Siplast ParaGREEN Amenity Specification

This specification is provided as a general guide for use of Siplast products based on typical building conditions and standard waterproofing practices. Siplast is strictly a manufacturer/supplier of roofing, waterproofing, and vegetated roof assemblies and does not assume responsibilities of the architect or engineer. Siplast recommends that the Owner's representative independently verify the accuracy and appropriateness of a specification provided for a specific project.

It is important to note that a means of supplying water to the roof-top with sufficient pressure is required for irrigation purposes to establish a vegetated roof assembly. Spray or manual overhead irrigation must be employed during the first few months of the establishment period to allow the vegetation to establish healthy root structure. Permanent Irrigation is strongly recommended for the health of the plant material.

SECTION 329500 - VEGETATED ROOF ASSEMBLIES

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS
				1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			2. SUMMARY
				1. Section Includes ***(Note to Specifier: Edit to Project Requirements)****:*

Drainage Layer

Insulation

Modular Pavers Supported by Pedestals

Modular Planters

Lightweight Fill

Drainage and Water Retention Layers

Engineered Growing Media

Metal Edging and Accessories

* + - * 1. Related Requirements:

Insert Section or Sections in first subparagraph below to suit Project.

Section 12 93 00 "Site Furnishings" for exterior unit planters.

Section [-----] Thermal and Moisture Protection

Section 32 84 00 "Planting Irrigation" for irrigation system.

Section 32 93 00 "Plants" for trees, shrubs, and groundcovers.

* + - 1. DEFINITIONS
				1. ParaGREEN – A single source vegetated roof assembly comprised of root barrier, drainage and water retention layers, engineered growing media, and plants provided by Siplast.
				2. Engineered Growing Media: A manufactured, lightweight soil mixture comprised small to mid-range aggregates and an organic component designed for use on-structure.
			2. System Description ***(Note to Specifier: Edit to Project Requirements)****:*
				1. Furnish and Install a single source Amenity Deck including Drain Mat, XPS Insulation, pedestal set Unit Pavers, Modular Planters, Lightweight Fill, Drainage and Water Retention Components, Filter Fabric, Growing Media, and Accessories.

Retain "Preinstallation Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - 1. SUBMITTALS
				1. Product Data: For each vegetated roof component provide the following:

Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

Include performance specifications for each growing media,

Include list of plant species.

* + - * 1. Sustainable Design Submittals:

Insert recycled content or materials transparency goals to meet project sustainability requirements. Go to www.columbia-green.com/systems/ for more information.

Product Data: For recycled content, indicating recycled content and manufacturing locations for each system.

* + - * 1. Ballasting requirements for the specified loose laid extruded polystyrene insulation shall be provided to include the following:

A written ballast recommendation outlining specific ballasting requirement to satisfy limited wind resistance conditions.

Each roof level shall be individually evaluated.

* + - 1. INFORMATIONAL SUBMITTALS

Coordinate "Qualification Data" Paragraph below with qualification requirements in Section 014000 "Quality Requirements" and as may be supplemented in "Quality Assurance" Article.

* + - * 1. The installing contractor shall demonstrate qualifications to perform the work of this section by submitting the following documentation.

A list of a minimum of 3 similar projects completed over the last 5 years.

* + - * 1. Product Test Reports: For complete analysis of each type of growing media.
				2. Sample Warranty: For special warranties.
			1. CLOSEOUT SUBMITTALS
				1. Maintenance Data: For intensive and extensive vegetated roof assembly and plants, include a recommended maintenance plan with procedures for inspection and care. Submit before start of required warranty and maintenance periods.

Retain "Continuing Maintenance Proposal" Paragraph below if required. Continuing maintenance may be required for a plant-growth warranty. Revise starting date if required. Paragraph provides a service contract beyond initial maintenance service. If continuing maintenance proposal is submitted at time of bid, include that information in the Instructions to Bidders.

