposed subgrade should be thoroughly proofrolled with previously approved construction equipment having a minimum axle load of 10 tons (e.g. fully loaded tandem-axle dump truck). The areas subject to proofrolling should be traversed by the equipment in two perpendicular (orthogonal) directions with overlapping passes of the vehicle under the observation of the Geotechnical Engineer or authorized representative. This procedure is intended to assist in identifying any localized yielding materials. In the event that unstable or “pumping” subgrade is identified by the proofrolling, those areas should be marked for repair prior to the placement of any subsequent structural fill or other construction materials. If soft or yielding soils are observed during the proofroll of the subgrades, the soft soils should be undercut up to a maximum of 2 feet and replaced with properly manipulated onsite soils or compacted engineered fill to the design subgrade (see the Fill Placement section for guidelines).

This proofrolling procedure will only identify near surface soils that are unsuitable for slab support and any potential deeper pockets of unsuitable fill soils may not be fully identified and could lead to premature deterioration/cracking of the building slab/pavements. Methods of repair of unstable subgrade, such as undercutting or moisture conditioning, should be discussed with the

Geotechnical Engineer to determine the appropriate procedure with regard to the existing conditions causing the instability. Test pits may be excavated to explore the shallow subsurface materials in the area of the instability to help in determined the cause of the observed unstable materials and to assist in the evaluation of the appropriate remedial action to stabilize the subgrade.

To help limit the required volume of undercuts, we recommend that soft or yielding soils be evaluated in approximately 6 to 12-inch intervals. That is to say, if soft or yielding soils are identified, the contractor should remove 6 to 12 inches of material in the subject area and then proofroll/evaluate the undercut subgrade. This could potentially limit the need to remove 2 feet of soil at once at all locations where soft or yielding soils are identified. A DCP (dynamic cone penetrometer) or Army Corps of Engineers penetrometer can also be used in conjunction with proofrolling to establish appropriate depths for remedial action.

6.1.3 Site Temporary Dewatering

Subsurface Water: Based upon our subsurface exploration at this site, as well as significant experience on sites in nearby areas of similar geologic setting, we believe construction dewatering at this site will be limited to mainly removing accumulated rain water and perched water table conditions, if encountered. It appears permanent static groundwater for this site is well below the planned deepest excavation and is estimated to be at about EL. +656½ ft to EL. +665 ft above MSL (±). We anticipate that the removal of any accumulated water can be achieved utilizing drainage trenches and a sump and pump system.

6.2 EARTHWORK OPERATIONS

6.2.1 Structural Fill Materials

All fills should consist of approved materials, free of organic matter and debris, particles greater than 3-inches and have a Liquid Limit and Plasticity Index less than 40 and 15, respectively. Unacceptable fill materials include topsoil and organic materials (OH, OL), high plasticity silts and clays (CH, MH), and low-plasticity silts (ML). Under no circumstances should high plasticity soils be used as fill material in proposed structural areas or close to site slopes.

The existing Silty Clay (Fill and Natural) and Sand with Gravel FILL could be reused as engineered fill provided they are screened of any organic content, particles larger than 2 inches and/or any other deleterious/refuse materials. The project team/contractor should be prepared to implement discing or other drying techniques (termed manipulation) prior to using onsite cohesive soils (Silty Clay) as engineered fill. **Note that if construction occurs in the late fall through spring months, drying may not be feasible and imported granular fill soils may be required.** In addition, the existing Gravel base course could be reused as engineered fill.

Any on-site and off-site soils to be considered for engineered fill at the project site should be further evaluated and approved by an ECS geotechnical engineer prior to placement at the time of construction. We do not recommend the use of pea gravel as engineered fill. Pea gravel has round/smooth characteristics, no fines and does not interlock when compacted which make it more susceptible to future movement and instability resulting in excessive and variable settlement.

Fill materials should be placed in lifts not exceeding 8-inches in loose thickness and moisture conditioned to within ±2 percentage points of the optimum moisture content. Soil bridging lifts should not be used, since excessive settlement of overlying structures will likely occur. Controlled fill soils should be compacted to a minimum of 95 percent of the maximum dry density obtained in accordance with ASTM D1557, Modified Proctor method. The zone of the engineered fill placed below the foundations should extend 1 foot beyond the outside edges of the footings and from that point, outward laterally 1 foot for every 2 feet of fill thickness below the footing.

The expanded footprint of the proposed structure and fill areas should be well defined, including the limits of the fill zones at the time of fill placement. Grade control should be maintained throughout the fill placement operations. All fill operations should be observed on a full-time basis by a qualified soil technician to determine that the specified compaction requirements are being met. A minimum of one compaction test per 2,500 square foot area or 50 linear feet of trench should be tested in each lift placed with a minimum of 3 tests per lift. The elevation and location of the tests should be clearly identified at the time of fill placement.

Compaction equipment suitable to the soil type used as fill should be used to compact the fill material. Theoretically, any equipment type can be used as long as the required density is achieved; however, the standard of practice typically dictates that a vibratory roller be utilized for compaction of granular soils and a sheepsfoot roller be utilized for compaction of cohesive soils. In addition, a steel drum roller is typically most efficient for compacting and sealing the surface soils. All areas receiving fill should be graded to facilitate positive drainage from building pad areas of free water associated with precipitation and surface runoff.

It should be noted that prior to the commencement of fill operations and/or utilization of off-site borrow materials, the Geotechnical Engineer of Record should be provided with representative samples to determine the material's suitability for use in a controlled compacted fill and to develop moisture-density relationships. To expedite the earthwork operations, if off-site borrow materials are required, it is recommended they consist of suitable fill materials in accordance with the recommendations previously outlined in this section. If frost susceptible soils are imported to the project site, the frost susceptible soils should not be placed within 3½ feet of final site grades in unheated areas or 2 feet in heated areas.

Fill materials should not be placed on frozen soils or frost-heaved soils and/or soils that have been recently subjected to precipitation. All frozen soils should be removed prior to continuation of fill operations. Borrow fill materials, if required, should not contain frozen materials at the time of placement. All frost-heaved soils should be removed prior to placement of controlled, compacted fill, granular subbase materials, and foundation or slab concrete.

6.3 FOUNDATION AND SLAB OBSERVATIONS

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 2 to 3-inch thick "mud mat" of "lean" concrete should be placed on the bearing soils before the placement of reinforcing steel.

Foundation Subgrade Observations: ECS anticipates that localized undercutting will be required to reach suitable bearing materials at the project site. It will be important to have the geotechnical engineer of record observe the foundation subgrade prior to placing engineered fill and foundation concrete, to confirm the bearing soils are what was anticipated. If soft or unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut and removed. Any undercut should be backfilled with granular engineered fill/lean concrete to the planned bearing elevation. The zone of the engineered fill placed below the foundations should extend 1 foot beyond the outside edges of the footings and from that point, outward laterally 1 foot for every 2 feet of fill thickness below the footing. If lean concrete is utilized to replace weaker/low bearing soils or unsuitable soils, lateral over-excavation is typically not considered to be necessary, but the excavation should be 1 foot wider than the footing (6 inches on each side), and the lean concrete should be allowed to harden prior to placement of the footing concrete.

Slab Subgrade Verification: A representative of ECS should be called on to observe exposed subgrades within the expanded building limits prior to Structural Fill placement to assure that adequate subgrade preparation has been achieved. A proofrolling using a drum roller or loaded dump truck should be performed in their presence at that time. Once subgrades have been properly prepared new Structural Fill can be placed where necessary. Structural Fill should be moisture conditioned to within ±2 percentage points of optimum moisture content then be compacted to the required density. If there will be a significant time lag between the site grading work and final grading of concrete slab areas prior to the placement of the subbase stone and concrete, a representative of ECS should be called on to verify the condition of the prepared subgrade. Prior to final slab construction, the subgrade may require scarification, moisture conditioning, and re-compaction to restore stable conditions.

