PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interlocking concrete paver units including the following.
   1. Interlocking concrete pavers.

B. Permeable interlocking concrete paver units including the following.
   1. Permeable interlocking concrete pavers.
   2. Crushed stone bedding material.
   3. Open-graded subbase aggregate.
   4. Open-graded base aggregate.
   6. Edge restraints.
   7. Geotextiles.

1.2 RELATED SECTIONS

A. Section 32 05 16 - Aggregates for Exterior Improvements.
B. Section 31 10 00 - Site Clearing
C. Section 31 10 00 - Site Clearing
D. Section 31 10 00 - Site Clearing
E. Section 31 10 00 - Site Clearing
F. Section 31 10 00 - Site Clearing.
G. Section 03 30 00 - Cast-in-Place Concrete
H. Section 03 30 00 - Cast-in-Place Concrete.
I. Section 23 05 00 - Common Work Results for HVAC.
J. Section 23 05 00 - Common Work Results for HVAC.
K. Section 23 05 00 - Common Work Results for HVAC.
1.3 REFERENCES

A. ASTM International (ASTM):
   1. ASTM C 33, Standard Specification for Concrete Aggregates.
   5. ASTM C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
   7. ASTM D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
   8. ASTM C 936, Standard Specification for Solid Concrete Interlocking Paving Units.
   11. ASTM D 698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft³ (600 kN·m/m³)).
   12. ASTM D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN·m/m³)).
   14. ASTM D 2922 Standard Test Methods for Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).
   15. ASTM D 2940, Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.

B. Interlocking Concrete Pavement Institute (ICPI):
   1. ICPI Tech Spec Technical Bulletins.
   2. Permeable Interlocking Concrete Pavement manual.
   3. Permeable Design Pro software for hydrologic and structural design.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.
   3. Cleaning and maintenance instructions provided by the cleaning agent manufacturer.

C. Shop Drawings:
   1. Indicate perimeter conditions, junction with other materials, expansion and control joints, paver layout, patterns, color arrangement, installation and
setting details. Indicate layout, pattern and relationship of paving joints to fixtures, and project formed details.
2. Erosion and sediment control plan.

D. Certificates: Certificate of Compliance to specified performance requirements.

E. Stormwater management (quality and quantity) calculations; structural analysis for vehicular applications using ICPI Permeable Interlocking Concrete Pavements manual, Permeable Design Pro.

F. Test Reports:
1. Sieve analysis per ASTM C 136 for grading of bedding and joint sand.
2. Soils report indicating density test reports, classification, and infiltration rate measured on-site under compacted conditions, and suitability for the intended project.
3. Project specific or producer/manufacturer source test results for void ratio and bulk density of the base and subbase aggregates.

G. Letters of Compliance:
1. Letters of compliance from the manufacturer showing compliance of concrete pavers with ASTM C 936 and applicable ICPI Standards.

H. Verification Samples:
1. Four representative full-size samples of each paver type, thickness, color, finish that indicates the range of color variation and texture expected in the finished installation. Color(s) selected from manufacturer's available colors.
2. Minimum 3 lb (2 kg) samples of subbase, base and bedding aggregate materials.

I. Paver Installation Subcontractor Qualification and Documentation.
1. Provide references from projects of a similar size and complexity. Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.
2. Provide Written Method Statement and Quality Control Plan that describes material staging and flow, paving direction and installation procedures, including representative reporting forms that ensure conformance to the project specifications.

1.5 QUALITY ASSURANCE

A. Paving Subcontractor Qualifications:
1. Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated on this project.
2. Utilize an installer with a job foreman holding a record of completion from the Interlocking Concrete Pavement Institute’s Concrete Paver Installer Certification.
3. Utilize an installer with a job foreman holding a record of completion from the Interlocking Concrete Pavement Institute’s PICP Specialist Course.

B. Regulatory Requirements and Approvals: Provide applicable licensing, bonding or other requirements of regulatory agencies.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Install a 7 feet by 7 feet (2 by 2 m) paver area.
2. This area shall be used to determine surcharge of the bedding sand layer, joint sizes, and lines, laying pattern, color and texture of the installation,
jointing materials, and cleaning and sealing agents and compounds.
3. This area shall be used as the standard by which the work will be judged.
4. Do not proceed with remaining work until workmanship, patterns, types, colors, textures, finishes, shape, and cleaning and sealing agents and applications and methods are approved by Architect.
5. Rework mock-up area as required to produce acceptable work.
6. Subject to acceptance by Owner, mock-up may be retained as part of finished work.
7. If mock-up is not retained, remove and properly dispose of mock-up after completion of installation.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to starting work of this section.
   1. Review the manufacturers' product specifications and subcontractor's Method Statement and Quality Control Plan with a pre-construction meeting of representatives from the manufacturer, paver installation subcontractor, general contractor, engineer and/or Owner's representative.

