



**To: All Vendors Bidding on The College of New Jersey  
Quimby's Prairie Sidewalk Replacement and Regrading**

**From: Lauren Manning  
Finance & Business Services**

**Date: December 21, 2022**

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**ADDENDUM NO. 1**

**ISSUE DATE: January 3, 2023**

**REFERENCE:** The College of New Jersey  
Quimby's Prairie Sidewalk Replacement and Regrading  
Bid No. AB230009

Date of Original Bidding Documents: December 12, 2022

**INTENT:** This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents and Prior Addenda if any, as identified above. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

**TCNJ Clarifications:**

1. Fencing will be provided by TCNJ to secure the worksite throughout the project timeframe.
2. Contractor is responsible for all costs associated with soil testing and soil transportation required by facility receiving the excess soil from the project site.

**Attachments:**

1. Pre-bid Sign in sheet.
2. Specification Section 033000 – Cast in Place Concrete
3. Specification Section 311000 – Site Clearing
4. Specification Section 312000 – Earth Moving
5. Specification Section 321313 – Concrete Paving
6. Specification Section 329200 – Lawns and Grasses

**END OF ADDENDUM NO. 1**



**TCNJ**  
THE COLLEGE OF NEW JERSEY

PROJECT NAME: QUIMBY PRAIRIE SIDEWALK AND PAVER REPLACEMENT  
DATE: 12/16/22 TIME: 10:00 AM

PRE-BID MEETING  
SIGN-IN SHEET

NAME	COMPANY NAME	PHONE NUMBER	EMAIL
DAVID JURKIN	TCNJ	609-771-3425	JURKIN@TCNJ.EDU
JOSE GALLARDO	ocean Construction	732-917-33-77	Josec.@oceanconst.com
ANTHONY BADO LATO	OCEANO CONSTRUCTION	215-651-2510	ANTHONY.B@OCEANOCONST.COM
Bob Atkinson	Dwell Bldg. Restoration	856-273-8200	bob@dwellbuilding.com
FILIPPO GONZALEZ	A.P.I. & Sons	609-883-9030	
Dan Ingrassia	Veterans Contracting	732-742-6267	Dingrassia@yahoo.com
Craig Thron	GMP Contracting	551-232-9693	cthron@burg@imprnj.com
Bryan Pedro	Seacoast	908-705-4715	Bryan@seacoastinc.com

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.
- B. Cast-in-place concrete includes the following:
  - 1. Sidewalks.
  - 2. Ductbanks.

1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Laboratory test reports for concrete materials and mix design test.
- C. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
- D. Copies of Material Safety Data Sheets (MSDS) for any adhesives and other hazardous materials.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
  - 1. ACI-301 "Specifications for Structural Concrete for Buildings".
  - 2. ACI-304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
  - 3. ACI-311 "Recommended Practice for Concrete Inspection".
  - 4. ACI-315 "Details and Detailing for Reinforced Concrete Structures".
  - 5. ACI-318 "Building Code Requirements for Reinforced Concrete".
  - 6. ACI-347 "Recommended Practice for Concrete Formwork".
  - 7. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".
  - 8. Building Code requirements, which are more stringent than the above.

9. Perform concrete work in compliance with NJSDA Safety Policies and Requirements, local, state and federal governing authorities having jurisdiction including 29 CFR 1926 Subpart Q – Concrete and Masonry Construction.

## PART 2 - PRODUCTS

### 2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces.
  1. Use overlaid plywood complying with U.S. Product Standard PS-1 “A-C or B-B High Density Overlaid Concrete Form”, Class I.
  2. Use plywood complying with U.S. Product Standard PS-1 “B-B (Concrete Form) Plywood” Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCS) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.
  1. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

### 2.2 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or ASTM C1157, Type LH or GU.
  1. Use one brand of cement throughout Project unless otherwise acceptable to Architect.
  2. Do not re-use cement which has partially set or hardened.
- B. Fly Ash:
  1. Permitted in drilled piers, footings, pier caps, pile caps, columns, walls, grade beams only.
  2. ASTM C 618, Class C or F, except maximum loss on ignition: 6%. Maximum percent retained on #325 sieve: 28%. Maximum water requirement, stated as percentage of control: 100%.
  3. Testing: ASTM C311.
  4. Percentage of fly ash in mix design shall be by weight, not by volume. Water/cement ratio will be calculated as water/cementitious (total cement and fly ash) ratio.
  5. Prohibited: Fly ash in same mix with Type IP blended cement.
  6. If strength or air content varies from value specified by more than specified tolerances, Engineer or designated representative shall reject that concrete.
  7. The total fly ash contained in concrete should not be more than 20% of total cementitious materials by weight

