

**SECTION 02 21 13
PROJECT SURVEY & LAYOUT**

PART 1 GENERAL

1.01 SCOPE OF SERVICES

- A. The contractor shall provide construction stakeout sufficient to construct the proposed improvement in accordance with the approved construction plans.
- B. All stakeout services shall be completed under the direct supervision of a Professional Land Surveyor licensed in the State where the project is located.
- C. The Owner shall provide the following prior to the commencement of any stake-out services:
 - 1. Approved for construction site plans;
 - 2. Approved for construction dimensional control plans including a fixed relationship to the site boundary or on-site fixed element;
 - 3. Copies of the topographic survey that the approved site plans have been based on when available. The topographic survey shall include a benchmark, which shall be used for vertical control;
 - 4. Copies of the boundary survey that the approved site plans have been based on when available. The boundary survey shall be closed and monumented. These monuments shall be used for horizontal control, or a monumented baseline (minimum of 3 points) related to the site boundary and the dimensional control plan.

1.02 EXECUTION

- A. Work shall be performed by a Professional Land Surveyor, licensed in the State where the project is being completed, or under his direction:
- B. Playground Equipment Layout - Offset stakes will be located at post locations.
- C. Storm drainage and sanitary sewer lines (including manholes and catch basins). Stakes will be located @ 50 ft. stationing along the centerline of the utility line @ 15 ft. offsets. Manholes and catch basins will have 2 offsets per structure. Cut sheets shall be provided to the contractor by the surveyor.
- D. Water Layout - Offset stakes will be located at deflections and at hydrant locations. Hydrant elevations will be to grade ring.
- E. Lighting Layout - Centerline of lighting structure with 5 ft. offsets and finished grade elevations.
- F. Grade Stakes - Stakes will be located as needed to provide elevation references.

- G. Contractor will field verify the utility location, size and invert elevations at points of connection in area of conflict, prior to construction and protect them from damage.
- H. Notify landscape architect, if it is necessary to destroy or remove control points and/or benchmarks due to construction. Contractor shall be responsible for cost of relocation.
- I. Advise landscape architect of any discrepancies between plans and field layout.

1.03 REFERENCE STANDARDS

- A. In accordance with local rules and regulations.

1.04 QUALITY ASSURANCE

- A. All construction layout work shall be performed under the direction of a Professional Land Surveyor, with prior similar experience.
- B. The survey crew will discuss all layout procedures with the contractor's supervisor prior to commencing work.
- C. The survey crew daily report shall be filled out and signed by the contractor's supervisor at the end of that day's layout.
- D. Copies of sketches, cut sheets, etc. shall be provided to the contractor by the end of the next workday.
- E. All costs related to re-staking due to construction or contractors' work resulting in destruction or movement of stakes shall be paid for by the contractor and at no additional expense to the owner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The contractor/surveyor shall supply all stakeout materials.

2.02 EQUIPMENT

- A. The contractor/surveyor shall supply all equipment necessary to accomplish the work.

END OF SECTION 02 21 13

SECTION 02 41 16
SITE AND STRUCTURE DEMOLITION

PART 1 GENERAL

The Contract Drawings and all other specification sections along with all provisions included within this Contract package, Instructions to Bidders, and other General Conditions apply to this section. The Contractor must accept the site as is and shall be deemed to have inspected the site and reviewed all Contract Documents prior to submitting a bid.

1.01 SCOPE OF WORK

- A. Overall work under this Contract shall include all labor, materials, equipment, supervision, coordination efforts, permitting costs, certificate costs, services, filing fees, testing costs, security, insurance and all other associated or related items specified herein that are necessary and are required to complete the Work. Work elements shall include, but not be limited to the following:
1. Installation and maintenance of soil erosion and sediment control measures.
 2. Demolition and removal of all existing site structures including but not limited to all fencing, gates, site furnishings, and playground equipment, as noted on the drawings. City of Philadelphia reserves the right to save any portions of the existing play equipment that may be able to be re-used on another site.
 3. Removal of existing sidewalks, pavers, pavement, fences etc. as noted on contract documents and as required to complete the project.
 4. Removal/Abandonment of existing above-ground and underground utilities and associated structures. It shall be the responsibility of the Contractor to accurately locate all facilities and to determine their extent. If such facilities obstruct the progress of the work and are not indicated to be removed or relocated, they shall be removed or relocated only as directed by the Owner. Contractor to certify that utilities have been disconnected prior to demolition.
 5. Backfill of removed underground utilities. Backfill to grade with compacted suitable on-site soils.
 6. Removal from site and disposal of all excess and unusable material.
 7. Removal of trees and plant material as noted on the drawings.

1.02 RELATED SECTIONS

- A. Section 33 01 10 - Protection of Existing Utilities
- B. Section 31 25 00 - Soil Erosion and Sediment Control
- C. Section 31 20 00 – Earth Moving
- D. Section 31 23 10 - Excavation, Backfill & Subgrade Preparation for Pavement

- E. Section 32 90 00 - Landscape Planting

1.03 REFERENCE STANDARDS

- A. National Association of Demolition Contractors (NADC) - Demolition Safety Manual, latest edition.
- B. All applicable OSHA requirements and other Federal, State, and local codes, laws, ordinances, regulations, and guidelines for demolition and related work.
- C. All applicable sections of the International Building Code, latest edition.

1.04 QUALITY ASSURANCE

- A. A qualified Engineer, selected and paid by the Owner, shall be retained to perform demolition inspection for the duration of the demolition operations to ensure compliance with this section.
- B. An Independent Testing and Inspection Agency shall prepare field reports documenting the progress of the demolition operations and submit said reports to the Owner on a weekly basis.
- C. The Owner reserves the right to direct any inspection that is deemed necessary. The Contractor shall provide free access to the site for inspection activities.
- D. The Contractor shall provide and maintain a capable and experienced field person representing the Contractor to oversee all demolition operations. The representative shall be on site during all operating hours of the project.
- E. The Contractor shall obtain and pay for any permits, bonds, licenses, etc., required for demolition work.
- F. The Contractor shall conduct any work within street or highway right-of-ways in accordance with the requirements of the Philadelphia Streets Department or the governmental agencies having jurisdiction and shall not begin until these governing authorities have been notified. The Contractor shall restore to their present conditions any public right-of-way that is disturbed by the work under this section. All pavement restoration work in public rights-of-way shall be performed to the proper satisfaction of the Philadelphia Streets Department or the governmental agencies having jurisdiction.

1.05 SUBMITTALS

A. PERMITS

Prior to the commencement of work, the Contractor shall submit to the Owner record copies of all required permits and certificates obtained for the work in this section. The Contractor shall incur all fees and other requirements associated with obtaining the required permits and certificates. Permits shall be posted as required by the issuing authority/jurisdiction.

1.06 WORKING HOURS

- A. The Contractor shall limit all work for this project between 8:00 a.m. and 4:30 p.m. Monday through Friday or as limited by the City or the Owner. No work shall be done on Saturdays, Sundays or Holidays unless permission is given by the City and Owner and work on such days is not in conflict with local ordinance.

1.07 CONTRACT LIMIT LINE

- A. The contract limit line for demolition work is shown on the Contract Drawings. No equipment, materials, and/or trailers shall be kept or stored outside the contract limit line.
- B. Other trades and work may be ongoing onsite during demolition operations. The Contractor shall coordinate their work so as not to interfere with work of other trades.

1.08 UNACCEPTABLE PERFORMANCE

- A. The Contractor shall remove from the project any individual employed by the Contractor who is performing work in an unacceptable manner as determined by the Owner. The Contractor shall not be allowed claims for delays or down time resulting from the removal of such employees.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Noise-producing activities shall be held to a minimum. Internal combustion engines and compressors, etc., shall be equipped with mufflers to reduce noise to a minimum. The Contractor shall comply with all noise abatement ordinances.
- B. The work areas shall be sufficiently dampened to prevent dust from rising during demolition activities.
- C. The Contractor shall see to it that trucks leaving the site shall do so in such a manner that mud and earth will not be deposited on adjacent street pavements. Any mud or earth deposited on street pavements shall be promptly removed by the Contractor.

1.10 TEMPORARY SHORING AND PROTECTION

- A. Any damage done by the Contractor to existing pipe lines, utilities, etc., to remain shall be repaired by the Contractor and at his expense in a manner acceptable to the Owner of the damaged property. The Contractor shall report any existing damage prior to his beginning work.
- B. The Contractor shall provide necessary temporary shoring, bracing, etc., and maintenance thereto required in accordance with all applicable OSHA Standards for the completion of demolition work.
- C. The Contractor shall insure the provisions of adequate bracing, shoring, lamps, fencing, warning signs, and flags as required by agencies having jurisdiction and as directed by the Owner. Remove same when necessity for protection ceases.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials are as specified on the Contract Drawings when applicable. See related sections for additional product specifications.

PART 3 METHOD OF CONSTRUCTION

3.01 GENERAL

- A. The Contractor is responsible for the demolition of existing concrete slabs, walks and curb, asphalt pavement, utilities, signs and miscellaneous items encountered. Concrete elements shall be subject to an on-site crushing process and asphalt pavement shall be milled. Crushed concrete and asphalt millings may be stockpiled separately on site for reuse on site. All materials that cannot be recycled for reuse on-site shall be disposed off-site in accordance with all applicable Federal, State, County and Local codes and regulation governing legal transportation and disposal of work.
- B. The general scope of demolition work is shown on the site Demolition Plan. The Contractor shall include for all demolition work necessary to accomplish the construction project.
- C. Backfill and properly compact all open excavations, including trenching for utility and foundation removal.

3.02 SITE VISIT

- A. The Contractor shall visit the site and verify the location of all pertinent items prior to submitting a bid so that the difficulties associated with execution of the contract are fully understood. No additional compensation will be allowed for failure to be so informed.

3.03 SOIL EROSION SEDIMENT CONTROL

A. GENERAL

1. The Contractor shall install all soil erosion and sediment control measures in accordance with the requirements indicated on the Contract Drawings, permit, and specifications. All work shall be performed in accordance with the requirements of PADEP and PWD.
2. The Contractor shall be responsible for maintenance of all soil erosion and sediment control measures during the Contract.
3. The Contractor shall keep all streets clear of dirt and sediment and shall be responsible for any cleaning of the streets necessary during the course of the project.
4. The Contractor shall, if necessary, obtain approval from and comply with all additional directives issued by the PWD.

B. SEQUENCE OF CONSTRUCTION

1. The Contractor shall, if necessary, submit written notification to the PWD at least 48 hours prior to the start of construction of any soil erosion and sediment control measures.

2. A temporary crushed stone wheel cleaning pad shall be installed at the construction entrance/exits as shown on the Contract Drawings.
3. Compost filter sock shall be installed and maintained at locations shown on the Contract Drawings.
4. All soil erosion and sediment control measures shall be maintained until all work under this Contract is completed.
5. The Contractor shall, as necessary, notify the PWD upon commencement and completion of the project.

3.04 UTILITIES

A. GENERAL

Existing utilities service shall not be interrupted unless authorized in writing by authorities having jurisdiction and the owner of the utility. Any temporary interruption necessary shall be directly coordinated and supervised by utility company personnel. The Contractor shall provide temporary services during interruptions to existing utilities, as acceptable to governing authorities and the affected utility companies.

B. MAINTENANCE

The Contractor shall maintain and protect from damage all existing above and below ground utilities that are to remain. Other utilities to remain include, but are not necessarily limited to, above ground utility lines and transformers within the public right-of-ways. The Contractor shall immediately repair or have repaired by the appropriate utility company any damage incurred by utilities during demolition work at no cost to the utility owner or the Owner. Prior to demolition, the Contractor shall be responsible for notifying and coordinating the shut-off of abandoned utilities with the appropriate utility companies.

C. ABANDONMENT/REMOVAL

1. The Contractor shall disconnect and cap/terminate all services including but not limited to water, storm and sanitary sewers, gas, electric, telephone, cable TV, etc. prior to demolition. The Contractor shall determine if utility laterals are direct and exclusive to the building before disconnection is performed.
2. Prior to removal, all utilities and sewers shall be properly purged and evacuated of all residual gases, oils, etc. or de-energized in the case of electric, telephone or other communications services. All purging and testing shall be approved by local utility companies and governing authorities having jurisdiction.
3. The Contractor or appropriate utility company (if required) shall seal and/or plug the ends of all disconnected utilities where indicated on the plan or, if not indicated, at the Contract limit line with lean concrete, gasketed blank steel seal plates, or other measures as recommended and required by the utility company or Consultant. All plugs shall be inspected by the Consultant and appropriate utility company prior to backfilling.

4. All utility disconnections shall be performed no later than 15 days prior to the scheduled start of demolition and must precede the demolition permit application procedure.

D. RESTORATION

1. All underground utility lateral removals shall be properly backfilled using suitable compacted on-site soils. All disturbed pavements within the public right-of-way shall be restored to their pre-demolition (existing) condition. This includes the restoration of concrete pavement, concrete curbing, and asphalt pavement within the public right-of-way. All pavement and curbing shall be saw cut prior to excavation in order to produce a clean and neat edge. Replacement pavement and curbing shall be equal in design performance to the existing condition and as directed by the Consultant and/or the local authority having jurisdiction. All restoration work shall be performed immediately following utility removal and backfill completion.

END OF SECTION 02 41 16

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General Conditions, Special Contract Requirements and Division 01 Specification sections are a part of and govern work under this section.
- B. Section 31 00 00 – EARTHWORKS for excavation for installation of concrete pad
- C. Section 32 16 23 – CONCRETE PAVING

1.2 SUMMARY

- A. The work required under this section consists of furnishing all labor, materials, equipment, services, and related items necessary to supply and install the site furnishings listed below, and all related work, complete, as indicated on the drawings or specified herein.
 - 1. This section includes Cast-in-Place Concrete for Following Items:
 - a. Ramp and Stairs.
 - b. Footings.
 - c. Slabs on grade.
 - B. Full cooperation shall be given to other trades to install embedded items. Suitable templates, inserts and sleeves shall be provided for setting items not placed in the forms.
 - C. Related Work: The following items of related work are specified in other Sections. 1. Section 03100: Concrete Formwork 2. Section 03200: Concrete Reinforcement D. All concrete work shall conform to the requirements of ACI 318-95 and CRSI Standards, unless specifically noted otherwise.