1.7 DELIVERY, STORAGE AND HANDLING

A. General: Comply with Division 1 Product Requirement Section.
B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged packaging with identification labels intact.
   1. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.
   2. Deliver concrete pavers to the site on cubes capable of transfer by forklift or clamp lift.
   3. Unload pavers at job site in such a manner that no damage occurs to the product.
D. Storage and Protection: Store materials protected such that they are kept free from mud, dirt, and other foreign materials. Store concrete paver cleaners per cleaning agent manufacturer's instructions.
   1. Cover bedding material and joint material with waterproof covering if needed to prevent exposure to rainfall or removal by wind. Secure the covering in place.

1.8 PROJECT/SITE CONDITIONS

A. Environmental Requirements:
   1. Do not install during heavy rain or snowfall.
   2. Do not install over frozen base materials.
   3. Do not install frozen or saturated materials.
   4. Do not install concrete pavers on frozen or saturated materials.

1.9 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10 EXTRA MATERIALS

A. Extra Materials: Under contract of installer, order additional material for use by
PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: County Materials Corporation, 205 North St. P.O. Box 100 Marathon, WI 54448-0100. ASD. Toll Free Tel: 800-242-7733; Tel: 715-848-1365; Fax: 715-443-3691; Email: request info (info@countymaterials.com); Web: www.countymaterials.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 INTERLOCKING CONCRETE PAVER UNITS

A. System: Construction of concrete paver applications in the U.S. for concrete pavers and bedding sand over a compacted aggregate base for pedestrian and vehicular applications.

B. Interlocking Concrete Pavers:
   1. Paver Type: Elements Paving Stones manufactured by County Materials Corp.
      b. Color and Finish: As selected from manufacturer's standard options.
      c. Color and Finish: As indicated on the Drawings.
      d. Color and Finish: ______.
      e. Color Pigment Material Standard: Comply with ASTM C 979.
      f. Finish Texture: Fine finish surface manufactured with County Materials' proprietary face mix.
      g. Multiple Sizes: 2-3/4 inches (70 mm) high, configuration as selected from manufacturer's standard sizes.
      h. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
      i. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

   2. Paver Type: Crest Bullnose Pavers manufactured by County Materials Corp.
      a. Manufactured with a smooth rounded decorative front edge used as a finish edge paver.
      c. Color and Finish: As selected from manufacturer's standard options.
      d. Color and Finish: As indicated on the Drawings.
      e. Color and Finish: ______.
      g. Finish Texture: Fine finish surface manufactured with County Materials' proprietary face mix.
      h. Size: 6 inches D x 2-3/4 inches H x 12 inches L (152 mm x 70 mm x 305 mm).
      i. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
      j. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.
3. Paver Type: Milestone Pavers manufactured by County Materials Corp.
   b. Color and Finish: As selected from manufacturer's standard options.
   c. Color and Finish: As indicated on the Drawings.
   d. Color and Finish: ______.
   e. Color Pigment Material Standard: Comply with ASTM C 979.
   f. Finish Texture: Fine finish surface manufactured with County Materials' proprietary face mix.
   g. Multiple Sizes: 2-3/4 inches (70 mm) high, configuration as selected from manufacturer's standard sizes.
   h. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
   i. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

4. Paver Type: Grand Milestone Pavers manufactured by County Materials Corp.
   b. Color and Finish: As selected from manufacturer's standard options.
   c. Color and Finish: As indicated on the Drawings.
   d. Color and Finish: ______.
   e. Color Pigment Material Standard: Comply with ASTM C 979.
   f. Finish Texture: Fine finish surface manufactured with County Materials' proprietary face mix.
   g. Multiple Sizes: 2-3/4 inches (70 mm) high, configuration as selected from manufacturer's standard sizes.
   h. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
   i. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

5. Paver Type: Lifestyle Pavers manufactured by County Materials Corp.
   b. Color and Finish: As selected from manufacturer's standard options.
   c. Color and Finish: As indicated on the Drawings.
   d. Color and Finish: ______.
   e. Color Pigment Material Standard: Comply with ASTM C 979.
   f. Finish Texture: Fine finish surface manufactured with County Materials' proprietary face mix.
   g. Multiple Sizes: 2-3/4 inches (70 mm) high, configuration as selected from manufacturer's standard sizes.
   h. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
   i. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

6. Paver Type: Grand Lifestyle Pavers manufactured by County Materials Corp.
   b. Color and Finish: As selected from manufacturer's standard options.
   c. Color and Finish: As indicated on the Drawings.
   d. Color and Finish: ______.
   e. Color Pigment Material Standard: Comply with ASTM C 979.
   f. Finish Texture: Fine finish surface manufactured with County Materials' proprietary face mix.
   g. Multiple Sizes: 2-3/4 inches (70 mm) high, configuration as selected
from manufacturer's standard sizes.

h. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.

i. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

7. Paver Type: Tranquility Pavers manufactured by County Materials Corp.
   b. Color and Finish: As selected from manufacturer's standard options.
   c. Color and Finish: As indicated on the Drawings.
   d. Color and Finish: ______.
   e. Color Pigment Material Standard: Comply with ASTM C 979.
   f. Finish Texture: Fine finish surface manufactured with County Materials proprietary face mix.
   g. Multiple Sizes: 2-3/4 inches (70 mm) high, configuration as selected from manufacturer's standard sizes.
   h. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
   i. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

8. Paver Type: Destination Pavers manufactured by County Materials Corp.
   b. Color and Finish: As selected from manufacturer's standard options.
   c. Color and Finish: As indicated on the Drawings.
   d. Color and Finish: ______.
   e. Color Pigment Material Standard: Comply with ASTM C 979.
   f. Finish Texture: Fine finish surface manufactured with County Materials proprietary face mix.
   g. Multiple Sizes: 3-1/8 inches (80 mm) high, configuration as selected from manufacturer's standard sizes.
   h. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
   i. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

9. Paver Type: Dimetta Pavers manufactured by County Materials Corp.
   b. Color and Finish: As selected from manufacturer's standard options.
   c. Color and Finish: As indicated on the Drawings.
   d. Color and Finish: ______.
   e. Color Pigment Material Standard: Comply with ASTM C 979.
   f. Finish Texture: Fine finish surface manufactured with County Materials proprietary face mix.
   g. Size: 13 inches D x 3-1/8 inches H x 7-3/4 inches L. (330 mm x 80 mm x 197 mm).
   h. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
   i. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

10. Paver Type: Renewable Pavers (sandset) manufactured by County Materials Corp.
    b. Color and Finish: As selected from manufacturer's standard options.
    c. Color and Finish: As indicated on the Drawings.
d. Color and Finish: ______.
e. Color Pigment Material Standard: Comply with ASTM C 979.
f. Finish Texture: Fine finish surface manufactured with County Material's proprietary face mix.
g. Size: 8-5/8 inches D x 3-1/8 inches H x 8-5/8 inches L. (219 mm x 80 mm x 219 mm)
h. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
i. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

11. Paver Type: Essence Wood Plank Pavers manufactured by County Materials Corp.
b. Color and Finish: As selected from manufacturer's standard options.
c. Color and Finish: As indicated on the Drawings.
d. Color and Finish: ______.
e. Color Pigment Material Standard: Comply with ASTM C 979.
f. Finish Texture: Fine finish wood grain textured surface manufactured with County Materials' proprietary face mix.
g. Multiple Sizes: 3-1/8 inches (80 mm) high, configuration as selected from manufacturer's standard sizes.
h. Average Compressive Strength (C140): 8000 psi (50 MPa) per ASTM C 140.
i. Average Water Absorption (ASTM C 140): Lower than 5 percent.

C. Bedding and Joint Sand:

1. Provide bedding and joint sand as follows:
a. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.
b. Do not use limestone screenings, stone dust, or sand for the bedding sand material that does not conform to the grading requirements of ASTM C 33.
c. Do not use mason sand or sand conforming to ASTM C 144 for the bedding sand.
d. Where concrete pavers are subject to vehicular traffic, utilize sands that are as hard as practically available.
e. Sieve according to ASTM C 136.

2. Bedding Sand Material Requirements: Conform to the grading requirements of ASTM C 33 with modifications for Table 1 - Grading Requirements for Bedding Sand, ASTM C33 fine aggregate, as follows:
a. Sieve Size/Percent Passing: 3/8 inch (9.5 mm) / 100 percent.
b. Sieve Size/Percent Passing: No. 4 (4.75 mm) / 95 to 100 percent.
c. Sieve Size/Percent Passing: No. 8 (2.36 mm) / 80 to 100 percent.
d. Sieve Size/Percent Passing: No. 16 (1.18 mm) / 50 to 85 percent.
e. Sieve Size/Percent Passing: No. 30 (0.600 mm) / 25 to 60 percent.
f. Sieve Size/Percent Passing: No. 50 (0.300 mm) / 5 to 30 percent.
g. Sieve Size/Percent Passing: No. 100 (0.150 mm) / 0 to 10 percent.
h. Sieve Size/Percent Passing: No. 200 (0.075 mm) / 0 to 1.0 percent.