6.4 UTILITY INSTALLATIONS

Utility Subgrades: Existing miscellaneous fill soils and natural soil encountered in our exploration are anticipated to be suitable for support of utility pipes, provided that the subgrades proofroll satisfactorily. We recommend utility lines be underlain by at least 6 inches of stone fill such as CA-6 or CA-7 to create a stable bedding surface for the below-grade utilities. The pipe subgrade should be observed and probed for stability by ECS to evaluate the suitability of the materials encountered. Any loose or unsuitable materials encountered at the utility pipe subgrade elevation should be removed and replaced with suitable compacted Structural Fill or pipe bedding material.

Utility Backfilling: The granular bedding material should be at least 4 inches thick, but not less than that specified by the project drawings and specifications. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the requirements for Structural Fill given in this report. Compacted backfill should be free of topsoil, roots, ice, or any other material designated by ECS as unsuitable. The backfill should be moisture conditioned, placed, and compacted in accordance with the recommendations of this report.

Utility Excavation Dewatering: It is possible that perched water may be encountered by utility excavations. It is expected that removal of perched water which seeps into excavations could be accomplished by pumping from sumps excavated in the trench bottom and which are backfilled with IDOT CA-7 or other open graded bedding material. Should subsurface water conditions

beyond the capability of sump pumping be encountered, the Contractor should submit a Dewatering Plan in accordance with project specifications.

Excavation Safety: All excavations and slopes should be made and maintained in accordance with OSHA excavation safety standards. The Contractor is solely responsible for designing and constructing stable, temporary excavations and slopes and should shore, slope, or bench the sides of the excavations and slopes as required to maintain stability of both the excavation sides and bottom. The Contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

6.5 GENERAL CONSTRUCTION CONSIDERATIONS

Subgrade Protection: Measures shall be taken to limit site disturbance, especially from rubber-tired heavy construction equipment, and to control and remove surface water from development areas, including structural and pavement areas. It would be advisable to designate a haul road and construction staging area to limit the areas of disturbance and to prevent construction traffic from excessively degrading sensitive subgrade soils and existing pavement areas. Haul roads and construction staging areas could be covered with excess depths of aggregate to protect those subgrades.

Surface Drainage: Surface drainage conditions should be properly maintained. Surface water should be directed away from the construction area, and the work area should be sloped away from the construction area at a gradient of 1 percent or greater to reduce the potential of ponding water and the subsequent saturation of the surface soils. At the end of each work day, the subgrade soils should be sealed by rolling the surface with a smooth drum roller to minimize infiltration of surface water.

Excavation Safety: Cuts or excavations associated with utility and tank pit excavations may require forming or bracing, slope flattening, or other physical measures to control sloughing and/or prevent slope failures. Contractors should be familiar with applicable OSHA codes to ensure that adequate protection of the excavations and trench walls is provided.

7.0 CLOSING

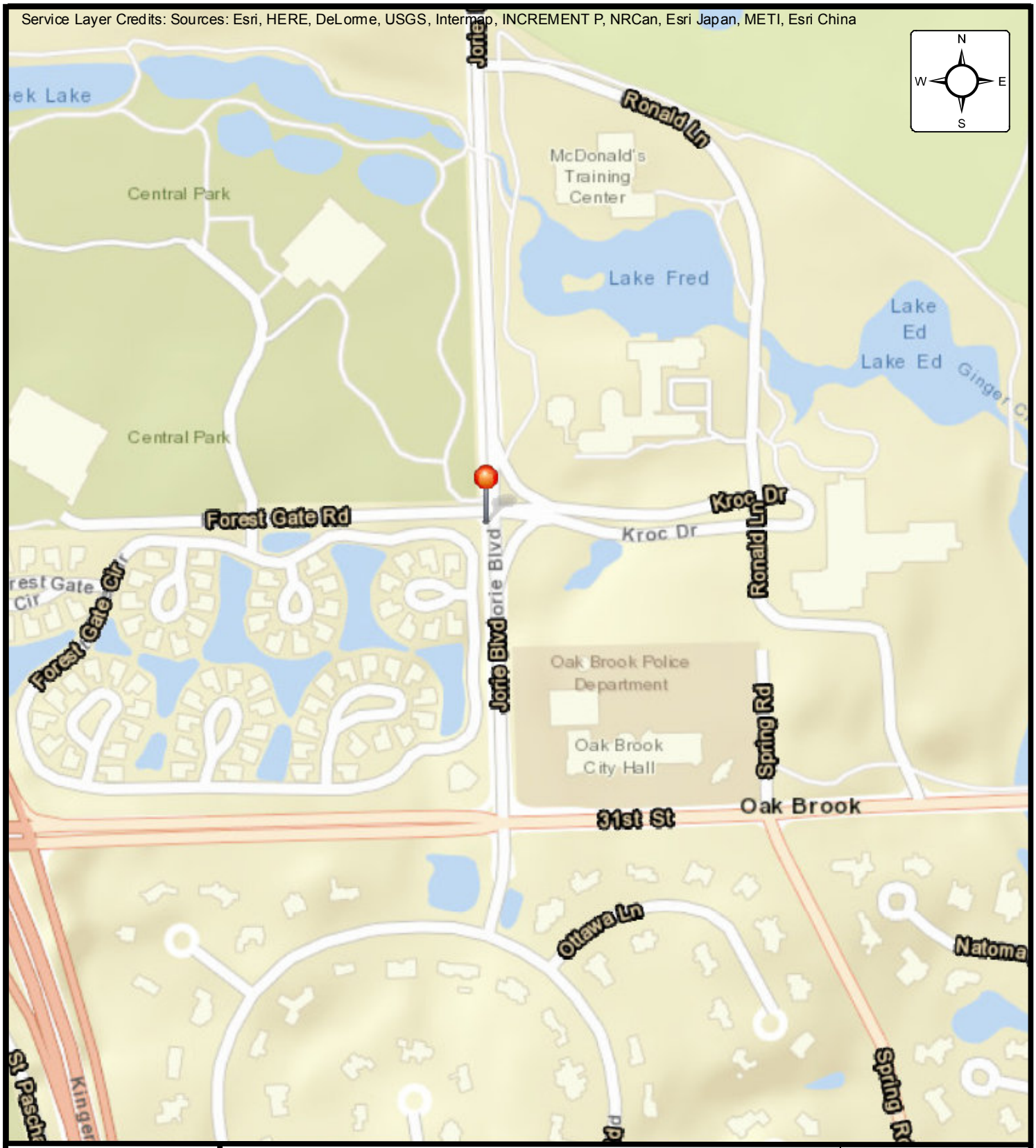
ECS has prepared this report of findings, evaluations, and recommendations to guide geotechnical-related design and construction aspects of the project. The description of the proposed project is based on information provided to ECS by your office. If any of this information is inaccurate, either due to our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted immediately in order that we can review the report in light of the changes and provide additional or alternate recommendations as may be required to reflect the proposed construction.

We recommend that ECS be allowed to review the project's plans and specifications pertaining to our work so that we may ascertain consistency of those plans/specifications with the intent of the geotechnical report.