* + - 1. QUALITY ASSURANCE
				1. Pre Installation Conference: Conduct a conference at the Project Site prior to roofing/waterproofing installation.

Arrange, in accordance with Section 01 31 00.

Attendance: All involved parties including but not limited to the Owner, General Contractor, Roofing/Waterproofing Sub-Contractor, Vegetated Roof Installer, Architect, Landscape Architect, Manufacturer, and others related to the scope of work.

* + - * 1. Installer Qualifications: The vegetated roof installing contractor shall be approved, authorized, or licensed by the vegetated roofing assembly provider and maintain an experienced full-time supervisor on the Project site when vegetated roof assembly work is in progress. The vegetated roof installing contractor shall demonstrate qualifications to perform the work of this section by submitting the following documentation.

Field Supervision: The Installer must maintain an experienced full-time supervisor on Project site when vegetated roof assembly work is in progress.

* + - * 1. Acceptable Products: Vegetated roof overburden products shall be supplied by Siplast, Inc.
				2. Local Regulations: Confirm to regulations of public agencies, including any specific requirements of the city and/or state of jurisdiction.
			1. DELIVERY, STORAGE, AND HANDLING
				1. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and Federal laws if applicable. Store material away from sources of ignition and extremely high temperatures. Avoid exposure to heat, sparks, and open flames.
				2. Protection Requirements:

General: Install vegetated roof overburden components in such a manner as to not damage or disturb any previously installed waterproofing membrane or accessory components.

Handle and store materials, and place equipment in a manner to avoid overloading the roof structure or damaging roofing membrane.

* + - 1. GUARANTEE/WARRANTY
				1. Upon completion of work the contractor shall supply the owner with a single source warranty direct from the roofing/waterproofing manufacturer.
				2. Available Warranties ***(Note to Specifier: Edit to Project Requirements)****:*

Material Warranty

Material Warranties on all inorganic vegetated roof components including the integrity of the root barrier, drainage and water retention layers, and filter fabrics.

Warranty Period: [10, 15, 20] years.

Paver Warranties against cracking splitting, or delaminating due to freeze thaw.

Warranty Period: 10 years

1. PRODUCTS
	* + 1. MANUFACTURERS
				1. Source Limitations: Obtain vegetated roof assembly components, growing medium, plants, drainage layers, pavers, pedestals, foam and accessories from the roofing/waterproofing manufacturer.

Basis of Design Manufacturer: Siplast Inc. Dallas, TX

* + - 1. COMPONENTS
				1. Drainage Layer: Composite Drainage Layer with a three dimensional dimple style drainage core fabricated from polypropylene and a non-woven, not rotting polypropylene fiber geotextile.

Paradrain Drainage Mat by Siplast, Inc.; Dallas, TX

* + - * 1. Insulation: Extruded polystyrene (XPS) rigid insulation having a density of **[40 psi, 60 psi, 100 psi]** for use above membrane ***(Note to Specifier: XPS insulation is only required in an inverted membrane roof application to achieve required R-Value, and is not integral to the vegetated roof assembly.)***

Extruded Polystyrene Insulation as marketed by Siplast.

* + - 1. PEDESTAL SET PAVER ASSEMBLY
				1. Concrete Slab Unit Pavers

Hydraulically Pressed Concrete Pavers as marketed by Siplast, Inc.

Compressive strength 8,500 psi, as tested per ASTM C140

Minimal flexural strength 1,100 psi, as tested per ASTM C293

Water absorption shall not exceed 5%, as tested per ASTM C140

Freeze thaw shall not exceed 1% loss of dry weight, as tested per ASTM C67

Dimensions and finish as noted on plans

Pedestal Supports: Adjustable Height Pedestals as recommended by Siplast

Typical height range 0-24 inches (bracing required above 24 inches)

* + - * 1. Wood Tile Pavers

Prefabricated Wood Tile Pavers for pedestal set applications as marketed by Siplast ***(Note to Specifier: Edit to Project Requirements)***

