PART 1 - GENERAL

1.1 SUMMARY

A. The General Conditions and Division - 1 Specification sections apply to the work of this section.

B. The following documents form part of the Specifications to the extent stated. Where differences exist between Codes, Standards, Authorities Having Jurisdiction, and the Documents, the one affording the greatest protection and/or more stringent condition shall apply.

C. Sustainable Design Requirements: Provide the Work and submit documentation necessary for compliance with specified sustainable requirements.

D. Section includes planting soils specified according to performance requirements of the mixes:
1. Topsoil
2. Planting Soils
3. Soil Preparation
4. Soil Amendments and Fertilizers
5. Soil Testing
6. Finish Grading
7. Weed Control

E. RELATED WORK
1. Division 32 Section “Plants”
2. Division 32 Section “Turf & Grasses”
3. Division 32 Section “Planting Irrigation”

1.2 DEFINITIONS
1. CEC: Cation exchange capacity.
2. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
3. Imported Soil: Soil that is transported to Project site for use.
4. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
5. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."
6. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and fertilizers to produce a soil mixture best for plant growth.
7. PPM: Parts per million.
8. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
9. SSSA: Soil Science Society of America.
10. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
11. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
12. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
13. USCC: U.S. Composting Council.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site prior to the commencement of the Landscape Soil Preparation scope. Attendees to include, but are not limited to General Contractor, Owner's Representative, and Landscape Architect.

1.4 SITE CONDITIONS

A. Underground Utilities:
   1. Prior to initiating any work of this section, the Contractor shall locate and identify all underground utilities.

B. Subgrade Elevations:
   1. Excavation, filling and grading required to establish elevations shown on the drawings are not specified in this section.
   2. Subgrade elevations shall be established prior to placement of landscape soils to allow for placement to depths as indicated and required.
      a. Contractor is responsible to coordinate establishment of subgrade elevations as required for landscape soils.
      b. Conditions in which subgrade elevations have not been provided, Contractor is responsible to complete excavation required and properly dispose of resulting spoils off-site.

C. Any contractor submitting a proposal for this work shall first examine the site of the proposed work and all conditions at the site that he may fully understand any facilities, difficulties, and restrictions attending the execution of the contract. No subsequent allowances shall be made because of omission, error, or negligence, in connection with this provision.

D. Any contractor submitting a proposal for this work shall carefully examine the architectural and structural drawings and specifications in addition to the drawings and specifications for the work in his particular trade.

1.5 QUALITY ASSURANCE

A. Contractor's Quality Control Responsibilities: Contractor is solely responsible for quality control of the Work.

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from all such authorities.

C. Installer Qualifications: A qualified landscape installer whose work has resulted in successful installation of planting soils and the establishment of exterior plants.
   1. Installer to maintain an experienced full-time supervisor on project site when mixing soils and installing soils.
   2. Contractor shall have experience in the proper and safe transportation and installation of soil material.
   3. The Contractor shall prepare and present to the Landscape Architect required soil submittals and their associated specified test results, six months prior to the scheduled soil and plant installation for proper lead time for material locations, initial soil mix testing, and approval. It is the responsibility of the Landscape Contractor, in conjunction with the Soil Supplier to submit material for the soil and compost tests.
   4. Installer Experience: Three years' experience in Rain Garden installations.

D. Soil-Mixing Contractor/Vendor Qualifications:

1. Soil-Mixing Contractor/Vendor shall be able to provide soil mixes that meet the specifications within the tolerances assigned.
2. Soil-Mixing Contractor/Vendor shall be able to produce enough consistently uniform soil material for the project to meet the schedule demands.
3. Soil-Mixing Contractor/Vendor shall be engaged at least six months prior to scheduled soil installation, to allow for sufficient time for material searches and initial planting mix approval.

