

SP-097047
(New)



Iowa Department of Transportation

**SPECIAL PROVISIONS
for
BRICK PAVERS**

Black Hawk County

STP-E-8155(723)--8V-07

**Effective Date
July 17, 2012**

THE STANDARD SPECIFICATIONS, SERIES OF 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Furnish and install brick unit pavers, sand setting beds and joint sand as shown on the Drawings and Specified herein.

1.02 REFERENCES

- A. ASTM C 902 - Standard Specification for Pedestrian and Light Traffic Paving Brick.
- B. ASTM C 33 - Specification for Concrete Aggregates.
- C. ASTM C 43 - Terminology of Structural Clay Products.
- D. ASTM C 67 - Test Methods of Sampling and Testing Brick and Structural Clay Tile.
- E. ASTM C 88 - Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
- F. ASTM C 136 - Method for Sieve Analysis for Fine and Coarse Aggregates.
- G. ASTM C 140 - Sampling and Testing Concrete Masonry Units.
- H. ASTM C 144 - Standard Specifications for Aggregate for Masonry Mortar.
- I. ASTM D 698 - Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5 lb Rammer and 12 in. drop.
- J. ASTM C 1272, Standard Specification for Heavy Vehicular Paving Brick.
- K. ASTM D 1557 - Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10 lb Rammer and 18 in. drop.
- L. ASTM D 2940 - Graded Aggregate Material for Bases or Subbases for Highways or Airports.
- M. Brick Industry Association Technical Note #14 on Brick Construction.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Exterior Unit Paver installer shall have a minimum of 5 years successful experience, either in the present business form or by having principal personnel with equivalent experience elsewhere, in the installation of the products and systems of the type specified.
- B. Single-Source Responsibility: Obtain each color, type, and variety of unit pavers, joint materials, and setting materials from a single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying progress of the Work.

1.04 SUBMITTALS

- A. Product Data: Submit copies of manufacturer's specifications, installation instructions and setting bed requirements.
- B. Submit six full size samples of brick pavers for initial selection purposes in form of actual units or sections of units showing full range of colors and textures available for the unit paver indicated. Include similar samples of material for joints and accessories involving color selection. Engineer will approve color and final product from submitted samples.
- C. Submit sieve analysis for grading of bedding and joint sands.
- D. Shop Drawings: Submit shop drawings showing proposed unit paver layout, at minimum 1/4 inch scale, designating all unit sizes, styles, and colors.

- E. Test results shall be submitted from an independent testing laboratory for compliance of paving unit requirements to ASTM or other applicable requirements.
- F. The layout, pattern, and relationship of paving joints to fixtures and project formed details shall be indicated.

1.05 MOCK-UPS

- A. One complete in-place installation of a 6 foot by 6 foot area of brick pavement, as selected by the Contractor and agreed to by the Engineer. Installation shall reflect all detailing as shown on the drawings.
- B. This area will be used to determine the amount that the pavers settle into bedding sand after compaction, joint sizes, lines, laying pattern(s), color(s), and texture of the project.
- C. This area shall be the standard from which the work will be judged.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver brick pavers to the site in steel banded, plastic banded or plastic-wrapped cubes capable of transfer by fork lift or clamp lift. Unload pavers at job site in such a manner that no damage occurs to the product.
- B. Sand shall be covered with waterproof covering to prevent exposure to rainfall or removal by wind. The covering shall be weighted to resist removal by wind.
- C. Delivery and paving schedules shall be coordinated in order to minimize interference with normal use of buildings adjacent to paving.

1.07 ENVIRONMENTAL CONDITIONS

- A. Do not install sand or pavers during rain or snowfall or during freezing conditions.

PART 2 PRODUCTS

2.01 CRUSHED ROCK GRANULAR FILL (MODIFIED SUBBASE)

- A. Aggregate base under the brick pavers shall meet the requirements of Iowa DOT Type A aggregate base course.
- B. Crushed rock shall consist of hard, durable particles or fragments of stone, free from dirt or other objectionable matter, and shall be free of excess flat, elongated, soft or disintegrated pieces.