8. Submit all fly ash concrete mix designs per ACI 301.
- C. Waterproofing Admixture:
1. Xypex(C-500)Cementitious Crystalline or approved equal.
- D. Ground Granulated Blast-Furnace Slag (GG BFS):
1. ASTM C 989, Grade 100 or higher.
  2. Percentage of GGBF slag in mix design shall be by weight, not by volume. Water-cement ratio shall be calculated as water-cementitious (total Portland cement + GGBF slag) ratio.
  3. If strength or air content varies from value specified by more than specified tolerances, Engineer or designated representative shall reject that concrete.
  4. Total fly ash and slag contained in concrete should not be more than 30% of total cementitious materials by weight.
  5. Submit all GGBF slag concrete mix designs per ACI 301.
- E. Aggregates:
1. Normal weight aggregates: Aggregates shall be crushed stone or gravel complying with ASTM C 33, uniform throughout the work, with fineness modulus not varying by more than 0.15 either way from approved samples; maximum size of coarse aggregate particles shall be ½ inch for slabs on grade and 1” for other concrete. Use in all foundations, slabs on grade, walls, steps, pits, mats, etc.
  2. Fine aggregates: Natural sand conforming to ASTM C33.
  3. Combined aggregate gradation for slabs and other designated concrete shall be 8% - 18% for large top size aggregates (1½ in.) or 8% - 22% for smaller top size aggregates (1 in. or ¾ in.) retained on each sieve below the top size and above the No. 100.
- F. Water: Potable.

## 2.3 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.
1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
- C. Exposed surfaces to be broom finished to match adjacent existing surfaces.

END OF SECTION 033000

CAST-IN-PLACE CONCRETE

033000 - 3

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Protecting existing vegetation to remain.
  - 2. Removing existing vegetation.
  - 3. Clearing and grubbing.
  - 4. Stripping and stockpiling topsoil.
  - 5. Removing above- and below-grade site improvements.
  - 6. Disconnecting, capping or sealing, removing site utilities and abandoning site utilities in place.
  - 7. Temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

- A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
- E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings.
- F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
  - 1. Use sufficiently detailed photographs or videotape.
  - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify utility locator service and college for area where Project is located before site clearing.
- C. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- D. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- E. Do not direct vehicle or equipment exhaust towards protection zones.
- F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- G. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
  - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Wrap a 1-inch (25-mm) blue vinyl tie tape flag around each tree trunk at 54 inches (1372 mm) above the ground.
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### 3.3 TREE AND PLANT PROTECTION

- A. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by owner.
- B. All trees to be replaced shall be a minimum of five inches in diameter of a type approved by the owner.

### 3.4 EXISTING UTILITIES

- A. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Steam utilities shall only be disconnected during approved summer shutdown period.
  - 2. Notify Engineer not less than two weeks in advance of proposed utility interruptions.



3. Do not proceed with utility interruptions without Engineer's written permission.
- B. Excavate for and remove underground utilities indicated to be removed.

### 3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.
  3. Use only hand methods for grubbing within protection zones around manholes and in congested areas shown on drawings.
  4. Chip removed tree branches and dispose of off-site.
  5. All trees that are removed as part of this project shall be replaced with two trees with minimum trunk diameters of five inches.
- B. 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 not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

### 3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches (150 mm) in a manner to prevent intermingling with underlying subsoil or other waste materials.
  1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil at Carlton Avenue lot away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
  1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
  2. Do not stockpile topsoil within protection zones.
  3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
  4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

### 3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

### 3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Preparing subgrades for walks and pavements.
- 2. Excavating and backfilling trenches for utilities.

B. Related Sections:

- 1. Section 01322 "Photographic Documentation" for recording pre-excavation and earth moving progress.
- 2. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

- 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
- 2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. (0.76 cu. m) for bulk excavation or 3/4 cu. yd. (0.57 cu. m) for trench and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

- 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp (103-kW) flywheel power with bucket-curling force of not less than 28,700 lbf (128 kN) and stick-

- crowd force of not less than 18,400 lbf (82 kN) with extra-long reach boom; measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp (172-kW) flywheel power and developing a minimum of 47,992-lbf (213.3-kN) breakout force with a general-purpose bare bucket; measured according to SAE J-732.
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
  - J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
  - K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
  - L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
- 1.4 ACTION SUBMITTALS
- A. Product Data: For each type of the following manufactured products required:
    - I. Warning tapes.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For qualified testing agency.
  - B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
    1. Classification according to ASTM D 2487.
    2. Laboratory compaction curve according to ASTM D 698.
  - C. Seismic survey report from seismic survey agency.
  - D. Preexcavation Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.
- 1.6 QUALITY ASSURANCE
- A. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:
    1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
    2. Seismographic monitoring during blasting operations.
  - B. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

- C. Preexcavation Conference: Conduct conference at Project site.

