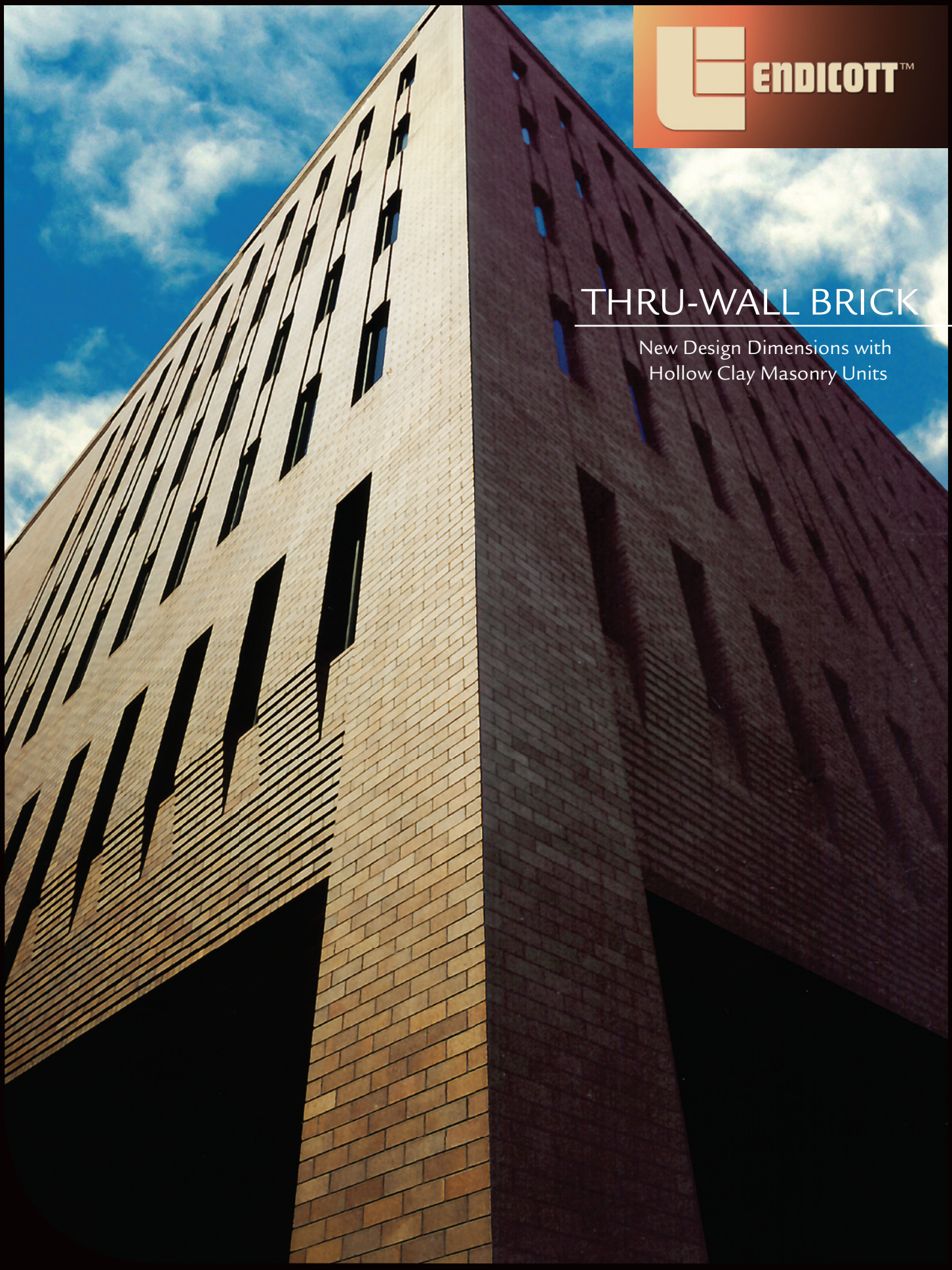


ENDICOTT™

THRU-WALL BRICK

New Design Dimensions with Hollow Clay Masonry Units

INTRODUCTION

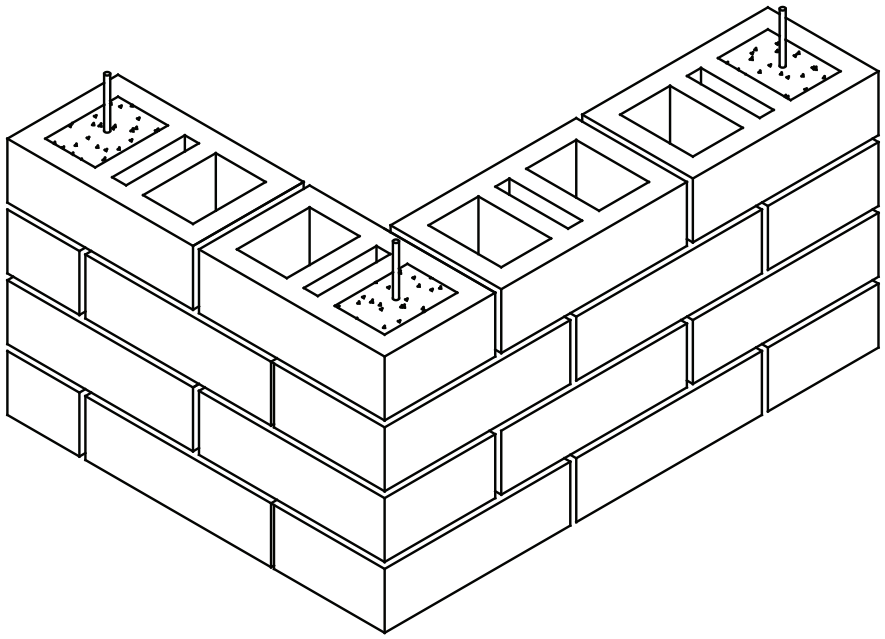
Unit masonry comes in various forms. Typically brick is used as veneer over concrete block or wood/ metal studs. Another form of unit masonry is thru-the-wall units used in either load bearing or non-load bearing applications. These face brick are made from hard-burned shale or clay manufactured to meet ASTM Standard Specification for Hollow Brick (hollow masonry units) C652-09. These units are available in a variety of architecturally and aesthetically pleasing colors.

