

## **ECORASTER<sup>®</sup> E40 - PRODUCT SPECIFICATION (CSI Format)**

Specifier Note: This product guide specification is written according to the Construction Specifications Institute (CSI) Format, including MasterFormat (1995 Edition), SectionFormat, and PageFormat, contained in the CSI Manual of Practice.

This specification must be carefully reviewed and edited by the Engineer to meet the requirements of the project and local building code. Coordinate with other specification sections and the drawings.

Delete all "Specifier Notes" when editing this section.

### **SECTION 321243: POROUS FLEXIBLE PAVING** (formerly 02795 Porous Paving)

Specifier Note: This section covers Purus North America's (Purus) Ecoraster E40 Permeable Pavement System. This system provides enhanced load support for vehicular and pedestrian traffic with a permeable aggregate over a permeable aggregate base while increasing storm water infiltration and storage capacity.

The major components of the complete system are the Ecoraster units, the engineered infill (i.e. permeable aggregate), and the engineered permeable aggregate base.

Consult Purus for assistance in editing this section for the specific application.

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. This Section includes providing all material, labor, tools and equipment for the installation of the Ecoraster<sup>®</sup> E40 Permeable Paving System as shown in the Contract Documents and as specified in this Section.

##### **1.2 RELATED SECTIONS**

Specifier Note: Edit the following lists as required for the project. List other sections and references with work directly related to the porous pavement system.

- A. Section 312000 - Earth Moving.
- B. Section 334600 - Subdrainage.
- C. Section 321000 - Bases, Ballasts, and Paving.
- D. Section 323000 - Site Improvements.
- E. Section 329000 - Planting.
- F. Section 329200 - Manufacturers of Turfs and Grasses.
- G. Section 328000 - Irrigation.

##### **1.3 REFERENCES**

- A. The American Society of Testing and Materials (ASTM)

- B. American Association of State Highway and Transportation Officials (AASHTO)
- C. Federal Highways Administration (FHWA)
- D. American Society of Landscape Architects (ASLA)
- E. US Green Building Council (USGBC)

#### 1.4 SYSTEM DESCRIPTION

- A. The Ecoraster® E40 Permeable Paving System provides structural ground reinforcement with confined porous aggregate infill.
- B. Load distribution reduces applied bearing pressure on the subgrade.
- C. Reduces surface runoff and increases storm water infiltration by providing a permeable load support structure for vehicular and/or pedestrian traffic loading utilizing porous aggregate infill.
- D. Major Components of the complete system include:
  - 1. Ecoraster® E40 units
  - 2. Parking space markers, where applicable
  - 3. Permeable aggregate infill
  - 4. Permeable levelling course
  - 5. Permeable aggregate base

#### 1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 013000.
- B. Project specific shop drawings shall include as a minimum: plan view, cross-section, and product data.
- C. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
  - 1. List of proposed materials with recycled content. Indicate post-consumer recycled content and preconsumer recycled content for each product having recycled content.
  - 2. Product data and certification letter indicating percentages by weight of post-consumer and preconsumer recycled content for products having recycled content.
- D. Certificates:
  - 1. Product certificates signed by the manufacturer certifying material compliance of polyethylene used to make Ecoraster® E40 units.
  - 2. ISO Certificate certifying manufacturer's quality management system is currently registered to ISO 9001:2008 quality standards.
- E. Manufacturer's installation guide shall be submitted.
- F. Manufacturers warranty.
- G. Substitutions: No material will be considered as an equivalent to the Ecoraster® E40 unit specified herein unless it meets all areas of this specification without exception. Proposed equals must be approved by the Engineer a minimum of thirty (30) days prior to bid date. The Engineer reserves the right to accept or reject any proposed equal. Manufacturers seeking to supply what they represent as equivalent material must submit records, data, independent test results, samples, certifications, and documentation deemed necessary by the Specifier to prove equivalency. The Specifier shall approve or disapprove other manufacturers materials within 60 days after all submitted information is studied and tested.

#### 1.6 QUALITY ASSURANCE

- A. The porous pavement material shall be provided from a single Manufacturer for the entire project.
- B. The Manufacturer's Quality management system shall be certified and in accordance with ISO 9001:2008. Any substitute materials submitted shall provide a certification that their manufacturing process is part of an ISO program and a certification will be required specifically stating that their testing facility is certified and in accordance with ISO. An ISO certification for the substitute material will not be acceptable unless it is proven that it pertains specifically to the manufacturing operations for the specified substitute product.

- C. The Manufacturer shall provide certification of compliance to all applicable testing procedures and related specifications upon the customer's written request. Request for certification shall be submitted no later than the date of order placement. The Manufacturer shall have a minimum of 20 years of experience producing porous pavement systems.
- D. Installer Qualifications: Experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
- E. Pre-Installation Meeting: Prior to installation of any materials, conduct a pre-installation meeting to discuss the scope of work and review the installation requirements. The pre-installation meeting shall be attended by all parties involved in the installation of the porous flexible paving system.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. The materials shall be stored in accordance with Manufacturer's instructions. The materials shall be protected from damage and out of direct sunlight.
- C. The materials shall be delivered, unloaded and installed in a manner to prevent damage.