## 1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways. Temporary bridges to be provided over sidewalks if necessary to allow continuous usage by college staff and students.
- B. Utility Locator Service: Notify utility locator service and college for area where Project is located before beginning earth moving operations.
- C. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Section 311000 "Site Clearing," are in place.
- D. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- E. Do not direct vehicle or equipment exhaust towards protection zones.
- F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- H. Drainage Course: Narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.
- J. Sand: ASTM C 33; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

## 2.2 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:
  - I. Yellow: Gas, oil, steam, and dangerous materials.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### 3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

### 3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

### 3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
  - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
    - a. 24 inches (600 mm) outside of concrete forms other than at footings.
    - b. 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
  - 1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

### 3.5 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.6 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.
  - 1. Clearance: 12 inches (300 mm) each side of pipe or conduit.

- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
  - 1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  - 2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
  - 3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
  - 4. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
  - 1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- E. Trenches in Tree- and Plant-Protection Zones:
  - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
  - 2. Do not cut main lateral roots or taproots.

### 3.7 SUBGRADE INSPECTION

- A. Notify Engineer when excavations have reached required subgrade.
- B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below manholes to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction.
  - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

### 3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.



1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
2. Carlton Avenue lot shall be used for storage. Coordinate with owner on location and access.

### 3.9 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  2. Surveying locations of underground utilities for Record Documents.
  3. Testing and inspecting underground utilities.
  4. Removing concrete formwork.
  5. Removing trash and debris.
  6. Removing temporary shoring and bracing, and sheeting.
  7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

### 3.10 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Roadways: Provide 4-inch- (100-mm-) thick, concrete-base slab support for piping or conduit less than 30 inches (750 mm) below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches (100 mm) of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 033000 "Cast-in-Place Concrete."
- D. Backfill voids with satisfactory soil while removing shoring and bracing.
- E. Place and compact initial backfill of subbase material, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.
  1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- G. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

### 3.11 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Under grass and planted areas, use satisfactory soil material.
  - 2. Under walks and pavements, use satisfactory soil material.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

### 3.12 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

### 3.13 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
  - 1. Under structures and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
  - 2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 92 percent.
  - 3. Under turf or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.
  - 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

### 3.14 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Turf or Unpaved Areas: Plus or minus 1 inch (25 mm).
  - 2. Walks: Plus or minus 1 inch (25 mm).
  - 3. Pavements: Plus or minus 1/2 inch (13 mm).

### 3.15 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
  - 1. Place base course material over subbase course under hot-mix asphalt pavement.
  - 2. Shape subbase course and base course to required crown elevations and cross-slope grades.
  - 3. Place subbase course and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
  - 4. Place subbase course and base course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
  - 5. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.
- C. **Pavement Shoulders:** Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

### 3.16 FIELD QUALITY CONTROL

- A. **Testing Agency:** Contractor will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
  - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
  - 2. Determine that fill material and maximum lift thickness comply with requirements.
  - 3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. **Paved and Building Slab Areas:** At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
  - 2. **Trench Backfill:** At each compacted initial and final backfill layer, at least one test for every 150 feet (46 m) or less of trench length, but no fewer than two tests.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

END OF SECTION 312000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Walks.
- B. Related Sections:
  - 1. Section 033000 "Cast-in-Place Concrete for general building applications of concrete.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.
- B. WWM: Woven Wire Mesh

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Indicate concrete mix and rebar design.
- C. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
- D. Other Action Submittals:
  - 1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified ready-mix concrete manufacturer.
- B. Material Certificates: For the following, from manufacturer:
  - 1. Cementitious materials.
  - 2. Steel reinforcement and reinforcement accessories.
  - 3. Fiber reinforcement.
  - 4. Admixtures.

5. Curing compounds.
  6. Applied finish materials.
  7. Bonding agent or epoxy adhesive.
  8. Joint fillers.
- C. Material Test Reports: For each of the following:
1. Aggregates.
- D. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- D. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.

## 1.7 PROJECT CONDITIONS

- A. Traffic Control:
1. Maintain access for pedestrian traffic as required for other construction activities. Bridges shall be provided over existing walkways during construction.
  2. Installation of temporary walkways (Gravel) will be required to maintain traffic flow as best as possible during the work of each area. Keep work areas neat and organized at all times.
  3. All areas to be secure with proper fencing and signage to prevent physical harm to pedestrian traffic. Advanced notice as to when the work will begin and when the work will be completed are required on signage provided by this contractor.
  4. Movement of construction vehicles must be approved to assure safety to existing sidewalks and the college community.