Hollow clay masonry units have been introduced as a means of producing a more economical brick wall while retaining the virtues of conventional brickwork. The cells are specifically made to accommodate vertical reinforcing or pour-in-type insulation. Hollow cored thru-the-wall units work well in reinforced brick masonry construction to create taller, thinner walls.

Proportionately greater size and warpage variation can be expected in these units because of their larger dimension and cell sizes. Masonry product manufacturers and masonry contractors work to meet the specifications for workmanship, finish and size variation; however, unrealistic inspection may increase wall costs. To achieve strict mechanical perfection in masonry is very difficult and expensive. Remember, the ultimate objective is the finished wall, not individual units.

Thru-the-wall brick are available in colors that harmonize or blend with other exterior trim materials and landscaping, as well as with interior surfaces and furnishings. They are attractive, colorful and economical building units which allow freedom of design in contemporary bearing wall construction or in curtain walls. The units are strong, weather and water resistant and can support the building and its contents while withstanding the elements. They make for easy handling for the bricklayer; consequently, they lay up fast for economical construction. Endicott thru-the-wall units are produced and marketed as textured two faces, select one. If the brick are to be exposed on both surfaces of the wall, it must be understood that considerable selection may be needed to create acceptable finishes on both wall surfaces.

Brick prisms constructed for testing to determine the ultimate compressive strength (f'm) of hollow clay masonry is based on net area of mortar bedded surfaces.



SPECIFICATIONS

1. Scope

1.1 This specification covers hollow building and facing brick made from clay, shale, fire clay, or mixtures thereof, and fired to incipient fusion. In this specification the term hollow brick shall be understood to mean, hollow clay masonry units whose net cross-sectional area (solid area) in any plane parallel to the surface, containing the cores, cells, or deep frogs, is less than 75% of its gross cross-sectional area measured in the same plane.

2. Classification

2.1 Grade SW, Severe Weathering – Hollow brick intended for use where a high and uniform degree of resistance to frost action and disintegration by weathering is desired and the exposure is such that the hollow brick may be frozen when permeated with water.

Note: Only SW grade hollow brick is manufactured by Endicott Clay Products Co.

2.2 Type HBS – Hollow brick for general use in exposed exterior and interior masonry walls and partitions where variations are permissible according to Tables 3, 4, and 5, but do not detract when viewed from a distance of 20 feet under normal lighting conditions.

Note: Only Type HBS hollow brick is manufactured by Endicott Clay Products Co. HBS Brick can be used as HBA, which allows more relaxed tolerances and allowances.

2.3 Class H40V- Hollow brick intended for use where void areas or hollow spaces are greater than 25%, but not greater than 40%, of the gross cross-sectional area of the unit measured in any plane parallel to the bearing surface. The shell thicknesses shall comply with the requirements of ASTM C652-09 Section 10 - Hollow spaces. Endicott 4", 6" and 8" Thru-the-wall brick conform to this class.

3. Materials and Finish

3.1 The body of all hollow brick shall be of clay, shale, fire clay, or mixtures of these materials, with or without admixtures, fired to meet the requirements of this specification. Any coloring or other materials added to the clay shall be suitable ceramic materials.

4. Physical Requirements

4.1 Durability – The hollow brick shall conform to the physical requirements for Grade SW as prescribed in Table 1. If the average net compressive strength is greater than 3,000 psi or the average water absorption is less than 8 % after 24-hr. submersion in cold water, the requirements for Saturation Coefficient shall be waived. (ASTM C652-09 paragraph 5.1.2 and 5.1.3).

4.2 Freezing and Thawing – The requirement for 5 Hour Boil Water Absorption and Saturation Coefficient do not apply provided a sample of 5 brick meeting the strength requirements of table 1 passes the Freezing and Thawing Test as described in ASTM C652-09 Paragraph 5.1.3.1 and 5.1.3.2.

5. Efflorescence

5.1 When the hollow brick are tested in accordance with ASTM Methods C 67, Sampling and Testing Brick, the rating for efflorescence shall be "NOT EFFLORESCED."

Note: Brick are not required to be tested for efflorescence to comply with the specification unless requested by specifier or purchaser.

6. Dimensions and Permissible Variations.

6.1 Size – The size of hollow brick shall be as specified by the purchaser. In a sample of ten hollow brick selected to include the extreme range of color and sizes to be supplied, no hollow brick shall depart from the specified size by more than the individual tolerance for the type specified as prescribed in Table 2.

6.2 Warpage – Tolerances for distortion or warpage of face or edges intended to be exposed in use of individual hollow brick from a plane surface and from a straight line, respectively, shall not exceed the maximum for the type specified as prescribed in Table 3.

7. Workmanship, Finish, and Appearance

7.1 The face or faces that will be exposed in place shall be free of chips that exceed the limits of Table 4. The limits apply to the type HBS. The aggregate length of chips shall not exceed 10% of the perimeter of the exposed face or faces of the hollow brick.

