

PART 1 – GENERAL

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PART 1 - GENERAL

1.1	<u>Related Sections</u>	.1	Concrete	Section 03 30 00
		.2	Precast Concrete	Section 03 45 00
		.3	Topsoil Placement and Grading	Section 32 91 19
		.4	Trees, Shrubs and Groundcover Planting	Section 32 90 00
1.2	<u>Action and Informational Submittals</u>	.1	Submit in accordance with project Submittal Procedures	
		.2	Product Data:	
		.1	Submit manufacturer's instructions, printed product literature and data sheets for all composite elements of structural soil cell system and include product characteristics, performance criteria, physical size, finish, and limitations.	
		.3	Shop Drawings:	
		.1	Submit shop drawings to CSA A23.4 and CAN/CSA-A23.3 including:	
		.2	Manufacturer's site-specific soil cell layout in plan and section. Indicate on drawings:	
		.1	All composite elements of structural soil cell system.	
		.2	Construction details, material descriptions, finishes, installation details	
		.3	Methods of handling and erection.	
		.4	Grades and dimensions (indicate stepping or sloping conditions to achieve finished grades), and soil volumes as required.	
		.5	All details and drawings to be stamped by a Professional Engineer licensed in Nova Scotia	
		.6	Warranty the product satisfies all reasonably expected loading requirements in this location.	
		.3	Samples:	
		.1	Produce, deliver and erect where directed by Project Engineer on project site, [1] full size sample of each type of support module and related products finish and quality for approval of Project engineer.	

- 1.3 Delivery, Storage, and Handling
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- 1.4 Warranty
- .1 Provide manufacturer's standard warranty against defects in materials and workmanship.

PART 2 - PRODUCTS

- 2.1 Description
- .1 The Structural Soil Cell system shall have the flexibility to be assembled around existing structures, utilities and in tight constraints, specific to the site requirements and achieve the required soil and/or stormwater volume. The system shall be easily disassembled and reassembled to allow for utility repair within and below the system.
- 2.2 Materials
- .1 Either of the following systems:
 - a. StrataVault 30 series as manufactured by City Green Urban Landscape Solutions
Contact: Stephen Lovering
Email: stephen.lovering@citygreen.com
Telephone: 778-533-7764 Website: www.citygreen.com
 - b. Silvacell as manufactured by Deeprout Canada Corp.
Contact: Michael James
Email: mjames@deeprout.com
Telephone: 1 604-687-0899 Website: www.deeprout.com
 - .2 The Structural Soil cells system shall meet the manufacturer's specifications including, but not limited to, the following components:
 - a. non-woven filter cloth;
 - b. tensile geogrid;
 - c. root deflector, structural cells, and decking;
 - d. air and watering system;
 - e. Infill Panel: Injection molded, polypropylene or polyethylene with nominal dimensions as per manufacturer;

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- f. Interlocking uprights and decks are assembled on-site to create modules which can be uniformly stacked in height, not to exceed 2m in height (per project design); and
- g. The soil module system shall have the ability to be assembled as a complete, interlocked unit or as independent modules.

PART 3 – Execution

- 3.1 General Conditions .1 Soil cells and related products shall be installed by a qualified installer with experience successfully installing structural soil cells on at least two (2) prior projects.
- Installer will be required to takes part in a training session provided by the manufacture. Training session to be attended by all foremen and key personnel involved in the installation.
 - Installer shall utilize the same field supervisor through the project unless a substitution is submitted and approved by the Engineer.
- .2 Coordinate the installation with the product manufacturer, to have the manufacturer on-site during product installation.
- Photo record of each phase of installation to be submitted to product manufacturer and Engineer.
- .3 Locate underground utilities before proceeding with excavation.
- Clearance and cover measurements for service pipes and conduits to be observed by installer.
- .4 Review manufacturer's installation procedures and coordinate installation with other work affected, such as grading, excavation, utilities, construction access, erosion control, etc.
- .5 Installation of the first 20m² section shall be completed and inspected by the Engineer or their representative.
- .6 Structural soil cells are not to be filled or covered prior to inspection and acceptance by the Engineer or their representative.
- .7 Each soil cell or stack of soil cells shall be structurally independent such that a single stack, or group of stacks, may be removed to facilitate future utility connections or repairs. If connections are required, the connections must have ability to break during access for maintenance or repair activities.