1.3 REFERENCE

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 305R - Guide to Hot Weather Concreting.
 - 3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 - 4. ACI 308.1 - Specification for Curing Concrete.
 - 5. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:

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1. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
2. ASTM C33 - Standard Specification for Concrete Aggregates.
3. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
5. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
6. ASTM C150 - Standard Specification for Portland Cement.
7. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
8. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
9. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
10. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
11. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
12. ASTM C685 - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
13. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
14. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
15. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
16. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
17. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
18. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
19. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on joint devices, attachment accessories, admixtures.
- C. Design Data:

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1. Submit concrete mix design for each concrete strength.
2. Submit separate mix designs if admixtures are required for following:
 - a. Hot and cold weather concrete Work.
 - b. Air entrained concrete Work.
3. Identify mix ingredients and proportions, including admixtures.
4. Chlorides can contribute to corrosion of metals embedded in concrete. Admixture manufacturers are not required to identify chloride content, unless requested.
5. Identify chloride content of admixtures and whether chlorides were added during manufacture.
6. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
7. Manufacturer Instructions: Submit installation procedures and interfacing required with adjacent Work.
8. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.5 QUALITY ASSURANCE

- A. Perform Work according to ACI 318.
- B. Comply with ACI 305R when pouring concrete during hot weather.
- C. Comply with ACI 306.1 when pouring concrete during cold weather.
- D. Acquire cement and aggregate from one source for Work.
- E. Prior to starting concrete operations the Contractor shall name his source of supply for concrete materials and shall submit representative samples and reports of quality tests for approval.
- F. The Contractor will engage the services of a recognized independent testing laboratory, approved by the Engineer, to perform the following services, (in accordance with ASTM E 329-77) the cost of which shall be paid by the Contractor:
 1. Design the concrete mixtures specified, make quality tests of materials, inspect the proportioning and mixing of all concrete for this project.
 2. Slump Test, ASTM C-143, shall be taken as often as required to provide the specified consistency to concrete.
 3. Cast and test of at least 6 cylinders for each day's pour or for each 100 cubic yards or fraction thereof. Cylinders shall be cured and tested in accordance with ASTM specifications for control tests. Cylinders shall be tested at 7 and 28 days. The Contractor shall provide insulated storage room with heat when necessary to store control cylinders, and a protected, fenced-in space for storage of field cylinders, which approximates the condition of curing of the concrete being sampled.
- G. Sampling and Testing:

CAPITOLO PLAYGROUND FIELD RENOVATIONS

1. All materials shall be sampled, tested in accordance with appropriate ASTM Standards, and approved before inclusion in any work on this project.
2. Samples for testing shall be furnished by the Contractor.
3. Rejected material shall be immediately removed from the site.
4. Reinforcing steel shall be tested by heat in shops and by random sampling in the field when required by the Landscape Architect/Engineer

1.6 MOCKUPS

- A. Section 014000 - Quality Requirements: Requirements for mockup.
- B. Construct mockup for architectural concrete surfaces receiving special treatment or finish as result of formwork.
- C. Size: Sufficient to indicate required special treatment or finish.
- D. Obtain acceptance of Landscape Architect/Engineer for resultant surface finish prior to erecting formwork.
- E. Incorporate accepted mockup as part of Work.

1.7 AMBIENT CONDITIONS

- A. Section 015000 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.
 - a. Maintain concrete temperature after installation at minimum 50 degrees F for minimum seven days.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. A. Concreting shall not be started during rain, sleet or snow and shall not be continued during such weather after having been started except long enough to come to a suitable cutoff point. Concrete placed during rain shall have the cement content increased in the amount of one sack of cement per cubic yard of concrete. All forms and earth forms shall be free of ice and frozen surfaces.
- B. No concrete shall be poured unless temperature is 40 degrees and rising or unless special precautions are taken (approved by the Architect). Adequate equipment shall be provided for heating the concrete materials and protecting the concrete during freezing and near freezing weather. All concrete shall have a temperature of between 50 degrees and 90 degrees F when depositing and shall be maintained within this temperature range for at least 72 hours or for as much time as is required to insure the proper rate of curing. No salt or other chemicals shall be added to prevent freezing. The covering or other method used for temperature protection shall remain in place 24 hours after artificial heat is discontinued. The recommended Practice for Cold Weather 10/08 03300-4 Cast-In-Place Concrete Concreting" (ACI 306) and the "Recommended Practice for Hot Weather Concreting" (ACI 305) shall be accepted as good practice.

PART 2 - PRODUCTS

2.1 MATERIALS

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- A. All materials shall be subject to approval. Any change of materials specified shall be submitted for approval and such change, if acceptable, shall be used only when specifically authorized in writing.
- B. Cement shall conform to the following specifications:
 - 1. Coarse and fine aggregate shall conform to requirements of ASTM C33 or Federal Specification SS-S-281a.
 - 2. All coarse aggregates shall be crushed limestone.
 - 3. The maximum size of coarse aggregate shall not be larger than 1", 1/5 of the narrowest dimension between forms of the member for which the concrete is to be used, nor larger than 3/4 the minimum clear spacing between reinforcing bars. Coarse aggregate for all concrete exposed to the weather shall be crushed limestone with a #57 gradation.
 - 4. Absorption in coarse aggregate shall not exceed 5%.
 - 5. The fineness modulus for fine aggregate used shall not vary more than 0.2 from the approved sample without approval. Fineness modulus to be 2.9.
- C. All concrete shall be normal weight unless specifically noted otherwise.
 - 1. Normal weight concrete shall be approximately 145 to 155 pounds per cubic foot.
 - 2. Lightweight concrete shall not exceed 110 pounds per cubic foot and shall be made of normal and normal weight fines.
- D. Water shall be clean, fresh, and free from injurious amounts of oils, acids, alkali or organic material or other substances that may be deleterious to concrete or steel.

2.2 QUALITY AND PROPORTIONING

- A. It shall be the Contractor's responsibility to furnish concrete which will conform to the quality and strength specified.
- B. Strengths, unless otherwise indicated on plans or in specifications below, shall be Exterior Concrete 4000psi (5% Air Entrained)
- C. Proportioning shall follow the limiting factors in the following table:
 - 1. Minimum allowable compressive strength at 28 days (psi) 4000
 - 2. Maximum allowable water per sack of cement: (gal/sack):
 - a. Non-air entrained: 5-1/2
 - b. Air entrained: 5
 - 3. Slump, range in inches: 3-5
 - 4. Minimum sacks of cement per cu. yd. 6-1/4
 - 5. Water reducing agent oz./100# cement: 3

CAPITOLO PLAYGROUND FIELD RENOVATIONS

6. Proportioning on the basis of field experience shall conform to Section 5.3 of ACI 318-89 or the maximum water/cement ratio in Section 5.4 of ACI 318-89.
- D. Design mixes shall be established to produce average strengths higher than specified by the amounts specified in Chapter 5 of ACI 318-95.
- E. Admixtures:
1. Calcium Chloride shall not be used.
 2. An approved air-entraining agent (ASTM C260) shall be added at the mixer with accurate dispenser to produce entrained air 4-6% by volume in all concrete subject to weathering conditions.
 3. An approved water-reducing agent equal to those manufactured by mixer with an accurate dispenser.
 4. These and other admixtures shall be used only with specific approval. Tests for design mixes shall be made with the admixtures included.
 5. Fly ash shall not be permitted.
- F. The concrete shall be of such consistency and composition that it can be worked readily into the corners and angles of the forms and around reinforcement without permitting 10/08 03300-6 Cast-In-Place Concrete materials to segregate or free water to collect on the surfaces. Within the limiting requirements the Contractor shall adjust the consistency of the concrete as may be necessary to produce mixtures which will be placeable with reasonable methods of placing and compacting. The Contractor shall maintain on the job at all times adequate extra cement to be used at the rate of $\frac{1}{2}$ sack cement per cubic yard concrete for each 2" slump increase for corrections due to wetness desired or obtained. No water shall be added to concrete except under the direct supervision of the engineer or his appointed representative. Under no circumstances will the addition of more than 2 gallons of water per cubic yard of concrete be allowed at the site.
- G. Measurement of Materials:
1. Cement shall be measured by the sack or half-sack unless cement is weighed for each batch.
 2. Aggregates shall be proportioned separately by weight with proper compensation for weight of moisture; weighing equipment shall be accurate within 1%.
 3. Water shall be measured by an approved device capable of accurate measurement to one pint. H. Concrete shall be from a single source for each major pour.

2.3 FORMS

- A. Refer to Section 03100 for requirements for concrete forms.

2.4 REINFORCEMENT

- A. Refer to Section 03200 for requirements for reinforcement.

2.5 EXPANSION MATERIALS

- A. Verify compatibility of joint filler with sealant specified.

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- B. All expansion joints on grade shall be pre-formed non-extruding resilient type, bituminous or bonded cork (ASTM D994 or ASTM D1751).
- C. Other expansion joints may comply with ASTM D1752 – “Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.”
- D. Manufacturer’s certification and material submittal are required.

2.6 CURING, SEALING AND HARDENING COMPOUNDS

A. Liquid Curing and Sealing Compounds – General requirements

1. Curing Compounds: Comply with ASTM C 309, Type 1, Class B.
 - a. Non-yellowing formulation where subject to ultraviolet light.
 - b. Curing and Sealing Compound: Where indicated, providing curing and sealing formulation with long-lasting finish that is resistant to chemicals, oil, grease, deicing salts, and abrasion.
2. Curing and Hardening Compound: Free of waxes, resins or oils; meet water retention requirements of ASTM C 309; penetrate concrete to change free lime to calcium silicate forming a permanently dense, hard surface.
3. The curing compound shall have test data from an independent laboratory indicating a maximum moisture loss of 0.030 grams per square cm. When applied at a coverage rate of 300 square feet per gallon. Manufacturer’s certification is required.
 - a. Provide L&M “dress & Seal 30” or Master Builders “Masterseal 66.”
 - b. Dissipating Resin Curing Compound: The compound shall be a dissipating resin type compound, conforming to ASTM C309, Type I, “Kurez DR” by The Euclid Chemical Company or approved equal. The film must chemically break down in a two-to-four-week period after application.
4. Curing compounds shall not be used on any surface against which additional concrete or other cementitious material are to be bonded.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until satisfactory conditions have been corrected.

3.2 CONDUITS, HANGERS, SUPPORTS, ANCHORS, ETC.

- A. The Contractor shall see that all necessary bolts and anchors of all other trades employed on this structure including conduits, sockets, inserts, sleeves, etc., will be placed by their respective trades or shall himself place them to details before concreting a given section of work. He shall see that these items do not interfere with the reinforcement. No aluminum conduit or product containing aluminum or any other material detrimental to concrete shall be embedded in concrete.

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- B. All openings in slabs, beams, columns, and footings, which are not shown on the structural plans, must be approved by the Engineer. The maximum diameter of embedded pipes or conduit shall be 1/3 times the slab or wall thickness. The minimum center-to-center spacing of embedded pipes or conduits shall be three times the outside diameter. For pipes or conduits of different diameters, the minimum edge-to-edge spacing shall be two times the smaller diameter.
- C. All pipes and conduits providing flow able material conveyance which penetrate beams, footings, or walls shall be provided with sleeves of an appropriate size and material to provide movement for expected settlements or deflections.

3.3 PREPARATION

- A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Concrete placing shall not be started until all necessary preparations have been completed and approval has been given. Preparations shall consist of completing all form work involved, placing all reinforcing steel, pipes, conduits, sleeves, hangers, anchors, fastening devices, waterproofing and such other work to be built into the concrete in the section to be poured, and any other preparations herein required for the concreting operations. Free water and any mud or debris shall be removed from forms and excavations to be occupied by concrete. Approved equipment shall be available on the job site for heating and/or protecting the concrete whenever freezing temperatures are likely to occur within the curing period. Ice or chilled water may be required to control concrete temperature in hot weather to below 90 degrees F. B. Slabs-on-grade shall be placed on a properly leveled and thoroughly compacted sub grade, equal to 93% maximum dry density. All subsoil's for slabs shall be approved before placing concrete.
- C. Approved equipment shall be provided for heating concrete materials and/or protecting the concrete whenever freezing temperatures are likely to occur within curing period. 3.04

3.4 INSTALLATION

- A. A. Concrete shall be conveyed from the mixer or transporting vehicle to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of materials or displacement of the reinforcing steel and which will avoid rehandling. For ready-mix concrete in an agitator truck, the elapsed time from mixer to placement shall not exceed 1-1/2 hours.
- B. Concrete shall be deposited as nearly as practicable in its final position and shall have the qualities required. Concrete shall be deposited continuously in layers or sections of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause seams or planes of weakness. If sections cannot be placed continuously, proper construction joints shall be provided.
- C. Concrete during and immediately after depositing shall be thoroughly compacted and worked around reinforcing and embedded fixtures and into all parts of forms by means of spades, rods and approved mechanical vibrators. For thin walls or inaccessible portions, concrete shall be worked into place by vibrating or other approved method: Care shall be taken so as not to work concrete to the point where segregation occurs.

3.5 CONSTRUCTION AND CONTROL JOINTS

- A. All horizontal and vertical construction joints shall be intentionally roughened to a full 1/4" ± amplitude or have a continuous 2"x 4" keyway along the joint at contractor's option.
- B. Provide reinforcing dowels to match the member reinforcing at the joint, unless noted otherwise.

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- C. Unless indicated otherwise, slabs-on-grade shall have construction or control joints spaced not to exceed 30 times the slab thickness in any direction. All discontinuous control or construction joints shall be reinforced with two (2) #4 x 48". See structural details. Construction joints shall not exceed a distance of 15'-0" O.C. in any direction.
- D. Control joints shall be installed in slabs-on-grade so the length-to-width ratio of the slab is not more than 1.25:1. Control joints shall be completed within 12 hours of concrete placement. Control joints may be installed by:
 - 1. Saw Cut to a depth of $\frac{1}{4}$ the thickness of the slab.
 - 2. Tooled joints shall be made to a depth of $\frac{1}{4}$ the thickness of the slab.
- E. Control joints in visually exposed walls, unless noted otherwise (shall line up with masonry and architectural joints, see drawings):
 - 1. Vertical control joints at 10'-0" O.C.
 - 2. Reinforcing shall be continuous through control and construction joints, unless noted otherwise.
 - 3. Control joints in foundation walls shall line up with masonry control joints.
- F. Control joints shall be installed in suspended slabs over steel decking by saw cutting along all interior grid lines. Joints centered above the purlins shall be $\frac{3}{4}$ " deep and shall have #4x5'-0" at 16" O.C. reinforcing placed perpendicular to (and centered on) the purlin. Joints centered above the girders shall be $\frac{3}{4}$ " deep and shall have #4x16'-0" O.C. reinforcing placed perpendicular to (and centered on) the girder. The #4 bar reinforcing centered above the grid lines shall be in addition to the specified WWF, which is continuous throughout the suspended slabs over steel decking. Reinforcing shall be placed 1" below the top of the slab.

3.6 FINISHING

- A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding $\frac{1}{4}$ " in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or surfaces that are covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, damp proofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.
- C. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets surfaces occurring 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.

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- E. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, terrazzo, stone and other bonded applied cementitious finish flooring material, and as otherwise indicated. After placing slabs, plane surface to a tolerance not exceeding $\frac{1}{2}$ " in 10' when tested with a 10' straightedge. Slope surfaces uniformly to drains where required. After leveling; roughen surface before final set, with stiff brushes, brooms or rakes.
- F. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, and as otherwise indicated. After screening, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance not exceeding $\frac{1}{4}$ " in 10' when tested with a 10' straightedge. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth granular texture.
- G. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, paint or other thin film finish coating system. After floating, begin final trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding $\frac{1}{8}$ " in 10' when tested with a 10' straightedge. Grind smooth surface defects, which would telegraph through applied floor covering system.
- H. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect and Owner's Representative before application. See Section 02528 – Concrete Paving and Curbs.
- I. Chemical-Hardener Finish: Apply chemical-hardener finish to interior concrete floors where indicated. Apply liquid chemical-hardener after complete curing and drying of the concrete surface. Dilute liquid hardener with water, and apply in 3 coats; first coat, $\frac{1}{3}$ -strength; second coat, $\frac{1}{2}$ -strength; third coat, $\frac{2}{3}$ -strength. Evenly apply each coat, and allow 24 hours for drying between coats. Apply proprietary chemical hardeners, in accordance with manufacturer's printed instructions. After final coat of chemicalhardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

3.7 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect. Cut out honeycomb, rock pockets, voids over $\frac{1}{4}$ " in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brushcoat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.
- B. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repair of Formed Surfaces: Remove and replace concrete having defective surface if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture

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irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

- D. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- E. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.
- F. Repair finished unformed surfaces that contain defects, which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
- G. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
- H. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.
- I. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same material to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finish concrete. Cure in same manner as adjacent concrete.
- J. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact-dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours. Use epoxy-based mortar for structural repairs, where directed by the testing laboratory.
- K. Repair methods not specified above may be used, subject to acceptance of Architect.