7.2 Other than chips, the face or faces shall be free of cracks or other imperfections detracting from the appearance of the designated sample when viewed from a distance of 20 ft.

7.3 The brick shall be free of defects, deficiencies, and surface treatments, including coating, that interfere with the proper setting of the brick or significantly impair the strength of performance of the construction.

7.4 The number of hollow brick in a delivery that are broken or otherwise fail to meet the requirements for chippage and tolerances shall not exceed 5%.

7.5 After brick are placed in usage, the manufacturer or the manufacturer's agent shall not be held responsible for compliance of brick with the requirements of this specification for chippage and tolerances.

8. Texture and Color

8.1 The color and texture should be specified by the purchaser. Unless otherwise specified by the purchaser, at least one end of the majority of the individual hollow brick shall have the same general texture and general color tone as the approved sample. The texture of the finished surfaces that will be exposed when in place shall conform to an approved sample consisting of not less than four stretcher hollow brick, each representing the texture desired. The color range shall be indicated by the approved sample.

9. Cells, Webs

9.1 Cells – The distance of any cell shall not be less than ¾ in. from any exposed edges of the brick.

9.2 Webs – The thickness of webs between cells shall not be less than ½ in.

10. Sampling and Testing

10.1 For purposes of tests, brick that are representative of the commercial product shall be selected by a competent person appointed by the purchaser, the place or places of selection to be designated when the purchase order is placed. The sample or samples shall include specimens representative of the complete range of colors and sizes of the brick supplied or to be supplied. The manufacturer or the seller shall furnish specimens for the test without charge.

10.2 Sample and test the brick in accordance with ASTM Methods C67.

10.3 Prism testing should be done in accordance with applicable building codes. This should include prism tests to determine the design compressive strength (f'm). Test the selected materials to determine conformity far enough in advance so as not to delay construction and required field prism tests.

11. Costs of Tests

11.1 Unless otherwise specified in the purchase order, the cost of tests is typically borne as follows:

11.1.1 If the results of the tests show that the brick do not conform to the requirements of this specification, the cost is typically borne by the seller.

11.1.2 If the results of the tests show that the brick do conform to the requirements of this specification, the cost is typically borne by the purchaser.

12. Bidding and Ordering

Scope – When the masonry is designed in a structural application the brick become a primary factor in the critical path method of construction.

12.1 Manufacturer must be capable of supplying at the rate and time desired.

12.2 Order must be placed well in advance of need. The selection should be made by the owner and architect prior to or immediately following the awarding of the contract.

12.3 The contractor should allow no less than 10% waste and damage. This will vary subject to the cutting requirements on the job, as large brick are more susceptible to damage in handling than are smaller brick.

TABLE 1 PHYSICAL REQUIREMENTS						
Designation	Compressive strength (Hollow Brick in Bearing Position) net area. Min.psi		Water Absorption by 5 hr. Boiling. Max. Percent		Saturation Coefficient max.	
	Average of 5 Brick	Individual	Average of 5 brick	Individual	Average of 5 brick	Individual
Grade SW	3,000	2500	17.0%	20.0%	0.78	0.80

TABLE 2 TOLERANCE ON DIMENSIONS	
Specified Dimensions (inches)	Permissible Variation Max. (Inches)
	Type HBS
Over 3 to 4 incl.	±3/32
Over 4 to 6 incl.	±3/16
Over 6 to 8 incl.	±1/4
Over 8 to 12 incl.	±5/16

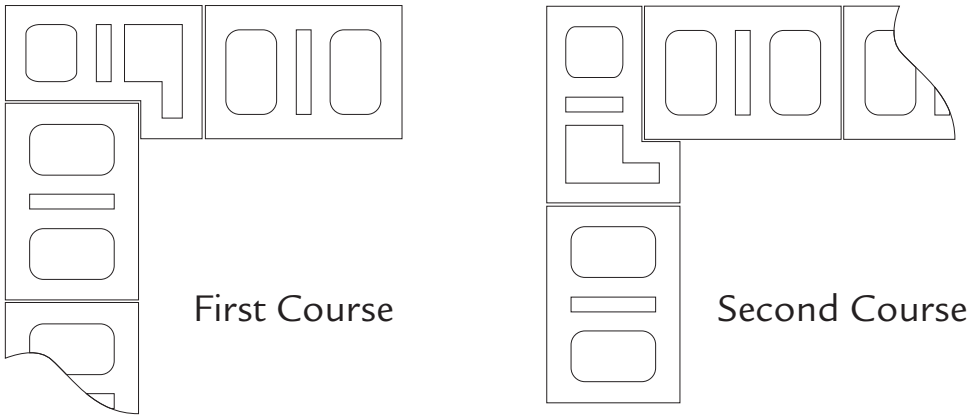
TABLE 3 TOLERANCES ON DISTORTION	
Face Dimension Max. (Inches)	Permissible Distortion Max. (Inches)
	Type HBS
8 and Under	3/32
Over 8 to 12 inc.	1/8

TABLE 4 PERMISSIBLE EXTENT OF CHIPPAGE FROM THE EDGES AND CORNER OF FINISHED FACE OR FACES INTO THE SUBJECT, MAXIMUM.		
TYPE	Chippage in from: (inches)	
	Edge	Corner
Type HBS (Altered)	5/16	1/2