3. Joint Sand Material Requirements: Conform to the grading requirements of ASTM C 144 as shown with modifications in Table 2 - Grading Requirements for Joint Sand, ASTM C144:
a. Natural Sand:
   1) Sieve Size/Percent Passing: No. 4 (4.75 mm) / 100 percent.
   2) Sieve Size/Percent Passing: No. 8 (2.36 mm) / 95 to 100 percent.
3) Sieve Size/Percent Passing: No. 16 (1.18 mm) / 70 to 100 percent.
4) Sieve Size/Percent Passing: No. 30 (0.600 mm) / 40 to 75 percent.
5) Sieve Size/Percent Passing: No. 50 (0.300 mm) / 10 to 35 percent.
6) Sieve Size/Percent Passing: No. 100 (0.150 mm) / 0 to 15 percent.
7) Sieve Size/Percent Passing: No. 200 (0.075 mm) / 0 to 1 percent.

b. Manufactured Sand:
   1) Sieve Size/Percent Passing: No. 4 (4.75 mm) / 100 percent.
   2) Sieve Size/Percent Passing: No. 8 (2.36 mm) / 95 to 100 percent.
   3) Sieve Size/Percent Passing: No. 16 (1.18 mm) / 70 to 100 percent.
   4) Sieve Size/Percent Passing: No. 30 (0.600 mm) / 40 to 100 percent.
   5) Sieve Size/Percent Passing: No. 50 (0.300 mm) / 20 to 40 percent.
   6) Sieve Size/Percent Passing: No. 100 (0.150 mm) / 10 to 25 percent.
   7) Sieve Size/Percent Passing: No. 200 (0.075 mm) / 0 to 10 percent.

D. Edge Restraints: Provide edge restraints installed around the perimeter of all interlocking concrete paving unit areas. Comply with ICPI Tech Spec #3.

E. Precast Concrete Landscape Step Units manufactured by County Materials Corp.
   1. Color and Finish: As selected from manufacturer's standard options.
   2. Refer to the Drawings for dimensions of treads and risers, and locations and layouts of steps.
   3. Materials and physical properties specified hereinbefore for pavers shall apply also to the precast concrete step units.
   4. Step units shall include the tread and riser integral and to the dimensions shown on the drawings.
   5. Precast concrete step units are to be furnished by the same manufacturer as the concrete unit pavers.

F. Accessories: Provide the following; confirm after test area is prepared and approved.
   1. Geotextile Fabric:
      a. Type and Manufacturer: ________.
   2. Cleaners:
      a. Type and Manufacturer: ________.
   3. Sealers:
      a. Type and Manufacturer: ________.
   4. Joint Sand Stabilizers:
      a. Type and Manufacturer: ________.

2.3 PERMEABLE INTERLOCKING CONCRETE PAVER UNITS

A. Permeable Interlocking Concrete Paver Units:
   1. Paver Type: H2O Pro Pavers manufactured by County Materials Corp.
      b. Color: As selected from manufacturer's available color options.
d. Finish Texture: Fine finish surface manufactured with County Materials' proprietary face mix.

e. Size with tabs: 3.937 inches D x 3.125 inches H x 7.874 inches L (100 mm x 80 mm x 200 mm). Actual Surface Size without tabs: 3.464 inches D x 3.125 inches H x 7.401 inches L (88 mm x 80 mm x 188 mm).

f. Size with tabs: 7.874 inches D x 3.125 inches H x 7.874 inches L (200 mm x 80 mm x 200 mm). Actual Surface Size without tabs: 7.401 inches D x 3.125 inches H x 7.401 inches L (188 mm x 80 mm x 188 mm).

g. Size with tabs: 7.874 inches D x 3.125 inches H x 15.748 inches L (200 mm x 80 mm x 400 mm). Actual Surface Size without tabs: 7.440 inches D x 3.125 inches H x 15.314 inches L (188 mm x 80 mm x 389 mm).

h. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.

i. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

2. Paver Type: Renewable Pavers (permeable) manufactured by County Materials Corp.


b. Color: As selected from manufacturer's available color options.


d. Finish Texture: Fine finish surface manufactured with County Materials' proprietary face mix.

e. Size with tabs: 8.661 inches D x 3.125 inches H x 8.661 inches L (220 mm x 80 mm x 220 mm). Actual Surface Size without tabs: 8.228 inches D x 3.125 inches H x 8.228 inches L (209 mm x 80 mm x 209 mm).

f. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.

g. Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

3. Paver Type: Harmony Pavers (permeable) manufactured by County Materials Corp.


b. Color: As selected from manufacturer's available color options.


d. Finish Texture: Fine finish surface manufactured with County Materials' proprietary face mix.

e. Size with tabs: 3.897 inches D x 3.149 inches H x 7.835 inches L (99 mm x 80 mm x 199 mm). Actual Surface Size without tabs: 3.346 inches D x 3.149 inches H x 7.283 inches L (85 mm x 80 mm x 185 mm).

f. Size with tabs: 7.835 inches D x 3.149 inches H x 7.835 inches L (199 mm x 80 mm x 199 mm). Actual Surface Size without tabs: 7.283 inches D x 3.149 inches H x 7.283 inches L (185 mm x 80 mm x 185 mm).

g. Size with tabs: 7.835 inches D x 3.149 inches H x 11.772 inches L (199 mm x 80 mm x 299 mm). Actual Surface Size without tabs: 7.283 inches D x 3.149 inches H x 11.220 inches L (185 mm x 80 mm x 285 mm).

h. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
Average Water Absorption (ASTM C 140): 5 percent with no unit greater than 7 percent.