3.8 CONCRETE CURING AND PROTECTION

- A. A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting; keep continuously moist for not less than 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- B. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curings, by curing compound, and by combinations thereof, as herein specified.

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C. Provide moisture curing by following methods:

1. Keep concrete surface continuously wet by covering with water.
2. Continuous water-fog spray.
3. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

D. Provide moisture-cover as follows:

1. Cover concrete surfaces with moisture retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

E. Provide curing compound to slabs as follows:

1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
2. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, damp proofing, membrane roofing, flooring, painting, and other coatings and finish materials, unless otherwise acceptable to Landscape Architect.

F. Curing Formed Surfaces: Cure formed concrete surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

G. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing compound. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

END OF SECTION 03 30 00

SECTION 05 52 30

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General Conditions, Special Contract Requirements and Division 01 Specification sections are a part of and govern work under this section.
- B. Section 03 30 00 – CAST-IN-PLACE CONCRETE

1.2 SUMMARY

- A. The work required under this section consists of furnishing all labor, materials, equipment, services, and related items necessary to supply and install the site furnishings listed below, and all related work, complete, as indicated on the drawings or specified herein.

1.3 COORDINATION

- 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.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height. a. Show method of connecting and finishing members at intersections.
- D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Qualification Data: For testing agency.
- F. Welding certificates.

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- G. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- H. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- I. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.
- J. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 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 RAILING

- A. Shop fabricated – see drawing detail.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "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.

2.3 METALS, GENERAL

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

2.4 STEEL AND IRON

- A. A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Tubing: ASTM A 500 (cold formed).

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - 1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Shop Primers: Provide primers that comply with Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."
- F. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- G. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- H. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- I. Intermediate Coats and Topcoats: Provide products that comply with Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."
- J. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.
- K. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.
- L. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- M. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- N. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

CAPITOLO PLAYGROUND FIELD RENOVATIONS

1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

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 (1 mm) 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 are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
- F. Connections: Fabricate railings with either welded or nonwelded connections unless otherwise indicated.
- G. 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.
- H. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- I. Form Changes in Direction as Follows:
 1. As detailed.
 2. By flush bends
- 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.

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- K. Close exposed ends of railing members with prefabricated end fittings.
- L. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- M. 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.
- N. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.7 STEEL AND IRON FINISHES

- A. Galvanized Railings:
 - 1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
 - 2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
 - 3. Comply with ASTM A 153/A 153M 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 are 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.
- C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - 1. Shop prime uncoated railings with primers specified in Section 09 91 13 "Exterior Painting".

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that are 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 variations 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.
 - 1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.
- 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.

3.2 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.
 - 1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

3.4 PROTECTION

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

END OF SECTION 05 52 30

SECTION 11 68 33

ATHLETIC FIELD EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soccer Goals.
2. Athletic Field Striping

1.2 RELATED DOCUMENTS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product: Include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.
- 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, not less than 6-inch- long linear components and 4-inch- square sheet components.
- E. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For site furnishings to include in maintenance manuals.
- B. Warranty Information: Provide manufacturer's warranty documentation to the owner.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of site furnishings through one source from a single manufacturer.
- B. Warranty: Perform all work as to maintain manufacturer's warranty of the product.

PART 2 - PRODUCTS

2.1 SOCCER GOALS

- a. Provide Soccer Goal meeting one of the following:

CAPITOLO PLAYGROUND FIELD RENOVATIONS

B. Manufacturer: Aluminum Athletic Equipment Co. (AAE). Item SGR-P

1. Color: White.
2. Size: 24' wide; 8' high; and 3' top depth/8' bottom depth.
3. Material: Aluminum
4. Include pneumatic wheel set.
5. Include Polyethylene Braided Net with 5" Square Mesh
6. Do not install Concrete Anchor. Provide anchor parts to SDP.

C. Manufacturer: Bison, Inc. Item SC2480PA40NT

1. Color: White.
2. Size: 24' wide; 8' high; and 4' top depth/8' bottom depth.
3. Material: Aluminum
4. Include Wheel Set
5. Include Net

D. Manufacturer: Sportsfield Specialties, Inc. Item SG824R

1. Color: White.
2. Size: 24' wide; 8' high; and 4' top depth/8' bottom depth.
3. Material: Aluminum
4. Include Wheel Kit
5. Include Net

E. Or approved Equal.

2.2 ATHLETIC FIELD STRIPING

A. Provide and install athletic field striping in accordance with the following:

1. Color: White.
2. Material: Water-based latex.
3. 4" Wide

PART 3 - EXECUTION

3.1 EXAMINATION

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- 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, GENERAL

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.
- D. Athletic Field Striping to be placed after sodding is complete and upon meeting the criteria for "Satisfactory Turf" as outlined in Section 32 92 23 - Sod.

3.3 CLEANING

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

END OF SECTION 11 68 33

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SECTION 12 93 23
TRASH RECEPTACLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General Conditions, Special Contract Requirements and Division 01 Specification sections are a part of and govern work under this section.
- B. Section 31 00 00 – EARTHWORKS for excavation for installation of concrete pad
- C. Section 32 16 23 – CONCRETE PAVING

1.2 SUMMARY

- A. The work required under this section consists of furnishing all labor, materials, equipment, services, and related items necessary to supply and install the site furnishings listed below, and all related work, complete, as indicated on the drawings or specified herein.
- B. This section includes the following site and street furnishings:
 - 1. Trash Receptacles

1.3 SUBMITTALS.

- A. Product Data: For each type of product indicated, include construction details, material descriptions, dimensions of individual components and profiles, finishes field-assembly requirements, and installation details.
- B. Samples for Initial Selection: For units with factory-applied color finishes.
- C. Samples for verification: For each type of exposed finish required, prepared on Samples of size indicated below
 - 1. Size: Not less than 6-inch long linear components and 4-inch square sheet components.
- D. Product Schedule: For site and street furnishings. Use same designation on Drawings.
- E. Maintenance Data: For site and street furnishings to include in maintenance manuals.

1.4 QUALITY ASSURANCE AND GUARANTEE

- A. Source Limitations: Obtain each type of site and street furnishings through one source from a single manufacturer.
- B. Minimum of three year manufacturer's warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- A. Dumor, Inc. – P.O. Box 142, Mifflintown, PA 17059, Phone: (800) 598-4018, Web: www.dumor.com. Local Representative: General Recreation, P.O. Box 440, Newtown Square, PA 19073, Phone: (800) 726-4793 Web: www.generalrecreationinc.com
- B. Approved equal.

2.2 TRASH RECEPTACLES

- A. Dumor Series 157-32-FTO
- B. Color is black.
- C. Standard top opening.
- D. 32 Gallon interior plastic liner, black in color.
- E. Side liner access with operable latch.
- F. Trash receptacle to be surface mounted to concrete paving with manufacturer's recommended anchors as shown on the drawing.

PART 3 - EXECUTION

3.1 STORAGE AND HANDLING

- A. Trash Receptacles shall be packaged as recommended by the manufacturer and remain packaged until immediately prior to installation to insure protection during transit, storage, and hauling.
- B. Storage of Trash Receptacles shall be in a location away from active construction operations and secured from public access

3.2 INSTALLATION

- A. The contractor shall install all trash receptacles in the locations and in the manner as shown on the drawings and in strict accordance with manufacturer installation specifications.
- B. Contractor to construct concrete paving as shown on the drawings to receive trash receptacle anchoring system.
- C. All trash receptacles to stand plumb stable and secure anchored prior to acceptance by Professional.
- D. All trash receptacles shall be free from any dirt, stains, defects, or damage of any sort prior to acceptance by Professional. All trash receptacles with defects, deformities or damage shall be removed from the site.

END OF SECTION 12 93 23

SECTION 12 93 43

SITE SEATING AND TABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General Conditions, Special Contract Requirements and Division 01 Specification sections are a part of and govern work under this section.
- B. Section 31 00 00 – EARTHWORKS for excavation for installation of concrete pad
- C. Section 32 16 23 – CONCRETE PAVING

1.2 SUMMARY

- A. The work required under this section consists of furnishing all labor, materials, equipment, services and related items necessary to supply and install the site furnishings listed below, and all related work, complete, as indicated on the drawings or specified herein.
- B. This section includes the following site and street furnishings:
 - 1. Benches
 - 2. Picnic Tables

1.3 SUBMITTALS.

- A. Product Data: For each type of product indicated, include construction details, material descriptions, dimensions of individual components and profiles, finishes field-assembly requirements, and installation details.
- B. Samples for Initial Selection: For units with factory-applied color finishes.
- C. Samples for verification: For each type of exposed finish required, prepared on Samples of size indicated below
 - 1. Size: Not less than 6-inch long linear components and 4-inch square sheet components.
- D. Product Schedule: For site and street furnishings. Use same designation on Drawings.
- E. Maintenance Data: For site and street furnishings to include in maintenance manuals.

1.4 QUALITY ASSURANCE AND GUARANTEE

- A. Source Limitations: Obtain each type of site and street furnishings through one source from a single manufacturer.
- B. Minimum of three year manufacturer's warranty.

PART 2 - PRODUCTS

CAPITOLO PLAYGROUND FIELD RENOVATIONS

2.1 MANUFACTURERS:

- A. Dumor, Inc. – P.O. Box 142, Mifflintown, PA 17059, Phone: (800) 598-4018, Web: www.dumor.com. Local Representative: General Recreation, P.O. Box 440, Newtown Square, PA 19073, Phone: (800) 726-4793 Web: www.generalrecreationinc.com
- B. Approved equal

2.2 BENCH

- A. Dumor Series 165-60I (Backed) and 166-60I (Backless) Steel Frame and Wood Slats, 6-foot length with center armrest
- B. Wood slats shall be Ipe.
- C. Size: Six-foot long
- D. Color of bench metal: black.
- E. Bench to be surface mounted to concrete paving or pad with manufacturer's recommended anchors as shown on the drawing

2.3 PICNIC TABLE

- A. Dumor Series 72 PL (picnic table)
- B. Seat options:
 - 1. 72-68-1-PL (ADA Compliant)
 - 2. 72-80-PL
- C. Metal Color to be Black
- D. Table to be surface mounted to concrete paving or pad or PPR approved rigid paving with manufacturer's recommended anchors as shown on the drawing.

PART 3 - EXECUTION

3.1 STORAGE AND HANDLING

- A. Bench shall be packaged as recommended by the manufacturer and remain packaged until immediately prior to installation to ensure protection during transit, storage, and hauling.
- B. Storage of Benches shall be in a location away from active construction operations and secured from public access.

3.2 INSTALLATION

- A. The contractor shall install all benches in the locations and in the manner as shown on the drawings and in strict accordance with manufacturer installation specifications.
- B. Contractor to construct concrete paving as shown on the drawings to receive bench anchoring system.
- C. All benches to stand plumb stable and secure anchored prior to acceptance by Professional.

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- D. All benches shall be free from any dirt, stains, defects, or damage of any sort prior to acceptance by Professional. All benches with defects, deformities or damage shall be removed from the site.

END OF SECTION 12 93 43

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SECTION 13 28 21
MINI PITCH SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General Conditions, Special Contract Requirements and Division 01 Specification sections are a part of and govern work under this section.
- B. Section 03 30 00 CAST IN PLACE CONCRETE
- C. Section 31 00 00 – EARTHWORKS for excavation for footing

1.2 SUMMARY

- A. The work required under this section consists of furnishing all labor, materials, equipment, services, and related items necessary to supply and install the Mini Pitch system specified below, and all related work, complete, as indicated on the drawings or specified herein.
- B. This section includes the following:
 - 1. Mini Pitch system including the enclosure, goals and access gates as specified.

1.3 SUBMITTALS.

- A. Submit under provisions of Division 01 Section "General Requirements."
- B. Submit shop drawings and product data.
 - 1. Include footings, panels, accessories, fittings, hardware, anchorages, and schedule of components.
- C. Manufacturer's installation instructions.

1.4 QUALITY ASSURANCE AND GUARANTEE

- A. Source Limitations: Obtain each type of site and street furnishings through one source from a single manufacturer.
- B. Minimum of three year manufacturer's warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Helogoal inc.
25392 E Indore Dr
Aurora, CO 80016
phone: (720) 788-7813
Email jb@helogoal.com

CAPITOLO PLAYGROUND FIELD RENOVATIONS

B. Approved equal.

2.2 MINI PITCH SYSTEM

A. GreenCourt Arena Pro 39M x 18.9M (approximately 112'x62') mini pitch system with 4M (13.1' x 6.6' x 3.3.') goals or approved equal.

1. Surrounding panel system, with panels that are 100cm (39,4") high and 4 cm (1.6") thick.
2. Panels are polyurethane hard foam with 7mm (0.27") steel coating on both side (one side green, one side light grey) Framework is made of corrosion-free aluminum.
3. System includes fully welded soccer goals, integrated into the panel system- one entrance door per goal, integrated into a side part of the goal

B. Included Options:

1. Pair of Anti-Vandal goals (aluminum grid) instead of standard goals with mesh net.
2. Cylinder lock mechanism on the entrance doors of the goals
3. The enclosure to have one 8'-6" wide double swing gate at location shown on the drawings.
4. Powder coating on the aluminum parts
5. Noise Absorption treatment with artificial turf on the inside of the panels. Green side of the panel to face the outside.
6. Advertising applied in production on the goal sides. Owner to provide graphic

PART 3 - EXECUTION

3.1 STORAGE AND HANDLING

- A. Mini Pitch System shall be packaged as recommended by the manufacturer and remain packaged until immediately prior to installation to insure protection during transit, storage, and hauling.
- B. Storage of Trash Receptacles shall be in a location away from active construction operations and secured from public access

3.2 INSTALLATION

- A. The contractor shall install all footings for the Mini Pitch System in the manner as shown on the drawings and in strict accordance with manufacturer installation specifications.
- B. Contractor to construct concrete paving as shown on the drawings to receive trash receptacle anchoring system.
- C. The enclosure to stand plumb stable and secure anchored prior to acceptance by Professional.

END OF SECTION 12 93 23

SECTION 13 34 16.53
ANGLE FRAME BLEACHERS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Design and fabrication of angle frame bleachers

1.2 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer must have a minimum of ten years experience in the design and manufacture of bleachers.
- B. Welders must conform to AWS standards.
- C. Source Quality Control: Mill Test Certification.

1.3 CODES AND STANDARDS

- A. 2003 International Building Code

1.4 WARRANTY

- A. Warranty shall guarantee bleachers to be free from defect in materials and workmanship for a period of 1 year under normal use. Warranty period shall begin on date of completion for projects installed by manufacturer, or its subcontractors, OR warranty period shall begin on date of final delivery on projects installed by others.