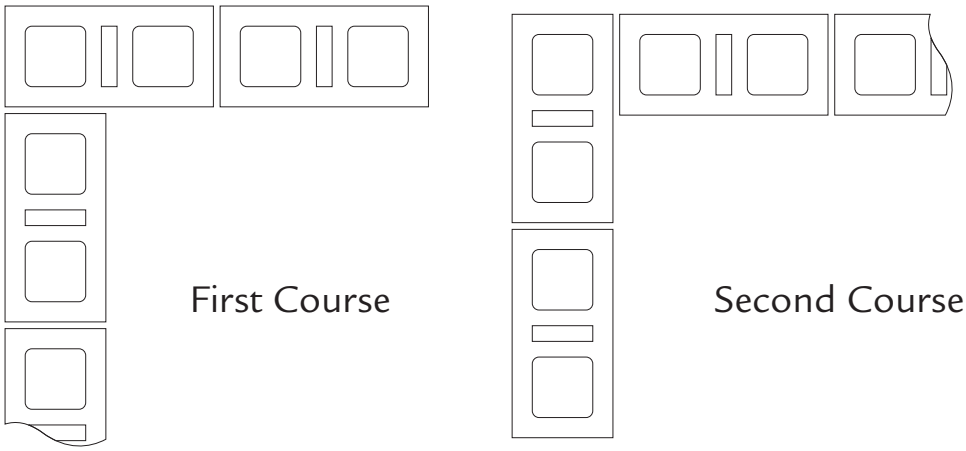
TABLE 5 PERCENTAGES OF SHIPMENT THAT MAY BE ALLOWED CHIPPAGE OVER MAXIMUM PERMISSIBLE IN TABLE 5			
Type	Percentages Allowable	Chippage from: (inches)	
		Edge	Corner
HBS (Altered)	15% Max	5/16-7/16	1/2- 3/4