Ipe Wood Tile, Smooth (23.875” x 23.875” x 1.69”) Nominal

Ipe Wood Tile, Ribbed (23.875” x 23.875” x 1.69”) Nominal

Ipe Wood Tile, Smooth (29.875” x 29.875” x 1.69”) Nominal

Ipe Wood Tile, Smooth (47.9375” x 23.875” x 1.69”) Nominal

Ipe Wood Tile, Ribbed (47.9375” x 23.875” x 1.69”) Nominal

Ipe Wood Tile, FSC, 8 Plank, Smooth (23.875” x 23.875” x 1.69”) Nominal

Cumaru Wood Tile, 8 Plank (23.875” x 23.875” x 1.69”) Nominal

Cumaru Wood Tile, 8 Plank (47.9375” x 23.875” x 1.69”) Nominal

Cumaru Wood Tile, FSC, 8 Plank, Smooth (23.875” x 23.875” x 1.69”) Nominal

Cumaru Wood Tile, FSC, 8 Plank, Smooth (47.9375” x 23.875” x 1.69”) Nominal

Garapa Wood Tile, FSC, Smooth (23.875” x 23.875” x 1.69”) Nominal

Bamboo Wood Tile, 5 Plank, Smooth (23.88” x 23.88” x 1.69”) Nominal

Itauba Wood Tile, 8 Plank, Smooth (23.875” x 23.875” x 1.69”) Nominal

Tigerwood Wood Tile, Smooth (23.875” x 23.875” x 1.69”) Nominal

Pedestal Supports: Adjustable Height Pedestals as recommended by Siplast

Typical Height Range 0-24 inches (bracing required above 24 inches)

Fastening Kit

Manufacturer’s recommended securement accessories to secure tiles to pedestals.

* + - * 1. Porcelain Pavers

Porcelain Pavers as marketed by Siplast

Break Strength >\_ 3000lbs (24”x24”) as tested per ASTM C648

Water Absorption <\_ 0.1% as tested per ASTM C373

Thermal Shock Resistance as tested per ISO 10545-9 (Resistant)

Dimension and finish as called out on plans

Support Tray

Manufacturer’s recommended support tray to provide wind uplift resistance and support the porcelain paver in the event of cracking. (The support tray is not designed to prevent cracking of the paver itself.)

* + - 1. MODULAR PLANTERS
				1. Modular Planters

Aluminum or Steel Prefabricated Modular Planters by Siplast, Inc., Dallas, TX

* + - * 1. Lightweight Fill: Lightweight, engineered fill material comprised of closed cell expanded polystyrene (EPS). Density as specified by project engineer.

EPS Geofoam as marketed by Siplast.

* + - * 1. Drainage and Water Retention Layer(s) (Note to Specifier: Keep Item 1 below and delete Items 2 and 3, or delete Item 1 and retain Items 2 and 3.)

A three dimensional molded polypropylene core with drainage on the bottom side and water retention reservoirs and aeration holes on the top side, with a non-woven geotextile fabric bonded to both the top and bottom sides.

Basis of Design Product

ParaGREEN Drainage and Water Retention Layer by Siplast, Inc. Dallas, TX

* + - * 1. Vertical Drainage Layer: Composite Drainage Layer with a three dimensional dimple style drainage core fabricated from polypropylene and a non-woven, not rotting polypropylene fiber geotextile.

Paradrain Drainage Mat by Siplast; Dallas, TX

* + - * 1. Filter Fabric: Non-woven, chemical resistant geotextile fabric comprised of polypropylene fibers.

