HIGGINS BRICK COMPANY

QUALITY BRICK SINCE 1927

This brochure is designed to provide you with the complete information on the selection, specification and installation of Higgins Brick paving.

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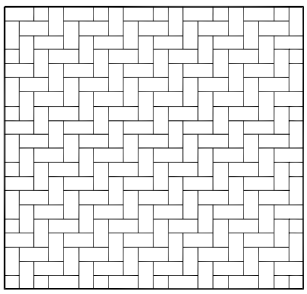
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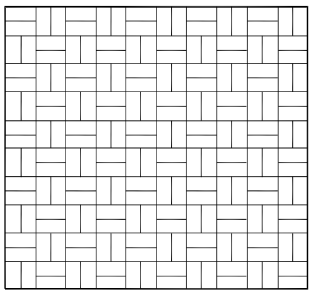
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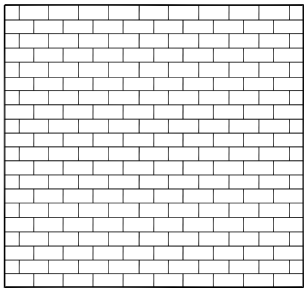
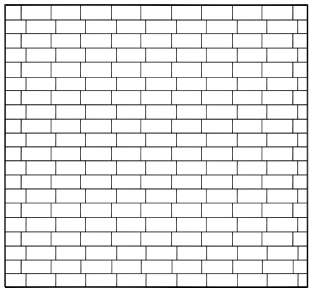
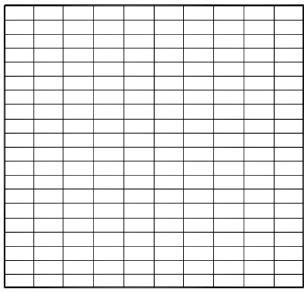

1/2 Running Bond


1/4 Running Bond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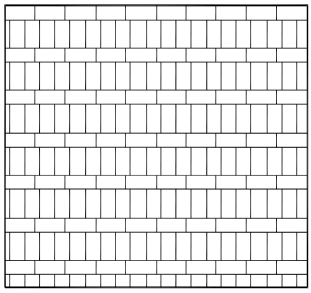
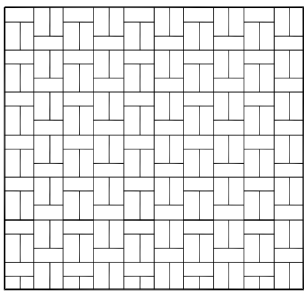
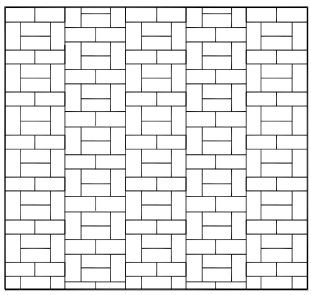

Running & Stack Bond Mixed


Various Pattern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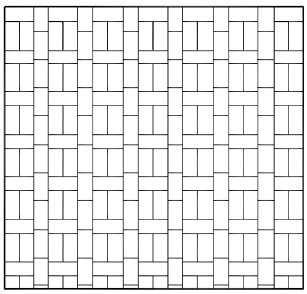
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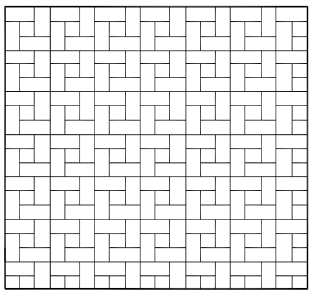

Various Pattern

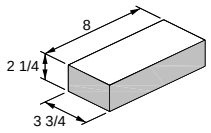
Brick Pattern Diagrams

Brick pavers are popular for a wide variety of installations including commercial and institutional plazas, shopping centers, building entrances, lobbies, industrial buildings, patios, walkways, roads and streets subject to relatively light vehicular traffic. Attractive pavers offer the owner long term value that cannot be minimized.

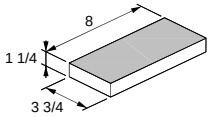
The information provided will assist in the design, selection, specification, and installation of Higgins Brick paving in those applications named above. It does not cover installation for heavy iron wheeled traffic and impact, nor for installation requiring special chemical resistance. It also does not cover installation using bonding agents or adhesives other than the basic Portland cement mortar. If you require additional information on any subject related to brick paving or need to consult about specific products, the technical staff of Higgins Brick will be glad to assist you.

Higgins paving brick may be laid in a variety of patterns for different visual effects. The effect of unit size will be one important factor in the layout as will the decision to install a mortared or mortarless paving system. For example, a basket weave pattern may be achieved using 3½ in. x 11½ in. units with normal size mortar joints resulting in 12 in. x 12 in. elements. However, laid without mortar joints, the elements would measure approximately 11½ in. in one dimension and only 10½ in. in the other, resulting in a gap. This gap would not occur in a herringbone or running bond pattern.

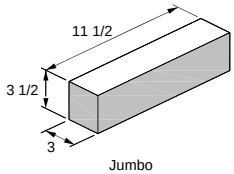
The presence of elements such as planters, driveways, curbs, edges and corners will also influence pattern development. These elements will inspire the use of many different patterns within the overall design layout of the installation.