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- .8 Cold weather installation or assembly of modules should not be undertaken when temperatures are below 4° C.
- .9 Tree Pit Layout: Layout tree pit locations and dimensions using string lines, survey pegs and marking paint. Obtain Engineer's approval of layout before proceeding with excavation.
- .10 Tree Pit Depths: Confirm excavation depths with reference to finished pavement elevations. Allow for granular base course layer and, where applicable, drainage layer.
- .11 Assembled modules may be walked on, but vehicular traffic is prohibited until properly backfilled and covered per Manufacturer's recommendations. Protect personnel and the installation against damage with highly visible construction tape, fencing, or other means until construction is complete.
- 3.2 Excavation Below Grade
- .1 Excavation required for the installation of all pipes and structures shall be made to the depths and widths indicated on the Drawings (a minimum of 300 mm beyond all sides of the structural soil cell components for proper backfill). The Contractor shall ensure that the bottom of the excavation is firm and dry and, in all respects, acceptable to the Engineer.
- .2 All objectionable material encountered within the limits indicated shall be removed and disposed of by the Contractor.
- .3 In excavation faces, all loose or protruding rocks shall be secured or otherwise removed to finished grade. All cut slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings or as directed by the Engineer or authorized representative.
- .4 Furnish, install, monitor, and maintain excavation supports (e.g., shoring, sheeting, bracing, trench boxes, etc.) as required by to meet applicable safety requirements. Support the sides of excavation, to prevent any movement which could in any way reduce the width of the excavation below that necessary for proper construction and protect adjacent structures from undermining, settlement, or other damage.

3.3	<u>Sub-Grade Preparation and Grading</u>	.1	Sub-grade shall be unfrozen, level, and free of lumps or debris with no standing water, mud, or muck. Do not use frozen materials or materials mixed or coated with ice or frost. A minimum 9,764.86 kilograms per square meter (2,000 pounds per square foot) bearing capacity is required.
		.2	If Contractor fails to maintain the sub-grade properly, the Contractor shall remove the unsuitable material. If the bottom of any portion of the excavation is removed below the limits shown on the Drawings, it shall be restored per the Engineer to the elevation shown in the Drawings. Compacted native earthen fill is not acceptable.
		.3	If in the opinion of Engineer or authorized representative, the sub-grade, at or below the normal grade of the excavation as indicated on the Drawings, is unsuitable for construction; it shall be removed to such depth and width as the Engineer may direct and be replaced with suitable material as directed by the Engineer or authorized representative.
3.4	<u>Sub-Drainage Piping Installation</u>	.1	Install sub-drainage piping as per drawings.
		.2	Typically installed in the base layer.
3.5	<u>Sub-Base Preparation</u>	.1	Install leveling bed to depths shown on drawings across the footprint of the structure. Granulars shall be rolled, or plate compacted to provide a flat surface; free from lumps, debris or any other sharp materials. Base may have up to a 5% slope.
		.2	Base shall be compacted to 95% Proctor Density minimum, or as specified by the Project Engineer.
		.3	Dependent on the geotechnical report, the Project Engineer or authorized representative may require that a reinforcement geogrid fabric be placed within the base layer. If required, the geogrid fabric shall have placed on top of 50 mm of aggregate and covered with 50 mm of aggregate. Overlap geogrid a minimum 300 mm, or as recommended by manufacturer.
3.6	<u>Installation of the Structural Soil Cells</u>	.1	Installation procedure, as follows, shall be followed by the Contractor. The Contractor shall also reference the Manufacturer's Installation Guidelines, and where any discrepancy exists the Engineer reserves the right to contact the Manufacturer's Representative prior to continuation.

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- Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.
- .2 Utilize a soluble paint, chalk, or string to outline the footprint of the structural soil cell system. Prior to the installation of soil module panels, confirm tree pit dimensions and mark location of trees. Rectify discrepancies and errors. Ensure squareness prior to module placement.
- .3 Install structural soil cell modules in strict accordance with manufacturer's written instructions and installation diagrams. Prior to placement, check each soil module for damage. Reject cracked, chipped and otherwise damaged modules. Ensure that panels in contact with granular base course are firmly seated, with no rocking. Ensure that panels are mechanically interconnected both horizontally and, in multiple layers, vertically.
- .4 Upon completion of the placement, wrap the sides of the system with root and moisture barrier, or geogrid/fabric to prevent material migration into the soil module system. Avoid damage to the root and moisture or geogrid/fabric barrier during placement. If damage occurs, repair that portion per manufacturer specifications.
- 3.7 Utilities Within Soil Module System .1 Coordinate interface or spanning of utilities with the Project Engineer to ensure offsets module system meet utility owner's standards. This may require special treatments, barriers, and details.
- 3.8 Soil Filling .1 Obtain Engineer's approval prior to filling the structural soil cell modules with filler soil. Install filler soil after soil modules are fully assembled and piping systems and barriers are in place.
- .2 Except as shown otherwise on Drawings completely fill all void spaces with filler soil. Place filler soil using an excavator bucket and spread with rakes or shovels.
- .3 Keep outer trench free of filler soil.
- .4 Soil can be compacted in lifts of 200 mm to 300mm during placement and compacted by walking over layers or utilizing a hand-held roller designed specifically for this use. Note: the top panel is also an aeration deck allowing soil to be filled to top of upright panels.