Basis of Design Product: ParaGREEN Filter Fabric/ParaGREEN Filter Fabric 20

* + - * 1. Engineered Growing Media ***(Note to Specifier: Coordinate Media Densities with structural loading requirements of Project.)***

Vegetated roof assemblies proprietary blend of aggregates and organic components capable of supporting the specified vegetation. ***(Note to Specifier: Edit to Project Requirements)***

Basis of Design Product:

ParaGREEN Intensive Growing Media by Siplast, Inc. Dallas, TX

ParaGREEN Custom (list media specification below) by Siplast, Inc. Dallas, TX

* + - 1. ACCESSORIES
				1. Metal Edging

Slotted metal edging for. transition between vegetated and non-vegetated areas allowing for continuous drainage. Size and Finish as called out on plans.

Basis of Design – ParaGREEN Metal Edge Restraint provided by Siplast, Inc., Dallas, TX

* + - * 1. Gravel Ballast: Washed River Rock used as ballast shall meet the ASTM D 448 #57 requirements. Diameter of the rock particles shall maintain a nominal ¾ inch to maximum 1 – 1/2 inch range.
1. EXECUTION
	* + 1. EXAMINATION
				1. Membrane Inspection

Roofing/Waterproofing Membrane to be visually inspected to ensure membrane is installed per manufacturer’s instructions.

Membrane to be integrity tested to ensure it is water tight prior to placement of the vegetated and/or paver overburden by one of the following methods.

Electronic Leak Detection (ELD)

Flood Test (Ponding water at minimum 2” depth for a period of 48 hours.

Verify Structure can support dead load weight of flood test prior to testing.

* + - * 1. Overburden Installer to inspect membrane for compliance with requirements prior to installation of overburden components.

Verify protection course over membrane roofing is in place and conforming to roofing manufacturer instructions, as inspected and accepted by roofing manufacturer's technical representative.

Verify that roof insulation over roofing membrane is in place, secure, and flush along all seams (If applicable).

Verify that perimeter and other flashings are in place and secure along entire lengths where they will be covered by vegetated roof assembly.

* + - 1. VEGETATED ROOF INSTALLATION
				1. Drainage Layer: Unroll and place drainage layer oriented with the length of the component running parallel to the slope. Abut the edges of the drainage layer core. Overlap selvage edge of the attached filter fabric onto adjacent courses of the drainage layer.
				2. Extruded Polystyrene Rigid Insulation: Place the specified insulation un-adhered directly over the root barrier with the channeled edges down, if applicable. Install the panels to fit tightly. Extend the insulation beneath the drain mat to terminate flush with the vertical face of flashing conditions and penetrations. In multiple-layer configurations install the thickest layer of insulation as the base layer. Stagger the panel joints between insulation layers. Install per manufacturers recommendations.
			2. HARDSCAPE INSTALLATION
				1. Gravel Ballast: Distribute the river-washed stone ballast evenly over the drainage mat or filter fabric in accordance with project details and to meet local code requirements.
				2. Install pedestal-set pavers per the Manufacturer’s installation instructions and as indicated on perimeter details, and in accordance with ballast requirements, including any perimeter securement and incorporation of metal fabricated restraints at the perimeter.
			3. MODULAR PLANTER INSTALLATION
				1. Install Modular planters per the manufacturer’s installation instructions.

Planters shall be anchored where required.

* + - * 1. Geofoam Fill: Install geofoam-fill blocks in as few layers as possible with abutting edges and ends and with the long dimension of each block placed at right angles to blocks in each subsequent layer. Offset joints of blocks in successive layers.

Install geofoam connectors as recommended by geofoam manufacturer

Insert requirements for installing additional anchorage to restrain geofoam fill from displacement due to wind loading on roof if required.

Cover geofoam fill with filter fabric on slopes or faces greater than 2:12, or drain mat on slopes less than 2:12 before installing drain mat or growing media.

* + - * 1. Drainage and Water Retention Layer: Unroll and place drainage layer parallel to slope. Abut sections of drainage layer. Overlap selvage edge of attached filter fabric.
				2. Filter Fabric Installation: Filter Fabric shall be installed at vertical-to-horizontal transitions and at penetrations to contain growing media.