## PART 2 - PRODUCTS

### 2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

- I. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

## 2.2 STEEL REINFORCEMENT

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.
- D. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars; assembled with clips.
- E. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.
- F. Deformed-Steel Wire: ASTM A 496/A 496M.
- G. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars. Cut bars true to length with ends square and free of burrs.
- H. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- I. Hook Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- J. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
  1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
- K. Zinc Repair Material: ASTM A 780.

## 2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
  1. Portland Cement: ASTM C 150, gray portland cement Type I.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.
  1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.
  2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

- C. Water: Potable and complying with ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.4 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

## 2.5 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
  - 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 4500 psi (31 MPa).
  - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
  - 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
  - 1. Air Content: 5-1/2 percent plus or minus 1.5 percent for 1-1/2-inch (38-mm) nominal maximum aggregate size.
  - 2. Air Content: 6 percent plus or minus 1.5 percent for 1-inch (25-mm) nominal maximum aggregate size.
  - 3. Air Content: 6 percent plus or minus 1.5 percent for 3/4-inch (19-mm) nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.



## 2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
  - 1. For concrete batches of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
  - 2. For concrete batches larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
  - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

## PART 3 - EXECUTION

### 3.1 DEMOLITION

- A. Remove sidewalks as identified using equipment and machinery required to safely dislodge and remove from site.
- B. Great care must be taken to assure no damage is incurred to adjoining sidewalks, light fixtures, trees and minimal disturbance to landscaping and lawn areas. Repair all disturbed areas immediately after work of each area is done.
- C. All debris is to be hauled from the site on a daily basis.

### 3.2 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete pavings to identify soft pockets and areas of excess yielding.
  - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
  - 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
  - 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch (13 mm) according to requirements in Section 312000 "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.3 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

### 3.4 GENERAL INSTALLATION

- A. All sidewalks and intersections are to contain 6" packed 3/4" clean crushed aggregate over compacted sub grade.
- B. Concrete is to be 4,000 PSI, rated class C and air entrained with fly ash. A 15% Class C fly ash mix is suggested, similar to a 1# fly ash to 1# cement ratio. Submit concrete mix design to TCNJ for approval and provide delivery tickets for each day's placement of concrete.
- C. 6x6 WWF Reinforcing is to be installed in low one-third of all concrete walks (only if there is no re-bar).
- D. Expansion joints are to be placed a maximum of 20' on center utilizing preformed expansion joint material, PVC pipe for re-bar continuation, minimum 1/2" thick.
- E. Pavement slope: minimum 1/8" per foot.
- F. Create 1/2" radius along outside edge by use of an appropriate edging tool. Intermediate lines and details to match the existing prior to removal. Take pictures in order to assist in duplicating the work.
- G. Appropriate sealer to be applied to all new concrete via 1/2" smooth dowels at a minimum of 12" into the adjacent concrete and epoxy solid into the concrete, with a minimum of 12" into the new concrete.
- H. Topsoil and seed / hay (or mulch) per existing conditions all edges of new walkways immediately upon final cleanup of each area.

### 3.5 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

### 3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Zinc-Coated Reinforcement: Use galvanized-steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.

- F. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.
- G. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap of adjacent mats.

### 3.7 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
  - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
  - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
  - 2. Provide tie bars at sides of paving strips where indicated.
  - 3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  - 4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  - 5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
  - 1. Locate expansion joints at intervals of 50 feet (15.25 m) unless otherwise indicated.
  - 2. Extend joint fillers full width and depth of joint.
  - 3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
  - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
  - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
  - 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

### 3.8 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- K. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
  - 1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
  - 2. Do not use frozen materials or materials containing ice or snow.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- L. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:
  - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.9 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.

- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
  - 1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
  - 2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
  - 3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

### 3.10 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

### 3.11 CONCRETE DETAILS (LARGER THAN 8 FEET WIDE)

- A. Perimeter border of sidewalk to be one foot wide.
- B. Border to be 12" thick reinforced with #4 and #5 rebar on 24" centers and 18" centers respectively. See detail 06 on drawing M-4.
- C. Concrete inside border is to be minimum 8" thick reinforced with #4 and #5 rebar on centers as noted above.

### 3.12 CONCRETE DETAILS (LESS THAN 8 FEET WIDE)

- A. Concrete is to be 5 inches thick across entire slab.
- B. Concrete sidewalk, 4,000 psi class C air entrained with 6"x6" WWM in lower one-third of slab.
- C. 1/2" preformed joint filler expansion joints required.

### 3.13 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
  - 1. Elevation: 3/4 inch (19 mm).
  - 2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
  - 3. Surface: Gap below 10-foot- (3-m-) long, unlevelled straightedge not to exceed 1/2 inch (13 mm).

