**PART 1 - GENERAL**

**1.01 SUMMARY**

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. Concrete masonry pavers.

2. Mortar, grout, and grouting.

C. Related Sections:

1. Section 01 45 23: Testing and Inspection.

2. Section 03 11 00: Concrete Forms and Accessories.

3. Section 03 20 00: Concrete Reinforcement.

4. Section 03 30 00: Cast-In-Place Concrete.

5. Section 04 22 20: Concrete Unit Masonry.

**1.02 REFERENCES**

A. American Society for Testing and Materials International (ASTM):

1. ASTM C33 – Standard Specification for Concrete Aggregates.

2. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

1. ASTM C150 - Standard Specification for Portland Cement.
2. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
3. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
4. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
5. ASTM C476 - Standard Specification for Grout for Masonry.
6. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
7. ASTM C936 – Standard Specification for Solid Concrete Interlocking Paving Units.

**1.03 SUBMITTALS**

A. Mix Design: Provide mix design for grouting.

B. Product Data: Submit manufacturer's Product Data for assembly components, materials, and accessories.

C. Samples: Submit Samples of each type of masonry paver.

**1.04 QUALITY ASSURANCE**

A. Perform the Work in accordance with CBC, Chapter 21A. Refer to Section 01 45 23: Testing and Inspection.

B. Comply with requirements of ACI 530 and ACI 530.1, Building Code Requirements & Specifications for Masonry Structures.

C. Concrete masonry paver: Sample and test in accordance with ASTM C140.

1. Notify the testing laboratory a minimum of 45 days in advance of installing concrete masonry pavers, to allow for testing of pavers in compression, shrinkage, and absorption (absorption test requires 40 days) or provide current absorption test data from an independent certified laboratory.

2. The retained material testing laboratory shall receive five concrete masonry pavers per test from masonry unit manufacturer as designed or specified by the Architect, and shall perform and send required test results to the Architect and PI.

D. Portland Cement: Sample and test in accordance with ASTM C150.

E. Mortar: Sample and test in accordance with ASTM C780.

F. Grout: Sample and test in accordance with ASTM C404.

G. Compressive Tests: Sample and test to verify compliance with the following minimum values:

1. Mortar: At least 900 psi at 7 days and 1,900 psi at 28 days.

2. Grout: At least 1,200 psi at 7 days and 2,000 psi at 28 days.

3. Test per: ASTM C476, C1019. Do not test 28 day specimen when 7 day tests exceed 28 day requirements.

H. Coordinate concrete pavement and masonry paver layout before and during installation.

1. Inspection: The PI will inspect the installation of masonry pavers.

J. Payment for original tests and inspection will be paid by the Owner.

K. If testing is required by DSA, removed masonry shall be replaced with new masonry paver to match adjoining Work. Core testing shall conform to CBC, Chapter 21A.

**1.05 DELIVERY, STORAGE AND HANDLING**

A. Store units above ground on level platforms to allow air circulation under stacked unit.

B. Cover and protect against wetting before installation.

C. Handle pavers on pallets or flat bed barrows. Free discharge from conveyor units or transportation in mortar trays is not permitted.

**PART 2 - PRODUCTS**

* 1. **MANUFACTURERS**

1. All Interlocking Concrete Paving Stones shall be as by ORCO, or equal. Shape, design, and color as indicated on the Drawings.

**2.02 MATERIALS**

A. All interlocking masonry pavers shall conform to the following:

1. Pavers shall provide an average minimum compressive strength of 8,000 psi with no individual unit less than 7,200 psi when tested in accordance with the procedures of ASTM C140.
2. Materials furnished to manufacture interlocking paving stones shall conform to the following:
   1. Cement – ASTM C150 (Portland Cement)
   2. Aggregates – ASTM C33, washed and graded sand and rock. Expanded shale or lightweight aggregates are not permitted.
   3. Color Pigment Source – Harcross, or equal.
3. Size, shape design, and color shall be in accordance with details as noted on Drawings.
4. The specified requirements under ASTM C936 Section 4.3 (Resistance to Freezing and Thawing), and 4.4 (Abrasion Resistance) may be waived if it is demonstrated that the climatic and service conditions in which the paver units are to be installed do not warrant said requirements.
5. Pavers shall have been cured for a minimum of 28 days.
6. Masonry paver shall provide a maximum liner shrinkage of 0.06 percent from saturated to oven dry.