Filter Fabric shall be installed at the finished elevation of the growing media, or 12 inches up onto the vertical surface beneath drain mat (if applicable), and 8 inches onto the drainage and water retention layer.

* + - * 1. Vertical Drainage Layer: Install drain mat along vertical walls, tacking in place with approved adhesive or tape compatible with common in place root barriers and/or waterproofing/damp proofing assemblies. Mechanically fasten a termination bar on the planter wall over drain mat using an approved fastening system. Use a construction adhesive to adhere the selvedge edge to adjacent drain mat segments.
			1. GROWING MEDIA INSTALLATION
				1. Transport growing medium to roof using stabilized hoisting equipment, blower truck, or cranes.
				2. Remove all debris on layered system prior to installing growing medium.
				3. Distribute growing medium evenly throughout the system or as shown on drawings, removing ay temporary ballast measures.
				4. Growing Media shall be installed in lifts up to 8-12 inches. Each lift shall be watered in or compacted with a water filled lawn roller for proper compaction and to minimize settling.
			2. PLANTING

Retain "Site Planting" Paragraph below to reference requirements in other planting Sections; revise to suit Project. Delete paragraph below if only preplanted vegetative mat is required for plantings or required planting is specified in other paragraphs retained below.

* + - * 1. Site Planting: Plant vegetation according to requirements specified in [**Section 32 92 00 "Turf and Grasses."**] [**and**] [**Section 32 93 00 "Plants."**] except as otherwise indicated on Drawings and required by vegetated roof assembly manufacturer's written instructions. Perform digging carefully to prevent damaging roofing system below the vegetated roof assembly.

Retain "Plugging" Paragraph below for planting grass or plant plugs. Plugging rates vary with plant type and grass species and mixtures.

Retain "Individual Plant Planting" Paragraph below for planting individual potted or bagged plants; revise spacing to suit Project. If preferred, insert spacing for each plant type or indicate spacing on Drawings.

* + - * 1. Stand Alone Planters:

Dig holes large enough to allow spreading of roots.

Free up or remove girdling roots.

Work growing medium around roots to eliminate air pockets.

Water thoroughly after planting, taking care not to cover plant crowns with wet growing medium.

Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

* + - 1. CLEANING
				1. Leave the rooftop clean, as well as the surrounding premises free from debris and residue resulting from the work of this Section.
				2. Remove stains from adjacent surfaces according to the waterproofing membrane manufacturer's recommended cleaning agents.
			2. PROTECTION
				1. Protect vegetated roof assemblies from damage, including growing-medium contamination, due to operations of other contractors and trades. Repair or replace damaged vegetation prior to installation.
			3. MAINTENANCE SERVICE

Verify with Owner that maintenance service is required for Project. Generally, a maintenance period should be long enough to ascertain establishment of healthy plants.

* + - * 1. Maintenance Service: Provide maintenance by a qualified party familiar with manufacturer’s vegetated roof assembly. Begin maintenance immediately after plants are installed and continue for a period as defined below.

Assembly and Plant Maintenance: During maintenance period, maintain plantings by pruning, cultivating, watering, weeding, fertilizing if necessary, mulching, restoring planting saucers, adjusting and repairing devices, resetting plants to proper elevations or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

Replace growing medium that becomes displaced or eroded because of settling or other processes.

Apply treatments as required to keep plant materials, planted areas, and growing medium free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

Use only products and methods acceptable to roofing-membrane manufacturer.

Following the maintenance period, instruct the Owner and furnish written maintenance instructions as necessary for planting materials to develop and maintain healthy root structure.

Coordinate "Maintenance Period" Subparagraph with warranty requirements; revise to suit Project. At minimum Columbia Green Technologies recommends a period of 90 days following installation through substantial completion and occupancy by Owner. A 24 month maintenance period as offered by installer is recommended.

Maintenance Period: **[24] <Insert number> months from date of [Substantial Completion] [Planting Completion]**.

END OF SECTION 32 95 00