Field observations, monitoring, and quality assurance testing during earthwork and foundation installation are an extension of and integral to the geotechnical design recommendation. We recommend that the owner retain these quality assurance services and that ECS be allowed to continue our involvement throughout these critical phases of construction to provide general consultation as issues arise. ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

APPENDIX A – Drawings & Reports

Site Location Diagram
Boring Location Diagram

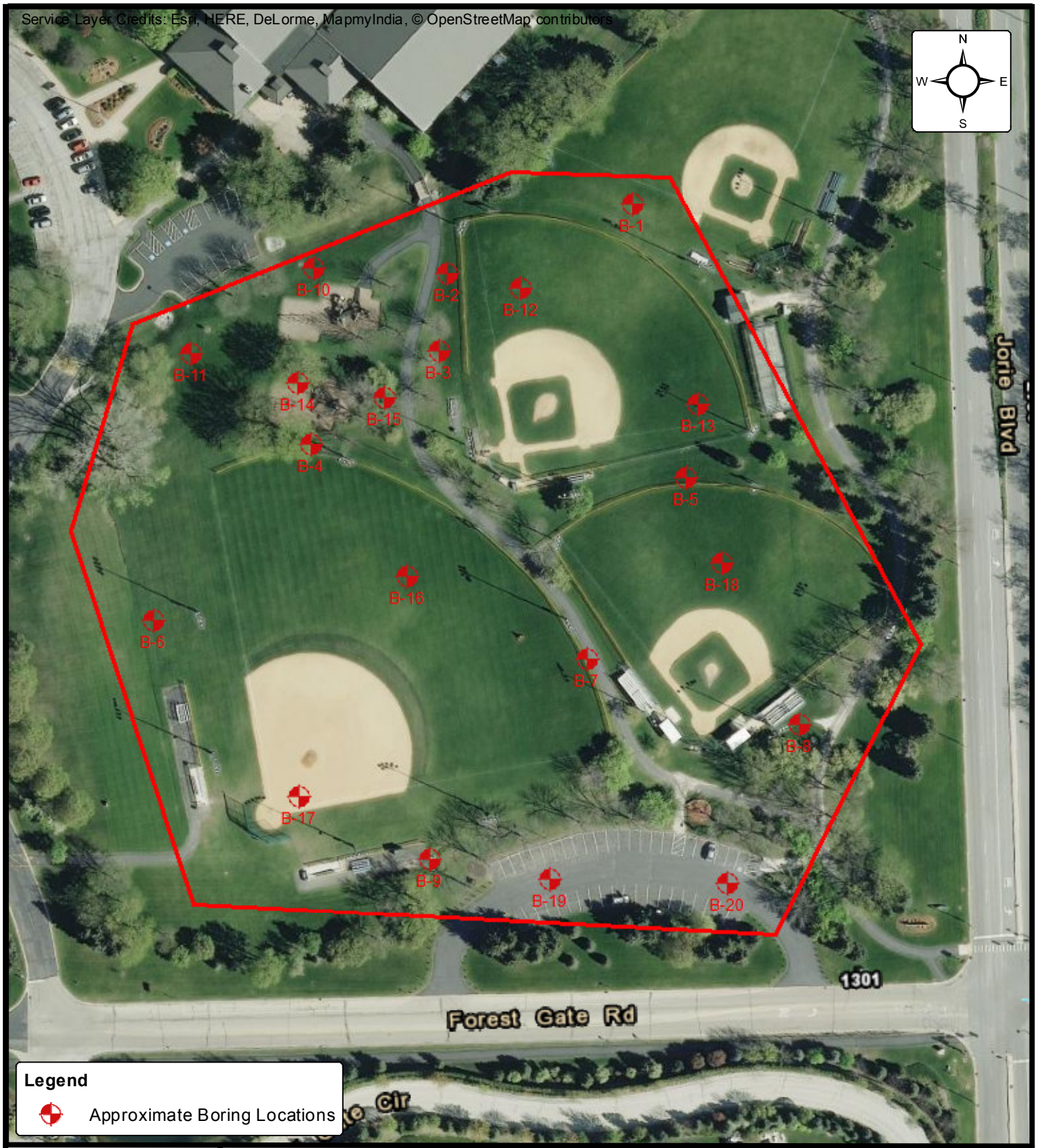


SITE LOCATION DIAGRAM

OAK BROOK PARK DISTRICT CENTRAL PARK SITE IMPROVEMENTS

OAK BROOK PARK DISTRICT
OAK BROOK IL 60523

ENGINEER	
SCALE	NTS
PROJECT NO.	16:12009
SHEET	1 OF 1
DATE	7/20/2017



BORING LOCATION DIAGRAM

OAK BROOK PARK DISTRICT CENTRAL PARK SITE IMPROVEMENTS

OAK BROOK PARK DISTRICT
OAK BROOK IL 60523

ENGINEER	
SCALE	NTS
PROJECT NO.	16:12009
SHEET	1 OF 1
DATE	7/21/2017

APPENDIX B – Field Operations

Reference Notes for Boring Logs
Boring Logs B-1 through B-20

REFERENCE NOTES FOR BORING LOGS

MATERIAL[1,2]	
	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
	FILL[3] MAN-PLACED SOILS
GW	**WELL-GRADED GRAVEL** gravel-sand mixtures, little or no fines
GP	**POORLY-GRADED GRAVEL** gravel-sand mixtures, little or no fines
GM	**SILTY GRAVEL** gravel-sand-silt mixtures
GC	**CLAYEY GRAVEL** gravel-sand-clay mixtures
SW	**WELL-GRADED SAND** gravelly sand, little or no fines
SP	**POORLY-GRADED SAND** gravelly sand, little or no fines
SM	**SILTY SAND** sand-silt mixtures
SC	**CLAYEY SAND** sand-clay mixtures
ML	**SILT** non-plastic to medium plasticity
MH	**ELASTIC SILT** high plasticity
CL	**LEAN CLAY** low to medium plasticity
CH	**FAT CLAY** high plasticity
OL	**ORGANIC SILT or CLAY** non-plastic to low plasticity
OH	**ORGANIC SILT or CLAY** high plasticity
PT	**PEAT** highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS			
SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION		
DESIGNATION		**PARTICLE SIZES**
Boulders		12 inches (300 mm) or larger
Cobbles		3 inches to 12 inches (75 mm to 300 mm)
Gravel:	Coarse	¾ inch to 3 inches (19 mm to 75 mm)
	Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand:	Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
	Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
	Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")		<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS		
UNCONFINED COMPRESSIVE STRENGTH, Q_P[4]	**SPT[5] (BPF)**	**CONSISTENCY[7] (COHESIVE)**
<0.25	<3	Very Soft
0.25 - <0.50	3 - 4	Soft
0.50 - <1.00	5 - 8	Medium Stiff
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

GRAVELS, SANDS & NON-COHESIVE SILTS	
SPT[5]	**DENSITY**
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

RELATIVE AMOUNT[7]	COARSE GRAINED (%)	FINE GRAINED (%)
Trace	<5	<5
Dual Symbol *(ex: SW-SM)*	10	10
With	15 - 20	15-25
Adjective *(ex: "Silty")*	25 - <50	30 - <50

WATER LEVELS[6]		
	WL	Water Level (WS)(WD)
		(WS) While Sampling
		(WD) While Drilling
	SHW	Seasonal High WT
	ACR	After Casing Removal
	SWT	Stabilized Water Table
	DCI	Dry Cave-In
	WCI	Wet Cave-In

[1] *Classifications and symbols per ASTM D 2488-09 (Visual-Manual Procedure) unless noted otherwise.*

[2] *To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.*

[3] *Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-**FILL**)].*

[4] *Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).*

[5] *Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf).*

[6] *The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.*

[7] *Minor deviation from ASTM D 2488-09.*

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-1	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

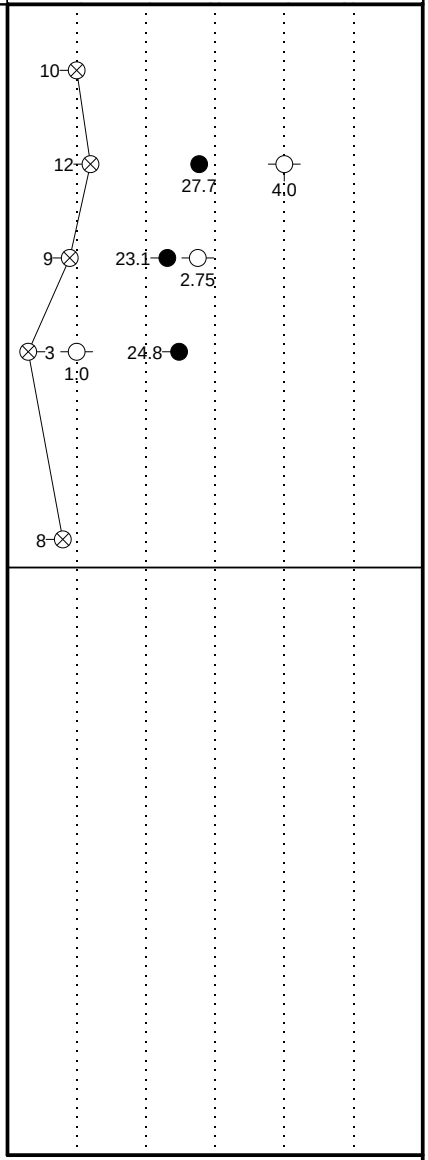
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +670 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]		670	
	S-1	SS	18	10	(SP) FILL, MEDIUM TO COARSE SAND WITH GRAVEL, dark brown, moist, loose			5 4 6
					(CL/ML) SILTY CLAY, trace sand, trace gravel, contains roots, dark brown, moist, hard			
	S-2	SS	18	16				4 5 7
5					(CL/ML) SILTY CLAY, trace sand, trace gravel, greenish brown and gray, moist, very stiff to stiff		665	
	S-3	SS	18	16				3 3 6
	S-4	SS	18	18				2 1 2
10							660	
	S-5	SS	18	18	(SM/ML) SILTY SAND/SANDY SILT, gray, moist, loose			3 4 4
15					END OF BORING @ 15'		655	
20							650	
25							645	
30							640	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 10'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-2	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