1.5 SUBMITTALS

- A. Engineering certifications and calculations by a Registered Professional Engineer
- B. Shop drawing

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- A. The contractor shall provide and use all necessary equipment and materials to perform the work described herein.

2.2 MANUFACTURER:

- A. National Recreation Systems, Inc. 5120 Investment Drive Fort Wayne, In 46858-1487 (888) 568-9064 email sales@bleachers.net web site www.bleachers.net
- B. Approved equal.

2.3 DESIGN

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- A. Applicable Codes: INTERNATIONAL BUILDING CODE (IBC), 2003 EDITION
- B. Design Loads:
 - 1. Live Loads: Uniform loading - Structure = 100 psf Uniform loading Seat and Foot plank = 120 plf
 - 2. Sway Loads: Perpendicular to seats = 10 plf Parallel to seats = 24 plf
 - 3. Guardrail Loads: Uniform vertical load = 100 plf Uniform horizontal load = 50 plf Concentrated horizontal load = 200 pounds
 - 4. Wind Loads: Basic design wind speed = 150 mph (exposure "B")

2.4 ANGLE FRAME BLEACHERS

- A. Quantity and Size: Shall consist of 2 unit(s) 3 rows high.
 - 1. Length: 18 feet and 21 feet
 - 2. Net seating capacity per unit excluding aisles, based on 18" per seat: 36 and 42
- B. Framework: Prefabricated galvanized steel angle at max. 6' spacing joined by means of aluminum angle cross bracing.
- C. Shop connections: Welded to meet AWS standards and local code requirements.
- D. Joint Sleeve Assembly: Internal splices, where required shall be two per joint, and shall penetrate the joint a minimum of 8 in each direction and be riveted at one end only to allow for contraction and expansion.

2.5 MATERIALS / FINISHES

- A. Framework:
 - 1. Each frame shall be unit-welded, using metal inert gas method, under guidelines by the American Welding Society. Galvanized Steel: ASTM A36/A & A529/A after fabrication all steel is hot dipped galvanized to ASTM A 123 specifications. All crossbracing and horizontal bracing shall be aluminum angle 6061-T6 mill finish.
- B. Seats and floorboards:
 - 1. Nominal 2" x 10" pressure treated yellow pine.
- C. Accessories:
 - 1. Channel End Caps: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.
 - 2. Hardware: Bolts and Nuts shall be hot dipped galvanized.
 - 3. Hold Down Clip Assembly: Aluminum alloy 6063-T6 mill finish.
 - 4. Joint Sleeve Assembly: Aluminum alloy 6061-T6, mill finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install bleacher unit in accordance with manufacturer written instructions and shop drawings.

END OF SECTION 13 34 16.53

SECTION 22 10 00
PLUMBING SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of Division 1, the General Conditions, the Supplementary General Conditions and the Contract Drawings are hereby made a part of this section as fully as if repeated herein.
- B. The Contractor shall consult these sections in detail as he will be responsible for and governed by the conditions set forth therein and the work indicated.

1.2 DESCRIPTION

- A. Description of System(s): Perform all work necessary and/or required and furnish all materials for a complete installation of the system(s) indicated and specified. Such work shall include, but not be limited to, the following:
 - 1. Piping for ground hydrant system
 - 2. Backflow preventor and valves
 - 3. All miscellaneous devices and accessories for the hydrant systems.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Unless otherwise specified or indicated, all materials and equipment shall be the products of a manufacturer regularly engaged in the production of plumbing materials and equipment.
 - 2. All design, fabrication and erection shall be performed in full compliance with all applicable laws, ordinances, rules, regulations and the latest edition of the following codes and standards:
 - a. IBC
 - b. National Plumbing Code
 - c. Philadelphia Plumbing Code
 - d. NFPA
 - e. UL
 - f. OSHA
- B. Requirements of Regulatory Agencies:
 - 1. Contractor shall comply with all applicable code and regulatory requirements of Federal,

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State and local authorities. These shall include, but not be limited to, the following:

- a. State Health Department
 - b. Local Department of Licenses and Inspections
2. Contractor shall comply with all requirements regarding the testing and inspections of piping system.

1.4 SUBMITTALS

A. General:

1. Submit shop drawings and descriptive data in accordance with the General and Supplementary Conditions of this Specification.
2. Obtain approval of submittals prior to ordering or fabricating materials.

B. Shop Drawings: Furnish shop drawings and descriptive data, complete with project designation, for the following:

1. Backflow preventer and valves
2. Ground hydrant

1.5 PRODUCT DELIVERY, HANDLING & STORAGE

- A. Delivery: Deliver equipment and materials to project site in manufacturer's unopened original packaging.
- B. Handling: During loading, transporting and unloading exercise care to prevent damage to equipment and materials.
- C. Storage: Store materials in area protected from weather, moisture and mechanical damage. Materials that have been exposed to weather or moisture and exhibit excessive scale, rust or water damage will not be permitted.

PART 2 - PRODUCTS

2.1 HYDRANT AND PIPING

- A. Ground Hydrant: non-freeze, flush type, lead-free – Zurn Z1360XL, Murdock or as approved equal
- B. Piping – 3/4" and 1" diameter CPVC pipes, including accessories or as approved equal
- C. Pressure regulating valve
- D. Backflow preventor
- E. Valves

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Water Piping Installation:
 - 1. Cold water piping:
 - a. Layout: Connect at ground water hydrant and install as indicated to supplies, plumbing components, etc.
 - 2. Water piping accessories:
 - a. Install plumbing water lines and accessories according to Philadelphia Plumbing Code.

3.2 TESTING, BALANCING AND ADJUSTING

- A. Test procedures outlined here are a minimum requirement. If requirements of governing authorities or utility companies are more stringent, perform testing procedures as directed thereby. Remove or valve any appurtenances that are not capable of withstanding test pressure.
- B. Pressure testing of all piping systems as follows:
 - 1. Entire plumbing system of piping and ground hydrants:
 - a. Test with water unless weather conditions prevent so doing, in which case, use air.
 - b. Static head of water or psig minimum air pressure must be maintained for 60 minutes without loss of pressure.
 - c. All portions of piping may be tested in sections with necessary test tee connection.
 - d. Finally, test entire system from City of Philadelphia water main.
 - 2. All systems of water piping in place for a 24 hour period as follows:
 - a. 50 psig in excess of expected normal operating pressure.
- C. Test, calibrate and adjust as required the following system components:
 - 1. Shut-off valves
 - 2. Backflow preventers
 - 3. Pressure regulating valves
- D. On the entire cold water piping system:
 - 1. Balance to assure proper flow to each ground water hydrants (hose bibbs).
 - 2. Adjust as required for quiet and proper operation.
- E. Submit to the Engineer all data required for conformance to the requirements of this Article.

END OF SECTION 22 10 00

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SECTION 22 11 30

FLUSH TYPE GROUND HYDRANT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of Division 1, the General Conditions, the Supplementary General Conditions and the Contract Drawings are hereby made a part of this section as fully as if repeated herein.
- B. The Contractor shall consult these sections in detail as he will be responsible for and governed by the conditions set forth therein and the work indicated.

1.2 DESCRIPTION

- A. Description of System(s): Perform all work necessary and/or required and furnish all materials for a complete installation of the system(s) indicated and specified. Such work shall include, but not be limited to, the following:
 - 1. Piping for hydrant systems
 - 2. Backflow preventers
 - 3. Shut-off valves
 - 4. Pressure regulating valves

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Unless otherwise specified or indicated, all materials and equipment shall be the products of a manufacturer regularly engaged in the production of plumbing materials and equipment.
 - 2. All design, fabrication and erection shall be performed in full compliance with all applicable laws, ordinances, rules, regulations and the latest edition of the following codes and standards:
 - a. IBC
 - b. National Plumbing Code
 - c. Philadelphia Plumbing Code
 - d. NFPA
 - e. UL
 - f. OSHA
- B. Requirements of Regulatory Agencies:
 - 1. Contractor shall comply with all applicable code and regulatory requirements of Federal, State and local authorities. These shall include, but not be limited to, the following:
 - a. State Health Department
 - b. Local Department of Licenses and Inspections

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2. Contractor shall comply with all requirements regarding the testing and inspections of domestic water piping system.

1.4 REFERENCES

- A. ASME A112.21.3M
- B. ASSE 1011
- C. SWDA Sect 1417(d)

1.5 SUBMITTALS

- A. Comply with all related sections, such as Submittal Procedures, as required.
- B. Product Data: Submit manufacturer's product data, including installation instructions.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in clean, dry area in accordance with manufacturer's instructions. Do not store materials in direct sunlight.
- C. Handling: Protect materials and finish during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Hydrant
 1. Ground Hydrant: non-freeze, flush type, lead-free – Zurn Z1360XL, Murdock or as approved equal

PART 3 - PART 3- EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive Ground Hydrant. Notify Engineer of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install Ground Hydrant in accordance with manufacturer's instructions provided in the manner deemed acceptable by the engineer or City of Philadelphia.

3.3 PROTECTION

- A. Protect installed Ground Hydrant from damage prior to, during, and post construction.

END OF SECTION 22 11 30

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. The work under this Section shall include all labor, materials, and equipment necessary for Site Clearing as hereinafter specified and/or as otherwise required for the proper and timely completion of the Contract.
- B. This Section includes the following:
 - 1. Removing surface debris.
 - 2. Removing designated paving; curbs; and existing features including, but not limited to inlets, pipes, and fencing.
 - 3. Removing designated trees, shrubs, and other plant life.
 - 4. Removing abandoned utilities.
 - 5. Excavating topsoil.

1.2 RELATED DOCUMENTS

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

1.3 MATERIALS OWNERSHIP

- A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become the Contractor's property and shall be disposed of in accordance with all applicable regulations.

1.4 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Notify utility locator service for area where Project is located prior to site clearing.
- D. Contractor shall verify existing grades prior to performing work under this section. If existing grades are at variance with the drawings, notify the Owner and engineer to receive instructions prior to proceeding. No additional compensation will be considered resulting from grade variances once site clearing has commenced.
- E. All benchmarks and monuments shall be protected during construction. If disturbed or destroyed, they shall be replaced in original position by a licensed surveyor at the Contractor's expense.
- F. Protect areas outside limits of disturbance from encroachment by construction personnel or equipment, regardless of property Ownership. Access shall be by specific, written permission or easement only.

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PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- A. The contractor shall provide and use all necessary equipment and materials to perform the work described herein.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing plant life designated to remain is tagged or identified.

3.2 PREPARATION

- A. Call the Pennsylvania One Call System at 1-800-242-1776 not less than three working days before performing work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Provide erosion control measures in accordance with Section 312500, Soil Erosion and Sediment Control, prior to any construction activity.
- C. Limit of clearing is to be staked and verified by Owner or engineer prior to removal of any material.
- D. All trees and shrubs not designated to remain within the area to be graded, whether shown or not on the drawings, shall be cut and the stumps shall be completely dug out. Burning on site is not permitted.

3.3 PROTECTION

- A. The Contractor shall protect existing underground utilities from damage. The accuracy of the utilities shown on the plan as to line and grade is not guaranteed. Any damage caused by the Contractor to any utility shall be the responsibility of the contractor to correct.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted. If utilities are interrupted, arrange to provide temporary utility services.
 - 1. Notify Owner not less than 72 hours in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruption without Owner's written permission.
- C. All trees and vegetation to remain shall be barricaded and protected during the construction process in accordance with plans and specifications.

3.4 CLEARING AND GRUBBING

- A. Clear areas required for access to site and excavation of Work.
- B. Remove trees and shrubs indicated. Remove stumps and main root balls.
- C. Clear undergrowth and deadwood, without disturbing subsoil.
- D. Remove obstructions, objectionable material, rubbish, junk, trees, shrubs, grass, and other vegetation within the limit of disturbance to permit Work. Removal includes digging out stumps and obstructions and grubbing roots, unless otherwise specified.

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- E. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers and compact each layer to a density equal to adjacent original ground as in accordance with Section 310000 - Earthwork.

3.5 REMOVAL

- A. Remove debris, rock, and extracted plant life from site.
- B. Partially remove paving and curbs. Neatly saw cut edges at right angles to the surface.
- C. Remove abandoned utilities. Indicate removal termination point for underground utilities on Record Documents.
- D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- E. Do not burn or bury materials on site. Leave site in a clean condition.
- F. Comply with requirements specified in Section 01 74 19 - Construction Waste Management and Disposal. Legally dispose of waste off Owner's property.

3.6 TOPSOIL EXCAVATION

- A. Excavate topsoil from entire site within the limit of disturbance without mixing with foreign materials for use in finished grading.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site to depth not exceeding 20 feet and protect from erosion.
- D. Remove excess topsoil not intended for reuse from site.

END OF SECTION 31 10 00

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SECTION 31 23 50

SAWCUTTING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section includes the saw-cutting of existing concrete, bituminous pavement, and footway at the locations indicated on the plans.

1.2 RELATED DOCUMENTS

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

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 GENERAL

- A. Saws shall be equipped with guides, blade guards, water-cooling system and cut-depth control. Sawcut shall be done at the nearest joint, if applicable. The joint shall be sawed continuously and shall be of sufficient depth to allow removal of the paving without disturbing the paving that is to remain.
- B. Contractor to mark out sawcut lines in field for approval by the Owner or Authorized Representative prior to proceeding with the pavement removal.

END OF SECTION 31 23 50

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SECTION 31 25 00

SOIL EROSION & SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The work of this Section includes all temporary erosion and sediment control and related and incidental operations, including:
1. Filter Bag Inlet protection;
 2. Stone and Concrete Block Inlet Protection;
 3. Compost filter sock;
 4. Temporary seeding and mulching;
 5. Rumble Pad Construction Entrance
 6. Pumped Water Filter Bag;
 7. Temporary Stockpile Protection;
 8. Compost Sock Washout Station; and,
 9. Maintenance and repair of erosion and sediment control measures.

1.2 SUBMITTALS

- A. Submit complete shop drawings and product information for all items to be furnished under this Section upon receipt of notice to proceed and prior to construction.

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.
- B. Codes and Standards: Perform work in compliance with applicable requirements of governing authorities having jurisdiction. Construction operations shall be carried out in a manner such that soil erosion, air pollution, and water pollution is minimized. State, County, and Municipal laws concerning pollution abatement shall be followed.
- C. The recommendations and Standards set forth in the Erosion and Sediment Pollution Control Program Manual, published by the PA Department of Environmental Protection, shall be applicable where the work is not specifically detailed in this Specification, the accompanying Drawings, or the Erosion and Sediment Pollution Control Plan.
- D. The Contractor shall take action to remedy unforeseen erosion conditions and to prevent damage to adjacent properties as a result of increased runoff and/or sediment displacement. Stockpiles of wood chips, hay bales, crushed stone, and other mulches shall be held in readiness to deal immediately with emergency problems of erosion. All erosion control checks and structures shall be inspected after heavy rainfalls, and if damaged, repaired or replaced.
- E. No other construction activities may take place until appropriate Erosion and Sedimentation Control devices have been installed and approved by Owner/Authorized Representative. All changes to the Erosion and Sedimentation Control Plan must be approved by Owner/Authorized Representative prior to implementation.