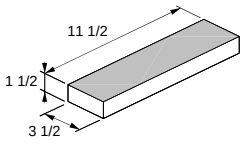
Standard



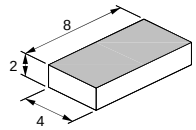
Standard Paver



Jumbo



Jumbo Paver



Mortarless Paver

Site
The site planning must include consideration of underground utilities, user convenience and base support. Successful installation will depend on proper sub-grade preparation. Vegetation and organic matter subject to decay must be removed. Soft or poorly compacted sub base must be removed and replaced with properly compacted material. Expansive clays must be removed, or provisions must be made for the differential expansion that may occur.

Design and construction considerations
Brick paving installations may consist of several different combinations of rigid or flexible bases and paving.

Rigid brick paving consists of either thick or thin brick without mortar joints laid in mortar beds. Rigid brick paving is stiff and subject to cracking if deformed excessively.

Flexible brick paving consists of either thick or thin brick without mortars used as either a bed or a joint. Flexible brick paving is not subject to cracking due to deformation.

Rigid base is a reinforced concrete slab on grade or a concrete or steel structural slab. A rigid base is not subject to large deflection.

Flexible base consists of compacted gravel or damp, loose, sand-cement mixture tamped into place and grade. This permits considerable deformation. Wood support is considered flexible, as is asphalt paving. Asphalt paving is considered as flexible because of the flow characteristics of tar. Only flexible types of paving should be placed over the asphalt paving, unless it is a thick and strong rigid installation.

Traffic loading and exposure to wear or weather determine the kinds of paving and base that should be specified. Heavy vehicular traffic will typically require rigid paving and a rigid base. Light, vehicular traffic such as encountered in residential driveways and service areas, may be carried by flexible paving supported by flexible base. Pedestrian traffic is appropriate over any combination of paving and base.

Cushion
Cushion material may be placed between the paving and the base and serves as a leveling layer to improve the accuracy of the finished grade and to compensate for irregularities of the base and of the paving units. In some instances cushion material may serve to provide for differential motion between the top surface and the substrate.

Cushion material is normally sand, but may also be pea gravel, or stone screenings, and in wet conditions should not be uniformly graded. “Skip grading” will provide better drainage and inhibits capillary action. Use of one ungraded size will provide greatest pore drain space, whereas uniform size gradation will provide less pore space, with maximum density. Cushion material may also consist of sand and cement mixes of one part Portland cement to 3 to 6 parts damp loose sand. Sand cushion material for flexible paving should be at least ½ in. thick and never more than 1½ in. thick.

Roofing felt may serve as a cushion between the paving and the base. Roofing felt can be installed rather rapidly and will impart some resilience to the support as well as controlling subsurface drainage. It will stop the flow of ground water into the paving, also inhibit the flow of surface water to substrate and supported slabs.

Ecology and the flexible brick pavement
Flexible type brick paving permits water passage through the paving assembly and the subgrade. This alleviates sewer overflow pollution and returns rainwater to the ground water, minimizes flash flooding, and reduces rainwater puddles in parking lots and pedestrian areas.

Drainage
Surface and subsurface drainage requirements must be recognized. Normally, exterior brick paving should be sloped $^{1}/_{8}$ to $^{1}/_{4}$ in. per foot. Large paved areas for malls and vehicular parking lots require a larger slope. All paving should be sloped away from buildings, retaining walls, and other elements that might be influenced by collected surface water. Roadways and walks should be crowned for drainage. In areas susceptible to high water tables, a porous base and cushion material of gravel may be used. This type of base serves as a capillary break, minimizing the upward flow of moisture due to capillary action. Supported slabs and localities with relatively impervious soils, capable of surface water retention, may require subsurface drainage systems. Subsurface drainage may be required as shown in Figures E and F, which show two-level drains.

Edging
A method of containment must be provided around the entire perimeter of the paved area to prevent horizontal movement of mortarless brick paving units. See Figures A, B, C, and D. This may be a curb of brick soldier coursing set in concrete or mortar. An existing concrete curb, building, or retaining wall will also serve.

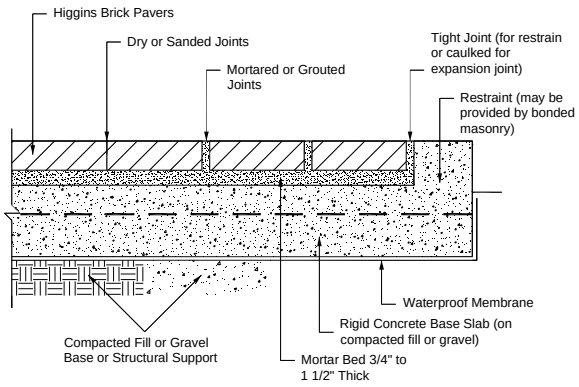


FIGURE A Concrete Base/Mortared Bed: Mortared, Grouted or Dry Joints

Recommended uses: Exterior or interior, heavy traffic on structurally supported interior slabs, slabs on graded compacted fill or gravel base for drainage. Waterproof membrane to prevent ground moisture penetration.