B. Crushed Stone Filler, Bedding, Base And Subbase:
   1. Crushed stone with 90 percent fractured faces, LA Abrasion < 40 per ASTM C 131.
   2. Do not use rounded river gravel for vehicular applications.
   3. All stone materials shall be washed with less than 2 percent passing the No. 200 sieve.
   4. Joint/opening filler, bedding, base and subbase: conforming to ASTM D 448 gradation as shown in Tables 1, 2 and 3 below:
      a. Table 1: ASTM No. 8 Grading Requirements, Bedding and Joint/Opening Filler
         1) Sieve size, 12.5 mm (1/2 in.) - Percent passing, 100.
         2) Sieve size, 9.5 mm (3/8 in.) - Percent passing, 85 to 100.
         3) Sieve size, 4.75 mm (No. 4) - Percent passing, 10 to 30.
         4) Sieve size, 2.36 mm (No. 8) - Percent passing, 0 to 10.
         5) Sieve size, 1.16 mm (No. 16) - Percent passing, 0 to 5.
      b. Table 2: ASTM No. 57 Base, Grading Requirements
         1) Sieve size, 37.5 mm (1-1/2 in.) - Percent passing, 100.
         2) Sieve size, 25 mm (1 in.) - Percent passing, 95 to 100.
         3) Sieve size, 12.5 mm (1/2 in.) - Percent passing, 25 to 60.
         4) Sieve size, 4.75 mm (No. 4) - Percent passing, 0 to 10.
         5) Sieve size, 2.36 mm (No. 8) - Percent passing, 0 to 5.
      c. Table 3: Grading Requirement for ASTM No. 2 Subbase
         1) Sieve size, 75 mm (3 in.) - Percent passing, 100.
         2) Sieve size, 63 mm (2-1/2 in.) - Percent passing, 90 to 100.
         3) Sieve size, 50 mm (2 in.) - Percent passing, 35 to 70.
         4) Sieve size, 37.5 mm (1-1/2 in.) - Percent passing, 0 to 15.
         5) Sieve size, 19 mm (3/4 in.) - Percent passing, 0 to 5.

C. Accessories:
   1. Provide accessory materials as follows.
      a. Edge Restraints
         1) Manufacturer:
         2) Material:
         3) Material Standard:
      b. Geotextile Fabric:
         1) Manufacturer:
         2) Material:
         3) Material Standard:

PART 3 EXECUTION

3.1 PREPARATION

A. Verify base is dry, certified by Contractor as meeting material, installation and grade specifications.

B. Verify that base and geotextile if scheduled is ready to support sand, edge restraints where required or indicated, pavers and imposed loads.

C. Edge Restraint Preparation:
   1. Install edge restraints per the drawings and manufacturer's recommendations at the indicated elevations.
   2. Mount directly to finished base. Do not install on bedding sand.
   3. The minimum distance from the outside edge of the base to the spikes shall...
be equal to the thickness of the base.

3.2 INTERLOCKING PAVEMENT INSTALLATION

A. Acceptance of Site Verification of Conditions:
   1. Contractor shall inspect, accept and certify in writing to the paver installation subcontractor that site conditions meet specifications for the following items prior to installation of interlocking concrete pavers.
      a. Verify that base materials, thickness, compacted density, surface tolerances and elevations conform to specified requirements.
      b. Provide written density test results for soil subgrade, and base materials to the Owner, Contractor and paver installation subcontractor.
   2. Do not proceed with installation of bedding and interlocking concrete pavers until subgrade soil conditions are corrected by the Contractor.

B. Spread bedding sand evenly over the base course and screed to a nominal 1 inch (25 mm) thickness, not exceeding 1-1/2 inches (40 mm) thickness. Spread bedding sand evenly over the base course and screed rails, using the rails and/or edge restraints to produce a nominal 1 inch (25 mm) thickness, allowing for specified variation in the base surface.
   1. Do not disturb screeded sand.
   2. Screeded area shall not substantially exceed that which is covered by pavers in one day.
   3. Do not use bedding sand to fill depressions in the base surface.

C. Lay pavers in pattern(s) shown on drawings. Place units hand tight without using hammers. Make horizontal adjustments to placement of laid pavers with rubber hammers and pry bars as required.