1.4 REFERENCES

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- A. PennDOT, Publication 408 Specifications (most recent edition).
- B. Pennsylvania Department of Environmental Protection, Erosion and Sediment Pollution Control Program Manual (most recent version).
- C. Commonwealth of Pennsylvania, Department of Transportation (PennDOT)
 - 1. Bulletin No. 15: Approved Construction Materials.

PART 2 - PRODUCTS

2.1 FILTER BAG INLET PROTECTION

- A. Filter bags shall be provided in accordance with PennDOT Publication 408, Section 860.
- B. Filter bags shall be manufactured to fit the opening of the catch basin or drop inlet. Filter bags will have the following features:
 - 1. Two dump straps attached at the bottom to facilitate the emptying of the bag;
 - 2. Lifting loops as an internal part of the system to be used to lift the filter bag from the basin;
 - 3. Restraint cord approximately halfway up the sack to keep the sides away from the basin walls, this cord is also a visual means of indicating when the sack should be emptied.
- C. Filter bag seams shall have a minimum certified average wide width strength per ASTM D-4884 of 300 psi.
- D. Inlet filter bags for installation in new or existing highway grate and open mouth grate inlets shall be listed in PennDOT Bulletin 15 or approved equal.
- E. City inlet (and curb opening portion of open-mouth grate inlet) protection shall be a synthetic filter manufactured from recycled synthetic fibers listed in PennDOT Bulletin 15 or approved equal.

2.2 STONE AND CONCRETE BLOCK INLET PROTECTION

- A. In accordance with PennDOT Publication 408, Section 860.2(b).
- B. Inlet protection in roadway is not to include stone or berms.

2.3 COMPOST FILTER SOCK

- A. Compost filter sock shall be provided in accordance with PennDOT Publication 408, Section 867.
- B. The compost socks shall be Filtrexx Siltsox manufactured by Filtrexx International LLC of Grafton, Ohio or approved equal as listed in PennDOT Bulletin 15

2.4 PUMPED WATER FILTER BAG

- A. Pumped water filter bags shall be provided in accordance with PennDOT Publication 408, Section 855.
- B. Sediment filter bag shall be manufactured of non-woven geotextile material that filters soil particles while allowing discharge water to pass through the bag.
- C. The sediment filter bag seams shall be a double 401 lock chain stitch seam with minimum 200 lbs/inch sewn seam strength, tested in accordance with ASTM D-4884.

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- D. The sediment filter bag shall have an adjustable spout large enough to accommodate a six-inch (6") diameter discharge hose.
- E. The pump discharge hose shall be inserted into the bags in the manner specified by the manufacturer and securely clamped.
- F. Filter bag shall be inspected daily. If any problem is detected pumping shall cease immediately and not resume until the problem is corrected.
- G. Filter bag shall be GTF-FB series from Frank Roberts and Sons, Inc., Dirtbag by ACF Environmental, or approved equal, and shall have a rated flow rate fifty percent (50%) greater than the attached pump.

2.5 TEMPORARY SEEDING AND MULCHING

- A. All stockpiles and inactive disturbed areas shall be seeded and mulched in accordance with the design plans if they are to be left exposed for more than twenty (20) days.

2.6 RUMBLE PAD CONSTRUCTION ENTRANCE

- A. Prefabricated rumble pad shall be installed according to manufacturer's recommendations. A sufficient number of pads shall be installed to provide a minimum of four (4) tire revolutions while on pad.
 - 1. More pads may be needed depending on site conditions.
- B. Accumulated materials shall be cleaned from the pads daily and as necessary and disposed of in accordance with all applicable regulations.

2.7 TEMPORARY STOCKPILE PROTECTION

- A. Compost Filter Sock provided in accordance with PennDOT Publication 408, Section 867.
- B. Seeding in accordance with PennDOT Publication 408, Section 804.2(b), Formula E.

2.8 COMPOST SOCK WASHOUT STATION

- A. Concrete washout water shall be directed to the compost sock washout station as indicated on the plans. The compost sock washout station shall be comprised of a compost filter sock in accordance with this specification.

2.9 TEMPORARY STABILIZATION MEASURES

- A. Rolled Erosion Control Products (RECPs) shall be in accordance with PennDOT Pub. 408 Section 806, and from an approved supplier named in Bulletin 15. Non-biodegradable materials shall not be acceptable (including pins or stakes). Installed RECPs shall also be seeded or mulched as appropriate.
- B. Temporary seeding or sodding shall be in accordance with the specified permanent seeding and/or sod requirements, or in the absence of such specified materials shall be in conformance with PennDOT Pub. 408 Section 804, Formula E seed mixture.
- C. Mulch shall be in accordance with the specified permanent mulch, or in the absence of such specified materials shall be in conformance with PennDOT Pub. 408 Section 805, Wood Fiber or Wood Chips. Recycled materials shall not be acceptable for use as mulch (wood pulp, cellulose, etc.).

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- D. Straw or hay temporary stabilization shall only be permitted when use of seeding/sodding or mulch is impracticable (subject to approval by Owner/Authorized Representative). The use of blown straw shall only be accepted when used in conjunction with a tackifier as specified herein. Straw or hay shall be free of weed seeds or other contaminants.
- E. Tackifier shall be Earth Bond tackifier (Turf Guard Manufacturing Inc.) or approved equal. Tackifier shall be composed of organic compounds, and contain no toxins or hazardous materials.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. All temporary erosion and sediment control measures specified herein shall be in place before the beginning of any earthwork or excavation.
- B. All erosion and sediment control devices shall be installed according to the manufacturer's specifications, or in accordance with PennDOT Pub. 408 if no manufacturer recommendation exists.
- C. When temporary erosion and sediment control measures as described herein do not provide adequate control, replacement or relocation of measures shall be required as directed by the Owner/Authorized Representative.
- D. Erosion and sediment control measures shall be inspected weekly and after every precipitation event.
- E. Contractor shall maintain complete written logs of inspections and shall make them available to PWD Inspector/Owner/Engineer upon request.
- F. All maintenance work, including but not limited to cleaning, repair, replacement, regrading, and restabilization of temporary erosion and sediment control measures shall be performed immediately.
- G. Contractor shall ensure that erosion and sedimentation control measures remain in place and fully functional until site achieves final stabilization.
- H. Orange fencing shall be used to delineate the limits of earth disturbance in all off street applications, and as specified in Section 015639 for tree protection.

3.2 PUMPED WATER FILTER BAG

- A. Sediment-laden water shall be pumped through a pumped water filter bag as specified herein.
- B. Filter bags shall be removed and replaced when they have reached their capacity to filter sediment effectively, or upon any breach of the filter bag.
- C. The Contractor shall not discharge to any sewer without the prior approval of PWD from the Industrial Waste Unit.

3.3 TEMPORARY INLET PROTECTION

- A. The downstream inlets from the site of any disturbance or construction on the project site shall be protected with approved inlet protection practices. Downstream inlets are considered to be the next immediate inlet downslope that will receive runoff from the site of any disturbance, as well as any and all inlets within the site itself.

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- B. All new inlets shall be protected with approved inlet protection practices upon installation. Inlets draining exclusively to a stormwater feature shall remain fully closed to runoff until final site cleanup.
- C. Final site cleanup shall include removal of all temporary inlet protection, cleaning of all permanent inlet protection, and cleaning of all inlets (existing downstream inlets and newly installed) of accumulated construction debris and sediment.
- D. Highway grate and open mouth grate inlets shall be protected using inlet filter bags as specified herein.
- E. Open mouth grate inlets and open mouth inlets (city inlets) shall be protected with a compost sock or synthetic filter as specified herein.
- F. Inlet protection shall be installed, inspected, cleaned and replaced according to manufacturer's specifications.
 - 1. Inlet filter bags and open mouth inlet protection shall be removed and replaced when filled with silt or when extended periods of ponding occur following a precipitation event. New inlet filter bags or approved inlet protection devices shall be installed and secured immediately after removal of silted protection devices.

3.4 STORAGE STOCKPLIES

- A. Stockpiles of all loose materials (aggregate, fill, soils, etc) shall be protected from dust and rain by use of a cover. The cover shall be free of defects, and secured adequately to maintain protection of the materials. Owner/Authorized Representative reserves the right to refuse use of any material that has been compromised by inadequate protection onsite.
- B. Stockpiles shall not be placed upslope from any infiltration structure. Any drainage structure (such as but not exclusively inlets) downslope of a stockpile shall be adequately protected from runoff.
- C. Stockpile heights are not to exceed 20 feet high. Stockpile slopes shall be 2:1 or flatter.

3.5 TEMPORARY STABILIZATION

- A. Any disturbed surfaces to remain unfinished and unprotected for more than four (4) days shall be temporarily stabilized. Method to be used shall be approved by the Project Manager and shall be appropriate to the expected length of time employed (for example, use of hay alone without seeding would not be appropriate for a several month application, but could be appropriate for a week-long site delay).

3.6 REMOVAL AND FINAL CLEANUP

- A. Once the site has been fully stabilized and approval is given by Owner/Authorized Representative, temporary erosion and sedimentation control measures and all accumulated silt and sediment shall be removed. All permanent inlet protection measures shall be cleaned, inspected, and verified to be in working order.
- B. Any remaining dirt or debris within the public right of way shall be removed by the Contractor, using necessary means as sufficient to remove the dirt and debris from the public right of way. This may include, but is not limited to, street sweeping, sidewalk vacuuming, inlet cleaning, power washing, or hand removal.
- C. Silt and waste materials shall be disposed of in a proper manner. No extra construction materials

CAPITOLO PLAYGROUND FIELD RENOVATIONS

are to remain onsite upon completion of the Work. The Work of this Contract shall not be considered complete until all extraneous construction-related items have been removed (temporary traffic control devices, signage, etc).

END OF SECTION 31 25 00

SECTION 31 11 16

SUBBASE COURSE

PART 1 - GENERAL

1.1 SUMMARY

- A. This item consists of the preparation of the subgrade and the construction of a layer of aggregate for driveways, footways/sidewalks, and roadway pavement of the depth indicated, to the lines and grades shown on the drawings, or as directed by the engineer.
- B. Section Includes:
 - 1. Aggregate subbase.
 - 2. Aggregate base course.
- C. Related Sections:
 - 1. 31 00 00 - Earthwork
 - 2. 32 16 00 - Concrete Curbs and Sidewalk

1.2 RELATED DOCUMENTS

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

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
- B. ASTM International:
 - 1. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - 2. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 4. ASTM D2940 - Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.
 - 5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 - 1. Submit data for geotextile fabric.
- C. Samples: Submit, in air-tight containers, 10 lb. sample of each type of aggregate fill to testing laboratory.
- D. Materials Source: Submit name of aggregate materials suppliers.

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work according to Pennsylvania Department of Transportation standards.
- C. Maintain one copy of each document on site.

PART 2 - PRODUCTS

2.1 AGGREGATE MATERIALS

- A. Subbase Aggregate:
 - 1. No. 2A Stone Aggregate in accordance with PennDOT Publication 408, Section 703.
- B. Base Course Aggregate:
 - 1. No. 2A Stone Aggregate in accordance with PennDOT Publication 408, Section 703.

2.2 ACCESSORIES

- A. Geotextile Fabric:
 - 1. Class 4, Type C Woven Geotextile Fabric in accordance with PennDOT Publication 408, Section 735.

PART 3 - EXECUTION

3.1 GENERAL

- A. Subbase material shall not be placed on soft, muddy or frozen areas, nor until all irregularities in the prepared areas, including soft areas in the foundation, have been satisfactorily corrected. The subgrade shall be compacted to not less than one hundred percent (100%) of the determined dry weight density.
- B. Unstable subbase conditions, including soft foundation areas which develop ahead of the base and paving operations shall be satisfactorily corrected by scarifying, reshaping, and compacting, or by replacement as required.

3.2 PLACEMENT

- A. Install geotextile fabric over subgrade as indicated on the plans and in accordance with manufacturer's instructions.
 - 1. Lap ends and edges minimum 6 inches.
 - 2. Anchor fabric to subgrade when required to prevent displacement until aggregate is installed.
- B. Place aggregate in equal thickness layers over prepared substrate to total compacted thickness indicated on Drawings.
 - 1. Maximum Layer Compacted Thickness: 6 inches
 - 2. Minimum Layer Compacted Thickness: 3 inches
- C. Level and contour surfaces to elevations, profiles, and gradients indicated.

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- D. Add small quantities of fine aggregate to course aggregate when required to assist compaction.
- E. Maintain optimum moisture content of fill materials to attain specified compaction density.
- F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
- G. When constructed in part width, the extension of the subbase construction shall not proceed to its full width until the existing edge of the subbase is trimmed and all foreign and deleterious material is removed from the remaining prepared area.

3.3 COMPACTION

- A. The uniformly spread material shall be compacted by means of approved equipment to not less than one hundred percent (100%) of the maximum dry weight density (PENNSYLVANIA TEST METHODS (PTM) No. 106, Method B) as determined by PTM No. 112, or PTM No. 402. When the material is too coarse to satisfactorily use these methods, compaction will be determined by the Engineer based on non-movement of the material under the specified compaction equipment. Compaction shall progress gradually from the sides to the center with each succeeding pass uniformly overlapping the previous pass, and shall continue until the entire area is satisfactorily shaped and compacted to the required lines and grades. One (1) density determination shall be made for each three thousand (3,000) square yards or less, on each layer of completed subbase.

3.4 DEPTH TEST

- A. The depth of the finished subbase will be determined by cutting or digging holes to the full depth of the completed subbase. One depth measurement shall be made for each three thousand (3,000) square yards, or less, of the completed subbase. Any section in which the subbase is one half inch (1/2") or more deficient in specified depth shall be scarified to a depth of at least three inches (3"), blended with the necessary additional material, and then recompact to the specified density and depth or otherwise satisfactorily corrected.
- B. All test holes shall be cut or dug, backfilled with similar material, and satisfactorily compacted by and at the expense of the Contractor. This operation shall be under the direct supervision of the inspector who will check the depth for record purposes.

3.5 MAINTENANCE OF TRAFFIC

- A. No traffic shall be allowed on the completed subbase other than necessary local traffic and that developing from the operation of essential construction equipment, unless otherwise directed by the Engineer. Any defects which may develop in the construction of the subbase or any damage caused by the operation of local or job traffic is the responsibility of the Contractor and shall be immediately repaired or replaced at the expense of the Contractor.
- B. The completed subbase shall be uniformly moistened immediately prior to the construction of the base course and/or pavement, except when a hot-mix bituminous base course is to be placed.
- C. Completed subbase which has been subjected to hauling or exposed to the elements for periods in excess of one-hundred-twenty (120) calendar days will require re-testing of the material and re-approval by the Engineer before construction of the base course or pavement may proceed. Subbase so used or exposed, not meeting the requirements herein specified shall be re-constructed or replaced as directed by the Engineer at the expense of the Contractor.

END OF SECTION 32 11 16

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SECTION 32 16 23
CONCRETE 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 SCOPE OF WORK

- A. This Section includes construction of Concrete Sidewalks and Pavements.

1.3 RELATED SECTIONS

- A. Section 32 11 16 – Subbase Course

PART 2 - PRODUCTS

2.1 CONCRETE PAVING

- A. Concrete: Class A, in accordance with PennDOT Publication 408, Section 704.
- B. Aggregate: PennDOT Publication 408, Section 703.2 for Type C or better Number 2A material.
- C. Cure: PennDOT Publication 408, Section 711.2 (a).
- D. Joint Material: PennDOT Publication 408, Section 705.1.