This alternate vertical joint detail must be specified to provide the surface character desired for design. The fine sand may be omitted from the dry joints if approved. It provides additional stability and prevents undesirable dirt from filling the joints.

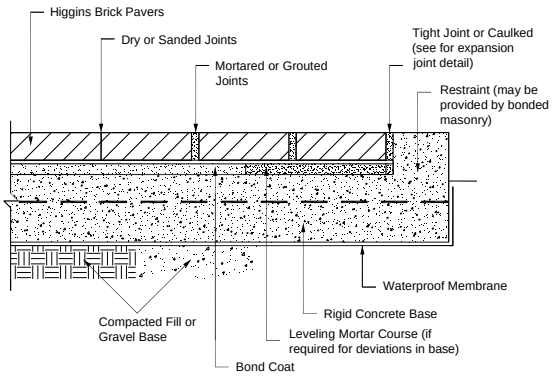


FIGURE B Concrete Base/Bond Cast Bed: Mortared, Grouted or Dry Joints

This is like Figure A, except for emphasis on the method of installation which is "dry set" or "thin set" bonding to a true base surface. The detail drawing may be the same, leaving the choice of execution to the field operation (subject to approval of the architect). The bond coat uses the Dry Set Method in accordance with ANSI 108.5 and ANSI 118. This method is not suitable if there is a variation in unit size.

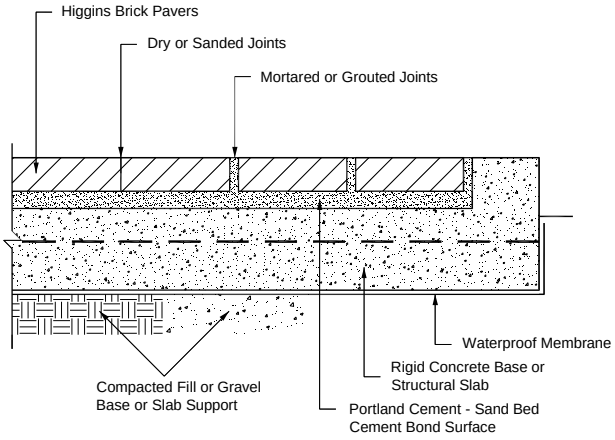


FIGURE C Concrete Base/Sand Cement Bed: Mortared, Grouted or Dry Joints

This is like Figures A and B except for a different installation method emphasized, which is placement of the bed. It is rapid and economical with a long record in interior floors and some exteriors. It is less suitable for heavy traffic but adequate for light and pedestrian traffic. It can easily accommodate irregularities in base and in units.

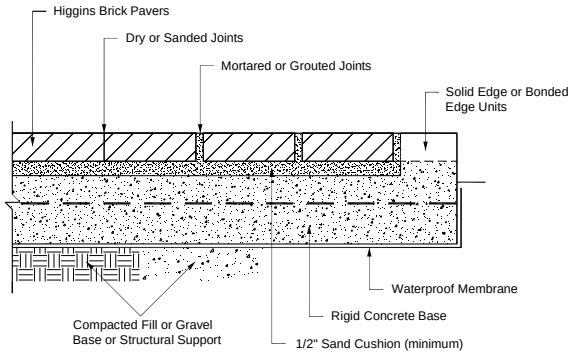


FIGURE D Concrete Base/Sand Bed: Mortared, Grouted or Sanded Joints

This installation provides for irregular units or surface and is economical and rapid. It is also easy to provide for changes and openings.

- It is adequate for light traffic when units are over 2 in. thick and for pedestrian traffic with thinner units.
- Sand beds over ½ in. thick should be a cement-sand mix.
- Expansion joints may be spaced wider with the unmortared joints because they provide some relief of stress. Space expansion joints 20 ft to 30 ft apart.

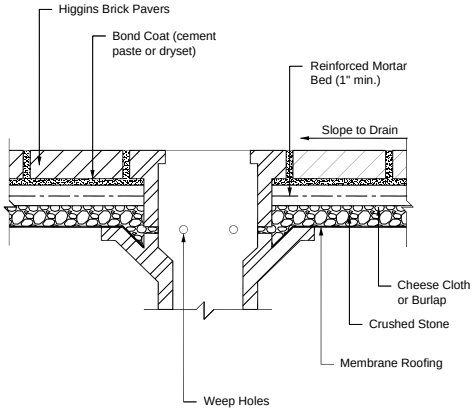


FIGURE E Concrete Base/Roof Membrane: Mortared Bed, Gravel Drainage

This provides for surface and subsurface drainage for exterior roofs and concrete or steel decks where a waterproof roof membrane is used. It may be used on stiff wood decks especially with dry joints that can accommodate differential deflections.

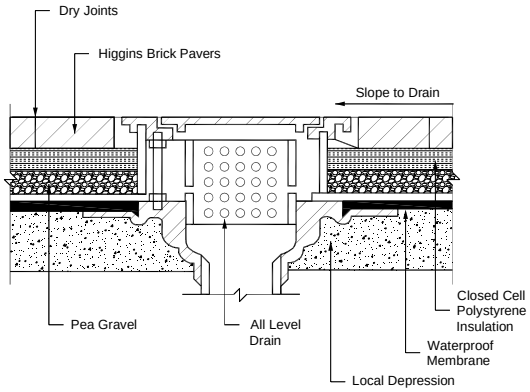


FIGURE F Concrete Base/Insulation: Gravel Drainage, Membrane

Like Figure E, but with insulation provision added and a more flexible surface.