E. Soil Testing Agency: All analytical services shall be completed by Dirt-n-Turf Consulting, Inc. and Brookside Laboratories. Reports and recommendations shall accompany all laboratory data.
1. David Marquardt, Agronomist. Dirt-n-Turf Consulting, Inc. 542 Clark Street, Hinckley, IL 60520. Phone: (630) 251-1511. Email: dave@dirt-n-turf.com
2. Tests shall be made in strict compliance with the standards of the Associate of Official Analytical Chemists and follow standards from ASTM, EPA, and/or Methods of Soil Analysis, SSSA.
3. (Contractor) (Owner) is responsible for all testing and analysis costs.

F. Analysis and Testing of Materials: For each type of packaged material required for the Work of this section, provide manufacturer's certified analysis. For all other materials, provide complete analysis by a recognized laboratory mad in strict compliance with the standards and procedures of the following:
1. International Society of Arboriculture (ISA)
2. American Society of Testing Materials (ASTM)
3. American Society of Agronomy (ASA)
4. Environmental Protection Agency (EPA)
5. Soil Science Society of America (SSSA)
6. Associate on Official Agricultural Chemist (AOAC)

1.6 SUBMITTALS AND TESTING

A. Topsoil Submittals:
1. Samples – For each Topsoil source in sealed containers, providing an accurate representation of composition, color and texture. Provide the following information for each sample:
   a. Label container with content of sample.
   b. Label container with source / location from where the sample was taken.
   c. Label container with date the sample was obtained.
   d. Label container with contact person who obtained the sample.
2. Test Reports – For each topsoil material as outlined in the Test Procedures and Reporting section.
3. Soil Analysis – Provide Initial Planting Soil Analysis for Topsoil material as outlined in the Test Procedures and Reporting section.

B. Composted Organic Material Submittals
1. Samples – For each Compost source in sealed containers, providing an accurate representation of composition, color and texture. Provide the following information for each sample:
   a. Label container with content of sample.
   b. Label container with source / location from where the sample was taken.
   c. Label container with date the sample was obtained.
   d. Label container with contact person who obtained the sample.
2. Test Reports – For each topsoil material as outlined in the Test Procedures and Reporting section.
3. Composted Organic Materials Analysis – Provide analysis for Compost material as outlined in the Test Procedures and Reporting section.

C. Amended Soil Mixes:
1. Samples – For each specified type of amended soil.

a. Label container with content of sample.
b. Label container with source / location from where the sample was taken.
c. Label container with date the sample was obtained.
d. Label container with contact person who obtained the sample.

2. Test Reports – For each amended soil mix as outlined in the Test Procedures and Reporting section.
3. Soil Analysis – Provide Amended Planting Soil Analysis for each amended soil mix as outlined in the Test Procedures and Reporting section.

D. Herbicide & Pesticides
1. Product data for all products listed.

1.7 TEST PROCEDURES AND REPORTING

A. Topsoil – Testing for initial approval shall be tested using the following procedures:
1. Particle-size distribution by the Pipet method, as outlined in *Methods of Soil Analysis*, Part 1, 1986. This includes the removal of organic matter and carbonates with hydrogen peroxide.
2. Saturated hydraulic conductivity, total porosity, and bulk density by ASTM F1815-97 or equivalent *Methods of Soil Analysis* determination for the tested sample.
3. Organic matter content (ASTM F1647-02a)
4. Salts and ammonium test.
5. Soil chemical and nutrient analysis shall be tested using Methods of Soil Analysis, Parts 1 and 3, 1986 and 1996, or approved equivalent.
6. Soil moisture testing required prior to soil placement shall be by gravimetric oven dry method, as described in Soil Science Society of America, *Methods of Soil Analysis*, Part 1, 1986.

B. Composted Organic Materials – Provide analyses of composed organic materials are to be submitted prior to Initial Planting Soil mix acceptance. Analyses shall include all tests required to verify specified criteria in Part 2 of this Section.