PART 3 - EXECUTION

3.1 CONCRETE PAVING

- A. In accordance with PennDOT Publication 408, Section 676.3. The thickness of the sidewalk paving and aggregate shall be as defined in the construction plans.

3.2 AGGREGATE BASE

- A. In accordance with PennDOT Publication 408, Section 350.3.

END OF SECTION 32 16 23

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SECTION 32 31 13

VINYL COATED CHAINLINK FENCE AND GATE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fence framework, fabric, and accessories.
 - 2. Excavation for posts.
 - 3. Concrete encasement for posts.
 - 4. Manual gates and related hardware.

- B. Related Sections:
 - 1. Drawings and general provisions of the Subcontract apply to this Section.
 - 2. Division 01 Section "General Requirements."
 - 3. Division 01 Section "Special Procedures."
 - 4. Section 03 30 00 Cast in Place Concrete

1.2 REFERENCES

- A. General:
 - 1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
 - 2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
 - 3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.
 - 4. Federal Specifications (FS)

- B. FS RR-F-191/1C Fencing, Wire and Post Metal (Chain-Link Fence Fabric)

- C. State of California - California Department of Transportation (CALTRANS):

- D. Standard Specifications: Chapter 80-4 excluding Section 80-4.04

- E. American Society for Testing and Materials (ASTM)
 - 1. ASTM A123 / A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - 2. ASTM C94 / C94M Standard Specification for Ready-Mixed Concrete
 - 3. ASTM D 412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
 - 4. ASTM D 792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
 - 5. ASTM D 1499 Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Plastics
 - 6. ASTM D 2240 Test Method for Rubber Property—Durometer Hardness
 - 7. ASTM F 668 Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric

1.3 SUBMITTALS

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- A. Submit under provisions of Division 01 Section "General Requirements."
- B. Submit shop drawings and product data.
 - 1. Include accessories, fittings, hardware, anchorages, and schedule of components.
- C. Manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Vinyl Fencing: Materials for vinyl-coated chain link fence shall be as specified herein. Material shall be of the same color of vinyl coating. Painted finishes are not acceptable. The color for this job is the manufacturer's standard black as approved by the University.
- B. Posts and Braces: Section 80-4.01A of CALTRANS
- C. Fabric: Section 80-4.01B of CALTRANS
- D. Accessories: Section 80-4.01C of CALTRANS
- E. Gates: Section 80-4.01D of CALTRANS

2.2 CONCRETE MIX

- A. Concrete: ASTM C 94; type II Portland Cement; 2500 psi at 28 days; 3-inch (75 mm) slump; 3/4-inch (20 mm) maximum size aggregate.

2.3 COMPONENTS

- A. Line Posts: 2.375-inch (59 mm) outside diameter, Schedule 40 galvanized steel pipe or galvanized "H" columns weighing not less than 2.7 lb./ft (13.18 kg/m²).
- B. Corner and Terminal Posts: 2.875-inch (73 mm) outside diameter, Schedule 40 galvanized steel pipe.
- C. Gate Posts: 3.500-inch (89 mm) diameter for man gates and 6.625-inch (168 mm) diameter for vehicular gates; gateposts to be galvanized steel pipe.
- D. Top, Bottom and Brace Rail: 1.660-inch (42.16 mm) outside diameter, plain end, sleeve coupled galvanized steel pipe.
- E. Gate Frame: 1.9-inch (48.26 mm) outside diameter Schedule 40 galvanized steel pipe for fittings and truss rod fabrication.
- F. Fabric/Vinyl Coated Steel: Chain link fence fabric shall be galvanized steel wire with a continuously bonded vinyl coating, with a finish size (i.e., size after coating) of 8 gauge, and shall comply with ASTM F 668. Fabric height shall be 8 feet (2.44 m) , +/- 3/4 inch (20 mm), with knuckled, selvage edges on the bottom and top. Mesh shall be vertically-woven diamond mesh, with a nominal distance of 2 inches (50 mm) between parallel wires.
- G. Tension Bars: 3/16 inches by 3/4-inch (4.76 mm by 20 mm) galvanized steel flat bars.
- H. Caps: Cast steel or malleable iron, galvanized, sized to post dimension, set-screw retained.

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- I. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings shall be galvanized steel.
- J. Extension Arms: Cast steel, to accommodate 3 strands of barbed wire, single arm, 12-inches (305 mm) high (measured vertically) above the top edge of the fence fabric, sloped to 45 degrees.
- K. Barbed Wire: 12-AWG wire, 3 strands, zinc-coated steel with bonded vinyl coating and 4 point barbs at 5-inches (127 mm) O.C., painted black.
- L. Gate Hardware: Fork type latch with gravity drop; center gate stop and drop rod; three 180 degree gate hinges per leaf.
- M. Privacy Slats: Plastic fencing slats manufactured from 97 percent recycled plastic containing 97 percent post-consumer recycled plastic.

2.4 FINISHES

- A. Galvanized Surfaces: Galvanize surfaces in accordance with ASTM A 123, with a coating of at least 1.20 oz/sq. ft.
- B. Accessories and Components: Same finish as fabric.

2.5 VINYL COATING

- A. The vinyl coating shall conform to FS RR-F-191/1C.
- B. Colors shall be stabilized and shall have a light fastness to withstand a minimum Weather-O-Meter exposure of at least 1500 hours without deterioration when tested in accordance with ASTM D 1499.
- C. Specific gravity shall be between 1.26 and 1.30 in accordance with ASTM D 792.
- D. Hardness shall be A90 +/-5 in accordance with ASTM D 2240.
- E. Tensile strength shall be between 2600 and 3000 psi (17.94 MPa and 20.7 MPa) in accordance with ASTM D 412.
- F. Vinyl coating shall be exposure-resistant to dilute solutions of most common mineral acids, sea water, salts, and alkali.
- G. Vinyl coating shall be continuously bonded to the wire under 5000 psi (34.5 MPa) pressure before the wire is woven into fabric.
- H. Color to be Black

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install framework, fabric, accessories, and gates in accordance with section 80-4.02 of CALTRANS.
- B. Install security fence of 8-foot (2.45 m) fabric height with 1-foot (0.9 m) barbed extension on support arms as shown on Drawings.

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- C. Space line posts at intervals not exceeding 10 feet (3 m).
- D. Set gate and posts plumb, in concrete footings with top of footing 1 inch (25 mm) above finish grade. Slope top of concrete for water runoff. Footings for line end and corner posts are to be 8 inches (203) diameter by 3 feet (0.91 m) deep below finish grade and for gates are to be 12 inches (305 mm) diameter by 3 feet 6 inches (1.07 m) deep below finish grade.
- E. Provide top rail through line-post tops and splice with 7-inch (178 mm) long rail sleeves.
- F. Brace each gate and corner post back to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate posts.
- G. Install center and bottom brace rail on corner and gate leaves.
- H. Stretch fabric between terminal posts or at intervals of 100 feet (30.5 m) maximum, whichever is less.
- I. Position bottom of fabric to no more than 2 inches (50 mm) above concrete or asphalt grade and touching dirt finish grade.
- J. Fasten fabric to top rail, line posts, braces, and bottom tension wire with 11-AWG galvanized wire ties 24 inches (610 mm) maximum on centers.
- K. Attach fabric to end, corner, and gateposts with tension bars and tension bar clips.
- L. Install bottom rail supported at each line and terminal post in such a manner that a continuous brace between posts is formed.
- M. Install gates with fabric and barbed wire overhang to match fence. Install three hinges per leaf, latch, catches, drop bolt, foot bolts and sockets.

END OF SECTION 32 31 00END OF SECTION 32 31 13

SECTION 32 91 13

PLANTING SOIL MIX

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This work shall consist of all the labor, materials and equipment needed for the preparation, mixing and placing of the planting soil.

1.2 RELATED SECTIONS

- A. General Conditions, Special Contract Requirements and Division 01 Specification sections are a part of and govern work under this section.
- B. Section 32 92 23 – Sod
- C. Section 32 93 00 – Exterior Plants

1.3 SUBMITTALS.

- A. Topsoil Analysis Report: Submit certified soil analysis report for topsoil.
 - 1. Before delivery of topsoil, furnish to the Site Architect a certified soil analysis, made by a certified soil-testing laboratory. In the soil analysis report, indicate the particle size distribution, sand/silt/Clay composition, the testing laboratory's recommended quantities for nitrogen, phosphorus, and potash; and any limestone, aluminum sulphate, or other soil amendments to be added to make the soil suitable.
 - 2. If modifications to topsoil are needed as per testing laboratory's recommendations. Modify topsoil so it meets requirements in this specification and per the recommendations in soil analysis. Submit for Site Architect's approval, a topsoil report of the modified soil that will be used on site.
 - 3. Submit to the Site Architect a certified soil analysis made by a certified soil testing laboratory of the planting mix (amended when necessary) showing total porosity, non-capillary porosity, capillary porosity, pH and organic matter content. Contractor to also submit location and source of the topsoil to the Site Architect.
- B. Soil sample:
 - 1. Submit a sample of topsoil and a sample of mixed planting soil to the Site Architect.
 - 2. Sample should be dry.

1.4 QUALITY ASSURANCE AND GUARANTEE

- A. General: Comply with applicable federal, state, county, and local regulations governing landscape materials and work.
- B. Employ only experienced personnel familiar with required work. Provide adequate supervision by qualified foreman.
- C. Coordinate with work of other sections
 - 1. Utilities: Determine location of underground utilities and perform work in a manner to avoid possible damage. Excavate by hand as required.
 - 2. Maintain grade stakes, and protective fencing set by others until removal is mutually

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- agreed upon by entities involved.
3. Coordinate with other contractors on site for access, locations, and sequences of work.
- D. Inspection: The Site Architect may inspect topsoil and mixed planting soils at any time during the process for compliance with requirements and may reject any defective or unsatisfactory topsoil or mixed planting soil. Such inspections shall not limit the rights of the Site Architect regarding warranty of trueness to analysis.
1. Remove rejected planting soil from project site immediately.
- E. Guarantee: All materials shall be guaranteed true to the analysis as required.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Topsoil shall be fertile, friable natural loam capable of sustaining vigorous plant growth. Furnished topsoil shall meet the following grading analysis:

1. Particle size

<u>Sieve</u>	<u>Minimum Percent Passing</u>
2"	100
No. 4	75
No. 10	60

2. Sand, silt and clay material passing the No. 10 sieve shall be present within the following ranges:

	<u>Minimum Percent</u>	<u>Maximum Percent</u>
Sand	30	50
Silt	10	30
Clay	20	50

- B. The topsoil shall be free from subsoil, stones larger than one inch, clods of hard earth, sod, plants or roots, sticks or other extraneous materials. It shall contain no toxic materials. Topsoil from swampy areas or areas of standing water will not be permitted. Do not deliver topsoil in either a frozen or muddy condition.

1. SOIL AMENDMENTS

- C. Limestone: Ground limestone shall have a minimum of 85% total carbonates and a minimum of 50% total calcium oxides. At least 90% of it shall be able to pass a No. 20 sieve and at least 50% to pass a No. 100 sieve.

- D. Fertilizers: Fertilizer shall be standard commercial fertilizer conforming to the requirements of the Pennsylvania Soil Conditioner and Plant Growth Substance Act of December 1, 1977, P.L. 258, No. 86 (3 P.S. 68.2), as amended and any other applicable State and Federal laws. Quantities as per soil analysis.

1. Use 20-10-5 (10 gram tablets) slow release, plus iron supplement as required.
2. Additives: Add in the amount and manner prescribed by the soil analysis.
3. Organic Matter: On dry weight basis 90% or better pH factor 3.5 - 5.5.
4. Porous Ceramics: Profile, Isolite or Axis.

2.2 EXTERIOR PLANTING SOIL MIX

CAPITOLO PLAYGROUND FIELD RENOVATIONS

- A. Planting soil mix shall be topsoil amended per the results of the soil analysis to have the following properties. Test the mixture to confirm it meets the specified requirements before placing.
 - 1. pH 6.0 to 7.0
 - 2. Total porosity 40-55%
 - 3. Non-capillary porosity (at 300 mm tension) 20-30%
 - 4. Capillary porosity (at 300 mm tension) 20-25%
 - 5. Organic matter content (by weight)
 - a. Lawn area: 2-5%
 - b. Trees, shrubs, ground covers and specialty seeding area: 10-20%
- B. Mycorrhizal fungi: Mycorrhizal fungi shall be added to planting soil prior to backfilling the planting pit except for Rhododendron and Kalmia species.
 - 1. For Trees and Shrubs: DIEHARD "Transplant" by Horticultural Alliance, Inc. (800-628-6373) or Approved Equal.
 - 2. For Flower Beds: DIEHARD "Flower Beds" by Horticultural Alliance, Inc. (800-628-6373) or Approved Equal.

PART 3 - EXECUTION

3.1 EXTERIOR PLANTING SOIL MIX

- A. Before mixing, clean topsoil of roots, plants, sod, stones, clay lumps and other extraneous material harmful to plant growth.
- B. Mixing: Mix topsoil and amendments thoroughly to provide uniform mixture, using drum-type mechanical mixer, powered rotary tiller, or other means acceptable to the Site Architect.
- C. For planting beds, mix planting soil prior to placing.
- D. Depth of planting mix
 - 1. Lawn area: 6".
 - 2. Continuous planting beds: 12" unless otherwise indicated in the drawings.

END OF SECTION 32 91 13

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SECTION 32 92 23

SOD

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This work shall consist of supplying all the materials, labor, equipment and incidentals necessary for the installation and maintenance for 12 months of sodded areas, as indicated on the plans.

1.2 RELATED WORK

- A. General Conditions, Special Contract Requirements and Division 01 Specifications are a part of and govern work under this section.
- B. Section 32 91 13 – Planting Soil Preparation
- C. Section 32 93 00 – Exterior Plants

1.3 SUBMITTALS

- A. Certificate of Sod: Submit sod vendor's certified statement of sod composition stating botanical and common name, percentage by weight, percentages of purity and germination analysis prior to installation.
- B. Planting Schedule: Submit proposed planting schedule indicating anticipated dates of installation.
- C. Methods for temporary storage of sod.
- D. Maintenance Instructions: Submit written instruction procedures to be established by the
- E. owner for maintenance of the lawn. Areas to be covered are:
 - 1. Mowing/grooming,
 - 2. Watering,
 - 3. Fertilizing,
 - 4. Weed removal.

1.4 STANDARDS

- A. Pennsylvania Seed Act of 1965, Act No. 187
- B. Pennsylvania Department of Agriculture regulation (PDAR), Bureau of Plant Industry.

1.5 QUALITY ASSURANCE AND GUARANTEE

- A. Comply with applicable federal, state, county, and local regulations governing landscape materials and work.
- B. Employ only experienced personnel familiar with required work. Provide adequate supervision by qualified foreman.
- C. Substitutions: Substitutions of sod materials are not allowed. If required is not obtainable, submit

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proof of unavailability to Site Architect, together with proposal for use of equivalent material. When authorized, adjustment of contract will be made by change order.