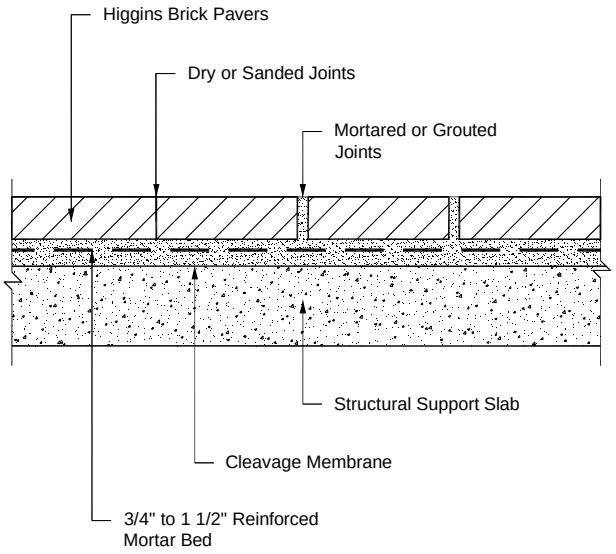


FIGURE G Concrete Slab/Mortar Bed, Reinforced: Mortared, Grouted or Dry Joints

This provides for integrity of paving over structural floors. The dry joints provide better stress relief than mortared joints.

This also provides a good paving system over existing slabs.

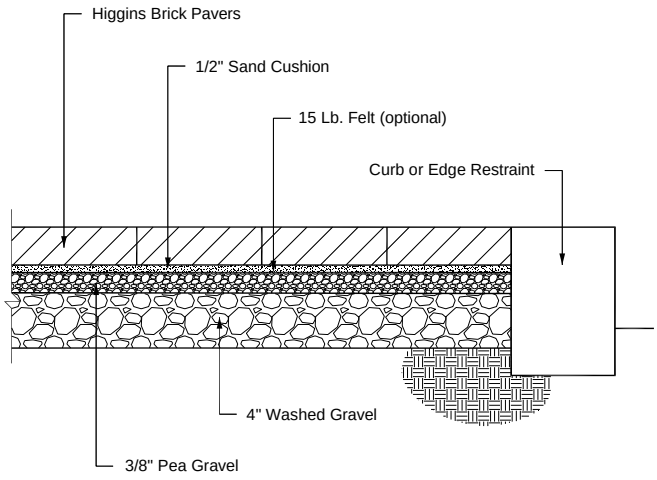


FIGURE H Gravel Base/Sand Bed: Dry Joints

This provides for pedestrian and light traffic over areas subjected to heavy precipitation, subsurface drainage or high ground water tables.

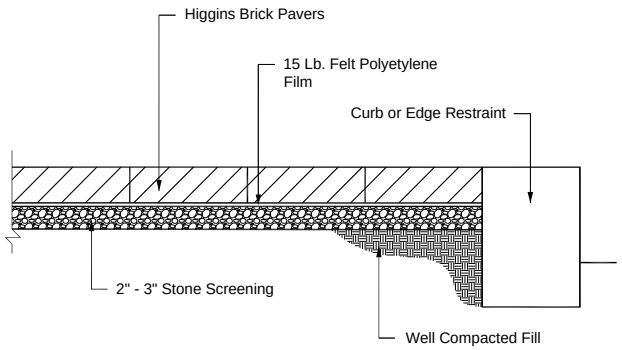


FIGURE I Gravel Base/Stone Screening Bed: Dry Joints

This is effective for patios and pedestrian traffic leading to heavier traffic areas.

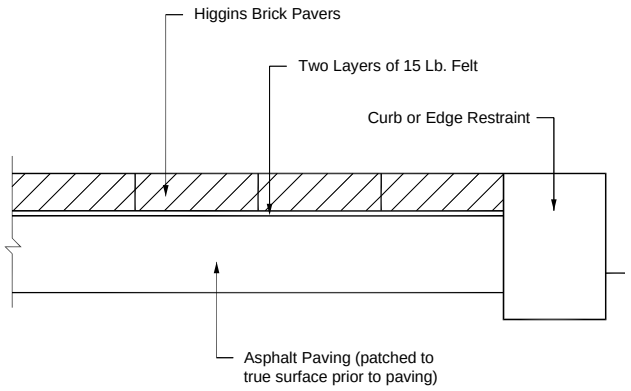


FIGURE J Asphalt Paving Base/Felt Bed: Sand Joints

The asphalt surface is considered semi-flexible or flexible.

Mortar Joints

There are three basic methods for installing mortar joints, with many modifications that may be used. Note that tilesetters refer to the infill between brick as grout whereas bricklayers call the infill mortar.

One method is by the conventional use of mortar placed with a trowel. Brick pavers are buttered with mortar to form the joints between the brick and brick are firmly shoved into a leveling bed of mortar.

