SP- 157091
(New)

SPECIAL PROVISIONS
FOR
SOIL CELLS

Polk County
TAP-T-1945(835)--8V-77

Effective Date
August 21, 2018

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

PART 1 - GENERAL

1.01 SUMMARY

Section Includes:

A. Soil Cell system for planting and paving, including assemblies and related accessories.

B. Other materials including, but not limited to, geotextile, geogrid, aggregate, subbase material, backfill, root barrier, and planting soil.

1.02 DEFINITIONS

AGGREGATE BASE COURSE: Aggregate material between the paving and the top of the soil cell deck below, designed to distribute loads across the top of the deck.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Prior to installation of the system and associated Work, meet with the Contractor, soil cell system installer and their field supervisor, manufacturer's technical representative, the Engineer, the Owner at the Owner's discretion, and other entities concerned with the soil cell system performance.
   1. Provide at least 72 hours advance notice to participants prior to convening preinstallation conference.
   2. Introduce and provide a roster of individuals in attendance with contact information.
   3. The preinstallation conference agenda will include, but is not limited to the review of:
      a. Required submittals both completed and yet to be completed.
      b. The sequence of installation and the construction schedule.
      c. Coordination with other trades.
      d. Details, materials and methods of installation.
         1) Review requirements for substrate conditions, special details, if any, installation procedures.
         2) Installation layout, procedures, means and methods.
      e. Mock-up requirements.

B. Sequencing and Scheduling:
   1. General: Prior to beginning Work of this Section, prepare a detailed schedule of the Work involved for coordination with other trades.
   2. Schedule utility installations prior to beginning Work of this Section.
   3. Where possible, schedule the installation of the system after the area is no longer required for use by other trades and Work. Where necessary to prevent damage, protect installed system if Work must occur over or adjacent to the installed soil cell system.

1.04 SUBMITTALS

A. Action Submittals: Submit these to the Engineer for review and acceptance not less than 45 days prior to start of installation of materials and products specified in this Section.
   1. Product Data: For each type of product, submit manufacturer's product literature with technical data sufficient to demonstrate that the product meets these specifications.
   2. Test and Evaluation Reports:
      a. Submit results of compaction testing required by the Specifications for approval.
      b. Include analysis of bulk materials including soils and aggregates, by a recognized laboratory that demonstrates that the materials meet the Specification requirements.
   3. Samples:
      a. One full size sample of an assembled soil cell (copy of manufacturers brochure with images of product may be accepted in lieu of actual sample).
      b. One 6-inch square piece of geogrid.
      c. One 6-inch square piece of geotextile.
   4. Manufacturer's Report: Submit soil cell system manufacturer's letter of review and approval of the Project, including Drawings and Specifications, Addenda, Clarifications and Modifications, and for compliance with product installation requirements.
   5. Qualification Statements:
      a. Manufacturer:
         1) Submit list of completed projects demonstrating durability and longevity of in-place systems.
            a) Include project name, location, and date of completion.
         2) Submit list of third party approval for stormwater management projects.
      b. Installer:
         1) Submit documentation of the qualifications of the soil cell system installer and their field supervisor.
         2) Submit list of completed projects of similar scope and scale demonstrating capabilities and experience.

B. Closeout Submittals: Submit fully executed manufacturer’s warranty to the Engineer at completion of installation.

1.05 QUALITY ASSURANCE

A. Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary permits/approvals from these authorities.

B. Manufacturer Qualifications:
   1. A manufacturer whose product is manufactured in an ISO/TS 16949 compliant and ISO 9001 - 2008 registered factory.
   2. A manufacturer with not less than 100 soil systems in-place, each system in use for not less than 7 years, confirming durability and longevity of the system.
   3. A manufacturer with documented written approval of their product for use as a stormwater treatment device by a minimum of three governmental jurisdictions.
   4. A manufacturer with an established and demonstrated utility service and repair process, including written procedure and photographs demonstrating work.
   5. A manufacturer with a published operating and maintenance manual

C. Installer Qualifications: A qualified installer with not less than 5 years of successful experience installing soil cell systems or related products and materials, and whose work has resulted in successful installation of underground piping, chambers and vault structures, planting soils, and planter drainage systems of a similar scope and scale in dense urban areas.