C. Initial Planting Soil Mixes:
1. Based upon the Topsoil and Compost test results and recommendations from Soil Testing Agency:
   a. Provide required soil treatments and soil amendments as required to meet Performance Requirements of the Planting Soil mixes. Reference Soil Schedule for specific Planting Soil criteria. Rates of treatments and amendments to be provided in weight per 1000 sf. Ft or volume per cu. Yd. for nitrogen, phosphorus, and potash nutrients.
   b. Provide type and quantity of additives required to adjust and/or reduce salt level content.
   c. Provide type and quantity of additives required to establish acceptable pH factor.
2. Topsoil tests shall be run prior to topsoil sample approval and at Landscape Architect's discretion throughout topsoil installation.

D. Final Planting Soil Analysis – The amended Planting Soil mixes submitted for initial approval shall be tested using the following procedures:
1. Particle-size distribution (ASTM F1632-03) – Perform for all soil layers. The ASTM F1632 test is acceptable for the loamy sand soil. Fines passing the #270 sieve are to be measured using the hydrometer method, as outlined in ASTM F1632.
2. Saturated hydraulic conductivity, total porosity, and bulk density (ASTM F1815-97) - Perform for all soil layers.
3. Organic matter content (ASTM F1647-02a)
4. Salts and ammonium test.
5. Soil moisture testing required prior to soil placement shall be by gravimetric oven dry method, as described in Soil Science Society of America, *Methods of Soil Analysis*, Part 1, 1986.

E. Testing Intervals for Organic Amendments, Planting Soil Mixes, Topsoil, and Subgrade

1. Provide testing at the following intervals:
   a. Amended soil tests: During the placement of planting soils, test every (1000) (500) cubic yards of planting soil mix delivered to the job site. Test shall be for soil mix quality assurance to maintain adherence to particle size distribution, pH, organic matter, salts, and ammonium. Report organic matter content on a percent by weight basis. Testing applies to all soil layers of the Soil Profile.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil Performance Requirements:
   1. Utilize naturally formed topsoil consisting of sandy clay loam or clay loam according to USDA textures; and modified to produce viable planting soil. Alternate soil textures may be provided pending compliance with Soil Schedule and Soil Testing Agency.
   2. Topsoil before amending: Minimum of 2 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration. Clean soil to be of the following:
   3. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
   4. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 4 percent by dry weight of the imported soil.
   5. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 1-1/2 inches in any dimension shall be removed from topsoil.

B. Topsoil Sources: Take imported, unamended topsoil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.
   1. Onsite topsoil may be utilized if it complies with the imported topsoil requirements and physical characteristics listed within this specification. Contractor shall be responsible for determining if available quantities of acceptable on site topsoil will satisfy the quantity requirements for the final installation of planting soil. Imported approved topsoil shall be utilized to offset any quantity deficiencies with onsite topsoil.

2.2 AMENDED PLANTING SOIL

A. Planting Soil Performance Requirements: Refer to Soil Schedule for specific criteria for each Planting Soil mix. Amend Topsoil soil with materials specified in other articles of this Section to become specified Planting Soil mix that complies with the Soil Schedule requirements.

2.3 INORGANIC SOIL AMENDMENTS

A. The following amendments shall be added as indicated by the Soil Testing Agency in order to achieve the amended Planting Soil(s) Requirements.
   1. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent.
   2. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.
   3. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

4. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.
5. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM F 2396.
6. UMaxx Urea
7. Mono-Ammonium Phosphate

2.4 ORGANIC SOIL AMENDMENTS

A. The following amendments shall be added as indicated by the Soil Testing Agency in order to achieve the amended Planting Soil(s) requirements.
   1. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
      a. Feedstock: Leaves and animal waste may be utilized. Alternate local forms of compost falling within the specified ranges may be utilizing pending approval from Soil Testing Agency. Biosolids will not be accepted.
      b. Reaction: pH stable compost. pH of 6 to 7.2
      c. Soluble-Salt Concentration: Less than 4 dS/m.
      d. Organic-Matter Content: 40 to 60 percent of dry weight.
      e. Particle Size: Minimum of 98 percent passing through a 1-inch sieve.