A second method involves placing each brick unit on a mortar leveling bed with $^{3}/_{8}$ to $^{1}/_{2}$ in. of joint space provided between the units, followed by placing a grout mixture between the units. Typically, grout proportions of Portland cement and sand are the same as for mortar with the exception that lime may be omitted. When grout is poured into the joints, special care must be taken, or the units must be protected to facilitate cleaning. One technique is to pour grout from a coffee pot, or pinched can, in about three quarters of the joint depth. This settles as water is absorbed by the clay units. Then a second pour is made leaving a slight crown that is tooled after stiffening.

A third method involves a dry mixture of Portland cement and sand, using the same proportions as for grout. Brick pavers are placed on a damp cushion comprised of this mixture, followed by the same mixture between the paving units. After cleaning excess material from the paving surface, the paving is sprayed with a fine mist of water until the joints are adequately wet for hydration. The pavement should be maintained in a damp condition for two to three days.

The latter two methods above tend to permit the units to become dirty and stained with the mortar or grout, which can be removed by using a sponge and ample clean water immediately after the mortar has set, but before the mortar has dried. Some improvement may be made by the use of surface bond breaker applications such as wax coatings or any other specialized bond breaker manufactured for this purpose.

The use of a bag applicator similar to a cake frosting decorator, for placing mortar into the joints and careful tooling, is recommended by Higgins Brick as an efficient method to provide tight joints and a clean surface.

Brick paving without mortar joints may be swept with plain dry sand or a mixture of Portland cement and sand to fill the joints. For the proper proportions of Portland cement and sand, refer to the discussion on grout type mortars. This mixture can be sealed using a joint sand stabilizer.

Thinset Bonding

Thinset bonding mortar is an economical way to apply paving material to the base. Thinset is normally a Portland cement with additives to improve bond and water retention. It may be used where the surfaces are relatively true to plane since it does not have body to accommodate large deviations. Material may be specified using ANSI A118 specification and ANSI A108 specification for the application. The manufacturer's recommendations should be carefully followed.

Expansion Joints or Control Joints

Allowance must be made for differential movements in material caused by moisture changes and temperature differentials. The paving surface, especially a dark one, may increase in temperature much more than the shielded base. Temperature measurements may show differentials as much as 100° F. In addition, a freshly poured concrete base will have shrinkage changes as great as some temperature volume changes, adding to the differential in length. This is shown in Figure K.

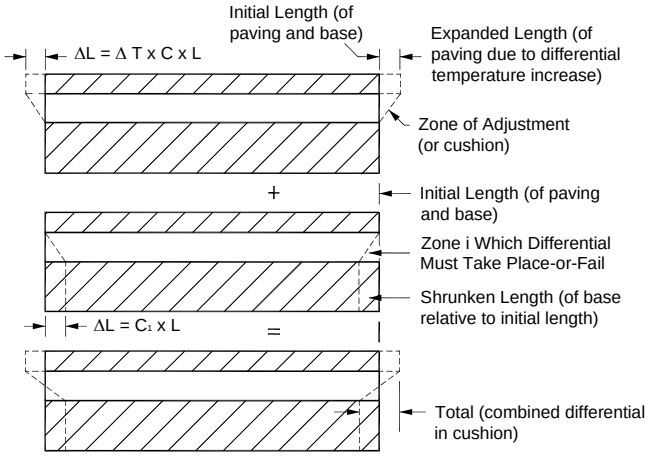


FIGURE K Differential Movements

This shows the cumulative differential effect of paving expansion and base shrinkage. This results in a double shearing stress and tendency to force curvature. Both these factors will have an additional tendency to destroy bond between the surface paving and the base, with consequent possibility of distress. The advantage of close spacing of expansion joints is the reduction of these accumulations.

Calculations may indicate that control joints in exterior exposed surfaces should not be more than 12 ft to 16 ft apart. This is, however, dependent upon many factors and local conditions and industry recommendations (BIA TN 14) indicate that 16 ft to 20 ft is a satisfactory spacing for expansion joints. More important is regard for joint location relative to shape of area.

The joints should be large enough to permit the joint material to accommodate the change in joint dimension.

Alternate Details for Control, Contraction, and Isolation Joints

NOTE: installation of back-up strip and sealant should be specified in the Caulking and Sealant section of the project specification documents.

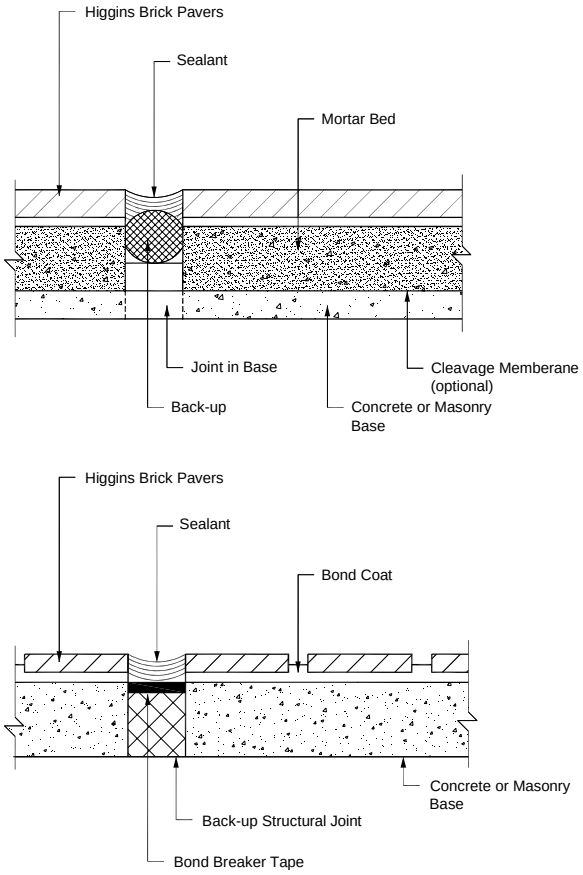


FIGURE L Isolation Joint Details

Expansion Joint Widths:

- Exterior - minimum $^3/_8$ in. for joints 12 ft on center, minimum $^1/_2$ in. for joints 16 ft on center. Minimum widths should be increased $^1/_{16}$ in for each 150 Fahrenheit of the actual temperature range high and winter low.
- Joints through brick and mortar directly over any structural joints in the backing must never be narrower than the structural joint.

Preparation:

- Brick edges to which the sealant will bond must be clean and dry. Cleaning or grinding of these edges is recommended to obtain optimum sealant bond.
- Primer on brick edges is mandatory when recommended by the sealant manufacturer. Care must be taken to keep primer off brick faces.

Joint Design Essentials

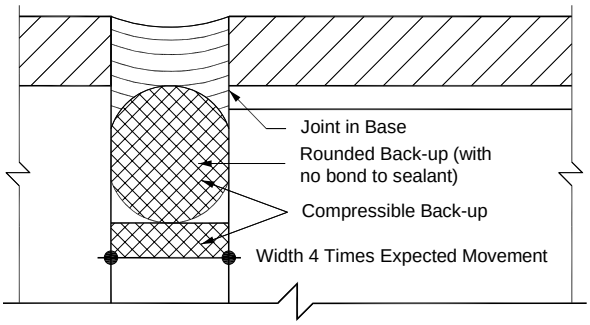


FIGURE M Joint Design

Materials:

- Single-component sealant (not traffic areas) shall be a non-sag type complying with Federal Specification TT-S-001543 or TT-S-00230c.
- Two- component sealant shall comply with Federal specification TT-S-00227e; use Type I (self leveling).
- Back-up strip shall be a flexible and compressible type of closed-cell foam polyethylene or butyl rubber, rounded at surface to contact sealant, as shown in details above, and in accordance with sealant manufacturers recommendations. It must fit neatly into the joint without compacting and to such a depth to allow a sealant depth of $^{1}/_{2}$ the width of the joint. Sealant must not bond to the back-up material.

Installation:

- Set compressible back-up strip when mortar is placed or utilize removable wood strip to provide space for back-up after mortar has cured.
- Install sealant after paving units and grout are dry. Follow the recommendations of the sealant manufacturer.
- Refer to sealant section in ANSI Installation Specifications, A108.

This Guide Specification is intended to be used as a basis for the development of an office master specification or in the preparation of specifications for a particular project. In either case, this Guide Specification must be edited to fit the conditions of use. Particular attention should be given to the deletion of inapplicable provisions. Include appropriate requirements where blank spaces have been provided.

BRICK PAVING

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

a) Cast-in-Place Concrete
b) Control Joints, Caulking
c) Membrane Waterproofing

1.02 QUALITY ASSURANCE

a) **Applicator Qualifications**
Applicator must have ___ years of experience in installing brick paving.
Insert number of years appropriate to type of floor being installed.

b) **Allowable Tolerances:**
1. Floor surface to be true to plane within $^{1}/_{8}$ in. in 10 ft (ℓ/960), not cumulative.
2. Joint width not to deviate more than 10% of shown dimension.
3. Unit dimension deviation not greater than listed in ASTM [C 216][C 902][C 1272]
Choose applicable ASTM Material Standard.

c) **Job Mock-up:** *Delete if mock-up not required.*
1. Provide a brick paving area (sample panel) not less than 2 ft-8 in. x 2 ft-8 in. (0.81 m x 0.81 m) using the same construction methods and materials proposed for project.
2. Use full range of mortar and brick color and texture.
3. Construct separate panels for each type of installation. Panels may be portions of the finished work.
4. Maintain approved mock-up for comparison with finished work.

1.03 SUBMITTALS

a) **Samples**
1. Furnish five individual samples of brick for approval.
2. Show extreme variations in color and texture.

b) **Certificates**
Provide manufacturer's certificates stating materials meet or exceed specification requirements.
Or require testimony to confirm this.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

a) Store brick off ground and cover to protect from elements and contamination.
b) Deliver aggregates to and store in segregated areas to prevent mixing with foreign materials.
c) Store cementitious materials in dry area not in contact with ground.
d) Store all admixtures in original unopened containers.
e) Protect liquid admixtures from freezing.
f) Keep wax coating on face of brick and off the sides and back of brick.
g) Stacked waxed brick with waxed face to waxed face.

1.05 ENVIRONMENTAL REQUIREMENTS

a) Follow building code provisions for cold and hot weather installation and protection procedures.
b) Do not install paving when ambient temperature is less than 40° Fahrenheit.