D. Installer's Field Supervisor: A full-time supervisor employed by the installer with not less than 5 years of successful experience similar to that of the installer and present at the Project site when Work is in progress. Utilize the same field supervisor throughout the Project, unless a substitution is submitted to and approved in writing by the Engineer.

E. Mock-Up: Prior to the installation of the soil cell system, construct a mock-up of the complete installation at the Project site in the presence of the Landscape Architect.
   1. Size and Extent: Minimum of 100 square feet in area and including the complete soil cell system installation with subbase, aggregate subbase, drainage installation, soil cell decks, posts, and bases, base course aggregate, geotextile, geogrid, backfill, planting soil, and necessary accessories.
   2. The mock-up area may remain as part of the installed Work at the end of the Project provided that it remains undamaged and meets the requirements of the contract documents.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Soil Cell System: Protect system components from damage during delivery, storage and handling.
   1. Store components on smooth surfaces, free from dirt, mud and debris. Store under tarp to protect from sunlight when time from delivery to installation exceeds one week.
   2. Perform handling with equipment appropriate to the size (height) of soil cells and site conditions; equipment may include, hand, handcart, forklifts, extension lifts, or small cranes, with care given to minimize damage to soil cell bases, posts, decks and adjacent assembled soil cells.

B. Packaged Materials: Deliver packaged materials in original, unopened containers indicating weight, certified analysis, name and address of manufacturer, and indication of conformance with State and Federal laws, if applicable. Protect materials from deterioration during delivery and while on the Project site.

C. Bulk Materials:
   1. Do not deliver or place backfill, soils, or soil amendments in frozen, wet, or muddy conditions.
   2. Provide protection including tarps, plastic and/or matting between bulk materials and finished surfaces sufficient to protect the finish material.
   3. Bring planting soil to the site using equipment and methods that do not overly mix and further damage soil peds within the soil mix.

D. Provide erosion-control measures to prevent erosion or displacement of bulk materials and discharge of soil-bearing water runoff or airborne dust to adjacent properties, water conveyance systems, and walkways. Provide additional sediment control to retain excavated material, backfill, soil amendments and planting mix within the Project limits as needed.

1.07 FIELD CONDITIONS

Existing Conditions: Do not proceed with Work when subgrades, soils and planting soils are in a wet, muddy or frozen condition.

1.08 WARRANTY

Manufacturer warrants to the original purchaser of its soil cell product that such product will be free from defects in materials and workmanship, and perform to manufacturer's written specifications for the warranted product, when installed and used as specifically provided in the product's installation guidelines for a period of 20 years from the date of purchase. This warranty does not cover wear from normal use, or damage caused by abuse, mishandling, alterations, improper installation and/or assembly, accident, misuse, or lack of reasonable care of the product. This warranty does not apply to events and conditions beyond manufacturer's control, such as ground subsidence or settlement, earthquakes and other natural events, acts of third parties, and/or Acts of God. If this warranty is breached, manufacturer will provide a replacement product. Incurred costs, such as labor for removal of the original product, installation of replacement product, and the cost of incidental or other materials or expenses are not covered under this warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Obtain all soil cell assembly components from single supplier to ensure complete system warrantee.

B. Provide soil cell assemblies by one of the following manufacturers, or approved equal:
   1. DeepRoot Green Infrastructure (www.deeproot.com)

2. Green Blue Urban (www.greenblue.com)
3. Citygreen (www.citygreen.com)

2.02 DESCRIPTION

A. The term soil cell shall be used to refer to a single soil cell.

B. Soil cells shall be designed for the purpose of providing stormwater management.

C. Soil cells shall be modular, structural systems.

D. Each soil cell shall be structurally-independent from all adjacent soil cell for incorporating utilities and other site features as well as for future repairs.

E. Soil cells shall be capable of supporting loads up to and including AASHTO H-20 (United States) when used in conjunction with approved pavement profiles.

F. Soil cells shall be open on all vertical faces and horizontal planes and shall have no interior walls or diaphragms.

2.03 SOIL CELL MATERIALS AND ACCESSORIES

A. Soil Cell System Components: Each soil cell module (hereafter "cell") is composed of one base, post assemblies, and one deck.

B. Soil Cell Materials and Fabrication:
1. Bases and Posts: Homopolymer polypropylene.
2. Decks: Fiberglass reinforced, chemically-coupled, impact modified polypropylene.