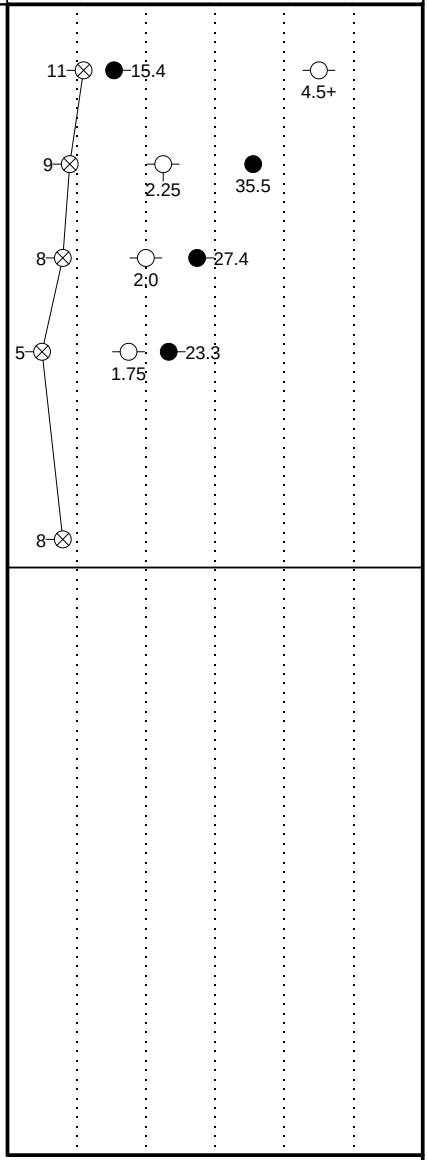
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +671 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]		670	
	S-1	SS	18	10	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, dark brown, moist, hard			3 4 7
					(CL/ML) SILTY CLAY, trace sand, trace gravel, dark brown to brown, moist, very stiff to stiff			
	S-2	SS	18	12				2 4 5
5							665	
	S-3	SS	18	12				2 3 5
	S-4	SS	18	16				2 2 3
10					(SP) SAND WITH GRAVEL, brown and gray, wet, loose		660	
	S-5	SS	18	16				2 3 5
15					END OF BORING @ 15'		655	
20							650	
25							645	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL 13.5 WS ☒ WD ☐	BORING STARTED 07/03/17	CAVE IN DEPTH @ 12.0'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-3	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

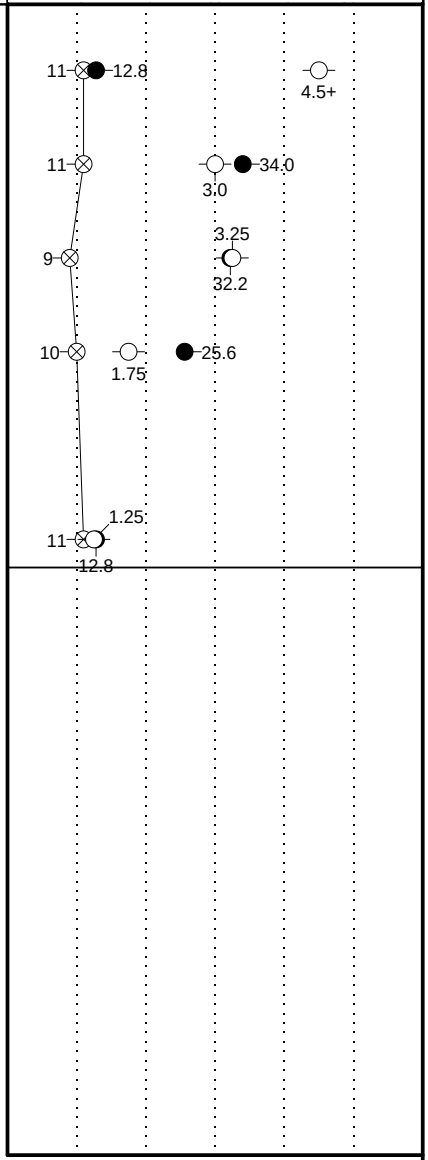
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +674 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]			
	S-1	SS	18	16	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, brown, moist, hard			4 5 6
					(CL/ML) SILTY CLAY, trace sand, trace gravel, contains roots, dark brown, moist, very stiff		670	
	S-2	SS	18	6				5 5 6
5								
	S-3	SS	18	10	(CL/ML) SILTY CLAY, trace sand, trace gravel, dark brown to brown and gray, moist, very stiff to stiff, Gray at 12 feet			3 5 4
	S-4	SS	18	16			665	2 3 7
10								
	S-5	SS	18	10			660	3 5 6
15					END OF BORING @ 15'			
							655	
20								
							650	
25								
							645	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 12'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-4	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

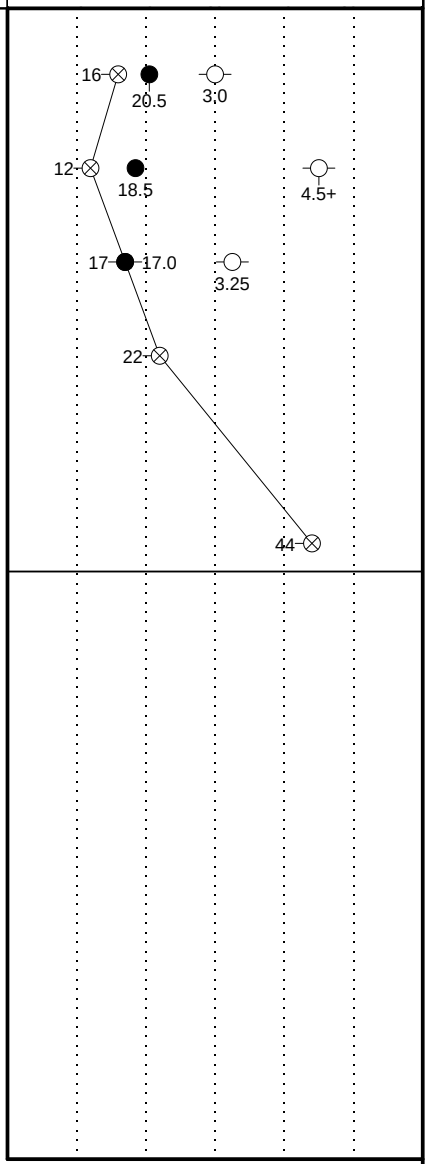
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +676 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]		675	
	S-1	SS	18	10	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, brown, moist, stiff to hard			3 7 9
	S-2	SS	18	10	(CL/ML) SILTY CLAY, trace sand, trace gravel, brown, moist, hard to very stiff		670	5 6 6
5	S-3	SS	18	6				7 7 10
	S-4	SS	18	10	(SM) SILTY SAND, trace gravel, brown, moist, medium dense to dense		665	11 11 11
10								
	S-5	SS	18	10				15 24 20
15					END OF BORING @ 15'		660	
20							655	
25							650	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 06/30/17	CAVE IN DEPTH @ 10'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 06/30/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-5	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