Construction Details

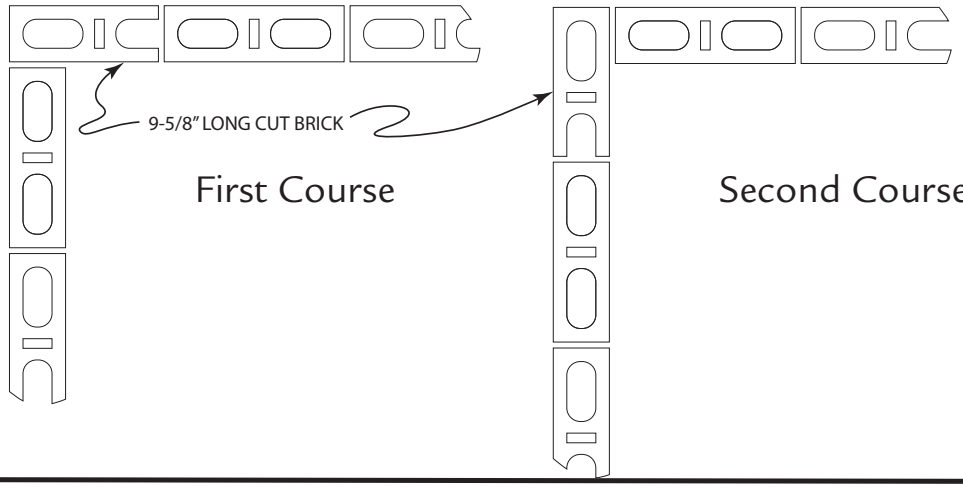
8” Bonded Corner



6” Bonded Corner

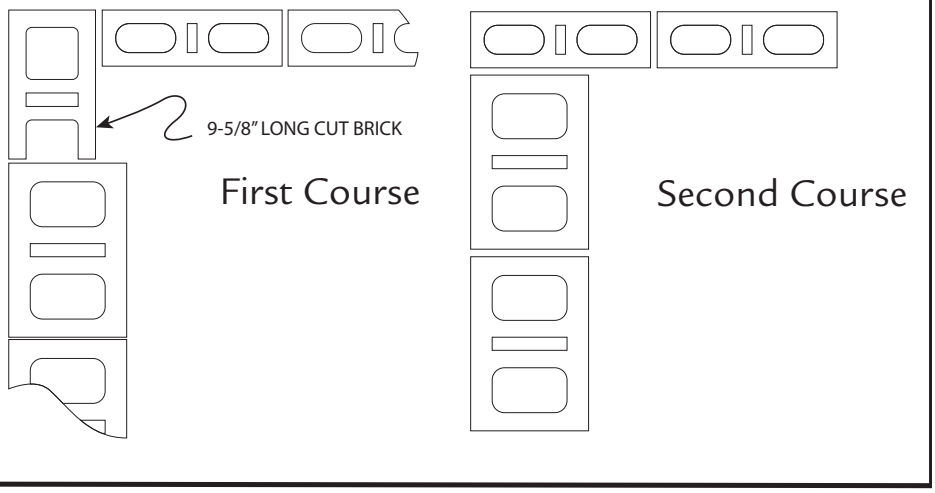


4” Bonded Corner

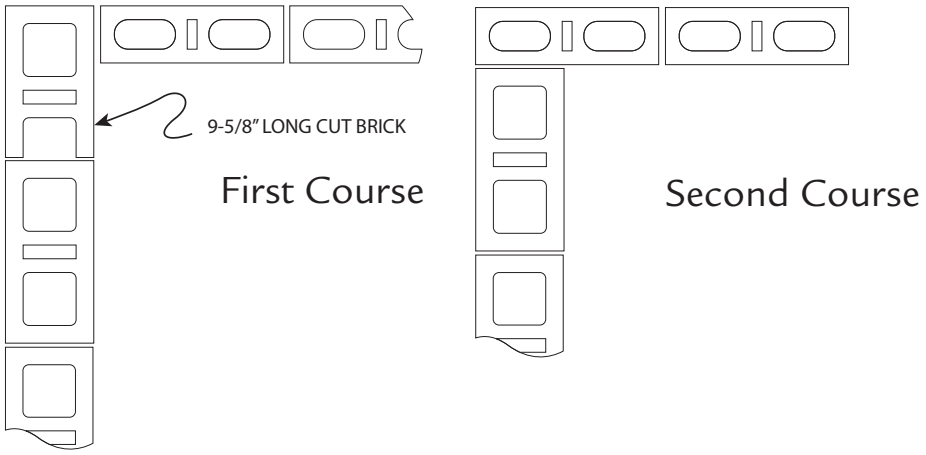


Construction Details

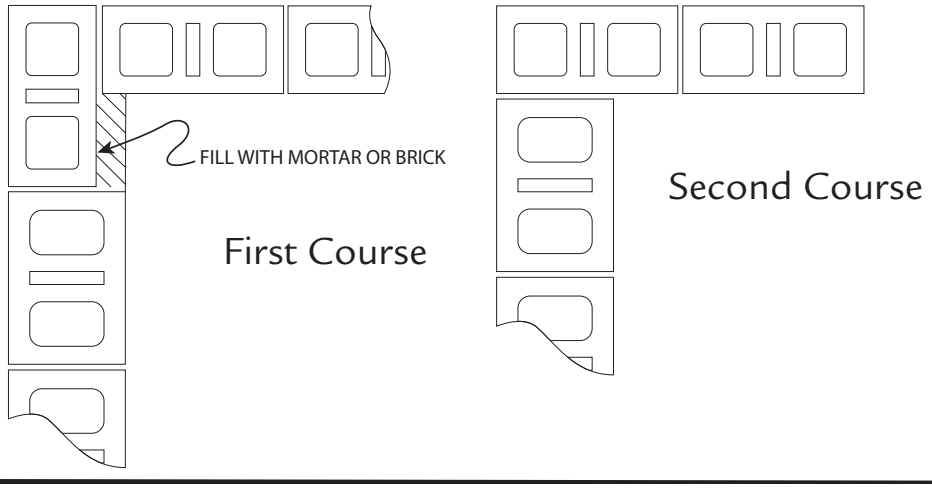
8” & 4” Bonded Corner



6” & 4” Bonded Corner



8” & 6” Bonded Corner



DESIGN AND ENGINEERING

All major "Model Building Codes" and most City or Municipal Building Codes contain engineering requirements for hollow masonry units designed as non-reinforced, partially reinforced and reinforced masonry walls.

General Engineering, using hollow thru-wall units, is accomplished on the basis of net area of the masonry unit in contact with the mortar bed or what is commonly referred to as net cross sectional area.

The Brick Institute of America has published a design manual on "Building Code Requirements for Engineered Hollow Brick Masonry". This document can be used in total or in conjunction with model building codes.

Just as in general masonry design, proper construction details, such as flashing, weep holes, mortar specifications, etc... are of utmost importance in preventing moisture penetration.

RECOMMENDED MORTAR SPECIFICATION

Mortar for use in reinforced and non-reinforced engineered brick masonry shall conform to Standard Specifications for Mortar for Unit Masonry ASTM C 270-09, types M, S or N, except that it shall consist of a mixture of portland cement (type I, II or III) and hydrated lime (type S). For further information refer to Technical Notes 8 revised and 8B, Brick Institute of America.

TABLE A GENERAL DESIGN DATA

Unit Size (Nominal) in.	Unit Size (Actual) in.	Area (in^2)		Percent Solid	Bed Area in^2	Core Area in^2
		Gross	Net		Individual	
W x H x L	W x H x L					
4" x 4" x 12"	3⅝" x 3⅝" x 11⅝"	42.14	26.44	62.7%	20.3 in^2	15.7 in^2
6" x 4" x 12"	5⅝" x 3⅝" x 11⅝"	65.39	39.66	66.7%	26.16 in^2	25.73 in^2
8" x 4" x 12"	7⅝" x 3⅝" x 11⅝"	88.64	54.27	61.22%	30.52 in^2	34.38 in^2

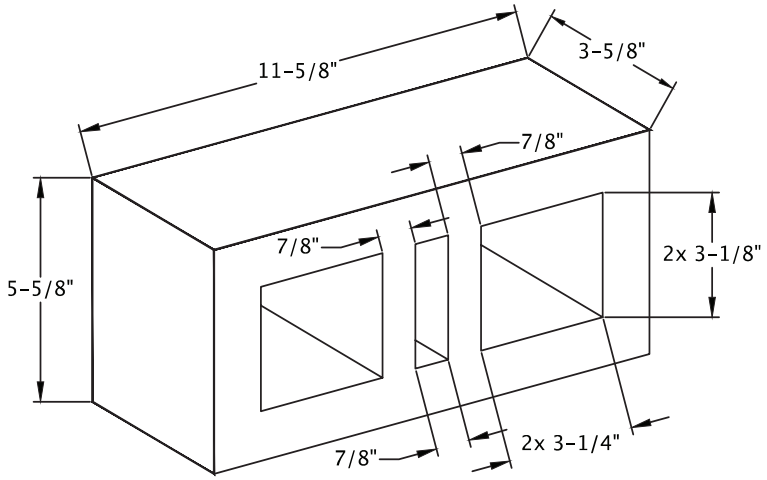
TABLE B GENERAL DESIGN DATA

Brick Size	Fire Rating (hours)			Sound Transmission Class (db)	Wall Weight lbs./sq.ft.
	Empty Cells	Filled Cells	Grouted Solid		
4"	1	1	1	45	31
6"	2	3	3	47	48
8"	3	4	4	48	62