2.04 RELATED PRODUCTS

A. Root Barrier: Recyclable, black, injection molded panels manufactured with a minimum 50% post-consumer recycled polypropylene plastic with UV inhibitors, and integrated zipper joining system which allows instant assembly by sliding one panel into another; for redirecting tree roots down and away from hardscapes.

B. Geogrid: Net-shaped woven polyester fabric with PVC coating, uniaxial or biaxial geogrid, inert to biological degradation, resistant to naturally occurring chemicals, alkalis, and acids; used to provide a stabilizing force within soil structure as the fill interlocks with the grid.

C. Geotextile: composed of high tenacity polypropylene yarns which are woven into a network such that the yarns retain their relative position and is inert to biological degradation and resistant to naturally encountered chemicals, alkalis, and acids.

2.05 OTHER RELATED MATERIALS

A. Wood Blocking: Nominal dimensioned untreated lumber used for spacing assembled soil cells.

B. Aggregate Subbase (Below soil cell Base):
1. Aggregate meeting the standard specifications.

C. Aggregate Base Course (Above soil cell deck):
1. Same as aggregate subbase specified above.

D. Aggregate Base Course for Porous Pavement (Above soil cell deck):
1. Aggregate complying with ASTM D448, No. 57.

Sieve	Percent Passing
1-1/2 inches	100
1 inch	95 to 100
1/2 inch	25 to 60
No 4	0 to 10
No 8	0 to 5

F. Setting Bed for Unit Pavers (Above soil cell deck):
   1. Aggregate complying with ASTM D448, No. 8.

Sieve	Percent Passing
1/2 inch	100
3/8 inch	85 to 100
No 4 (0.19 inches)	10 to 30
No 8 (0.09 inches)	0 to 10
No 16 (0.05 inches)	0 to 5

G. Backfill Material (Adjacent to Cells): Clean, compactable, coarse grained fill soil free of organic material, trash and other debris, and free of toxic material injurious to plant growth.

PART 3 - EXECUTION

3.01 EXAMINATION

Examine the conditions under which the soil cell are to be installed.

A. Carefully check and verify dimensions, quantities, and grade elevations.

B. Carefully examine the Plans to become familiar with the existing underground conditions before digging. Verify the location of aboveground and underground utility lines, infrastructure, other improvements, and existing trees, shrubs, and plants to remain including their root system.

C. Notify the Contractor and the Engineer in writing in the event of conflict between existing and new improvements, of discrepancies, and other conditions detrimental to proper and timely completion of the installation.

D. Obtain written approval of changes to the Work prior to proceeding. Proceed with installation only after changes have been made and unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Take proper precautions as necessary to avoid damage to existing improvements and plantings.

B. Prior to the start of Work, layout and stake the limits of excavation and horizontal and vertical control points sufficient to install the complete soil cell system.

C. Coordinate installation with other trades that may impact the completion of the Work.

3.03 TEMPORARY PROTECTION

A. Protect open excavations and soil cell system from access and damage both when Work is in progress and following completion, with highly visible construction tape, fencing, or other means until related construction is complete.

B. Do not drive vehicles or operate equipment over the soil cell system until the final surface material has been installed.

3.04 EXCAVATION

A. General: Excavate to the depths and shapes indicated on the Plans. Provide smooth and level excavation base free of lumps and debris.

B. Confirm that the depth of the excavation is accurate and includes the full section of materials required to place the subbase aggregate, soil cell, and pavement profile as indicated on the Plans.

C. Over-excavate beyond the perimeter of the soil cell to allow for:
   1. The extension of aggregate subbase beyond the soil cell layout as shown on the Plans.
   2. Adequate space for proper compaction of backfill around the system.

D. If unsuitable subgrade soils are encountered, consult the Engineer for directions on how to proceed.

E. If conflicts arise during excavation, notify the Engineer in writing and make recommendations for action. Proceed with Work only when action is approved in writing.

3.05 SUBGRADE COMPACTION

A. Compact subgrade to a minimum of 95% of maximum dry density at optimum moisture content in accordance with ASTM D698, Standard Proctor Method, or as approved by the Contracting authority's geotechnical representative.

B. Do not exceed 10% slope for subgrade profile in any one direction. If the 10% slope is exceeded, contact manufacturer's representative for directions on how to proceed.