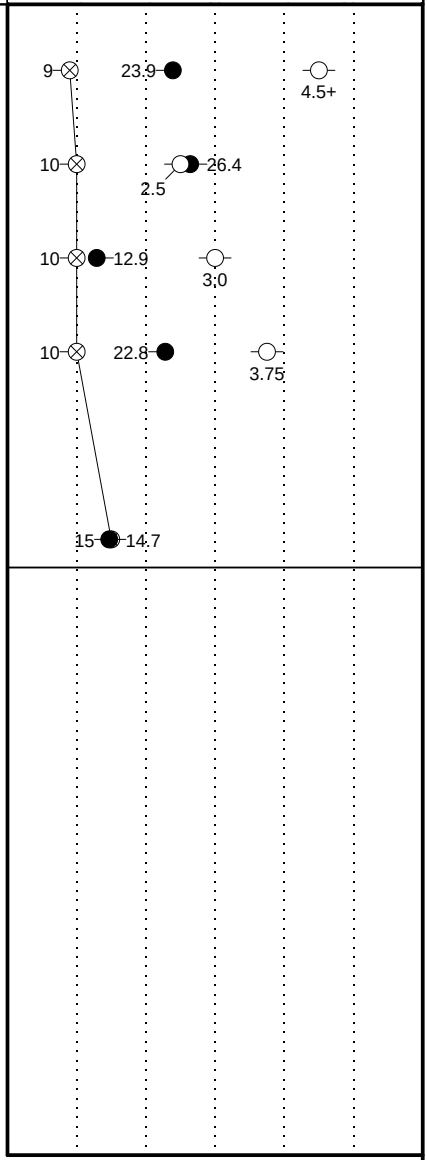
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION +673 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]			
	S-1	SS	18	12	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, dark brown, moist, hard			3 4 5
					(CL/ML) SILTY CLAY, trace sand, trace gravel, brown, moist, very stiff		670	
	S-2	SS	18	10				3 5 5
5								
	S-3	SS	18	15				5 5 5
							665	
	S-4	SS	18	16				3 4 6
10								
					(CL/ML) SILTY CLAY, gray, moist, sample disturbed		660	
	S-5	SS	18	3				3 8 7
15					END OF BORING @ 15'			
							655	
20								
							650	
25								
							645	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/02/17	CAVE IN DEPTH @ 11'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-6	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

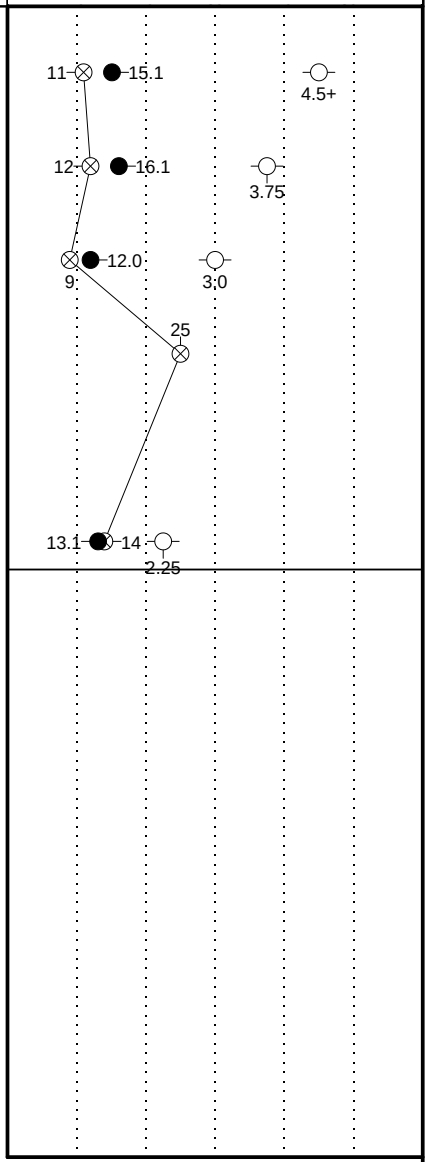
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION +677 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]			
	S-1	SS	18	15	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, brown, moist, hard		675	3 5 6
					(CL/ML) SILTY CLAY, trace sand, trace gravel, brown, moist, very stiff			
	S-2	SS	18	18				5 6 6
5								
	S-3	SS	18	18			670	6 5 4
					(ML/SM) SAND, trace silt, trace gravel, brown, moist, medium dense			
	S-4	SS	18	15				12 12 13
10								
					(CL/ML) SILTY CLAY, gray, trace gravel, trace sand, moist, very stiff		665	
	S-5	SS	18	3				5 7 7
15					END OF BORING @ 15'			
							660	
20								
							655	
25								
							650	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 10'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-7	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

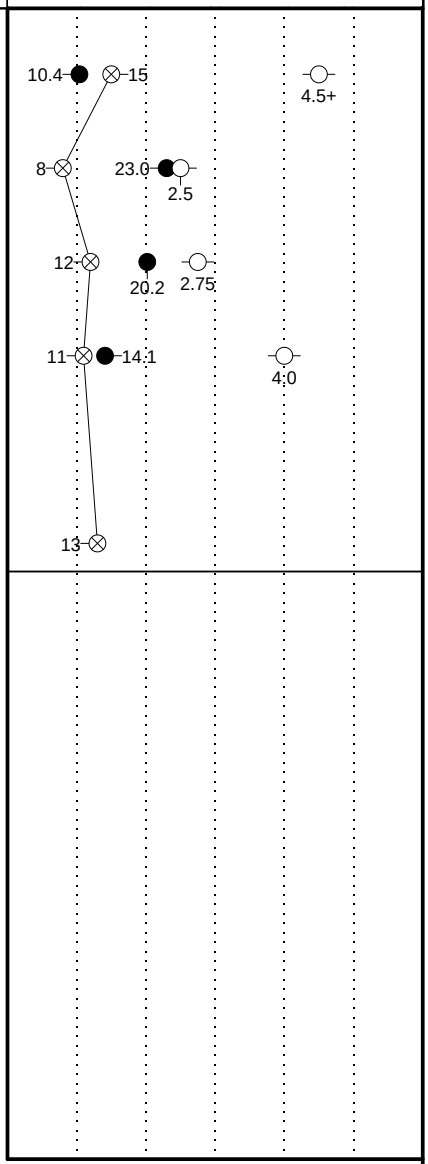
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION +677 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]			
	S-1	SS	18	12	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, brown, moist, hard		675	7 8 7
					(CL/ML) SILTY CLAY, trace sand, trace gravel, brown, moist, very stiff to hard			
	S-2	SS	18	15				3 3 5
5								
	S-3	SS	18	10			670	3 5 7
	S-4	SS	18	16				3 5 6
10								
					(SM) SILTY SAND, trace gravel, brown, moist, medium dense		665	
	S-5	SS	18	16				5 6 7
15					END OF BORING @ 15'			
							660	
20								
							655	
25								
							650	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 12'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-8	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