4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches (13 mm per 300 mm) of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch (25 mm).
6. Vertical Alignment of Dowels: 1/4 inch (6 mm).
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches (6 mm per 300 mm) of dowel.
8. Joint Spacing: 3 inches (75 mm).
9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
10. Joint Width: Plus 1/8 inch (3 mm), no minus.

### 3.14 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when it is 80 deg F (27 deg C) and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
    - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

### 3.15 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

## SECTION 32 9200 - LAWNS AND GRASSES

### PART 1 - GENERAL

#### 1.1 SECTION SUMMARY

- A. Provide sod and related items. Installation of lawn areas shall be where indicated and at a time allowed by environmental conditions, by adjacent construction operations, and as specified.
- B. Review of conditions and materials affecting sod installation.
- C. Maintenance of lawn work.

#### 1.2 RELATED SECTIONS

- A. Section 32 9100 – Soil Preparation And Mixes
- B. Section 31 0000 – Earthwork
- C. Section 32 9300 – Landscape Planting

#### 1.3 SUBMITTALS

##### A. Notices and Scheduling

1. Contractor shall submit a separate schedule itemizing lawn work to be performed ("Lawn Schedule") within 45 calendar days after the date of Contractor's execution of the Contract. This schedule shall address only lawn work and be in addition to any overall construction schedule(s) provided by Contractor.
  - a. Include in this Lawn Schedule the anticipated dates for commencement and sequencing of lawn work, including but not limited to sod placement and water applications, and commencement of maintenance period.
  - b. This Lawn Schedule shall also include, and be coordinated with, Work specified in other Sections, such as subgrade preparations, landscape soil placements and grading, utility installations, paving and other elements of the Work at the Site.
2. Prior to lawn installation and prior to the start of any Work included in this Section, Contractor shall obtain (i) written authorization from the Engineer for the Contractor to proceed with the Work included in this Section and (ii) written confirmation from the Engineer that the following elements of Work have been inspected and approved by the Engineer:



- a. Complete placement of planting soil mix including verification of acceptability of grades, quality of soil mixes, and quality of material placement.
- b. Contractor certification that no construction access will be required across lawn areas.

B. Product Data:

1. Submit manufacturer's or supplier's literature or tear sheets giving name of product, manufacturer's or supplier's name and evidence of compliance with Contract Documents.
  - a. Commercial fertilizer
  - b. Herbicides, pesticides and fungicides
  - c. Mulch(es)

C. Certificates:

1. Submit certified analysis for each treatment, amendment, and fertilizer material specified and as used. Include guaranteed analysis and weight for packaged material.
2. Prior to the use on the Site of any chemical weed control materials, submit a list of the weed control materials and quantities per acre intended for use in controlling the weed types expected on the Site. Submittal shall include data demonstrating the compatibility of the weed control materials and methods of installation or application with the intended planting and seed or sod varieties.

D. Statement(s) of Qualifications: Submit to confirm qualifications as specified in Paragraph 1.04 of this Section 02930.

E. Maintenance Program: Submit to Engineer prior to Substantial Completion a written program for continued maintenance of lawn areas after Substantial Completion. Program shall include a report of conditions unique to Site that has been identified during Contractor's maintenance of lawn work.

#### 1.4 QUALITY ASSURANCE

A. Qualifications:

1. Installation and maintenance foreman on the job shall be experienced in landscape installation and maintenance. Perform Work with personnel totally familiar with lawn preparations and installations under the supervision of an experienced landscape foreman.
2. Identify and provide evidence of a record of at least three (3) lawn installations of similar scope and size to this Project.

B. Pre-installation Review of Related Work: Within 45 calendar days after the date of Contractor's execution of the Contract, or such later date as approved by Engineer, but prior to first Pre-installation Conference, obtain data as necessary and review plant mix

materials and soil amendments to be used for lawn areas. Become familiar with proposed plant mixes and on-site grading conditions.