D. Coordinate with work of other sections

1. Utilities: Determine location of underground utilities and perform work in a manner to avoid possible damage. Excavate by hand as required.
2. Maintain grade stakes, and protective fencing set by others until removal is mutually agreed upon by entities involved.

E. Maintenance and Warranty

1. Sodded areas shall be maintained and guaranteed by the Contractor to remain alive and healthy for 12 months after the date of the installation acceptance of the Site Architect. Sodded areas in an impaired, dead or dying condition, shall be resodded within 24 hours of notification by Site Architect.
2. The Contractor will not be held responsible or liable for damages to sodding by animals, malicious or careless damage by human agencies, or by fire, or storm damage.

F. Inspections:

1. An Installation Inspection of this work will be made by the Site Architect upon written notification by Contractor of completion. Under normal circumstances this date shall be within two working weeks of written notification.
 - a. Criteria - Installation Inspection will be for apparent correctness of sodding, proper maintenance since time of sodding, and addition of all materials at time of inspection.
 - b. Acceptance - Acceptance of sodding at Installation Inspection will be the basis for invoicing, excluding any amounts tied to guarantee fulfillment.
 - c. Rejection and Replacement - Resod sodded areas rejected at Installation Inspection within 1 week. Where immediate resodding or reseeding would result in sodding outside the Spring or Fall planting season, resod during the next planting season.

Each resodding resulting from rejection at Installation Inspection will be considered for inspection and guarantee as if it were a newly sodded area, and all guarantee dates will correlate to the date of the acceptable replacement.

Repeated resodding may be required until the criteria of the Installation Inspection are met.

2. Two guarantee inspections will be made within the guarantee period, as follows:
 - a. First Guarantee Inspection

<u>Season when Installed</u>	<u>Time Elapsed since Install'n Acceptance</u>	<u>Date of First Guarantee Inspection</u>
SPRING	3 1/2 to 6 months	On or near Sept. 1 year of installation
FALL	3 1/2 to 6 months	On or near April 1 year following installation

- 1). Notify the Site Architect in writing of pending inspections approximately two weeks in advance, and arrange a mutually convenient date.

Inspections scheduled on or near April 1 may be adjusted to ensure that the sodded areas are not dormant at the time of inspection.

- 2). Criteria - The First Guarantee Inspection will be for survival, health, acceptable growth and fullness, durability of installation, proper maintenance practices, and trueness to type.

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- 3). Acceptance - Acceptance at the First Guarantee Inspection will not be the basis of any invoice unless a specific progress payment agreement is listed below.
 - 4). Rejection and Replacement - Replace rejected sodded and seeded areas during the planting season most closely following the inspection
- b. The final Guarantee Inspection shall be conducted on or near the date one year after an accepted Installation Inspection. Notify the Site Architect at least two weeks in advance and arrange a mutually convenient date.
- 1). Criteria - Same as the First Guarantee Inspection
 - 2). Acceptance - Acceptance at the Final Guarantee Inspection will be the basis for final payment.
 - 3). Rejection and Replacement - See 1.05 Quality Assurance and Guarantee F., 1., c.
3. The Site Architect retains the right of inspection at any time, during the work to inspect seeding for true species, variety, size and condition of root systems, insects, injuries, and latent defect, and to reject unsatisfactory or defective seeding.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect sod during delivery and while stored at site.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. See Section 02912: Soil Preparation

2.2 SOIL AMENDMENTS

- A. Limestone: Ground limestone shall have a minimum of 85% total carbonates and a minimum of 50% total calcium oxides. At least 90% of it shall be able to pass a No. 20 sieve and at least 50% to pass a No. 100 sieve.
- B. Fertilizers: Fertilizer shall be standard commercial fertilizers conforming to the requirements of the Pennsylvania Soil Conditioner and Plant Growth Substance Act of December 1, 1977, P.L. 258, No. 86 (3 P.S. 68.2), as amended and any other applicable State and Federal laws.

At time of sodding or seeding, fertilizers shall be 14-28-15 for dry application or 16-32-16 for wet application. For maintenance, fertilizer shall be 10-6-4 and applied at the rate of 2.5 lbs. N/1000 ft²/yr. Chemical analysis shall be guaranteed and clearly shown on each bag. The derivation of fertilizer elements shall be as follows:

Nitrogen...ammonium sulfate, ammonium nitrate, or ammonium phosphate
Phosphorus...phosphoric acid, calcium phosphate, ammonium phosphate
Potassium...muriate of potash

- C. Organic Matter: On dry weight basis 90% or better, pH 3.5-5.5.

2.3 MISCELLANEOUS MATERIALS

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- A. Outline Stakes: 1"x2"x48" length, as approved by Site Architect.
- B. Water shall be free from oil, acids, alkalis, salts or any other substance injurious to plant life. Water from stream, lakes, ponds or similar sources shall not be used unless approved by Site Architect.

2.4 SOD

- A. Sod may be nursery or field grown.
- B. Sod shall be weed-free *Poa pratensis* (Kentucky Bluegrass) containing a mix of four or five named varieties, one of which shall be Glade or A-34, each at a minimum 20% by weight and 10-20% perennial ryegrass.
- C. Sod sections shall be machine cut into pads between 12 and 16 inches wide and 24 to 35 inches long. For large areas sod may be furnished in rolls. Minimum thickness of sod shall be 3/4 inch excluding top growth and thatch. Broken, torn or uneven pieces are not acceptable.
- D. Moisture content: Sod shall not be harvested or transplanted when the moisture content is excessively wet or dry and may adversely affect its survival.

PART 3 - PART 3 - EXECUTION

3.1 SODDING SCHEDULE

- A. Sod when conditions of ground and weather permit establishment without danger of freezing or drying out.
- B. The Contractor shall be responsible for choosing proper sodding and seeding times, and for taking proper precautionary and maintenance measures to assure survival and growth. Do not place seeds when the temperature is under 32 degrees Fahrenheit.
- C. Installation times:
 - Spring: March 15 – June 30
 - Fall: September 1 - October 15.

These dates may be adjusted by the Site Architect as a result of actual weather conditions. Submit an installation schedule for written approval.

The decision of the Site Architect with regard to changed planting seasons shall be taken in consultation with the Contractor, but shall be final and shall not be grounds for any claim whatsoever by the Contractor, nor shall the normal planting seasons defined above be construed as a guarantee that the Contractor can in fact plant during any given day within such seasons.

- D. Trees, shrubs, and ground covers shall be planted after final grades are established and prior to sodding or seeding unless otherwise acceptable to the Site Architect. If planting of trees, shrubs, or ground covers should occur after sod or seed installation, protect sod and seeded areas and promptly repair damage resulting from planting operations.

3.2 SOD BED PREPARATION

- A. Advance Preparation and Clean up: After grading of areas has been completed and before applying fertilizer and ground limestone, areas to be sodded or seeded shall be treated mechanically and or chemically to remove existing vegetative cover, also to be raked or otherwise cleared of stones

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larger than 2 inches in any diameter, sticks, stumps and other debris which might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass covered areas. If any damage by erosion or other causes has occurred after the completion of grading and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage. This may include filling gullies, smoothing irregularities, and repairing other incident damage.

- B. An area to be sodded shall be considered a satisfactory bed without additional treatment if it has recently been thoroughly loosened and worked to a depth of not less than 6 inches as a result of roto-tilling and grading operations and, if immediately prior to sodding or seeding, the top 3 inches of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter and if shaped to the required grade.
- C. Soil shall be tested by a soil testing service. Soil amendments shall be added at rates recommended by the results of the soil tests before sodding or seeding.

3.3 SOD INSTALLATION

- A. Lay sod within 24 hours from the time of stripping. The soil shall be moist to a depth of six inches, but not saturated prior to installation of sod.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips. Do not overlap or stretch. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod. On steep slopes, peg the sod strips with wooden pegs to prevent slippage, and lay sod strips perpendicular to the slope of the steep area.
- C. Tamp or roll lightly to ensure contact with subgrade. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering adjacent grass.
- D. Water sod thoroughly with a fine spray immediately after planting. Repeat every day in the absence of rain until roots have grown into soil, usually 2 to 3 weeks.
- E. After installation the Contractor shall remove trash, debris and excess materials from the site and leave the paved areas in a clean condition.

3.4 MAINTENANCE

- A. The Contractor shall protect sodded areas against traffic or other use by warning signs or barricades, as approved by the Site Architect. Surfaces gullied or otherwise damaged following sodding shall be repaired by regrading and resodding as directed.
- B. The contractor shall coordinate mowing with other activities by maintenance staff. Water as required and otherwise maintain sodded areas in a satisfactory condition until final installation acceptance.
- C. All turf areas will be renovated in spring. This will include aerating, dethatching, groove seeding and applying a starter fertilizer.
- D. Contractor shall mow grass weekly during growing season and maintain the grass 2 ½" to 3" in height.
- E. Contractor shall fertilize grass 3 times during each maintenance year: (1) late summer or early fall, (2) late November, and (3) late spring.
- F. Per-emergent herbicide will be applied in the spring to help control weed. Herbicide will be applied

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semiannually.

G. Pesticide will be applied as needed.

END OF SECTION 32 92 23

SECTION 32 93 00

EXTERIOR PLANTS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This work shall consist of all labor, materials and equipment for planting, preparation, and furnishing all trees, shrubs, groundcovers and herbaceous plant materials as shown in the plans

1.2 RELATED SECTIONS

- A. The specification sections "General Conditions", "Special Requirements" and "General Requirements" form a part of this Section by this reference thereto and shall have same force and effect as if printed herewith in full.
- B. Related Sections
 - 1. Section 32 91 13 – Planting Soil Mix

1.3 STANDARDS

- A. "Standardized Plant Names," American Joint Committee on Horticultural Nomenclature (AJCHN), 1942 edition.
- B. ASNS, ANSI, Z60.1 of the AAN.

1.4 SUBMITTALS

- A. Planting Schedule: Submit proposed planting schedule in writing to Site Architect 60 working days prior to starting work, indicating anticipated dates and locations for each plant installation. Proposed schedule must comply with the requirements of the section 1.05 Quality Assurance and Guarantee.
- B. The methods for temporary storage of planting materials.
- C. Maintenance Schedule: Provide written maintenance schedule detailing tasks to be performed by contractor during maintenance period.
- D. Submit names of nurseries and plants being supplied by individual nurseries for inspection purposes.
- E. Submit Tree Staple™ schedule prior to installation for approval.

1.5 QUALITY ASSURANCE AND GUARANTEE

- A. Comply with applicable federal, state, county, and local regulations governing landscape materials and work.
- B. Employ only experienced landscape personnel. Provide adequate supervision by a foreman with a degree in horticulture, landscape architecture, forestry, or related field, and a minimum of 5 years experience in the landscaping field.

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- C. Substitutions of landscape materials are not allowed. If specified landscape material is not obtainable, submit written proof of unavailability to the Site Architect including names and phone numbers of three local nurseries contacted, together with proposal for use of equivalent material. When authorized, adjustment of contract will be made by written change order.
- D. Provide quantity, size, genus, species, and variety of plant materials indicated and scheduled for landscape work. Comply with applicable requirements of ASNS, ANSI, Z60.1-069, of the AAN.
- E. The measurements specified are the minimum size acceptable and are the measurements after pruning, when pruning is required.
1. Measure trees and shrubs with branches and trunks or canes in their normal position.
 2. Do not prune to obtain required sizes.
 3. Take caliper measurements 6" above ground for trees up to 4" caliper, and 12" above ground for larger size.
 4. Measure main body of shrub for height and spread dimensions; do not measure from tip to tip of branches or roots.
- F. Maintenance and Guarantees.
1. General:
 - a. Guarantees shall be in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the contract documents.
 - b. The Contractor must guarantee all plant material for the specified guarantee period, and proper maintenance is an integral part of such guarantee.
 - c. All costs of guarantee including maintenance must be included in the bid price for planting. No extra payment will be allowed for any aspect of guarantee or maintenance.
 - d. All warranty and guarantees commence at Substantial Completion.
 2. Definitions:
 - a. "Plant Material" includes all vegetation of any species, installed by any means including transplanting, on site propagation, or other methods.
 - b. "Installation" refers to placement of plant material as defined by the plans and specifications and in accordance with sound horticultural practice.
 - c. "Maintenance" refers to those practices required during the first year after substantial completion to keep plant material alive and healthy, free from pests, diseases, weeds and defects. In case of unsatisfactory growth, such practices as trimming, pruning or otherwise controlling the plant materials to fit the requirements of the design, are to be based on sound horticultural methods and vary from species to species and in accordance with the regional environment.
 - d. "Guarantee" refers to the guarantee that at a specified date the plant material will be alive and in healthy condition described under "Maintenance" above.
 - e. The activities of maintenance are a necessary part of any guarantee of plant material. The guarantee period is as defined below.
 - f. "Guarantee" also refers to the guarantee that all plant material is true to type, species, and variety. Claims against the trueness-to-type guarantee must be made by the Owner or/and the design professional within 6 months of the first appearance of flowers or other conclusive botanical identifying features.
 - g. The activities of maintenance are a necessary part of any guarantee of plant material. The guarantee period is as defined below.
- G. Period of Maintenance and Guarantee
1. Maintain all plant material from the time they leave the supplier's nursery or vehicle, and continue to maintain all plant material through the installation period as defined below. The Maintenance and Guarantee period shall be for 12 months after substantial completion. The guarantee defines that the maintenance will be correctly performed throughout

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the guarantee period. Where more than one period might be applicable to a species, the longest of the applicable periods shall apply unless specifically limited by this contract.

2. The Contractor will not be held responsible or liable for damages by animals, malicious or careless damage by human agencies over which the contractor has no control, or by fire and storm damage.

H. Inspection

1. The Site Architect retains the right to inspect all plant material at the nursery.
2. Even when trees are tagged in the nursery by the Site Architect, the Site Architect retains the right to reject any plant material on site that does not conform to the requirements as shown on the construction drawings and specified in this specification section, including the sizes and conditions of approved substitutes.
3. Upon written notice of completion by Contractor, the Site Architect will make an Installation Inspection to determine substantial completion. Under normal circumstance this date shall be within two working weeks of written notification. Substantial Completion will commence upon satisfactory final inspection by Site Architect.
 - a. Criteria: Installation Inspection will be for apparent correctness of the installation of plant material, verification of quantities, proper maintenance since time of planting, specified species and specified size.
 - b. Acceptance - Acceptance of plant material at Installation Inspection will be the basis for invoicing, excluding any amounts tied to guarantee fulfillment.
 - c. Rejection and Replacement - Replace plant material rejected at Installation Inspection immediately. Where immediate replacement would result in planting outside spring or fall planting season, replace during the next planting season.
 - d. Each replacement resulting from rejection at Installation Inspection will be considered for inspection and guarantee as if it were a new plant material, and all guarantee dates will correlate to the date of the acceptable replacement.
 - e. Repeated replacement may be required until the criteria of the Installation Inspection are met.
4. Two guarantee inspections will be made within the guarantee period, as follow:

a. First Guaranteed Inspection

Season when Installed	Time Elapsed since Installation Acceptance	Date of First Installation Inspection
Spring of year	3 ½ to 6 months	Inspection of Installation on/near Sept. 1
Fall of year	3 ½ to 6 months	Inspection of Installation on/near April 1

- i) Notify the Site Architect in writing of pending inspections approximately two weeks in advance, and arrange a mutually convenient date.
- ii) Inspections scheduled on or near April 1 may be adjusted to ensure that the plant material is not dormant at the time of inspection.
- iii) Criteria: The First Guarantee Inspection will be for survival, health, acceptance growth and fullness, durability of installation, proper maintenance practices, and trueness to type.
- iv) Acceptance: Acceptance at the First Guarantee Inspection will not be the basis of any invoice unless a specific progress payment agreement is listed below.
- v) Rejection and Replacement: Replace rejected plant material areas during the planting season most closely following the inspection.