2.5 FERTILIZERS

A. Fertilizers shall be added as indicated by the Soil Testing Agency in order to achieve the amended Planting Soil(s) requirements. This includes, but is not limited to:
   1. Superphosphate: Commercial, phosphate mixture, soluble.
   2. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium.
   3. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium.

2.6 MISCELLANEOUS

A. Pesticide: Registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergence Herbicide: Contractor to provide Post-Emergence product as required to maintain a weed-free project. Post-emergence product must be compatible with specified planting species.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine the areas to receive the Work and the conditions under which the Work would be performed. Remedy conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

3.2 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Under Existing Trees: Soil preparation under existing trees includes the removal by hand of surface vegetation not to remain.
   1. Herbicides shall not be used under existing trees unless specifically direct by the Landscape Architect.
   2. Existing soil under existing trees shall be amended per the recommendations of the Soil Testing Agency.

C. Subgrade Preparation: Till subgrade to the minimum depth indicated on the Soil Schedule. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

D. Mixing: Spread unamended soil to total depth as indicated on the Soil Schedule, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
   1. Amendments: Apply soil amendments, compost, and fertilizer, if required per soil testing reports, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil. Amendments shall be applied at rates indicated on Soil Test Analysis.
      a. Mix lime and sulfur with dry soil before mixing fertilizer. Apply at rates indicated on Soil Test Analysis.
      b. Mix fertilizer with planting soil no more than seven days before planting. Apply at rates indicated on Soil Test Analysis.
   2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers.
   3. Soil mixes may be pre-mixed on site or off site prior to installing the soil in the planting areas. Pre-mixed soils must still comply with all specified requirments.

E. Compaction: Compact each blended lift of planting soil to 82 percent, or as indicated, of maximum Standard Proctor density according to ASTM D 698 except where a different compaction value is indicated on Drawings.

F. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
   1. Tolerance: ½ inch variance in 20 feet.
   2. Limit fine grading to areas which can be planted immediately after grading.
   3. The site shall be free from irregular surface changes and shall vary uniformly between fixed elevations.
   4. Restore landscape areas to specified conditions if any eroded locations, ruts, depressions, or settlement exists after fine grading and prior to planting.

3.3 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

A. Application: Apply compost component of planting-soil mix at a thickness AS REQUIRED TO MEET PERFOMANCE SPECIFCATIONS of amended soil mixes. Apply compost to surface of in-place planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Finish Grading: Grade surface to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D 698. Space tests at no less than one for each 2000 sq. ft. of in-place soil or part thereof.
   2. Performance Testing: For each amended planting-soil type, demonstrating compliance with specified performance requirements. Perform testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.

B. Soil will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.5 WEED CONTROL / TREATMENT

A. All site locations to receive planting where weeds exist, shall be treated with post-emergent herbicide.
   1. Repeat treatment as required to ensure that no weeds are present at the beginning of work on the landscape planting of the Project.

B. Weeds shall not be present at the date of inspection for Substantial Completion of the Project and at the conclusion of the maintenance and establishment period following acceptance of the Contractor’s work.

C. Post-emergent weed treatment includes:
   1. Removal of weeds and other undesirable ground cover vegetation in turf/grass and planting areas shall be accomplished a minimum of 14 days prior to soil preparation for planting operations.
   2. Care shall be taken not to affect existing trees, shrubs, and plants to be saved on the site.

3.6 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

3.7 PROTECTION AND CLEANING

A. Protection Zone: Identify protection zones according to Section 01 56 39 "Temporary Tree and Plant Protection."

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

C. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.
   1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.
   2. All hardscape and paving areas affected by the soil preparation operations shall be thoroughly cleaned by sweeping and power washing.

END OF SECTION