2.02 CLAY BRICK PAVERS

- A. Obtain each type of brick from one source, with consistent color range and texture, complying with referenced ASTM standards and other references indicated.
- B. Classification: Nominal 4 by 8 by 2 3/4 as per ASTM C-1272 Class SX, Type 1 Application PS, 8000 minimum PSI, 6% maximum average absorption. Slip resistance shall be tested in general accordance with ASTM C 1028-96, standard test method for determining the static coefficient of friction of ceramic tile and other like surfaces by the horizontal dynamometer pull-meter test. Minimum static coefficient of friction shall be 0.60 for wet and 0.70 for dry.
- C. See Drawings for details on brick layout. Products of other manufacturers of similar color and finish shall also be considered if submitted as equal. Contractor shall submit samples to match the following types for approval of color and texture:

1. Brick Paver Type 1 (installed over concrete base as per details): Provide and install 4 by 8 by 2 3/4 pavers with layout as patterned in details. Provide clay brick pavers from the following manufacturers (or approved equal):
 - Pine Hall Brick (800-334-8689) - English Edge 4 by 8 by 2 3/4 beveled edge pavers. Color: Autumn Blend.
 - Boral Brick (319-226-3700) - Heavy Pavers 4 by 8 by 2 3/4 beveled edge pavers. Color: Heartland Flashed.
 - Endicott Clay Products (402-729-3315) - Heavy Traffic Relieved Edge 4 by 8 by 2 5/8 pavers. Color: 1/2 Red Blend, 1/2 Medium Ironspot #46.

2.03 BEDDING AND JOINT SAND

- A. The sand layer is a bedding course. The type of sand for this layer is often called concrete sand. Sands vary regionally. Contact paver installers local to the project and confirm sand(s) successfully used in previous similar applications. Mason sand should not be used.
- B. Type 1 Bedding Sand shall be clean, non-plastic, free from deleterious or foreign matter. The bedding sand shall be natural or manufactured silica sand. Grading of samples shall be done according to ASTM C136. The particles shall be sharp and conform to the grading requirements of ASTM C33 as shown below:

1. GRADING REQUIREMENTS FOR TYPE 1 BEDDING SAND

Sieve Size	Percent Passing
3/8in.	100
No. 4	95 to 100
No. 8	85 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

- C. Type 2 Joint Sand shall be clean, non-plastic, free from deleterious or foreign matter. The joint sand shall be natural or manufactured silica sand. Grading of samples shall be done according to ASTM C136. The particles shall be sharp and conform to the grading requirements of ASTM C33 as shown below:

1. GRADING REQUIREMENTS FOR TYPE 2 JOINT SAND

Sieve Size	Percent Passing
No. 4	100
No. 8	95 to 100
No. 16	70 to 100
No. 30	40 to 75
No. 50	10 to 35
No. 100	2 to 15
No. 200	0 to 10

2.04 GEOTEXTILES

- A. Geotextile shall be a woven, polypropylene fabric complying with ASTM D 4751, Test Method for Determining Apparent Opening Size of a Geotextile, with an approximate opening size from a No. 70 to No. 100 sieve size opening. Geotextile fabric shall permit water passage without allowing sand or soil migration. Geotextiles should be lapped at the sides and ends of rolls a minimum of 12 inches. Care should be taken to not locate laps directly under anticipated wheel paths.

PART 3 - EXECUTION

3.01 WEATHER EXTREMES

- A. Cover units with a weather resistant membrane held securely in place or otherwise protect units from the elements.
- B. Follow the procedures developed by the International Masonry Industry All-Weather Council (IMIAC) "Recommended Practices and Guide Specifications for Cold Weather Masonry Construction" and BIA Technical Notes on Brick Construction 1, "All Weather Construction".