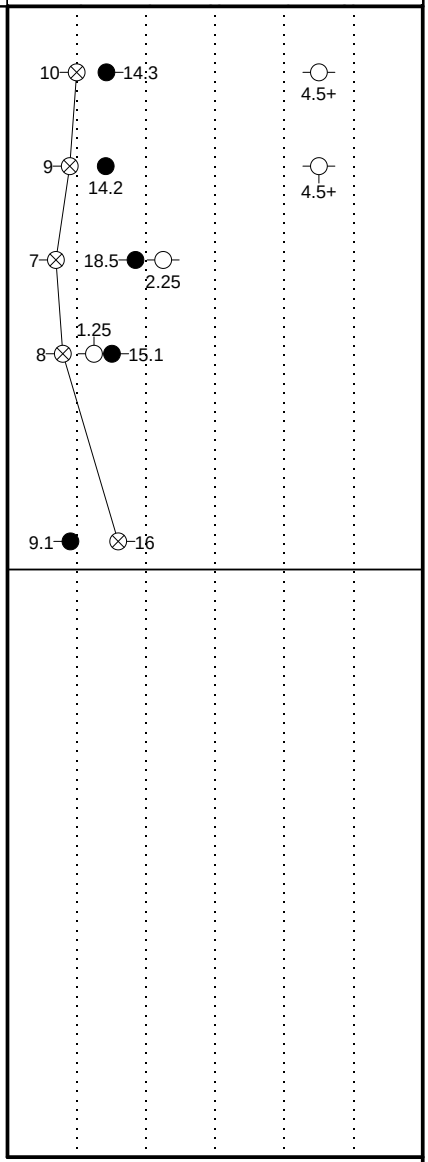
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +673 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]			
	S-1	SS	18	15	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, contains roots, brown to black, moist, hard			5 5 5
					(CL/ML) SILTY CLAY, trace sand, trace gravel, brown and gray, moist, hard to stiff		670	
	S-2	SS	18	16				3 4 5
5								
	S-3	SS	18	15				3 3 4
							665	
	S-4	SS	18	16				3 4 4
10								
							660	
	S-5	SS	18	16	(SM) SILTY SAND, trace gravel, gray, moist, medium dense			4 8 8
15					END OF BORING @ 15'			
							655	
20								
							650	
25								
							645	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL 8.5 WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 12.0'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-9	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

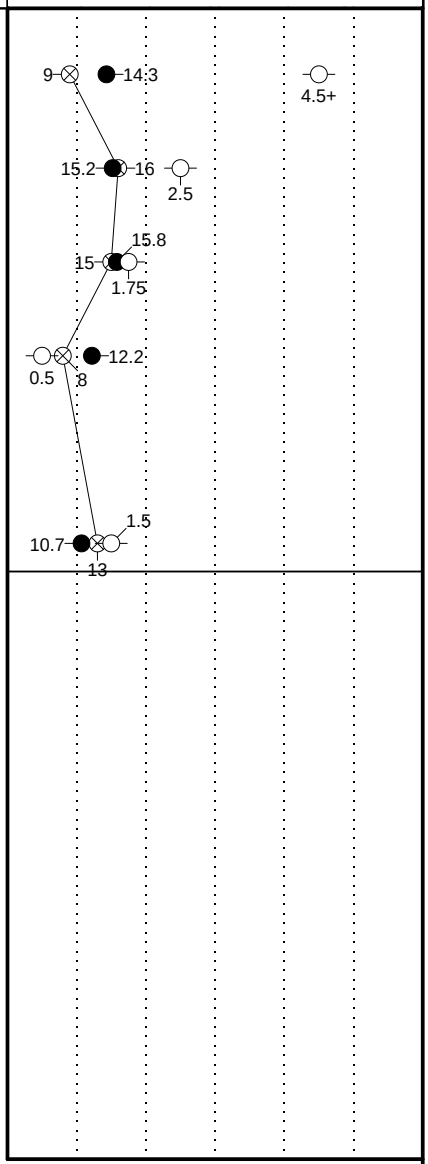
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +679 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Bituminous Pavement Depth [3"]			
					Gravel Base Depth [9"]			
	S-1	SS	18	16	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, brown, moist, hard			2 5 4
	S-2	SS	18	6	(CL/ML) SILTY CLAY, trace sand, trace gravel, brown, moist, very stiff to firm		675	7 7 9
5	S-3	SS	18	10				7 7 8
	S-4	SS	18	15			670	2 3 5
10					(SM) SILTY SAND, gray, moist, medium dense			
	S-5	SS	18	18			665	3 7 6
15					END OF BORING @ 15'			
20							660	
							655	
25								
							650	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 06/30/17	CAVE IN DEPTH @ 12'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 06/30/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-10	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

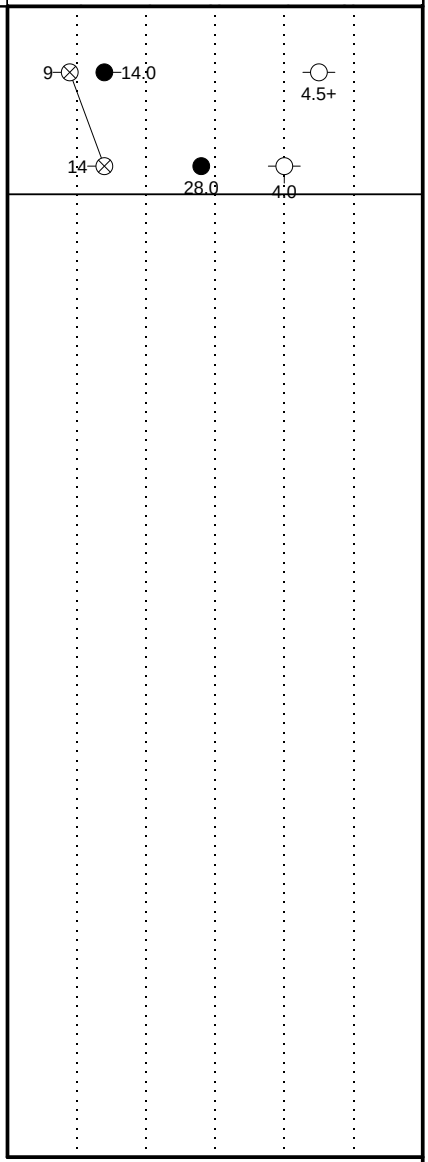
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +667 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]			
	S-1	SS	18	16	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, contains brick and roots, brown to black, moist, hard		665	3 4 5
	S-2	SS	18	16	(CL/ML) SILTY CLAY, trace sand, trace gravel, contains roots, dark brown, moist, hard			2 4 10
5					END OF BORING @ 5'		660	
10							655	
15							650	
20							645	
25							640	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 2'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-11	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

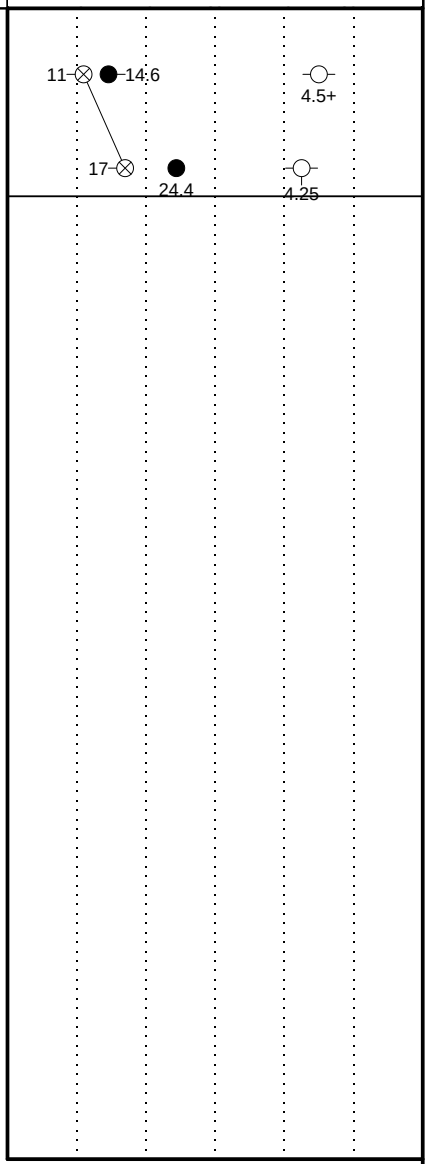
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION +669 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]			
	S-1	SS	18	12	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, brown, moist, hard			3 7 4
					(CL/ML) SILTY CLAY, trace sand, trace gravel, contains roots, dark brown, moist, hard			
	S-2	SS	18	16			665	5 7 10
5					END OF BORING @ 5'			
10							660	
15							655	
20							650	
25							645	
30							640	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 2'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-12	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Oakbrook Park District Central Park Site Improvements	