1. Contractor shall submit a letter of acceptance of soil mixes as being appropriate for sod installation and, if deemed necessary, recommendations from the local Soil Conservation District on adjustment of amendments.
  2. Review conditions and coordinate findings of report at pre-installation conference.
- C. Pre-Installation Conference: Prior to commencement of any of the field Work included this Section, arrange a conference at the Site with the Engineer with at least five-(5) working days notice.
1. Conference attendance will include the Contractor, the foreman appointed to oversee the Work of this Section, the foreman responsible for soil preparation and mixes and soil placement, other representatives of the Owner, and other persons as deemed appropriate for coordination of the Work and quality control.
  2. At the conference, review lawn installation and sequence schedules, specification criteria and installation, procedures, outstanding submittals and approvals, and such other subjects necessary for coordination of the Work.
  3. Establish follow up meeting(s) as necessary including but not limited to a final pre-installation review of lawn area plant mix soil placement.
- D. Inspection for Substantial Completion
1. Contractor shall maintain all lawn areas until Substantial Completion or such later date as specified in this Section.
  2. Landscape Architect will make an inspection for Substantial Completion of the Work included in this Section at the time of Substantial Completion of the entire Contract. The Contractor shall submit to Landscape Architect prior to Substantial Completion a full and complete written program for maintenance of the lawns after Substantial Completion.
    - a. Submit a written request for inspection at least 14 calendar days prior to the day on which the inspection is requested.
    - b. Contractor shall prepare a list with status of items to be completed or corrected for review by Landscape Architect, prior to inspection.
    - c. At time of Landscape Architect's inspection, all lawns shall show a uniform, thick, well-developed stand of plants. If the stand is unsatisfactory, as determined by Engineer, the Contractor's maintenance responsibility shall continue until an acceptable stand of plants is achieved.
    - d. Upon completion of the inspection Landscape Architect will amend Contractor's list of items to be completed or corrected as determined necessary and will indicate the anticipated time period for their completion or correction.
  3. Lawns will not be accepted until all items of lawn work have been completed or corrected. Landscape Architect, after Contractor's completion of outstanding

work, will recommend to the Owner, in writing, the Substantial Completion of the lawn work of this Section.

- a. The Contractor's responsibility for maintenance of the Work included in this Section, however, shall terminate only upon issuance of written acceptance by the Owner of Substantial Completion or such later date as specified in this Section.

## 1.5 REFERENCES

- A. SPN: "Standardized Plant Names," latest edition, by the American Joint Committee on Horticultural Nomenclature.
- B. Association of Official Agricultural Chemists.
- C. ASTM: American Society for Testing and Materials using test criteria as specified or required by other references.
- D. AASHTO: American Association of State Highway and Transportation Officials.

## 1.6 REGULATORY REQUIREMENTS

- A. Comply with all rules, regulations, laws and ordinances of all authorities having jurisdiction. Provide labor, materials, equipment and services necessary to make Work comply with such requirements without additional cost to the Owner.
- B. Procure and pay for all permits and licenses required for Work of this Section.

## 1.7 PROJECT/SITE CONDITIONS

- A. Acquaintance With Existing Site Conditions:
  1. Through study of all Contract Documents, and by careful examination of the Site, become informed as to the nature and location of the Work, the nature of surface and subsurface soil conditions, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the Work, the general and local conditions, and all other matters which can in any way affect the Work.
  2. Investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of the Site. Conform to all governmental regulations in regard to the transportation of materials to, from, and at the Site, and secure in advance such permits as may be necessary.
- B. Should the Contractor, in the course of the Work, find any discrepancies between the Contract Documents (including without limitation the Drawings and Specifications) and physical conditions or any omissions or errors in Contract Documents (including without limitation the Drawings or Specifications), or in layout as furnished by the Owner, it will be Contractor's duty to inform Engineer immediately in writing for

clarification. Engineer and Owner will investigate the matter and a final decision will be rendered in writing to the Contractor by the Owner. Work done after such discovery, unless authorized by Owner, shall be done at the Contractor's risk.

C. Sequencing and Scheduling:

1. Adjust, relate together, and otherwise coordinate the Work included in this Section with other Work of Project and all other Sections of Specifications.
2. Lawn installations shall not begin until all other constructions, including installation of all utilities and placement of planting soil mixes, are complete and possibility from damage caused by operations does not exist.

D. Environmental Requirements:

1. Perform soil work only during suitable weather conditions. Do not disc, rototill, or work soil when frozen, excessively wet, or in otherwise unsatisfactory condition.
2. Place sod only at seasonal times within appropriate temperature range and wind conditions for plant development as approved by Engineer:
  - a. Acceptable Sodding Seasons/Times:
    - 1) Spring: April 1st – June 15th
    - 2) Fall: September 15th – November 15th
  - b. Sodding at any time other than within the above seasons shall be allowed only when the Contractor submits a written request for permission to do so and permission is granted in writing by the Construction Manager, Engineer and Owner. Newly sodded areas, if installed out of season, must be continuously watered according to best recommended and Engineer's approved practice. Contractor shall be responsible for providing an acceptable stand of grass as specified on plans and details.

E. PRODUCT DELIVERY, STORAGE AND HANDLING Packaged Materials: Deliver packaged materials in unopened bags or containers, each clearly bearing the name, guarantee, and trademark of the producer, material composition, manufacturers' certified analysis, and the weight of the material.