3.02 EXAMINATION

- A. Verify that subgrade preparation, compacted density and elevations conform to the specifications. The maximum variation under the setting bed should be +/- 3/8 inch when a 10 foot straightedge is laid on the surface.
- B. Verify compaction of the modified subbase gravel to at least 95% standard Proctor density.
- C. Note that the top surface of the pavers should be 1/8 to 1/4 inch above the final elevation after compaction. This difference in initial and final elevation is to compensate for possible minor settling.
- D. Verify the proper installation of the concrete edge restraints, in terms of location, elevation, and adherence to the specifications.
- E. Beginning of bedding sand and paver installation shall signify acceptance of base and edge restraints.
- F. Determine actual paver dimensions (including tolerances) and coordinate with dimensions for pavement areas indicated on Contract Drawings prior to any pavement installation. Adjust pavement area dimensions to eliminate unnecessary paver cutting. Notify Landscape Architect of notable discrepancies with the Contract Drawings due to site conditions.

3.03 SITE PREPARATION (GRAVEL BASE)

- A. All subdrainage of underground services within the pavement area must be completed in conjunction with subgrade preparation, and before the commencement of subbase construction.
- B. All service trenches within the pavement area must be back filled to the sub- grade level with approved material placed in uniform lifts not exceeding 4 inches loose thickness. Each lift must be compacted to at least 98% Standard Proctor Density as specified in ASTM D 698.
- C. After trimming to the grades specified, the pavement is to be proof rolled to 98% Standard Proctor Density in the presence of the Consultant, with soft spots or localized pockets of objectionable material excavated and properly replaced with approved granular material.
- D. The subgrade shall be trimmed to within 0 to 1/2 inch of the specified grades. The surface of the prepared subgrade shall not deviate by more than 3/8 inch from the bottom edge of a 10 foot straight edge laid in any direction.
- E. Mechanical tampers (jumping jacks) are recommended for compaction of soil subgrade and aggregate base around lamp standards, utility structures, building edges, curbs, tree wells and other protrusions. Areas not accessible to roller compaction equipment should be compacted to the specified density with mechanical tampers. CAUTION - Care shall be taken around the perimeters of excavations, buildings, curbs, etc. These areas are especially prone to consolidation and settlement. Wedges of backfill should not be placed in these areas. If possible, backfilling and compacting in these areas particularly should proceed in shallow lifts, parallel to the finished surface.

- F. The Contractor shall ensure that the prepared subgrade is protected from damage from inundation by surface water. No traffic shall be allowed to cross the prepared subgrade. Repair of any damage resulting shall be the responsibility of the Contractor and shall be repaired.
- G. Under no circumstances shall further pavement construction proceed until the subgrade has been inspected by the Owner or the Consultant.