## **1.8 MAINTENANCE SERVICE**

- A. The surface should be inspected from time to time to identify signs of slight cell infill loss.
- B. The pavement should be monitored to ensure traffic frequency and loading does not exceed the pavement design.

## **1.9 LIMITED WARRANTY**

- A. Purus warrants each Ecoraster® E40 unit which it ships to be free from defects in materials and workmanship at the time of manufacture. Purus's exclusive liability under this warranty or otherwise will be to furnish without charge to Purus's customer at the original f.o.b. point a replacement for any unit which proves to be defective under normal use and service during the 20 year period which begins on the date of shipment by Purus. Purus reserves the right to inspect any allegedly defective unit in order to verify the defect and ascertain its cause.
- B. Propose equivalent materials that do not offer a written 20 year warranty will be rejected.
- C. This warranty does not cover defects attributable to causes or occurrences beyond Purus's control and unrelated to the manufacturing process, including, but not limited to, abuse, misuse, mishandling, neglect, improper storage, improper installation or improper application.
- D. This warranty does not cover defects attributable to causes or occurrences beyond Purus's control and unrelated to the manufacturing process, including, but not limited to, abuse, misuse, mishandling, neglect, improper storage, improper installation or improper application. Purus makes no other warranties, express or implied, written or oral, including, but not limited to, any warranties or merchantability or fitness for any particular purpose, in connection with the Ecoraster® E40 system. In no event shall Purus be liable for any special, indirect, incidental or consequential damages for the breach of any express or implied warranty or for any other reason, including negligence, in connection with the Ecoraster® E40 system.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURER**

Acceptable Manufacturer shall be:

Purus NA Ecoraster Inc.

801 Tremaine Ave. S. PO Box 53, Listowel, ON N4W 3H2

### **2.2 ECORASTER® E40 UNITS**

- A. Composition
  - 1. Material: 100% recycled low density polyethylene (LDPE)
  - 2. Colour: dark gray to black, uniform throughout all grids in pallet

3. Chemical Resistance: resistant to acids, alkalis, alcohols, oil, gasoline, de-icing salts, ammonia, acid rain, etc.
4. Moisture absorption: 0.01%

#### B. Dimensions

1. Single unit: 13 x 13 x 1.6 in (330 x 330 x 40 mm)
2. Area, per single unit: 1.17 ft<sup>2</sup> (0.111 m<sup>2</sup>)
3. Packaging, units/pallet: 1 layer = 3 x 4 units = 12 units total, area = 14.3 ft<sup>2</sup> (1.33 m<sup>2</sup>)
4. Wall thickness: 0.14 in (3.6 mm)
5. Weight, per unit: 1.27 lbs (0.58 kg)
6. Weight, per unit area: 1.07 lbs/ft<sup>2</sup> (5.22 kg/m<sup>2</sup>)
7. Dimensional stability: -58 to 194°F (-50 to 90°C); 0.5%, at normal temperatures, 68 to 176°F (20 to 80°C)

#### C. Performance

1. Load capacity, unfilled: up to 171 psi (120 t/m<sup>2</sup> = 1,177 kPa)
2. Load capacity, with Bloxx: up to 1,138 psi (800 t/m<sup>2</sup> = 7,845 kPa) depending on fill type

#### D. Permeability & Runoff Coefficient: dependent upon the actual site conditions and Ecoraster® E40 infill material.

## 2.3 ECORASTER® E40 INFILL MATERIAL

- A. The aggregate/topsoil engineered infill shall consist of a homogenous mixture consisting of 1) a crushed clear-stone (30-35% portion) having an AASHTO #8 or similar designation blended with 2) pulverized topsoil and 3) a void component generally containing air and/or water. This homogenous mixture will promote vegetative growth and provide required structural support. The aggregate portion shall have a particle range from 0.2 inch to 0.5 inch (5 mm to 13 mm). The percentage void-space of the aggregate portion shall be 30-35%. The pulverized topsoil portion shall be 65-70% of the total volume and be added and blended to produce a homogenous mixture prior to placement. The addition of long term fertilizer is optional.

## PART 3 EXECUTION

### 3.1 INSPECTION

- A. Site conditions: Verify compacted subgrade and granular base are acceptable and ready to support paving and imposed loads. Notify the Engineer if not acceptable. Do not begin preparation or installation until unsatisfactory conditions have been corrected.
- B. Layout: Verify layout, gradients and elevations of subgrade and base are correct. Notify the Engineer if not acceptable. Do not begin preparation or installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

#### A. Subgrade Preparation

1. Excavate area, if required, allowing for unit thickness and the base depth.
2. Provide adequate drainage from excavated area if area has potential to collect water, especially when working with in-situ soils that have poor permeability.
3. Prepare subgrade as specified in Section 321000. Verify subgrade is in accordance with porous flexible paving system manufacturer's instructions.
4. Ensure in-situ soils are relatively dry and free from standing water.
5. Grade subgrade such that infiltrated runoff will be able to flow in required direction to drain away from porous flexible paving area.
6. If required structurally, compact subgrade to 95% minimum Standard Proctor Maximum Dry Density (SPMDD) as per ASTM D698. For greater subgrade permeability, less to no compaction is optional.