F. Bulk Materials

1. Deliver bulk materials with each individual shipment accompanied by an affidavit from the vendor (supplier), countersigned by the Contractor upon receipt, identifying the material type, composition, analysis, and weight and certifying that the material furnished complies with specification requirements of this Project.
2. Affidavits shall be furnished in duplicate with one copy submitted to Construction Manager at the end of day of shipment receipt at the Project Site and the second copy retained with material or on file with Contractor.

- G. Mulch, amendment materials, or soil stored on the Site temporarily in stockpiles prior to placement shall be protected from intrusion of contaminants, and erosion and from mechanical or environmental damage.

## PART 2 - PRODUCTS

### 2.1 SOD

- A. Turfgrass Sod: Certified, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
- B. Turfgrass Species: Sod of grass species as noted on plans:
- C. Sod shall be a species recommended by an experienced, local American Sod Producers Association-certified nursery. Sod to be strongly rooted, weed-disease and pest free and uniform in thickness.
- D. All slopes greater than 3:1 shall be pegged to hold sod in place.

### 2.2 ACCESSORY MATERIALS

- A. Planting soil mixes shall be furnished and installed and top dressing material shall be furnished as specified in Planting Soils specification.
- B. Provide fertilizers, herbicides and like materials as required by conditions and as approved by Engineer for each condition of use.
  - 1. Herbicides: For possible use if there is seed germination in lawn areas after plant soil mix placement and prior to seed installation.
    - a. Herbicides (including post-emergent herbicides) shall be approved before use for type and rate of application by Engineer and by local and state agencies with jurisdiction.
  - 2. Humic Extract: Shall be a miscible solid extract, minimum 60% organic matter by dry weight
  - 3. Ground Limestone: Provide a Ground Limestone with a minimum of 88% of calcium and magnesium carbonates. Material shall have a total of 100% passing the 10 mesh sieve, minimum of 90% passing the 20 mesh sieve, and a minimum of 60% passing the 100 mesh sieve.
- C. Fertilizer
  - 1. Fertilizer shall be delivered to the Site, mixed as specified, in the original unopened standard size bags showing weight, analysis and name of manufacturer. Containers shall bear the manufacturer's guaranteed statement of analysis, or a manufacturer's certificate of compliance covering analysis shall

be furnished for Engineer review and approval. Store fertilizer in a weatherproof place and in such a manner that it shall be kept dry and its effectiveness shall not be impaired.

2. Percentages of nitrogen, phosphorus and potash shall be based on laboratory test recommendations as approved by Engineer. For the purpose of bidding, assume 10% nitrogen, 6% phosphorus and 4% potash by weight. At least 50% of the total nitrogen shall contain no less than 3% water-insoluble nitrogen. At least 60% of the nitrogen content shall be derived from super-phosphate containing not less than 18% phosphoric acid or bone meal containing 25% - 30% phosphoric acid and 2% - 3% nitrogen. Potash shall be derived from muriate of potash containing 55% - 60% potash.
3. Lawn areas shall have fertilizer applied in two (2) applications with a thorough watering immediately following application. The first application shall be one (1) week before the seeding at the rate of 11 pounds per 1,000 square feet harrowed into the top two inches (2") of seedbed. The second application shall be done at the rate of 14 pounds per 1,000 square feet, immediately following the second mowing.

- D. Water: Potable, clean, fresh and free from harmful material, water shall be furnished by the Contractor as necessary for lawn installation and maintenance. Include all hoses and other irrigation equipment required for correct use of water without waste.

### PART 3 - EXECUTION

#### 3.1 COORDINATION OF WORK

- A. Contractor shall coordinate all Work to ensure all grass within the boundaries of site is fully established and ready for its intended use at the time of Substantial Completion of all of the Work included in the Drawings, Specifications and other Contract Documents.

#### 3.2 VERIFICATIONS

- A. Prior to construction of lawn areas, ascertain the location of all electric cables, conduits, under drainage systems and utility lines. Take proper precautions so as not to disturb or damage sub-surface elements. Contractor failing to take these precautions shall be responsible for making requisite repairs to damaged utilities at Contractors own expense.
- B. Verify that required underground utilities are available, in proper location and ready for use. Coordinate with other trades.
- C. Verify that all final grades blend with adjacent grades and that area(s) to be sodded is free from depressions and abrupt changes in slope and that all grades as placed have been approved by, and remain satisfactory to Engineer.
- D. Verify that all tree planting in lawn areas and all shrub beds adjacent to lawn areas have been installed, will remain as approved, and no further construction work will occur which will or may require access through lawns.