3.04 BRICK PAVER INSTALLATION

- A. Spread the bedding sand evenly over the base course and screed to a nominal 1 inch thickness, not exceeding 1 1/2 inch thickness. The screeded sand should not be disturbed. Sufficient sand shall be placed in order to stay ahead of the laid pavers. Do not use the bedding sand to fill depressions in the base surface.
- B. Screeded sand shall be fully protected against incidental compaction, including compaction by rain. Any screeded sand which is incidentally compacted prior to laying of the paving unit, shall be removed and brought back to profile in a loose condition. Neither pedestrian nor vehicular traffic shall be permitted on the screeded sand.
- C. The Contractor shall screed the bedding sand using either an approved mechanical spreader (e.g.: an asphalt paver) or by the use of screed rails and boards.
- D. Initiation of paver placement shall be deemed to represent acceptance of the pavers.
- E. Pavers shall be free of foreign material before installation.
- F. Pavers shall be inspected for color distribution and all chipped, damaged or discolored pavers shall be replaced.
- G. Color Blending - Paving units shall be installed from a minimum of three bundles simultaneously drawing the paver vertically rather than horizontally.
- H. The pavers shall be laid in the pattern(s) as shown on the drawings. String lines or chalk lines on bedding sand should be used to hold all pattern lines true.
- I. Joints between the pavers on average shall be between 1/16 inch and 1/8 inch wide. In order to maintain the desired pattern, joint spacing must be consistent. This spacing must also be provided for the first row abutting the edge restraint.
- J. No more than 5% of the joints shall exceed 1/4 inch wide to achieve straight bond lines. Joint (bond) lines shall not deviate more than $\pm 1/2$ inch over 50 feet from string lines.
- K. Gaps at the edges of the paved area shall be filled with cut pavers. Layout paver units within each field such that no paver units are cut smaller than one-third of a whole paver along edges subject to vehicular traffic.
- L. Pavers to be placed along the edge shall be cut with a double blade paver splitter or masonry saw.
- M. Upon completion of cutting, the area must be swept clean of all debris to facilitate inspection and to ensure pavers are not damaged during compaction. (Debris or sand particles left on pavers which are being compacted can cause point loading which may chip, scrape or break the paver.)
- N. After sweeping and prior to compaction, the paved area must be inspected by the owner or consultant to ensure satisfactory color blending. Pavers can be moved easily at this time to achieve good color distribution.
- O. The pavers shall be compacted to achieve consolidation of the sand bedding and brought to level and profile by not less than three passes. Initial compaction should proceed as closely as possible following the installation of the paving units and prior to the acceptance of any traffic or application of sweeping sand.
- P. Low amplitude, high frequency plate compactor shall be used to compact the pavers into the sand. Use of a urethane plate compactor pad is recommended to minimize any scuffing of the

paving stone surface. The compactor shall transmit an effective force not less than 1600 pounds per square foot of plate area. The frequency of vibration shall be within the range of 75 to 100 Hz. Use Table 5 below to select size of compaction equipment:

PAVER THICKNESS AND REQUIRED MINIMUM COMPACTION FORCE

Paver Thickness	Compaction Force
2 3/8 inch	3000 lbs
2 3/4 inch & 3 1/8 inch	5000 lbs

- Q. Any units that are structurally damaged during compaction shall be immediately removed and replaced.
- R. Dry joint sand shall be swept into the joints until the joints are full. This will require at least two or three passes with the compactor. Do not compact within 36 inches of the unrestrained edges of the paving units.
- S. All work to within 36 inches of the laying face must be left fully compacted with sand-filled joints at the completion of each day.
- T. Allow excess joint sand to remain on surface to help protect pavers from damage from other trades. Sweep excess sand from pavement when directed by Engineer.
- U. Contractor shall return to site over a period of up to 90 days after substantial completion to add sand to fill joints as needed.

3.05 FIELD QUALITY CONTROL

- A. After removal of excess sand, check final elevations for conformance to the drawings. Notify Engineer of deviations and adjust as directed.
- B. All surface and pavement structures shall be true to the lines and levels, grades, thickness and cross sections shown on the drawings. All pavements shall be finished to lines and levels to ensure positive drainage at all drainage outlets and channels. In no case shall the cross-fall of any portion of pavement be less than that shown on the plans. The final surface elevations shall not deviate more than 3/8 inch under a 10 foot long straight edge.
- C. The surface elevation of pavers shall be 1/8 to 1/4 inch above adjacent drainage inlets, concrete collars or channels.
- D. Lippage: No greater than 1/8 inch difference in height between adjacent pavers.

PART 4– MEASUREMENT AND PAYMENT

- 4.01 Measurement: The Engineer shall measure the number of square feet of brick pavers that are satisfactorily installed in accordance with the plans and this Special Provision, as required by the contract documents.
- 4.02 Payment: For each type of brick paver installed and measured for payment, the Contractor shall be paid the contract unit price. This payment shall be full compensation for the paver or truncated dome tile installed.