PART 2 - PRODUCTS

2.01 MATERIALS

a) **Brick Paving Units:**
1. Brick shall conform to ASTM [C 902][C 1272]
Choose applicable ASTM Material Standard.
2. Type:
Higgins Standard, 3¾ x 2¼ x 8
or Higgins Jumbo, 3 x 3½ x 11½
or Higgins Standard Pavers, 3¾ x 1¼ x 8
or Higgins Jumbo Pavers, 3½ x 1½ x 11½
or Higgins Mortarless Pavers, 4 x 2 x 8
or Higgins Veneer Strips, (many dimensions)
3. Grade SW
4. Color: (many colors - see Higgins color list)
5. Texture: (many textures - including smooth, velour, wire, cut, bark, etc.).
6. Special Strength or property. ( )
Specify any special properties, such as compressive strengths greater than required for ATSM C 902/C 1272, or slip limits.

b) **Mortar:**
1. Portland Cement: ASTM C 150, low alkali, _____color.

Type: (I), (II), Color: (White), (Buff), (Grey)

2. Aggregate: ASTM C 144
   Also used for sand bed installations, without the requirement of fines.
3. Hydrated Lime: ASTM C 207 Type S
4. Water: Clean and portable.
5. Optional Mortar, ANSI 118.1 for Dry-Set Portland Cement or ANSI 118.4 for Latex-Portland Cement Mortar.

c) **Grout (for joints between brick pavers):**
   1. Grout: Provide mortar conforming to 2.01 b for infill between brick paver units.

d) **Coloring Agent:**
   1. Use only [Natural Mineral Oxide][Synthetic Mineral Oxide][Carbon Black] for mortar color. Do not exceed the maximum amount prescribed by the building code.
      Select one type of color.
   2. Harmless to set and strength.
   3. Stable at high temperatures.
   4. Chemically inert and fade resistant.

e) **Wax:**
   When required, provide paraffin or wax manufactured by: _____.
   See Proprietary Specifications for bond inhibitors.

2.02 MIXES

a) **Coloring Agents:**
   1. Mineral Oxide Maximum:
      Portland Cement Mortars-Do not exceed 10% color based on weight of Cement
      Mortar/Masonry Cement Mortars-Do not exceed 5% color based on weight of cement.
   2. Carbon Black Maximum:
      Portland Cement Mortars-Do not exceed 2% color based on weight of Cement
      Mortar/Masonry Cement Mortars-Do not exceed 1% color based on weight of cement.
   3. Follow the manufacturers' proportioning recommendations within maximum limits.

b) **Mortar:**
   Delete if mortar is specified under ASTM C 270
   1. One part Portland cement by volume.
   2. Maximum of one part hydrated lime by volume.
   3. Maximum of five parts aggregate by volume.
   4. Maximum amount of water for placement consistency.

c) **Grout:**
   Delete if grout is specified under ASTM C476
   1. One part Portland cement by volume.
   2. Three parts aggregate by volume.
   3. Sufficient water for flowability.

      OR

c) Grout: Mix in accordance with manufacturer's instructions.
   For proprietary grout.

PART 3 - EXECUTION

3.01 INSPECTION

a) Examine substrate to assure that it is completed without ridges, voids, or obstructions, and that it is free of contaminants that would interfere with installation of brick paving.
b) Check that waterproofing membrane has been installed, if required.
c) Do not begin installation of brick paving until conditions are satisfactory.

3.02 INSTALLATION

a) **General:**
   1. Wax exposed brick face, keeping wax from sides and back of brick.
      Delete if not required due to clean installation method or if pre-waxed brick are used.
   2. Do not use brick with chips, cracks, voids, discolorations, or other visible defects, or not in compliance with ASTM C 902/C 1272.
   3. Set brick with uniform joints in pattern shown.
   4. Place control joints in accordance with drawings.

b) **Sand Bed Application:**
   1. Place setting bed sand.
   2. Compact sand by dampening or wetting, do not permit irregular area drying.
   3. Screen sand to depth required to provide for setting of brick.
   4. Set brick in required pattern tightly against each other.
   5. Sweep fine sand over surface to fill joints.

c) **Portland Cement Grout Application:**
   1. Spread and screen mortar setting bed true to plane.
   2. Limit setting bed to minimum amount which can be covered with brick before initial set.
   3. Apply $^{1}/_{32}$ in. (0.8 mm) layer of neat cement paste over setting bed.

      OR

   3. Apply $^{1}/_{32}$ in. (0.8 mm) layer of neat cement paste over bottom of brick.
   4. Set and level each brick immediately.
   5. Tamp brick to complete contact with setting bed.
   6. Do not set large areas of brick for later leveling.
   7. Grout joints as soon as initial set of setting bed is achieved.
   8. Place grout in joints, strike flush, and tool slightly concave. A pressure applicator is

recommended in order to fill the joints and keep the brick surfaces clean.