SITE LOCATION

1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

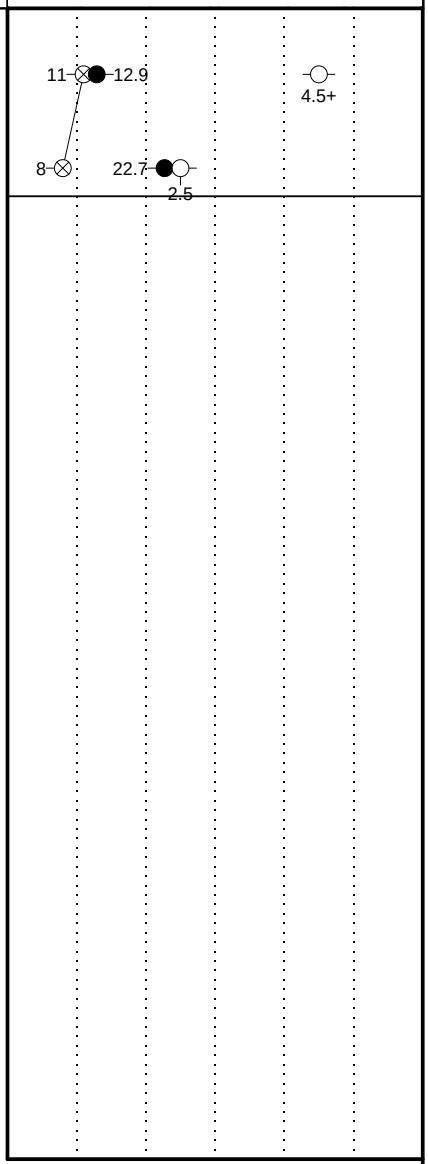
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION +671 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]		670	
	S-1	SS	18	10	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, contains roots, brown, moist, hard			3 4 7
					(CL/ML) SILTY CLAY, trace sand, trace gravel, dark brown, moist, very stiff			
	S-2	SS	18	12				3 4 4
5					END OF BORING @ 5'		665	
10							660	
15							655	
20							650	
25							645	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 2'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-13	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

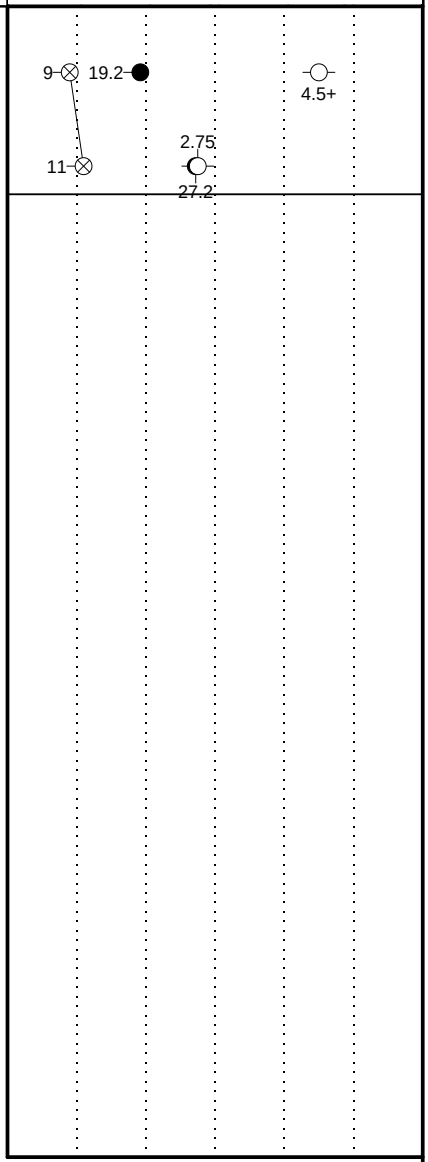
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +670 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]		670	
	S-1	SS	18	10	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, brown, moist, hard			3 4 5
	S-2	SS	18	10	(CL/ML) SILTY CLAY, trace sand, trace gravel, brown, moist, very stiff			3 5 6
5					END OF BORING @ 5'		665	
10							660	
15							655	
20							650	
25							645	
30							640	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 2'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-14	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +674 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]			
	S-1	SS	18	10	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, brown, moist, hard			3 5 6
	S-2	SS	18	10			670	5 6 7
5					END OF BORING @ 5'			
10							665	
							660	
15								
							655	
20								
							650	
25								
							645	
30								

11 — 15.0 — 4.5+

13 — 23.6 — 4.25

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 2'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-15	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

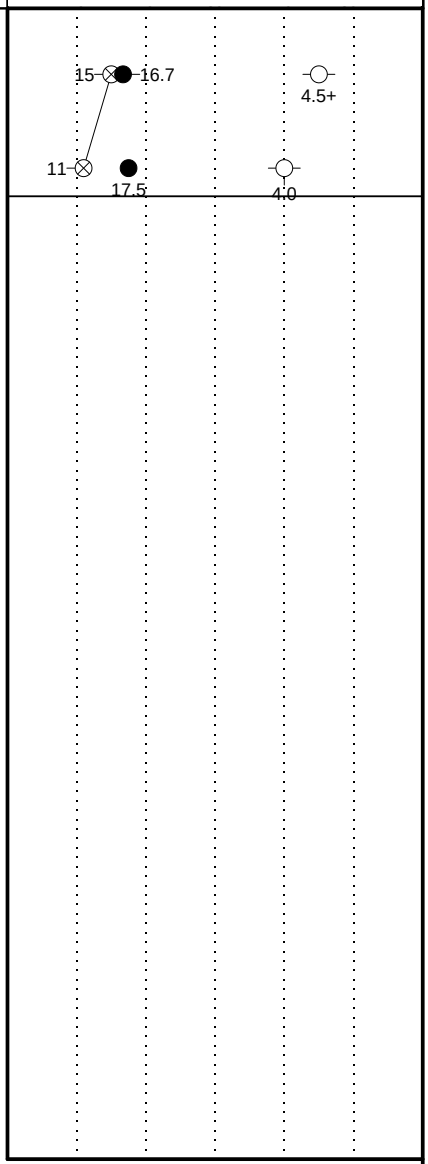
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +676 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]		675	
	S-1	SS	18	12	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, contains wood, brown to dark brown, moist, hard			4 7 8
	S-2	SS	18	16				4 5 6
5					END OF BORING @ 5'		670	
10							665	
15							660	
20							655	
25							650	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 2'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-16	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

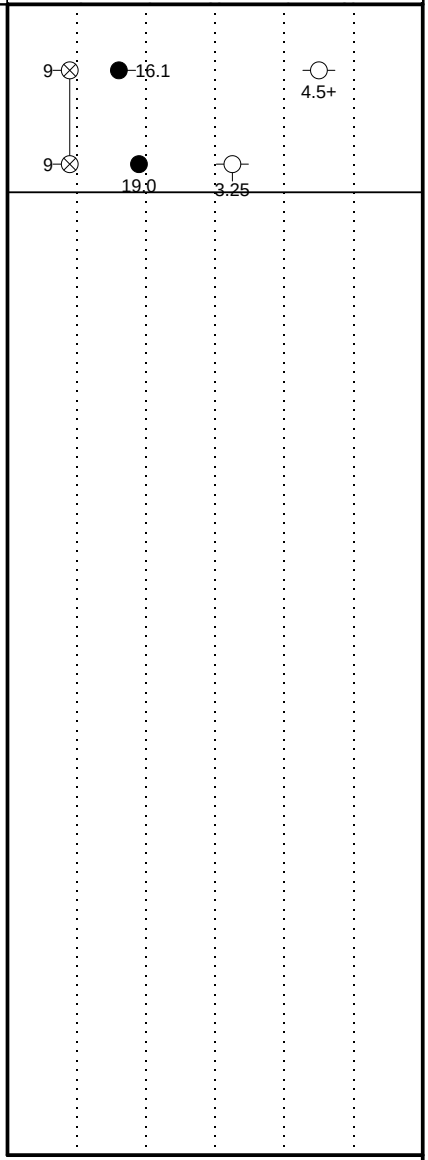
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +677 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]			
	S-1	SS	18	16	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, black to brown, moist, hard		675	3 5 4
	S-2	SS	18	18	(CL/ML) SILTY CLAY, trace sand, trace gravel, brown, moist, very stiff			4 4 5
5					END OF BORING @ 5'		670	
10							665	
15							660	
20							655	
25							650	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 06/30/17	CAVE IN DEPTH @ 2'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 06/30/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-17	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

