INDEX TO CLAUSES

PART 1 - GENERAL

1.1 Work Included

.1 This section specifies requirements for interlocking concrete paving, including excavation, bedding sand, preparation of bedding, compacting, and installation of concrete paver units, geotextile, joint sand, and edge restraints.

1.2 Reference Standards

The latest editions of all the following references shall apply to this specification.

.1 Joint Committee on Contract Documents Standard Specification for Municipal Services.

.2 ASTM C136-19, Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM C140-22, Sampling and Testing Masonry Units and Related Units.

.4 ASTM C936-21b, Specification for Solid Interlocking Concrete Paving Units.

.5 ASTM C979-16, Specification for Pigments for Integrally Colored Concrete.

.6 ASTM D698-12(2021), Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m^3).

.7 ASTM D1557-12E1, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700kN-m/m^3).

.8 CSA A23.1:24/A23.2:24, Concrete materials and methods of concrete construction / test methods and standard practices for concrete.

.9 CSA A179-14 (R2019), Mortar and grout for unit masonry.

.10 CSA A231.1:19/A231.2:19, precast concrete paving slabs/precast concrete.

.11 Interlocking Concrete Paving Institute (ICPI).

.1 Tech Spec Technical Bulletins, Vol. 1- latest edition.

.2 ICPI Fact sheet for Permeable Interlocking Concrete Pavement (PICP).

.12 AASHTO 1993 Guide for low-speed roads and parking lots.

1.3 Related Sections

.1 From Joint Committee on Contract Documents Standard Specification for Municipal Services, latest edition:

.1	Earthwork	Section 31 20 00
.2	Concrete	Section S-11

1.4 Submittals

.1 If not included in the Contractor's Comprehensive QMP submission, the Contractor shall submit a supplementary QMP to the Engineer (TPW.TIM@halifax.ca) for review, a minimum of 15 working days prior to commencement of any interlocking concrete paver work as part of the project(s). The supplementary QMP shall be prepared to fit the criteria of the unique project. The Engineer will provide a Contractor QMP Approval Letter in a timely manner, prior to commencement of this work.

If the Engineer deems the supplementary QMP unacceptable, the Contractor shall provide iterations in a timely manner until the QMP is considered adequate by the Engineer. Construction related to interlocking concrete paver work as part of a project(s) shall not commence without the Contractor's QMP Approval Letter for the project.

Note, if deemed necessary by the Contractor, an amended QMP can be submitted to the Engineer for review and approval at any point throughout the construction season (ends December 30th of the calendar year).

An outline for a QMP, based on ISO 10005, is provided for reference in Attachment A.

.2 If specified in Project Documentation, submit shop drawings indicating layout, pattern, and relationship of paving joints to fixtures and project formed details. Note, Project Documentation may request additional details than referenced above.

.3 Submit full size samples of concrete paving units to indicate color and shape selection.

.4 Submit sieve analysis of bedding and joint sand.

.5 Submit test results from an independent testing laboratory for compliance of paving unit requirements to ASTM C936 or other

applicable requirements as determined by the Engineer.

.6 Certification and Membership

.1 Submit manufacturer's certification of concrete pavers as having passed applicable ASTM or CSA standards.

.2 Upon written request from HRM, the Contractor shall coordinate with the interlocking concrete paver manufacturer(s) to allow for HRM (or its representative) to perform an inspection at the interlocking concrete paver manufacturer's location (facility) for any interlocking concrete pavers being manufactured for the project, *if requested* by HRM. For clarity, it is the responsibility of the Contractor, and not HRM, to coordinate this inspection and such inspection is to occur during the period set forth in the written notification or during another period agreed to by HRM in writing. The inspection conducted by HRM (or its representative) will verify compliance with certification requirements, testing standards, and quality control procedures.

1.5 Delivery, Storage, and Handling

.1 Deliver concrete pavers to the site in steel banded, plastic banded or plastic wrapped cubes capable of transfer lift or clamp lift. Unload pavers at job site in such a manner that no damage occurs to the product.

.2 Cover sand with waterproof covering to prevent exposure. Secure the covering in place.

1.6 Environmental Conditions

.1 Do not install sand and pavers over frozen base materials or saturated sand.

PART 2 - PRODUCTS

2.1 Pavers, Bedding, and Edging

.1 The Interlocking Concrete Pavement Institute (ICPI) shall approve manufacturers.

.2 Concrete paver requirements:

.1 Paver dimensions in accordance with CSA A321.2:1-19 Clause 6.1.1.

.2 Compressive strength testing conducted according to CSA A231.2 Clause 7.3, where an average compressive strength of the test samples shall be not less than 55 MPa with no individual unit less than 50 MPa.

.3 Absorption testing conducted to ASTM C140 where an average absorption of the test samples shall not be greater than 5% with no individual unit greater than 7%.

.4 Freeze thaw durability testing conducted according to CSA A231.2 Clause 7.4 where no greater mass loss than 200 g/m^2 when subjected to 25 freeze-thaw cycles or no greater than 500 g/m^2 when subjected to 50 freeze-thaw cycles in 3% saline solution test.

.3 Pigment shall conform to ASTM C979.

.4 Granular base materials:

.1 Sub-base shall be Type 2 as specified in Section 31 20 00 or as specified in the Project Documentation.

.2 Base shall be Type 1 as specified in Section 31 20 00 or as specified in the Project Documentation.