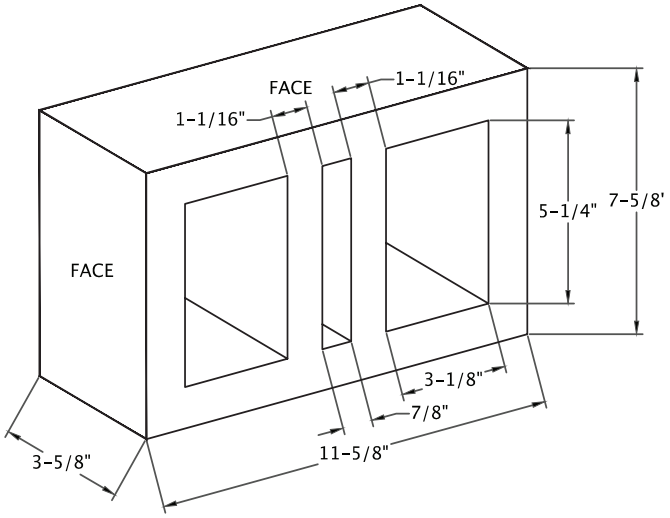
TABLE C GENERAL DESIGN DATA - COURSING

Height (inches)	Coursing	Units Per Sq. Ft.
4.0	3 courses = 12inches	3.00

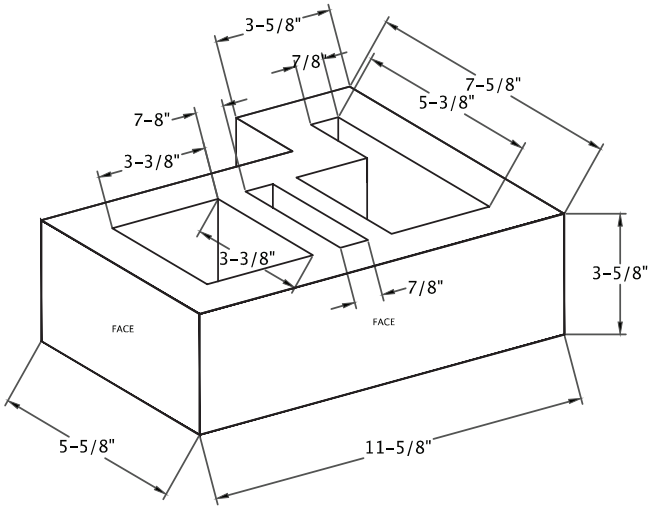
6″ THRU THE WALL



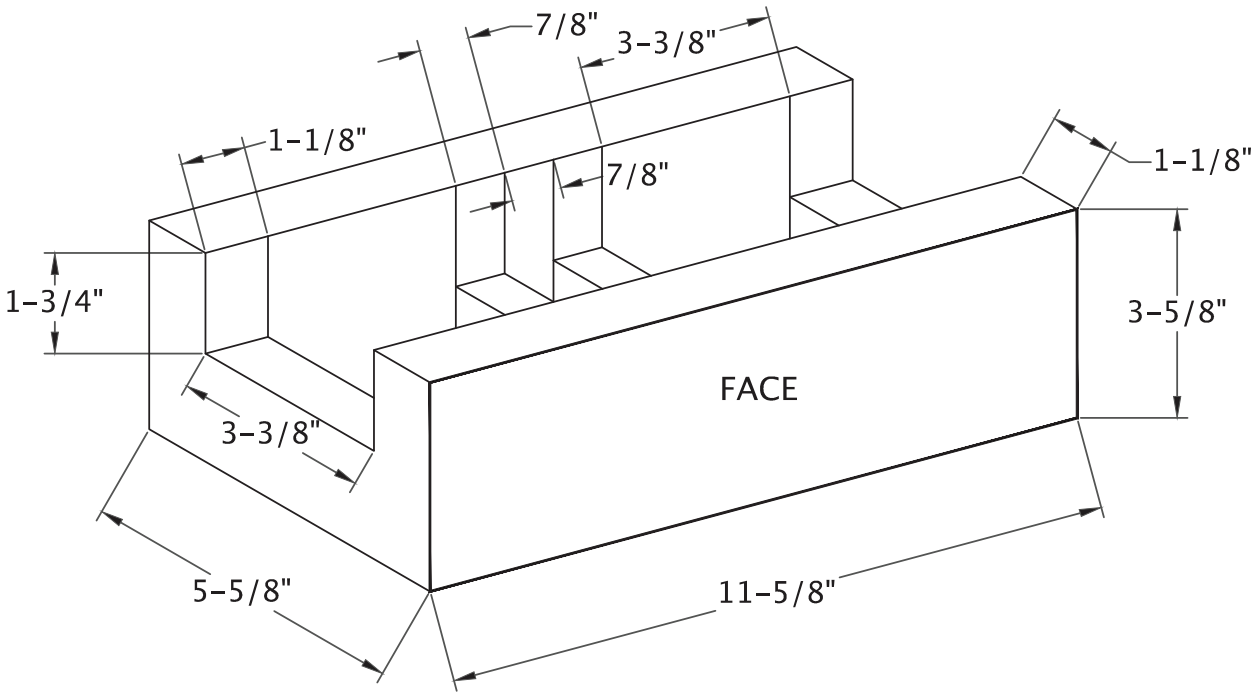
8″ THRU THE WALL



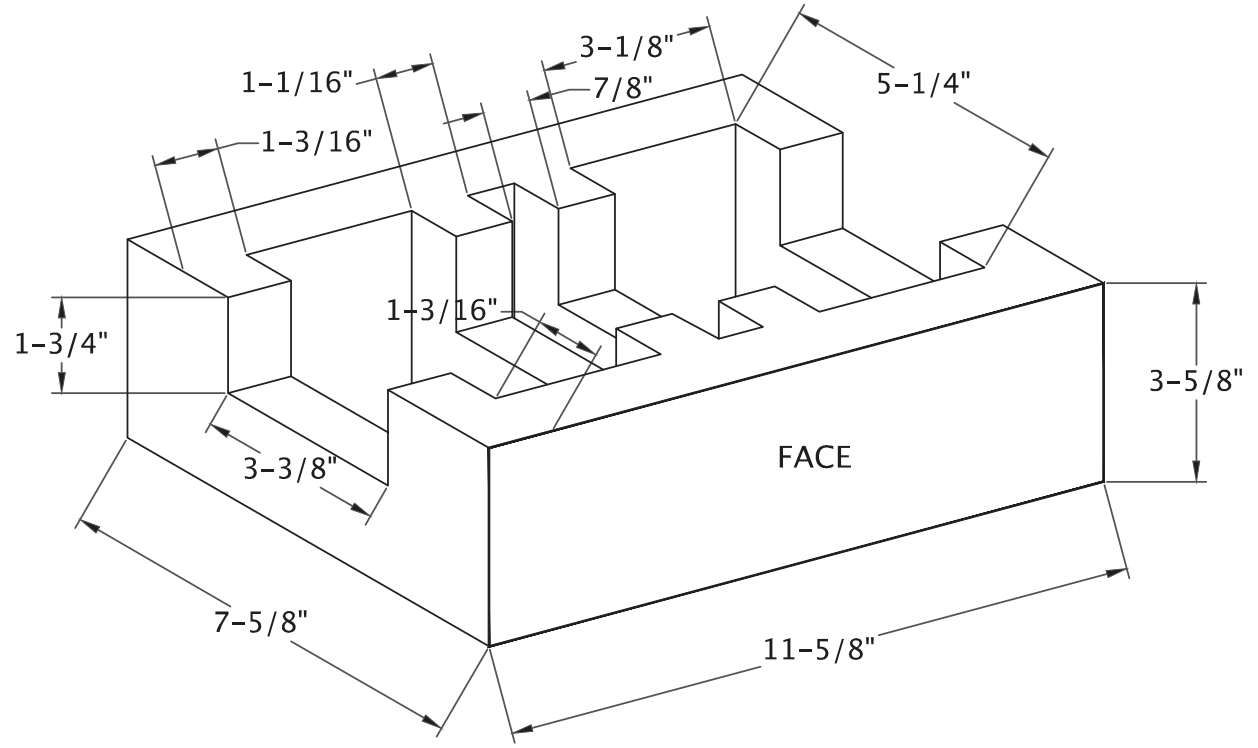
8″ TTW CORNER