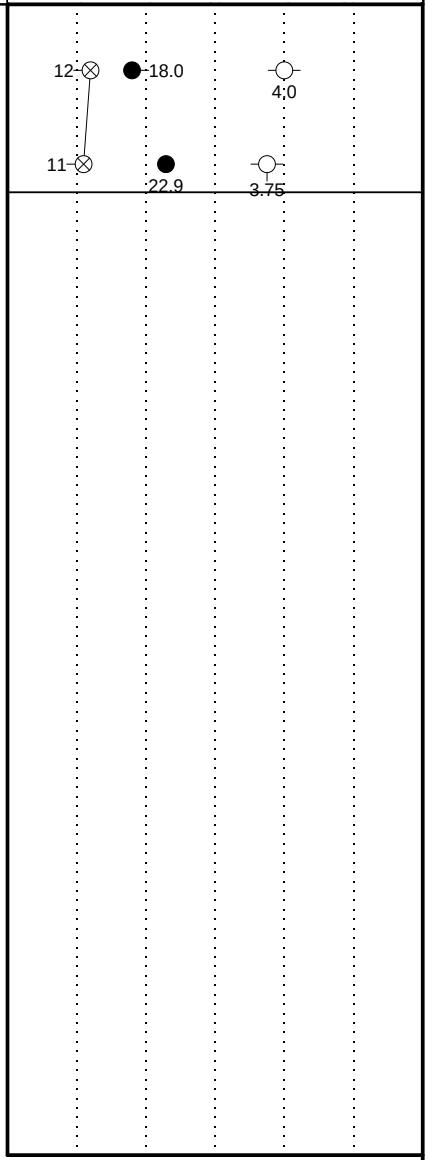
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +679 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]			
	S-1	SS	18	15	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, brown, moist, hard to very stiff, Sand seam at about 3 feet			6 5 7
	S-2	SS	18	12			675	3 4 7
5					END OF BORING @ 5'			
10							670	
15							665	
20							660	
25							655	
30							650	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 2'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-18	1 OF 1
PROJECT NAME: Oakbrook Park District Central Park Site Improvements	ARCHITECT-ENGINEER:		

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

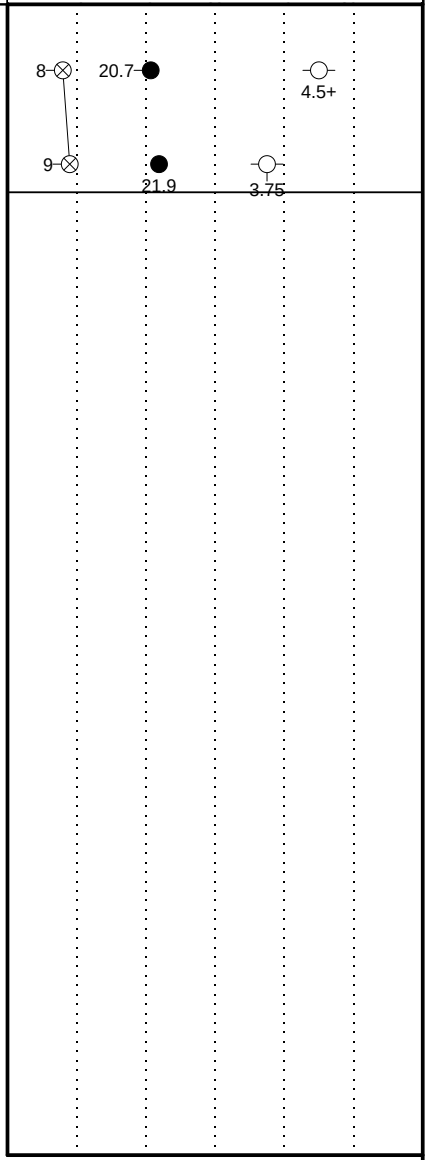
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +671 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [12"]		670	
	S-1	SS	18	15	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, brown, moist, hard			3 3 5
	S-2	SS	18	16	(CL/ML) SILTY CLAY, trace sand, trace gravel, brown, moist, very stiff			5 5 4
5					END OF BORING @ 5'		665	
10							660	
15							655	
20							650	
25							645	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 2'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-19	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

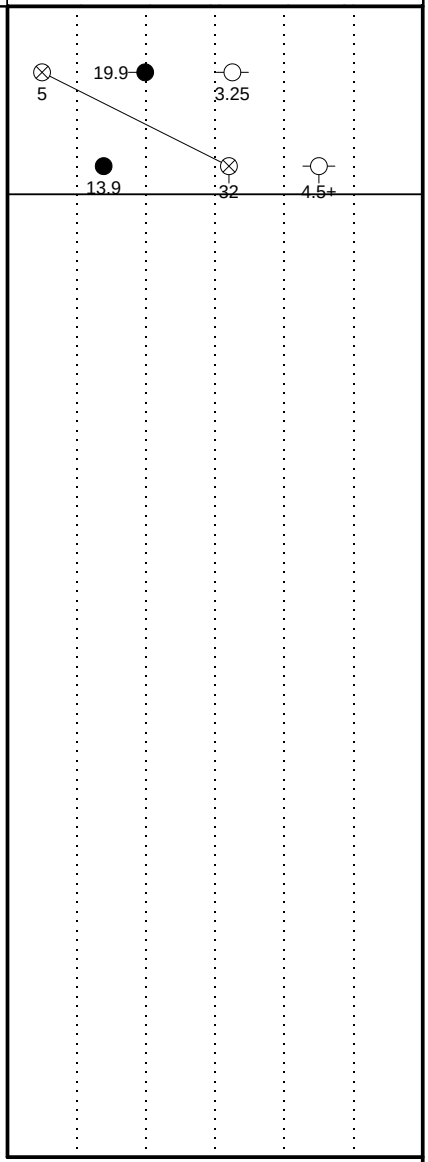
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +678 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Bituminous Pavement Depth [3"]			
					Gravel Base Depth [9"]			
	S-1	SS	18	10	(CL/ML) FILL, SILTY CLAY, trace sand, trace gravel, contains asphalt, brown and black, moist, very stiff		675	3 3 2
	S-2	SS	18	10	(CL/ML) SILTY CLAY, trace sand, trace gravel, brown, moist, hard			6 17 15
5					END OF BORING @ 5'		670	
10							665	
15							660	
20							655	
25							650	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 06/30/17	CAVE IN DEPTH @ 2'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 06/30/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA

CLIENT	Job #:	BORING #	SHEET
Oak Brook Park District	16:12009	B-20	1 OF 1

PROJECT NAME: Oakbrook Park District Central Park Site Improvements

ARCHITECT-ENGINEER:

SITE LOCATION: 1300 Forest Gate Road, Oak Brook, DuPage, IL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION +674 (+/-)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Bituminous Pavement Depth [6"]			
					Gravel Base Depth [6"]			
	S-1	SS	18	12	(CL/ML) FILL, SILTY CLAY, trace gravel, trace sand, greenish brown and black, moist, very stiff			3 2 4
	S-2	SS	18	12			670	1 3 4
5					END OF BORING @ 5'			
10							665	
15							660	
20							655	
25							650	
30							645	

6 | 7 | 20.8 | 14.6 | 2.5 | 3.5

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL DRY WS ☐ WD ☒	BORING STARTED 07/03/17	CAVE IN DEPTH @ 2'
WL(SHW) WL(ACR) DRY	BORING COMPLETED 07/03/17	HAMMER TYPE Auto
WL	RIG Truck FOREMAN Gabriel S.	DRILLING METHOD HSA