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| 3.9 | <u>Aeration/Irrigation and Inspection Piping</u> | .1 | Horizontal Aeration/ Irrigation Piping: Place horizontal piping in accordance with soil cell manufacturer's specifications. <ul style="list-style-type: none">• Pipe to be placed level and wrap entire tree pit.• Perforations to face bottom of tree pit.• Connect pipe to irrigation port at surface. Port cover to have grate to allow aeration. |
| | | .2 | Horizontal Subdrain: 100mm dia. perforated pipe with filter sock. <ul style="list-style-type: none">• Install at low point in tree pit, connect to storm drain system. |
| 3.10 | <u>Root Barriers and Root and Moisture Barriers</u> | .1 | Install ribbed root barriers and root and moisture barriers per manufacturer specifications. Overlap barrier joints 200mm and tape both sides of joint. Top edge of barriers shall be level with adjacent construction. Ensure that earth surfaces in contact with barriers are flat and free of sharp debris and stones to avoid puncturing barriers. Install ribbed root barriers with ribs facing inward. |
| 3.11 | <u>Backfilling</u> | .1 | Place backfill materials around the perimeter in lifts with a maximum thickness of 300 mm. Each lift shall be placed around the entire perimeter such that each lift is no more than 600 mm higher than the side backfill along any other location on the perimeter of the structural soil cell system. No fill shall be placed over top of modules until the side backfill has been completed. |
| | | .2 | Each lift shall be compacted at the specified moisture content to a minimum of 95% of the Standard Proctor Density until no further densification is observed (for self-compacting stone materials). The side lifts must be compacted with walk-behind compaction equipment. Even when "self-compacting" backfill materials are selected; a walk behind vibratory compactor must be used. |
| | | .3 | Take care to ensure that the compaction process does not allow the machinery to come into contact with the structural soil cell system due to the potential for damage to the root and moisture barrier or geogrid/fabric and structural soil cells. |
| | | .4 | Continue backfilling the perimeter until it is backfilled within 300 mm of the top of the structural soil cells. |

3.12	<u>Installation of Geogrid</u>	.1	Install the geogrid with integrated non-woven geotextile on top of the structural soil cell system allowing it to extend 300 mm vertical down the sides of the modules, and 300 mm horizontal away from the decking. Overlap geogrid with integrated non-woven geotextile a minimum 200 mm.
3.13	<u>Aggregate Base Course</u>	.1	Continue backfilling the perimeter and top of the assembled modules in 150 mm lifts, until specified depth is reached. Each lift shall be compacted at the specified moisture content to a minimum of 95% of the Standard Proctor Density.
		.2	Ensure that all unrelated construction traffic is kept away from the limits of excavation until the project is complete and final surface materials are in place. No non-installation related loading should be allowed over the PAVEMENT SUPPORT SYSTEM until the final design section has been constructed (including pavement).
3.14	<u>Site Quality Control</u>	.1	Compaction Tests: Testing agency shall perform compaction testing on sub-grade and on each layer of fill to determine compliance with specified compaction. Determine method and frequency of testing in consultation with Engineer.
		.2	Documentation: photos to be submitted to manufacturer and Engineer during each phase of installation. Work may not proceed until approval of previous phase has been provided.
3.15	<u>Tree Pit Openings</u>	.1	Confirm exact location of tree pit openings. Cut geogrid layer and fold back to expose opening. Position perimeter formwork.
		.2	Line opening with root barrier where required with ribs facing inward. Extend root barrier down to top of soil modules and up to level of finished pavement. Lap root barrier joints 200mm and tape both sides of joint.
3.18	<u>Closeout Activities</u>	.1	Provide manufacturer warranty, 20 year minimum.
3.19	<u>Cleaning</u>	.1	Obtain approval of cleaning methods from Project Engineer before cleaning soiled precast concrete surfaces.
		.2	Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11 - Cleaning.

- 3.20 Protection
- .1 Protect installed products and components from damage during construction.
 - .2 Repair damage to adjacent materials caused by concrete sidewalk and precast concrete curb installation.

****** END OF SECTION 32 94 50 ******