3.06 INSTALLATION OF GEOTEXTILE OVER SUBGRADE

Install geotextile over compacted subgrade.

A. Lay geotextile flat with no folds or creases.

B. Install the geotextile with a minimum joint overlap of 18 inches.

3.07 INSTALLATION OF AGGREGATE SUBBASE BELOW SOIL CELL BASES

A. Install aggregate subbase to the depths indicated on the Plans.

B. Extend subbase aggregate a minimum of 6 inches beyond the base of the soil cell layout.

C. Compact aggregate subbase to a minimum of 95% of maximum dry density at optimum moisture content in accordance with ASTM D698, Standard Proctor Method.

D. Do not exceed 10 percent slope on the surface of the subbase. Where proposed grades are greater than 10%, step the soil cells to maintain proper relation to the finished grade.

3.08 INSTALLATION OF SOIL CELL BASE

A. Install the soil cell system in strict accordance with manufacturer's instructions and as specified herein; where requirements conflict or are contradictory, follow the more stringent requirements.

B. Layout and Elevation Control:
Provide layout and elevation control during installation of the soil cell system to ensure that layout and elevations are in accordance with the contract documents.

C. Locate and mark other Project features located within the soil cell layout (e.g. light pole bases, utility pipes). Apply marking to identify the extent of the soil cell layout around these features. Follow the layout as shown on the Plans to ensure proper spacing of the soil cell bases. Refer to the Plans for offsets between these features and the soil cells.

D. Check each soil cell component for damage prior to placement. Reject cracked or chipped units.

E. Place the soil cell bases on the compacted aggregate subbase. Start at the tree opening and place soil cell bases around the tree openings as shown on the Plans.

F. Install soil cell bases around, over, or under existing or proposed utility lines, as indicated on the Plans.

G. Level each soil cell base as needed to provide full contact with subbase. Adjust subbase material, including larger pieces of aggregate, so each base sits solidly on the surface of the subbase. Soil cell bases that rock or bend over any stone or other obstruction protruding above the surface of the subbase material are not allowed. Soil cell bases which bend into dips in the subbase material are not allowed. The maximum tolerance for deviations in the plane of the subbase material under the bottom of the horizontal beams of each soil cell base is 1/4 inch in 4 feet.

H. Anchor soil cell bases with two spikes per base.
For applications where soil cells are installed over waterproofed structures, use wood blocking or similar spacing system consistent with requirements of the waterproofing system to maintain required spacing.

3.09 INSTALLATION OF SOIL CELL POSTS

Attach posts to the installed soil cell base. Each base will receive six 2x posts. Place the end of the post with tabs into the base. Rotate post clockwise to snap in place.]

3.10 INSTALLATION OF STRONGBACKS, GEOGRID, BACKFILL AND PLANTING SOIL

A. For soil cell systems that have a perforated drain line located inside or adjacent to the system, consult plans for layout and details.

B. Install strongbacks on top of the soil cell posts by snapping into place over installed posts prior to installing planting soil and backfill.
1. Strongbacks are required only during the placement and compaction of the planting soil and backfill.
2. Move strongbacks as the Work progresses across the installation.
3. Remove strongbacks prior to the installation of the soil cell decks.

C. Install geogrid around the perimeter of the soil cell system where the compacted backfill and planting soil interface.
1. Do not place geogrid between the edge of the soil cell and adjacent planting areas.
2. Cut the geogrid to allow for a 6 inch overlap at the base and a 12 inch overlap at the deck.
3. Provide a minimum 12 inch overlap between adjacent sheets of geogrid.
4. Secure geogrid with cable ties below the top of the posts, along the post ridges.

D. Place the first lift of backfill material loosely around the perimeter of the soil cell system, between the geogrid and the sides of the excavation. Place backfill to approximately the midpoint of the post. Do not compact.

E. Compact the first lift of backfill material, previously spread, to 95% of maximum dry density in accordance with ASTM D698, Standard Proctor Method or in accordance with Project Specifications for hardscape areas, whichever is greater.

F. Add and compact additional backfill material so that the final finished elevation is at approximately the same level of the placed planting soil within the soil cell. Maintain the geogrid between the soil cell system and the backfill material at all times.

G. Place the second lift of backfill material loosely around the perimeter of the soil cell system, between the geogrid and the sides of the excavation so that the material is 2 to 3 inches below the top of the posts. Do not compact.