### 3.3 PREPARATIONS AND PLACING OF PLANTING SOILS

- A. Refer to Section 329100, Soil Preparation and Mixes, for information and conditions related to previous placing of planting soils including but not limited to the following:
  - 1. Depth of soil placement for lawn areas.
  - 2. Grading tolerances.
  - 3. Rolling.
- B. Allow for and verify that planting soils of lawn areas, completed in placement with deficiencies corrected as necessary, to settle for a minimum fourteen (14) days prior to beginning of lawn installation.
- C. Coordinated sequencing of Work shall allow immediate sod installation after completion of verifications and preparations.

### 3.4 ADDITIONAL LAWN SEED AND SOIL AMENDMENTS

- A. Humic Extract: Apply humic extract to lawn areas in accordance with the following sequences and at the rates indicated. Humic extract shall be applied mixed with sufficient quantities of water to completely saturate areas of application.
  - 1. At Site (on bare soil): Apply four (4) days prior to seed installation at the rate of 3 to 4 gallons of humic extract per acre.
- B. Lawn Fertilizer: Apply fertilizer and work thoroughly (harrowed) into the top two inches (2") of seed bed (planting soil) in two applications. The applications shall be within five (5) days before seeding at the approximate total rate (to be verified by Engineer) of eleven pounds (11 lb.) per thousand square feet, or as otherwise determined by approved soil test results.
- C. Ground Limestone: If recommended as a result of the soil analysis, ground limestone shall be mechanically applied at the rate determined by the test results. Apply in separate applications but at same time period of lawn fertilizer.

### 3.5 SODDING

- A. Unless otherwise indicated, all "lawn" areas shall be sodded.
- B. Sod Bed Preparation - Grade areas to finish grade, filling as needed or removing surplus dirt, debris, etc. and floating areas to a smooth, uniform grade as indicated on grading plans
- C. Sod shall be cut and laid on site the same day. Lay only healthy, vigorous growing sod.
- D. Always lay sod across slope and tightly together so as to make a solid area.
- E. Pin sod on slopes as required to prevent sliding downhill.

- F. Roll or firmly but lightly tamp with suitable wooden or metal tamper all new sod sufficiently to set or press sod into underlying soil.
- G. After sodding has been completed, clean up and thoroughly moisten by sprinkler newly sodded areas.

### 3.6 MAINTENANCE OF LAWN WORK

#### A. General Maintenance Requirements:

1. Maintenance shall begin immediately after each portion of lawn is installed. Maintenance shall include watering, re-sodding, repair of ruts and erosion, repair of protective devices, weeding, fertilizing, mowing, trimming, and the repeating of any or all phases of lawn work construction specified herein and that may be required to obtain a uniform, thick, and well developed stand of grass to the satisfaction of the Engineer and Owner.
2. Lawn work shall be maintained on daily basis, weekends and holidays excluded, except as otherwise required herein, until acceptance for Substantial Completion or such later date as specified in this Section.
3. Protection: All new lawn areas shall be continuously protected from being disturbed. Erect and maintain temporary protective barriers such as 4'-0" high "snow fence" and appropriate signage. Remove lawn protections at Substantial Completion.

#### B. Watering:

1. The Contractor shall provide all labor and arrange for all watering necessary for establishment of lawn areas. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary and in sufficient quantities to continuously maintain moist (not soaked) soil to a depth of at least four inches.
2. Once the seed has been established, the frequency of watering can be reduced while increasing the duration of each watering as approved by Engineer.

#### C. Mowing of Lawn Areas: The first mowing shall not be attempted until the sod is firmly rooted, secure in place, and areas are fully established. Not more than 1/3 of the grass leaf shall be removed by the initial cutting or subsequent cuttings.

1. Lawn height shall be maintained between 2" and 2-1/2".
2. All lawn cutting shall be done with a power rotary mower.
3. Mowing shall include edging at all boundaries of all grass areas.

#### D. Repairs and Replacements: After the grass has been established, all areas which fail to show a uniformly thick and well developed stand of grass and all scattered base or dead spots, for any reason whatsoever, shall be reseeded or resodded repeatedly until all areas are covered with a satisfactory growth of grass to the satisfaction of the Landscape Architecture and Owner.



### 3.7 ACCEPTANCE OF LAWNS

#### A. All Lawn Areas:

1. Lawn areas shall show no joints or dead or bare spots larger than 3" in any dimensions at time of Substantial Completion as determined by the Engineer and Owner and shall be anchored to the underlying planting soil bed with vigorous, healthy root growth.
2. Prior to Substantial Completion, or the end of Contractor lawn maintenance responsibilities specified in Paragraph 3.04(l) of this Section, whichever is later, damage resulting from erosion, gullies, washouts, deleterious effects caused by maintenance procedures, damage due to lack of adequate protection, or other causes shall be repaired by filling with planting soil, tamping, re-fertilizing, re-sodding and re-seeding to meet the requirements specified at no additional cost to the Owner.

END OF SECTION 32 9200