.5 Manufactured sand for bedding shall follow CSA A23.1:24 Clause 4.2.3.3 to be hard, durable, crushed stone particles, to the gradation specified in CAN/CSA A23.1:24 Table 10 (FA1) with no more than 1 % passing the 80 µm sieve and tested according to CSA Test Method A23.2:24-5A:24. Sand to be free from clay lumps, cementation, organic material, frozen material, and other deleterious materials. Do not use limestone screenings or sand that does not meet gradation requirements. Do not use mason's sand for sand bedding.

.6 Joint sand shall be according to CSA A23.1:24 Clause 4.2.3.3.2, with Gradation to CSA A23.1:24 Table 10 (FA1) with no more than 1 percent passing the 80 µm or CSA A179. Joint sand shall be comprised of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material, and other deleterious materials.

.7 Polymeric binder shall be non-chemical, non-toxic, colourless, odourless additive for joints of interlocking concrete and clay brick paving.

.8 Edge restraints shall be metal, plastic, or concrete as per ICPI Tech Spec 3 or as specified in Project Documentation.

.9 Geotextile filter: as specified in the HRM Municipal Design Guidelines or Project Documentation.

2.2 Concrete Under Pavers

.1 May be constructed using one of the following types of Portland cement concrete pavement:

- Jointed concrete;
- Jointed reinforced concrete;
- Continuously reinforced concrete; or,
- Roller-compacted concrete.

.2 Concrete construction shall follow the requirements of the AASHTO 1993 Guide for low-speed roads and parking lots, Section S-11, and as specified in the Project Documentation.

PART 3 - EXECUTION

3.1 Standard Concrete Paver Installation

.1 Prepare sub-grade to ASTM D698 or ASTM D1557 as applicable to allow for installation of granular base.

.1 For furnishing zone pavers, prepare concrete base per the HRM Standard Details or Project Documentation.

.2 Install geotextile filter as specified in the HRM Municipal Design Guidelines or Project Documents.

.3 Construct base to minimum thickness as specified in the HRM Municipal Design Guidelines or Project Documents.

.4 Spread and compact crushed stone or gravel base in uniform layers not exceeding 150 mm compacted thickness.

.5 Compact base to a density of not less than 98 % Standard Proctor Density in accordance with ASTM D698.

.6 Shape and compact alternately to obtain a smooth, even, and uniformly compacted granular base in conformity with finish surface grades.

.7 Apply water as necessary during compaction to obtain water content within 2 % of optimum. If granular base is excessively moist, remove it and install more granular material to rid it of sponginess.

.8 Top of granular base not to exceed plus or minus 8 mm deviation

over a 2 m straightedge.

3.2 Edge Restraints

.1 Install edging true to grade, in location, layout, and pattern as indicated.

.2 Abut pavers tightly against edge restraints to prevent rotation under load and any subsequent spreading of joints.

.3 Install edge restraints so that they can withstand temperature changes, vehicular traffic, and snow removal equipment.

.4 Use edge restraints along all unrestrained paver edges and support on a minimum of 150 mm of aggregate base.

3.3 Bedding Sand

.1 Place and spread bedding sand to an uncompacted nominal thickness of 1 in. (25mm).

.2 Maximum uncompacted thickness not to exceed 40 mm.

.3 Use granular base material to compensate for depressions that exceed specified tolerances in surface of base.

.4 Bedding sand shall be compacted during the compaction of the pavers.

.5 Do not use polymeric jointing sand for bedding sand.

3.4 Surface Course

.1 Keep bedding sand and granular base free of foreign material prior to placement of concrete pavers. Do not allow water saturation to occur.

.2 Install unit paving true to grade on the bedding sand, in location, layout and pattern as indicated.

.3 Joint between pavers is to be between 2 mm and 5 mm wide or as indicated in the Project Documents.

.4 Precast concrete paving slabs:

.1 Install paving slabs with the joints of the prescribed width as indicated on the drawings.

.2 Compact and level units with a minimum 22 kN force mechanical plate vibrator.

.3 Do not compact unit paving within 2 m of unrestrained edges.

3.5 Paver Joint Sand

.1 Fill spaces between pavers by sweeping in sand. Sweep off excess sand.

.2 Utilize a mechanical plate vibrator specifically designed for interlocking concrete pavers to achieve compaction of sand in joints. Prior to completion of compaction, ensure that all joints are adequately filled.

3.6 Polymeric Sand Placement

.1 After paving has been compacted, sweep polymeric sand into joints, remove excess material remaining on the surface and remove any remaining sand/binder on paver surface prior to activation.

.2 Activate polymeric sand in accordance with manufacturer's instructions.

3.7 Finish Paver Grade

.1 At the completion of each workday, confirm all work within 2 m of laying face is to be left fully compacted and all joints are filled. Cover laying face with plastic sheets overnight.

.2 Surface of finished pavement: Free from depressions exceeding 8 mm as measured with 2 m straight edge.

.3 Surface elevations of pavers to be 3 mm to 6 mm above adjacent drainage inlets, concrete collars, or channels.

.4 Sweep surface clean and check final elevations.

3.8 Emissions Reduction

.1 Concrete production and construction must take into consideration the Canadian Treasury Board's aim to reduce greenhouse gas emissions for ready-mix concrete by at least 10% below the Regional Industry Average EPD. An outcome-based approach will allow various methods of reaching these targets

PART 4 - MEASUREMENT & PAYMENT

4.1 General

.1 Payment for all works carried out in accordance with this specification will be paid for per the payment items detailed in Section 01 22 00 – Measurement and Payment, of the Contract.

****** END S-12 ******