H. Place the second lift of planting soil inside of the soil cell to the bottom of the strongbacks. Walk through.

3.12 INSTALLATION OF SOIL CELL DECK

A. Obtain final approval by the Engineer of planting soil installation prior to installation of the decks.

B. Remove strongbacks, level out the planting soil, and immediately install decks over the posts below. Place deck over the top of the posts. Push decks down until the deck clips lock into the posts, snapping the deck into place.

C. Fold the 12 inches of geogrid onto the top of the decks.

3.13 FINAL BACKFILL PLACEMENT AND COMPACTION

Place and compact final lift of backfill material to 95% of maximum dry density in accordance with ASTM D698, Standard Proctor Method, such that the backfill is flush with the top of the installed deck. Do not allow compacting equipment to come in contact with the decks.

3.14 INSTALLATION OF GEOTEXTILE AND AGGREGATE BASE COURSE OVER THE DECK

A. Ensure geotextile meets the specifications in section 2.04 paragraph C.

B. Place geotextile over the top of the deck and extend to the edge of the excavation. Overlap joints a minimum of 18 inches. Leave enough slack in the geotextile for the aggregate base course to push the geotextile down in the gaps in between the decks.

C. Install the aggregate base course (including aggregate setting bed if installing unit pavers) over the geotextile immediately after completing the installation of the fabrics. Work the aggregate from one side of the layout to the other so that the fabric and aggregate conform to the soil cell deck contours.

D. Maintain equipment used to place aggregate base course completely outside the limits of the excavation area to prevent damage to the installed system.

E. For large or confined areas, where aggregate cannot easily be placed from the edges of the excavated area, obtain approval for the installation procedure and types of equipment to be used in the installation from the manufacturer.

F. Compact aggregate base course(s) to 95% of maximum dry density in accordance with ASTM D698, Standard Proctor Method. Utilize a vibration or plate compactor with a maximum weight of 800 pounds.

G Do not drive vehicles or operate equipment over the completed aggregate base course.

3.15 INSTALLATION OF CONCRETE CURBS AT TREE OPENINGS, AGGREGATE SUBBASE AND PAVEMENT ABOVE THE SOIL CELL SYSTEM

A. Place concrete curbs along planting areas and tree openings as shown on the plans to retain the aggregate base course from migrating into the planting soil.

B. When staking concrete forms (e.g. curbs around the tree openings), prevent stakes from penetrating the soil cell decks.

C. Turn down edge of concrete paving to the soil cell deck along the edges of tree openings or planting areas to retain the aggregate base course material.

D. When paving type is a unit paver or other flexible material, provide a concrete curb under the paving at the edge of the soil cell deck to retain the aggregate base course material at the tree opening.

E. Place paving material over soil cell system in accordance with the contract documents. The soil cell system does not fully meet loading strength until the final paving is installed. Do not operate construction equipment on top of the soil cell system until paving installation has been completed.

F. Use care when placing paving or other backfill on top of soil cell system to prevent damage to the system or its components.

3.16 INSTALLATION OF ROOT BARRIERS

Install root barrier in accordance with manufacturer's installation instructions.

3.18 PROTECTION

A. Keep construction traffic away from the limits of the soil cell until the final pavement profile is in place. The soil cell system does not fully meet loading strength until the final paving is installed.
   1. Do not operate equipment directly on top of the soil cell system until paving installation has been completed.
   2. Provide fencing and other barriers to prevent vehicles from entering the soil cell area.

B. When the soil cell installation is completed, and the permanent pavement is in place, limit traffic and construction related activities to only loads less than the design loads.

3.19 CLEAN UP

A. Perform clean up during installation and upon completion of the Work. Maintain the site free of soil, sediment, trash and debris. Remove excess soil materials, debris, and equipment from the site following completion of the Work of this Section.

B. Repair damage to adjacent materials and surfaces resulting from installation of this Work using mechanics skilled in remedial work of the construction type and trades affected.

3.20 METHOD OF MEASUREMENT

Measurement is based on the number of square feet of soil cells installed as shown on the plans.

3.21 BASIS OF PAYMENT

Payment will be made at the unit bid price per square footage of soil cell extents. Included with this item is supply, deliver, storage, preparation, installation, and all labor, materials, and equipment necessary to install soil cell system as indicated on the plans and as recommended by the manufacturer.