9. Cure grout by maintaining in damp condition for seven days.

d) **Portland Cement Mortar Applicator:**
   1. Install brick in full bed joint.
   2. Remove excess mortar as work progresses.
   3. Strike joints flush with top surface of brick and tool slightly concave.
   4. Cure mortar by maintaining in damp condition for seven days.

e) **Dry-Set Mortar Applications:**
   1. Surfaces shall be clean, free of oily or waxy films, oil or curing compounds.
   2. Install Portland cement mortar bed if required to provide true surface, cure for at least 20 hours.
   3. Surface for bonding with thin-set shall be within $^1/_8$ in. (3.2 mm) in 10 ft (3.0 m).
   4. Add dry mortar mix to liquid and mix thoroughly to obtain complete uniform wetting, without frothing.
   5. Slake 15 minutes and remix.
   6. Float or trowel mortar over area that can be covered by paving before loss of plasticity. Cover evenly with no bare spots. Comb with notched trowel (as recommended by manufacturer).
   7. Press brick into notched bed before it glazes over. Beat in and adjust brick immediately, before initial set takes place, with 100% contact with the bed with no voids in the mortar.
      80% minimum coverage or contact may be required for interior installations.
   8. Damp cure for 72 hours.

3.03 ADJUST AND CLEAN

a) Remove and replace bricks which have become loose, chipped, broken, stained, or otherwise damaged during installation.

b) Provide units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

c) Sweep excess sand from surface of sand bed application.

d) Cleaning Portland Cement Grout and Mortar Applications:
   1. Remove mortar or grout droppings before hardening.
   2. Wet paving with fine spray until water runs freely over surface.
   3. Apply brick manufacturer's recommended solution with stiff brush.
   4. Scrub maximum of 100 sq. ft. (9.3 m^2) of surface at one time.
   5. Rinse with clear water.

      OR

   1. Keep units clean.

e) Clean site of paving materials, debris and equipment prior to completion of the project.

EFFLORESCENCE

General
Occasionally efflorescence may occur on paving exposed to moisture. The phenomena and methods to prevent or minimize it are paradoxically simple but complicated by many unknowns.

Mechanism
The basic or simplified phenomena of efflorescence are:

1. **Water enters the masonry** through direct absorption, through cracks, through joints, through improper details.
2. **Soluble materials are dissolved** either before or after the water enters.
3. **Water migrates to a surface** through the internal porosity and evaporates as vapor, leaving behind what it has transported. This may show as crystalline or powdery deposit at the surface, either visible on the exterior or on the interior, in pores of the material.

In one case it is undesirably visible, in another it may cause interior crystals to grow and break down the structure of the masonry surface, causing spalling.

There are two basic methods to stop (or minimize) the phenomena:

1. **Eliminate the soluble material source.**
2. **Stop the water migration mechanism.**

The sources of efflorescence material are many. One potentially frequent source is the ground. Membranes laid on the ground will prevent penetration. Other sources that may contribute are: water, generally minute, especially where potable; the units, negligible or slight in fired clay or shale, and controllable; the lime, very slight; the aggregate, slight since it is generally washed; the cement, which contributes the major portion, as shown by chemical analysis, and by observing the migration from the joints. Type II Low Alkali cement apparently causes less than others.

The mechanism can be controlled by reduction of porosity, tooling of joints, use of flashing and membranes, use of coatings. The last is dangerous, especially with the “water retardant” coatings such as repellents. These permit water to enter through cracks, or due to pressure, and then prevent the exit of water as liquid through the surface. However, they permit the water vapor to exit, leaving behind deposits of the material that had been dissolved. This may result in the occasional growth of the deposits in the pores, beneath the repellent, until the pore pressure exceeds the tension value of the masonry material, which may spall or powder.
Recommendation:

1. Where suitable, provide a membrane.
2. Use dense units, and tight-tooled joints.
3. Use Low Alkali cement.
4. Use strong units, to resist the pore pressure.
5. Use a coating that reduces the migration.
6. Provide flashing and drainage.

Freeze Thaw
This may cause damage confused with efflorescence spalling. The effect is frequently similar. Higgins Brick meets ASTM requirements and it is noted the C/B ratio durability requirement is waived in the general Southern California area. However, for installation in severe exposure areas, the past local performance of brick must be evaluated. Standard freeze thaw tests also are recommended for determination of local suitability.

DO’S AND DON’TS

Do not get brick units dirty with mortar or grout. They will be difficult or impossible to clean. It is much easier to “clean it” **by keeping it clean**.

Do not apply thin paving over flexible bases.

Do not use heavy sandblasting to clean brickwork, merely light or “brush” blasting, or use soft aggregate such as walnut shells.

Do not permit traffic on the units to disturb bond before final set.

Do not confine large areas within rigid structures that prevent expansion.

Do layout patterns before start of paving.

Do use maximum of fine sand in the mortar or grout to provide maximum density (even though ASTM does not require it).

Do provide expansion joints in paving. Dark units will absorb heat and expand more than light. There is greater differential volume change between paving and old bases.

Do provide relieving joints at angular changes of surface planes that are concave downward (to avoid upward component of expansive compression).

Do use constant water content in sand bases to avoid differentials due to bulking during laying.

Higgins Brick Company cannot assumer responsibility for results or designs developed from the suggestions or recommendations discussed since it is beyond the scope of this booklet to anticipate every design factor or situation that may arise in the many different sites or installations possible. The designer and the installer are urged to consider all the pertinent factors for specific projects.