- b. The final Guarantee Inspection shall be conducted on or near the date one year after substantial completion. Notify the Site Architect at least two weeks in advance

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and arrange a mutually convenient date.

- i) Criteria: Same as the First Guarantee Inspection
- ii) Acceptance: Acceptance at the Final Guarantee Inspection will be the basis for final payment.
- iii) Rejection and Replacement: See Quality Assurance and Guarantee.
- iv) The Site Architect retains the right of inspection at any time during the work to inspect plant material for true species, variety, size and condition of root systems, insects, injuries, and latent defect, and to reject unsatisfactory or unacceptable plant material.

- I. Coordinate with work of other sections.
- J. If underground obstructions are encountered, notify Site Architect as to whether an adjustment of location for plant material is possible within the design intent. If the contractor is allowed to adjust the location, rather than remove the obstruction, he/she shall make the change at no expense to the Owner.

PART 2 - PRODUCTS

2.1 PLANTING SOIL

- A. See Section 32 91 13 Planting Soil Mix

2.2 MULCH

- A. Organic Mulch
 1. Mulch to consist of fibrous organic material, resistant to displacement by wind and free of foreign material, coarse stems, and any substance toxic to plant growth, and to be free of insects, mature seed-bearing stalks or roots of prohibited and noxious weeds.
 2. Mulch to be suitable double shredded, aged hardwood or pinewood bark, not decomposed, size passing one inch square mesh 100% and retained 1/8 inch square mesh

2.3 TREES

- A. General:
 1. Plant stocks:
 - a. Plants shall be of specimen quality, exceptionally heavy, symmetrical, dense plants so trained or favored in development and appearance as to be unquestionably and outstandingly superior in form, number of branches, compactness and symmetry.
 - b. Plants shall be nursery grown under climatic conditions similar to those in the locality of the project for at least two years.
 - c. Provide healthy stock free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions, and disfigurement.
 - d. Plants shall have fully developed root systems and have roots pruned two years prior to being dug
 - e. Site Architect to approve all plant material before installation
 - f. B&B material for spring planting shall not be dug prior to March 1 of the installation year. B&B material for fall planting shall not be dug prior to Oct 1 of the installation year.
 2. Size:
 - a. Provide plant materials of size indicated on plan and with proportions and shape

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as defined in ASNS, ANSI, and Z60.1 of the AAN for individual species. Trees and shrubs of larger size than specified may be used if acceptable to the Site Architect, in which case size of roots and rootball must be increased proportionally.

- b. Plants that have the measurements specified, but do not pass the normal balance between the height and spread shall be rejected. Thin, poorly branched, or sparsely rooted plants will be rejected regardless of whether they have the minimum technical requirement of ASNS, ANSI, Z60.1 of the AAN.
 - c. If a range of size is given, no plant shall be less than the minimum size. More than 50% of the plants shall be as large as the median size or larger.
3. Labels:
- a. Provide a securely attached waterproof tag bearing legible weather resistant ink designating correct common name, botanical name, size and condition for each plant.
 - b. Where formal arrangement or consecutive order of plants is shown, select stock for uniform height and spread and label with number to ensure symmetry in planting.
 - c. Attach directly to plants in a manner that shall not restrict growth.
- B. Shade, Flowering Trees: Balled and Burlapped. (B & B)
1. Container grown stock is acceptable in lieu of balled and burlapped stock, subject to size limitations specified in ASNS, ANSI, Z60.1 of the AAN.

2.4 MISCELLANEOUS LANDSCAPE MATERIALS

- A. Burlap: AASHTO-M 182, Class 1
- B. Twine: To be of natural, biodegradable jute materials. Synthetic materials are not acceptable.
- C. Water: Clean, fresh, potable and free from substances harmful to plant material.
- D. Anti-desiccant spray materials: Wilt-Pruf or ASTM-E96 in liquid form. Deliver in manufacturer's original containers, fully identified, with instructions for mixing and application included on label.
- E. Anchoring Materials: Tree Staple™ - Tree Staple, Inc. 139 South Street, New Providence, NJ 07974 (877) 873-3749. Contact Manufacturer for sizes and quantities of tree staples. Submit tree staple schedule to site architect for approval prior to installation.
- F. Wrapping: Paper for wrapping shall consist of two layers of waterproof, 30-lb. basic Kraft paper 4" wide, using 30 lb. basic asphalt as adhesive.

PART 3 - EXECUTION

3.1 PLANTING SEASON

- A. The planting season refers to the period for installation of plant material. Under normal conditions, the approved planting seasons are as follows:
1. Woody plant material
 - a. Spring: March 15 - May 15.
 - b. Fall: October 15 - December 1
- B. In case of unusual climate conditions that could threaten the survival of planting, the Site Architect may extend or decrease the approved planting season.

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- C. The decision of the Site Architect with regard to changed planting seasons shall be taken in consultation with the Contractor, but shall be final, and shall not be grounds for any claim whatsoever by the Contractor, nor shall the normal planting seasons defined above be construed as a guarantee that the contractor can in fact plant during any given day within such seasons.

3.2 DELIVERY

- A. The preparation of plants at nursery: Immediately after digging, spray evergreen and deciduous plant materials in full leaf with anti-desiccant, applying an adequate film over trunks, branches, twigs and foliage.
- B. Deliver trees, shrubs groundcovers and herbaceous plants after preparations for planting have been completed, and plant immediately.
 - 1. Balled and Burlapped plants:
 - a. Deliver only freshly dug trees and shrubs. See section 32 93 00-2.3
 - b. Do not prune prior to delivery unless otherwise directed by the Site Architect.
 - c. Provide protective cover during delivery.
 - d. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches, or destroy natural shape.
 - e. Do not drop any plant stock during delivery.
- C. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and manufacturer's name. Protect materials from deterioration during delivery and while stored on site.

3.3 STORAGE

- A. Balled and Burlapped Plants: If planting is delayed for more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by watering and covering with burlap, mulch, or other acceptable means of retaining moisture.
- B. Container Grown Stock and Groundcovers & herbaceous plants: Keep plants moist and do not remove from containers until immediately before planting.

3.4 PLANTING BED AND PIT PREPARATION

- A. Obtain the Site Architect's acceptance of layout before starting planting work. Make adjustments as may be requested.
 - 1. Prior to installation, the contractor shall layout all individual deciduous, evergreen, and ornamental trees with stakes for approval by Site Architect. Use stakes as described in Section 32 93 00, 2.5.E
 - 2. Contractor shall also outline all areas for multiple planting, shrub and groundcover, herbaceous planting beds, as shown on the drawings with any approved method such as ropes or hoses that will clearly show the extent and shape of each bed for approval by Site Architect.
- B. Trees and Shrubs:
 - 1. For all tree and/or shrub cluster planting bed approximately 1 foot outside of each plant's root ball excavation. Entire bed shall be mulched.
 - 2. Site Preparation
 - a. Completely clean up and remove all trash and debris from the proposed planting area.
 - b. Remove existing vegetation and turf. Dispose of such material outside of the Owner's property; do not turn over into soil being prepared for planting beds.
 - c. Till soil to a minimum depth of 12 inches.

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- d. Remove lumps, clods stones, roots, and other extraneous matter, leaving fine-textured homogeneous topsoil.
- C. Groundcovers and Herbaceous Plants
1. The size of the planting area for groundcovers and/or herbaceous plants should be approximately 1 foot outside the boundary of groundcover/herbaceous area as shown on the drawings.
 2. For each cleared area labeled groundcovers or herbaceous plants, spread organic material and fertilizer if needed. Roto-till top into 12" of topsoil until area is loose and friable.
 3. Lightly compact and rake area to its original line and grade. Mix the soil amendment to reach the standard soil requirement as indicated in Section 02912 Soil Preparation.

3.5 EXCAVATION FOR EXTERIOR PLANTS

- A. Excavate pits, beds, and trenches with vertical sides, leaving bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil at bottom and sides of excavation.
1. For Balled and Burlapped (B & B) trees and shrubs, make excavations at least 24" wider than the diameter of the ball (12" all around ball) and equal to the depth of the ball.
 2. Excavate for container grown plants as specified for balled and burlapped stock, but using container width (diameter) and depth in place of ball diameter and depth.
 3. Excavate the entire planting areas for multiple planting beds, groundcovers and herbaceous planting areas as defined in Section 32 93 00 3.4
- B. Contractor is responsible for confirming that water drains from the planting pit. If additional drainage is required, inform the Site Architect and obtain instructions before planting.
- C. All subsoil and debris from excavation shall be removed from the site. Do not mix with planting soil or use as back-fill.

3.6 PLANTING TREES

- A. Balled and Burlapped Stock:
1. Set plants in pit with top of ball 1"-2" above adjacent finished grade.
 2. Remove sides of wire basket, if any. Remove burlap from top and sides of root ball.
 3. Anchoring trees: Set each Tree Staple opposite the other and against the outside edge of the root ball. The shorter prong should be positioned over the root ball, halfway between the tree trunk and outer edge of the root ball. Using a sledge hammer, drive each Tree Staple into the ground until the crossbar is recessed one to two inches below the surface of the root ball.
 4. Place backfill in 2" to 3" thick layers. Tamp each layer by hand to compact backfill and eliminate voids. Maintain plant plumb during backfilling.
 5. When excavation is approximately 2/3 full, saturate backfill with water. Repeat watering until no more water can be absorbed.
 6. Place and tamp remainder of backfill and water again. When planting trees, backfill till grade around tree trunk level with base of the flare.
 7. Spread mulch to depth indicated on drawings. Use organic mulch unless otherwise indicated on the drawings. Keep mulch 2" from trunk. Mulch the entire backfilled area. When mulching in multiple (group) planting areas, the entire planting areas shall be mulched.
 8. For deciduous trees over 4" in caliper the orientation of the trunk is to match the orientation of the nursery. This is true for only certain species and will be as directed by the Site Architect.
- B. Container Grown Plants: Place and backfill as specified for balled and burlapped stock, and as follows:

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1. Immediately before placing, remove container.
 - a. Metal Cans: Cut two sides from bottom of can to within 1 inch of top, using approved can cutter, remove container.
 - b. See 3.6 - A.4 through A. 7
- C. Anti-desiccant: Apply using spray equipment to provide adequate film over trunks, branches, stems, twigs, and foliage. Apply only to evergreen green trees and shrubs. If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery immediately before moving.

3.7 PLANTING GROUNDCOVER AND HERBACEOUS PLANT MATERIAL.

- A. Plants:
 1. Spacing: Space plants as indicated on plans.
 2. Dig holes large enough to allow for spreading of roots; backfill with planting soil.
 3. Work soil around roots to eliminate air pockets. Leave a slight saucer-shaped indentation around plants to hold water.
 4. Place groundcover or herbaceous plants at the same level as the plants were grown in the nursery. Firm soil around the plant.
 5. Spread mulch after planting groundcover or herbaceous plants. In a large area if mulch was spread before planting groundcovers/herbaceous plants, the Contractor shall guarantee all roots to be below the surface of the planting soil.
 6. Water thoroughly after planting. Do not wash soil onto crowns of plants.
- B. Weed Killer: Pre-emergent weed killer may be used at contractor's option, provided that contractor replace plants showing loss of health or vigor resulting from weed killer use.

3.8 MAINTENANCE.

- A. General: The Contractor shall monitor and maintain all plant material and all work incidentals thereto by performing the following and all other operations necessary for care and promotion of root growth and plant life. This is so that all plant material is in an approved condition during the entire period of work under the contract up to the expiration of the guarantee period. The guarantee period: expires 12 months after the acceptance of the First Installation Inspection by the Site Architect.
 1. Watering and Draining: Plants shall be watered suitably to maintain the plant's health. During wet periods, omit watering. If excessively poor drainage or waterlogged conditions prevail, recommend and obtain approval from the Site Architect for provisions to permanently drain or relocate the plant. Check relative moisture content of soil for typical areas of herbaceous plants, groundcover, shrub, and tree planning weekly during the months of July and August. Water plants sufficiently to maintain relative moisture content of 25 to 30 percent. This specification to prevail unless as directed otherwise, elsewhere in the specification.
 2. Weeding: April through November, weed the mulched area around each shrub and tree and in bedded areas once every two weeks. Use of chemical weed killers is at discretion of Contractor and is the responsibility of the Contractor. Remove weeds from the project site.
 3. Controlling Insects and Diseases: Treat plants year-round with an approved chemical spray or absorbent chemical as required for insect, disease and fungus growth. The Contractor shall assume full responsibility for effectiveness of the treatment and plant survival. Contractor to use materials and methods approved by all applicable agencies. Protect vehicles and construction in the vicinity from damage or staining.
 4. Replacing Plants: During the maintenance period, remove or cut off at the ground line any plant materials that are dead, or that are, in the opinion of the Site Architect, in an unhealthy, unsightly, or unacceptable condition. Complete replacement within one week of being notified by the Site Architect, or at any time when the Contractor observes dead plants on the site. Where immediate replacement would result in plant material being in-

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stalled outside the respective planting season, replace during next planting season. New plant material installation and placement shall comply with the requirements of the particular specification for the original planting and at no additional cost to the Owner. Fill all pits, remove all debris, and repair all damaged or unsafe conditions caused by removal operations.

5. Replacement planting shall be guaranteed true to name, variety, and size of specified materials guaranteed healthy for a period of one year from the date of replanting or for the duration of the original one year maintenance period, whichever is longer.
- B. Trees: Along with the regular maintenance methods as indicated in 3.9 the trees shall be treated as follows:
1. Pruning: Prune plants during each growing season as necessary to remove crossing branches, dead and/or infected growth and suckers.
 2. Fertilizing: Fertilize all trees and shrubs once a year between May 15 and July 1 with 15-30-15 soluble fertilizer or equal, at the rate of one pound of fertilizer to 30 gallons of water. Apply mixture at rate as per manufacturer's recommendations. Do not fertilize at installation.
 3. Mulching: Provide sufficient mulch to maintain the depth as specified (3").
 4. Wrapping: Re-wrap trees as necessary to maintain protection and a neat appearance. Remove wrapping near the end of the maintenance period as approved by the Site Architect. Repair any damaged areas previously covered by wrapping to the satisfaction of the Site Architect.
 5. Anchoring: Replace or adjust anchoring device as necessary to maintain stabilization.
- C. Groundcovers and Herbaceous Plant Material: Along with the regular maintenance methods as indicated in 3.8, the groundcovers and herbaceous plant materials shall be treated as follows:
1. Fertilizing: Fertilize groundcovers once per year with 15-30-15 soluble fertilizer or equal, at the rate of one pound of fertilizer to 30 gallons of water. Apply mixture at rate as per manufacturer's recommendations.
 2. Mulching: Provide sufficient mulch to maintain the 3" depth.

END OF SECTION 32 93 00

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