D. Provide joints between pavers between 1/16 inch and 3/16 inch (2 and 5 mm) wide. No more than 5 percent of the joints shall exceed 1/4 inch (6 mm) wide to achieve straight bond lines.

E. Joint (bond) lines shall not deviate more than plus or minus 1/2 inch (plus or minus 15 mm) over 50 ft. (15 m) from string lines.

F. Fill gaps at the edges of the paved area with cut pavers or edge units.

G. Cut pavers to be placed along the edge with a double blade paver splitter or masonry saw.

H. Adjust bond pattern at pavement edges such that cutting of edge pavers is minimized. All cut pavers exposed to vehicular tires shall be no smaller than one-third of a whole paver. Cut pavers at edges as indicated on the drawings.

I. Keep skid steer and forklift equipment off newly laid pavers that have not received initial compaction and joint sand.

J. Comply with manufacturer's recommendation for use of natural joint sand confirming to ASTM C144. Polymeric sand should not be used on pavers with heavily textured surfaces.
   1. If polymeric sand is desired by the project owner, consult with an industry recommended polymeric sand agent, and follow the agent manufacturer's written instructions.

K. Make sure all joint material is completely swept off and removed from the fine finish surface of pavers before compacting to minimize surface abrasion.
L. Use a buffer such as a urethane mat between the plate compactor and the fine finish surface of pavers to prevent scuffing.

M. Use a low-amplitude plate compactor capable of at least minimum of 4,000 lbf (18 kN) at a frequency of 75 to 100 Hz to vibrate the pavers into the sand. Remove any cracked or damaged pavers and replace with new units. Pass vibrating plate with a mat in all directions to allow sand to penetrate between the joints.

N. Repeat by spreading additional dry joint sand and sweeping into the joints as required until full. Remove all excess sand from the fine finish surface of pavers before compacting. Do not compact within 6 feet (2 m) of unrestrained edges of paving units.

O. All work within 6 feet (2 m) of the laying face must shall be left fully compacted with sand-filled joints at the end of each day or compacted upon acceptance of the work. Cover the laying face or any incomplete areas with plastic sheets overnight if not closed with cut and compacted pavers with joint sand to prevent exposed bedding sand from becoming saturated from rainfall.

P. Remove excess sand from the fine finish surface of pavers when installation is complete.

Q. Surface shall be broom clean after removal of excess joint sand.

3.3 CROSSWALK INSTALLATION

A. Crosswalk on Concrete Base with Bitumen Setting Bed: Reference Interlocking Concrete Paver Institute (ICPI)-71 drawing for material and construction requirements.
   1. Base thickness and reinforcing varies with traffic, climate, and subgrade conditions. Refer to drawings.
   2. Concrete Curb: Minimum 12 inches by 12 inches (305 mm by 305 mm) reinforced concrete curb at each side of paver crosswalk.
   3. Concrete base minimum 2 percent slope from centerline to curb.
   4. Weep Holes: 2 inches (51 mm) diameter drain holes locate at lowest elevations fill with pea gravel.
      a. Do not provide weep holes to subgrade when water table is less than 2 feet (0.6 m) from top of soil subgrade. Provide drain to catch basins.
   5. Concrete Paver: 3 1/8 inches (80 mm) minimum thickness.
   6. Hand tight sand filled paver joints set in 3/4 inch (19 mm) sand-asphalt setting bed on tack coated reinforced concrete base.

B. Crosswalk on Concrete Base: Reference Interlocking Concrete Paver Institute (ICPI)-12 drawing for material and construction requirements.
   1. Base thickness and reinforcing varies with traffic, climate, and subgrade conditions. Refer to drawings.
   2. Concrete Curb: Minimum 12 inches by 12 inches (305 mm by 305 mm) reinforced concrete curb at each side of paver crosswalk.
   3. Concrete base minimum 2 percent slope from centerline to curb.
   4. Weep Holes: 2 inches (51 mm) diameter drain holes locate at lowest elevations fill with pea gravel.
      a. Do not provide weep holes to subgrade when water table is less than 2 feet (0.6 m) from top of soil subgrade. Provide drain to catch basins.
   5. Concrete Paver: 3 1/8 inches (80 mm) minimum thickness.
   7. Hand tight sand filled paver joints set in 1 inch (25 mm) sand setting bed over...
geotextile fabric on reinforced concrete base.