## B. Base Preparation

1. Proper base and levelling course preparation will enable the Ecoraster® E40 units to connect properly and remain flat and stationary after installation.
2. Install base as specified in Section 321000. Verify base is installed in accordance with porous flexible paving system manufacturer's instructions.
3. Coordinate base installation and preparation with subdrainage as specified in Section 334600.
4. If required, place a geotextile separation layer between the subgrade and the specified base.
5. If required, install the specified subdrain and outlet according to contract drawings.

Specifier Note: Modify base material and thickness as required for project specific conditions, loading and drainage requirements.

6. Place aggregate/topsoil engineered base thickness of [6 inches (150 mm)] [4 inches (100 mm)] [2 inches (50 mm)] [ \_\_\_\_\_ inches ( \_\_\_\_\_ mm)].
7. Place engineered base of clear stone or crushed rock (65-70%), homogenously blended with topsoil (30-35%) and a void component generally containing air and/or water.
8. Ensure aggregate portion of base is free from fines and has a known percentage void-space of 30% or greater when compacted. Particle size should range in size from 0.375 to 1.0 inch (10 to 25 mm).
9. Add and blend topsoil before placement equal to void percentage in aggregate.
10. The pulverized topsoil portion shall equal 30-35% of the total volume and be added and blended to produce a homogenous mixture prior to placement.
11. Compact the mixture to 95% Standard Proctor.

## C. Levelling Course Preparation

1. The levelling course material shall consist of crushed clear stone (50%, ¼ inch chip: crushed, angular stone with a well graded distribution from 0.10 to 0.25 in (2.5 to 6.4 mm) or a sand & fine gravel homogenously blended with topsoil (50%). The addition of long term fertilizer is optional.
2. Install levelling course as specified in Section 321000. Verify levelling course is installed in accordance with porous flexible paving system manufacturer's instructions.

## 3.3 ECORASTER® E40 INSTALLATION

A. Install and infill Ecoraster® E40 units in accordance with porous flexible paving system manufacturer's instructions.

1. Ensure that all adjacent hard-surfaced paving work is completed before installing the Ecoraster® E40 permeable paving system.

B. Installation of Ecoraster® E40 Units

1. Place packaging units/layers (3 x 4 units pre-connected) with the connectors (interlocking notches) to the ground and the open cells facing up.
2. Start laying units at one corner, preferable the lowest area, with the male connectors pointing outwards in the direction of the further area to be installed.
3. The next layers are connected to the notches of the already installed units.
4. To achieve a straight result, use a guideline along the outside edge.
5. Ensure that units are installed 2 in (50 mm) from adjacent fixed edges.
6. Where applicable, install units with the tops (after compaction) at the same level as the adjacent hard surfaces, in particular where traffic will traverse onto the units from the adjacent area.
7. Field cut units, preferably in place, with a circular saw, cutting disc, or jigsaw to custom fit contours and around obstructions.
8. Install units such that they do not protrude above the specified surface elevation.

C. Anchoring of Units

1. To prevent rising or lifting, for example, due to braking forces in parking areas, the units can be anchored with ground nails.
2. Alternatively, the outer edge of the units can be lowered/angled down slightly and buried to cover the edge.

D. Compacting Units

1. Prior to infilling the units, the empty units shall be compacted with a plate tamper to help set the units into the levelling course.

### 3.4 DELINEATION

- A. Prior to infilling, delineate the empty units with parking space markers where required according to the contract drawings.

### 3.5 FINISHING

- A. Finish in accordance with the manufacturer's instructions.

B. Infilling Units

1. The units shall be filled with the above specified infill aggregate.
2. The infill shall be placed and spread evenly with suitable equipment such that the units are not disturbed beyond the specified tolerances.
3. The units shall be slightly overfilled to allow for settlement and penetration during compaction.
4. Compact the filled units with suitable equipment.
5. The infill aggregate shall be fine graded by hand to ensure that:
  - i. each cell is completely filled, and
  - ii. the infill is at or just over the top of the units for regular passenger traffic and parking.

### 3.6 MAINTENANCE

- A. Snow Removal: To ensure that the Ecoraster® E40 units and vegetation are not damaged, remove snow using one of the following methods:
1. Keep a metal edged plow blade a minimum of 1.0 in (25 mm) above the surface during plowing operations,
  2. Use a plow blade with a flexible rubber edge or spacer pucks, or
  3. Use a plow blade with skis on the lower outside corners so the plow blade does not come in contact with the units.