B. Portland Cement: ASTM C150, Type II: low alkali from one source.

C. Mortar: ASTM C270, Type S unless otherwise noted.

D. Grout: ASTM C476.

E. Hydrated Lime: ASTM C207, Type S.

F. Admixture for Grout: Sika Chemical Corp. Grout Aid. Refer to Section 01420: Testing and Inspection.

G. Water: Potable and fresh.

H. Cleaning Materials: Sure Klean No. 600 detergent by ProSoCo.

I. Miscellaneous Materials: As required to complete the Work.

J. Sampling and Testing of Mortar: Refer to Specification Section 01 45 23: Testing and Inspection.

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

A. Discard units with cracked faces, chipped surfaces, or other defects not complying with requirements of ASTM C216.

**3.02 MORTAR AND GROUT MIXING**

A. Mortar: Damp, loose volumes per CBC table 2103A.8, specified 4 to 6 percent masonry sand only. Mix proportions shall be verified by material testing laboratory.

1. Portland cement: 1 part.

2. Hydrated lime: 1/4 to 1/2 part.

3. Mortar sand: 2-1/4 to 3 times the sum of the separate volumes of cementitious materials.

4. Water: to produce required consistency.

5. Mixing time for Silotec Mortar System shall be in accordance with Silotec Mortar System procedures instead of those indicated in Specification Section 01420: Testing and Inspection.

B. Grout: Damp, loose volumes as set forth in CBC table 2103A.12, Mix proportions shall be verified by material testing laboratory.

1. Proportions as determined by reviewed mix design or;

1. Portland Cement: 1 part sand; 2-1/4 to 3 parts pea gravel; 1 to 2 parts water, to provide a slump of 8 to 10 inches.
2. Discard grout not installed within 1-1/2 hours after water is added.

C. Measurements: Proportion by accurate volume measurements. Measure in calibrated devices that can be verified at any time.

1. Add water for workable consistency.

2. Shovel measurements are not permitted.

D. Mixing: Place sand, cement, and water in mixer in that order, while mixer is running; mix for 3 minutes, add lime, and admixture (for grout), and continue mixing until a uniform mass is provided, but in no case less than 10 minutes.

1. Equipment for mixing and handling mortar and grout shall be acceptable to DSA.

2. Batches of less than one sack of cement, and fractional sack batches are not permitted.

E. Retempering Time Limit: Retemper on mortar boards, for at least 3 minutes but not more than 10 minutes when required, by adding water into a basin formed by mortar, and installing mortar into it. Dashing or pouring of water over mortar is not permitted.

1. Do not re-temper mortar which has become hard or non-plastic.

2. Discard mortar, which has not been installed within one hour after original mixing.

F. Ready-Mix Grout: Grout batched off the Project site and delivered by mixer truck shall be subject to same procedures and controls as prescribed by DSA building code requirements. Refer to Section 01420: Testing and Inspection.

**3.03 INSTALLATION OF MASONRY UNITS**

A. Workmanship: Install pavers plumb and true to line; with straight, level joints of uniform thickness. Maintain pavers clean during and after installation.

1. Assist other trades with items requiring cutting and fitting of pavers.

2. Cut pavers with a diamond saw or carborundum wheel. Trowel or chisel cutting is not permitted.

B. Paver Installation: Clean dirt and dust from surfaces before installation. Do not wet paver units except in very dry weather.

1. Foundation preparation: Tops of concrete starting surfaces, wash-off by high pressure water jet, and slurry coat surfaces with neat cement grout for bond to pavers.

2. After bond bed has hardened slightly, install mortar to required joint thickness. Set pavers with 3/8 inch mortar bed on entire horizontal surface. Fill joints solid, install tightly to adjoining pavers. Provide a 3/8 inch joint.

a. Hold racking to a minimum.

b. No toothing is permitted.

c. If it becomes necessary to move a paver after it has been installed, remove the unit, discard the mortar, and install the paver in fresh mortar.

3. Finish Joint Treatment: Unless otherwise indicated, cut joints flush, and tool slightly concave to a dense, uniform surface.

4. Grouting: Unless noted otherwise on Drawings, completely fill joints with grout.

**3.04 CURING**

A. Remove efflorescence, stains, debris, excess grout and foreign matter.

B. During curing, or for any other purpose, do not saturate pavers with water.

C. For low-humidity conditions, dampen the paver surface with a very light fog spray continuously for 3 days to cure mortar in joints.

**3.05 CLEANING**

A. At completion of paver Work, remove misplaced mortar, grout or other foreign substances, and clean surfaces which will be exposed in finish Work with specified cleaner, or with clean water and stiff fiber brushes.

B. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

* 1. **PROTECTION**

A. Protect the Work of this section until Substantial Completion.

**END OF SECTION**