3.4 PERMEABLE PAVER INSTALLATION

A. Acceptance of Site Verification of Conditions:
1. Contractor shall inspect, accept and certify in writing to the paver installation subcontractor that site conditions meet specifications for the following items prior to installation of interlocking concrete pavers.
   a. Verify that subgrade preparation, compacted density and elevations conform to specified requirements.
   b. Provide written density test results for soil subgrade to the owner, general contractor and paver installation subcontractor.
   c. Verify location, type, and elevations of edge restraints concrete collars around utility structures, and drainage pipes and inlets.
2. Do not proceed with installation of bedding and permeable concrete pavers until subgrade soil conditions are corrected by the general contractor or designated subcontractor.

B. General:
1. Any excess thickness of soil applied over the excavated soil subgrade to trap sediment from adjacent construction activities shall be removed before application of the geotextile and subbase materials.
2. Keep area where pavement is to be constructed free from sediment during entire job. Geotextiles, base and bedding materials contaminated with sediment shall be removed and replaced with clean materials.
3. Do not damage drainpipes, overflow pipes, observation wells, or any inlets and other drainage appurtenances during installation. Report any damage immediately to the project engineer.

C. Geotextiles:
1. Place on bottom and sides of soil subgrade. Secure in place to prevent wrinkling from vehicle tires and tracks.
2. Overlap a minimum of 0.3 m (12 in.) 0.6 m (24 in.) in the direction of drainage.

D. Open-Graded Subbase and Base:
1. Moisten, spread and compact the No. 2 subbase in 4 to 6 in. (100 to 150 mm) lifts without wrinkling or folding the geotextile. Place subbase to protect geotextile from wrinkling under equipment tires and tracks.
2. For each lift, make at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 t (8 T) vibratory roller until there is no visible movement of the No. 2 stone. Do not crush aggregate with the roller.
3. The surface tolerance of the compacted No. 2 subbase shall be plus or minus 2 1/2 in. (plus or minus 65mm) over a 10 ft (3 m) straightedge.
4. Moisten, spread and compact the No. 57 base layer in one 4 in. (100 mm) thick lift. On this layer, make at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 t (8 T) vibratory roller until there is no visible movement of the No. 57 stone. Do not crush aggregate with the roller.
5. Use part of the compacted base area as a control strip for density testing by the Testing Company.
   a. The Testing Company shall supply nuclear moisture/density gauges and ancillary equipment required to conduct density and moisture content measurements for compaction of the No. 57 aggregate drainage layer. Qualified testing laboratory operators/gauges may conduct compaction testing. Each gauge operator shall be trained in the safe operation, transportation and handling of the gauge. The registered owner of the gauge shall have and maintain a valid
Radioisotope License for each gauge.

b. Each gauge shall have been calibrated within the last 12 months, either by the manufacturer or other qualified agent, against certified density and moisture reference blocks. The density standard count and the moisture standard count shall be within 2 percent and 4 percent respectively, of the most recent calibration values. A certificate of calibration for each gauge shall accompany each gauge.

6. Target Density:
   a. Determine a target density on the control strip during under the following conditions: (1) after initial placement and compaction of the base aggregate layer (2) when there is a perceptible change in the appearance or gradation of the aggregate, (3) when there is a change in the source of aggregate.

b. Test field density according to ASTM D 2922 Standard Test Methods for Density of Soil and Soil Aggregate In-Place by Nuclear Methods (shallow Depth). Field density tests shall be performed on compacted base materials to determine within acceptable limits of a target density.

7. Control Strip:
   a. The Testing Company shall construct a control strip for the determination of a target density consisting of a single uniform lift as specified in the contract documents, but not more than 4 in. (100 mm) thick and covering approximately 600 yd² (500 m²) in area. No testing shall be performed within 10 ft (3 m) from any unrestrained outside edge of the work area. The control strip may be incorporated into the project upon acceptance of density measurements by the Testing Company.

b. During construction of the control strip, the surface of the aggregate shall be visibly moist and maintained as such throughout construction and compaction.

c. After initial placement of the aggregate base material, the compaction equipment shall make two passes over the entire surface of the control strip. Field densities and field moisture contents, using the backscatter/indirect method, shall be determined at five randomly selected locations at least 15 ft (5 m) apart. The dry density and moisture content shall be calculated for each of these locations and the averages shall be used as initial values. The maximum compacted thickness of the aggregate base layer measured for density shall be 4 in. (100 mm).

d. The compaction equipment shall then make two additional passes over the entire surface of the control strip. After compaction, three separate, random field density and moisture content determinations shall be made, using the backscatter/indirect method, and a new average dry density and moisture content shall be calculated.

e. If the new average dry density exceeds the previous value by more than 1.2 pcf (20 kg/m³) then two additional passes of the equipment shall be carried out as described above. If the new average dry density does not exceed the previous value by more than 1.2 pcf (20 kg/m³), then compaction of the control strip will be considered satisfactory and complete.

f. Upon satisfactory completion of the control strip, an additional seven (7) field density and moisture tests, using the backscatter/indirect method, shall be taken at random locations and the dry density and moisture content values shall be determined. The final dry density and moisture content of the control strip shall be the average of these seven values plus the three most recent values obtained upon completion.
8. Compaction:
   a. Use a smooth dual or single smooth drum, minimum 10 t (8 T) vibratory roller or a minimum 13,500 lb (60 kN), reversible vibratory plate compactor with a compaction indicator without crushing the aggregate base.
   b. Compact aggregates without crushing them.

9. Test Report:
   a. The test report shall include the following:
      1) Project description.
      2) Sketch of test area and test locations.
      3) Aggregate type and layer thicknesses.
      4) Aggregate characteristic properties: gradation, void ratio, bulk density.
      5) Compaction equipment type and weight.
      6) Static or vibratory compaction.
      7) Number of passes of the compaction equipment.
      8) Test number and location.
      9) Individual and average field wet density, moisture content, and dry density values determined after each compaction operation in accordance with ASTM D 2922 Standard Test Methods for Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).
     10) Calculation of target density.

E. The surface tolerance the compacted No. 57 base should not deviate more than plus or minus 1 in. (25 mm) over a 10 ft (3 m) straightedge.

F. Bedding Layer:
   1. Moisten, spread and screed the No. 8 stone bedding material.
   2. Fill voids left by removed screed rails with No. 8 stone.
   3. The surface tolerance of the screeded No. 8 bedding layer shall be plus or minus 3/8 in (10 mm) over a 10 ft (3 m) straightedge.
   4. Do not subject screeded bedding material to any pedestrian or vehicular traffic before paving unit installation begins.

G. Permeable interlocking concrete pavers and joint/opening fill material:
   1. Lay the paving units in the pattern(s) and joint widths shown on the drawings. Maintain straight pattern lines.
   2. Fill gaps at the edges of the paved area with cut units. Cut pavers subject to tire traffic shall be no smaller than 1/3 of a whole unit.
   3. Cut pavers and place along the edges with a double-bladed splitter or masonry saw.
   4. Fill the openings and joints with No. 8 stone.
   5. Remove excess aggregate on the surface by sweeping pavers clean.
   6. Compact and seat the pavers into the bedding material using a low-amplitude, 75-90 Hz plate compactor capable of at least 5,000 lbf (22 kN). This will require at least two passes with the plate compactor.
   7. Do not compact within 6 ft (2 m) of the unrestrained edges of the paving units.
   8. Apply additional aggregate to the openings and joints if needed, filling them completely. Remove excess aggregate by sweeping then compact the pavers. This will require at least two passes with the plate compactor.
   9. All pavers within 6 ft (2 m) of the laying face must be left fully compacted at the completion of each day.
  10. The final surface tolerance of compacted pavers shall not deviate more than plus or minus 3/8 (10 mm) under a 10 ft (3 m) long straightedge.
  11. The surface elevation of pavers shall be 1/8 to 1/4 in. (3 to 6 mm) above
adjacent drainage inlets, concrete collars or channels.

3.5 FIELD QUALITY CONTROL

A. Paver Installation Requirements:
   1. The final surface tolerance from grade elevations shall not deviate more than plus or minus 3/8 inch (plus or minus 10 mm) under a 10 feet (3 m) straightedge.
   2. Check final surface elevations for conformance to drawings.
   3. The surface elevation of pavers shall be 1/8 inch to 1/4 inch (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.
   4. Lippage: No greater than 1/8 inch (3 mm) difference in height between adjacent pavers.

B. Permeable Paver Installation Requirements:
   1. After sweeping the surface clean, check the final elevations for conformance to the drawings.
   2. Lippage: No greater than 1/8 in. (3 mm) difference in height between adjacent pavers.
   3. The surface elevation of pavers shall be 1/8 inch to 1/4 inch (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.
   4. Bond lines for paver courses: +1/2 in. (+15 mm) over a 50 ft. (15 mm) string line.
   5. Verify the surface infiltration at a minimum of 100 in./hour using test method C 1781.

3.6 CLEANING AND SEALING

A. Clean concrete pavers in accordance with the cleaning agent manufacturer's written recommendations after review and approval of mock-ups.

B. Seal concrete pavers in accordance with the sealing agent manufacturer's written recommendations after review and approval of mock-ups.

C. Apply joint sand stabilization materials between concrete pavers in accordance with the joint sand agent manufacturer's written recommendations after review and approval of mock-ups.

3.7 PROTECTION

A. After work in this section is complete, the General Contractor shall be responsible for protecting work from damage due to subsequent construction activity on the site.

B. PICP installation contractor shall return to site after 6 months from the completion of work and provide the following as required: fill paver joints with stones, replace broken or cracked pavers, and re-level settled pavers to initial elevations. Any additional work shall be considered part of original bid price and with no additional compensation.

END OF SECTION