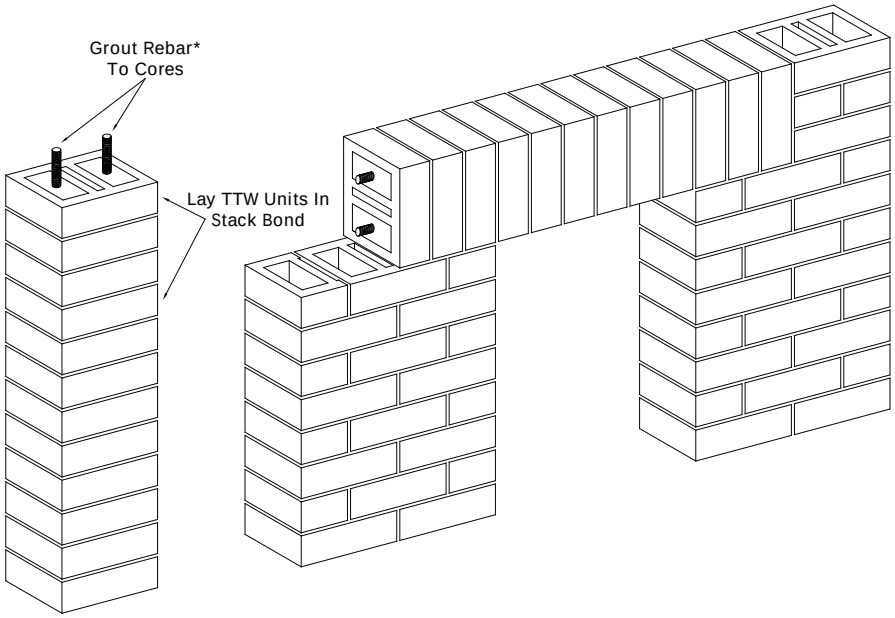
6″ BOND BEAM



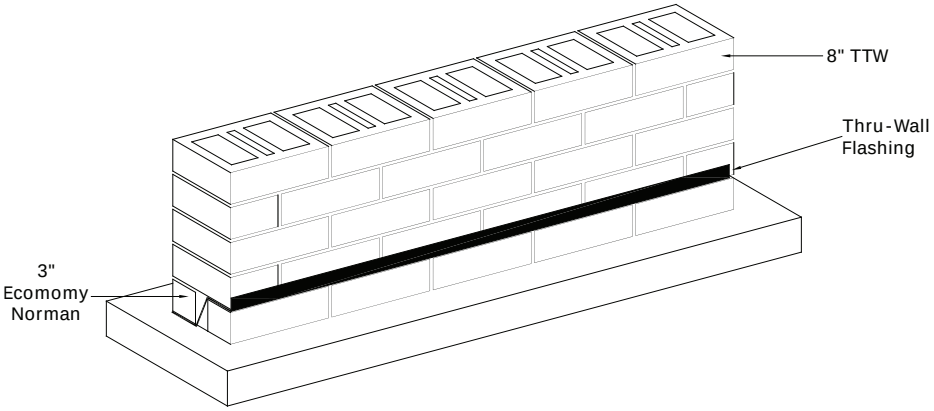
8″ BOND BEAM



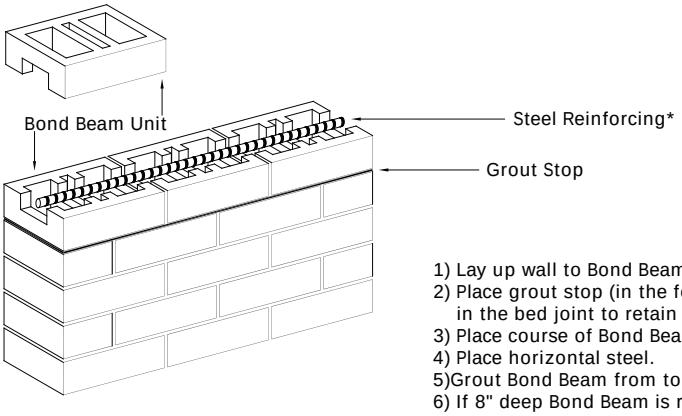
8”TTW PRECAST LINTEL



8”TTW FLASHING DETAIL



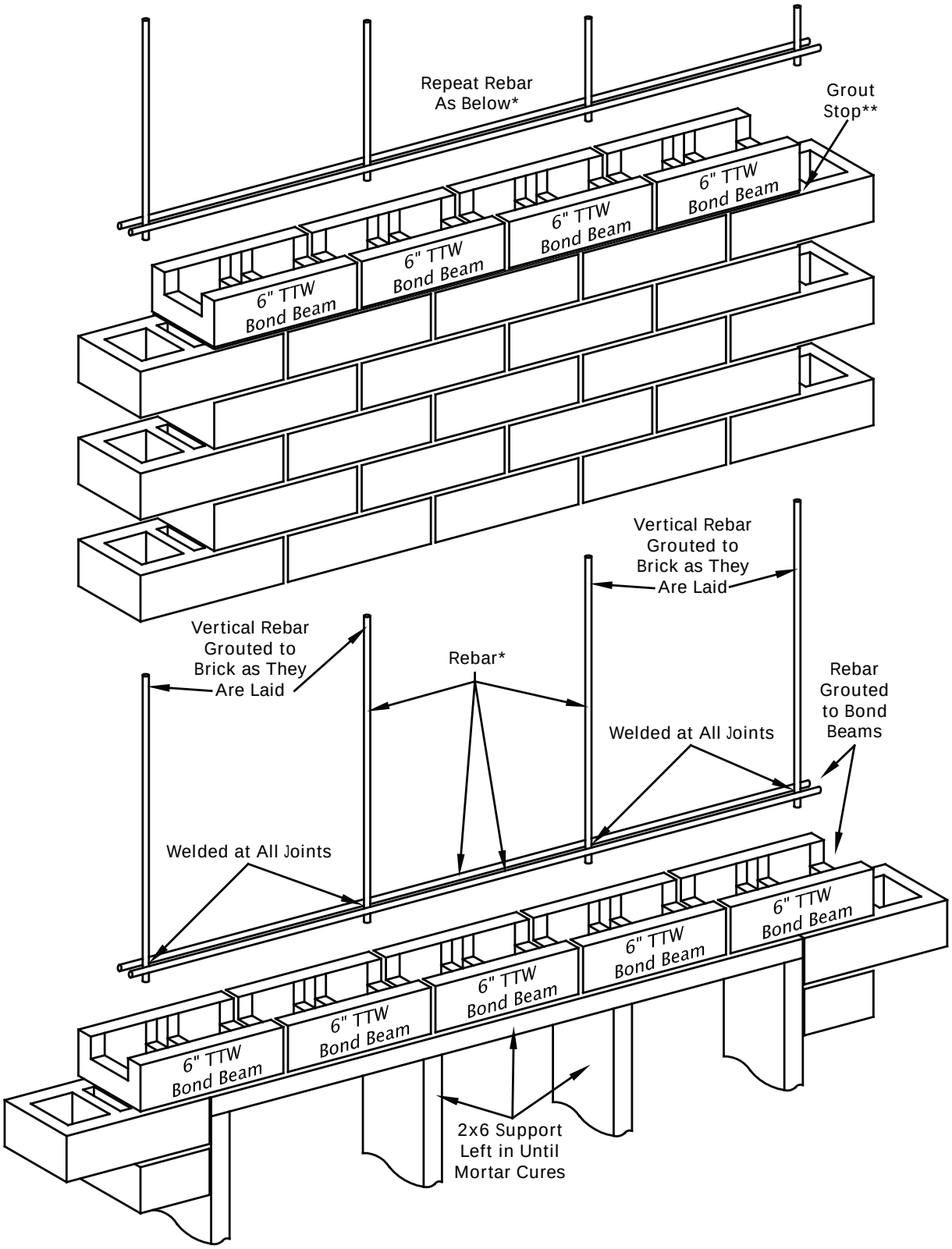
TTW BOND BEAM PLACEMENT



1) Lay up wall to Bond Beam height.
2) Place grout stop (in the form of steel or nylon mesh) in the bed joint to retain grout in Bond Beam units.
3) Place course of Bond Beam units.
4) Place horizontal steel.
5)Grout Bond Beam from top.
6) If 8" deep Bond Beam is required, complete steps 1 - 4 above. (Omit step 5.)
7) Lay second course of Bond Beam units in inverted position.
8) Grout Bond Beam form top.

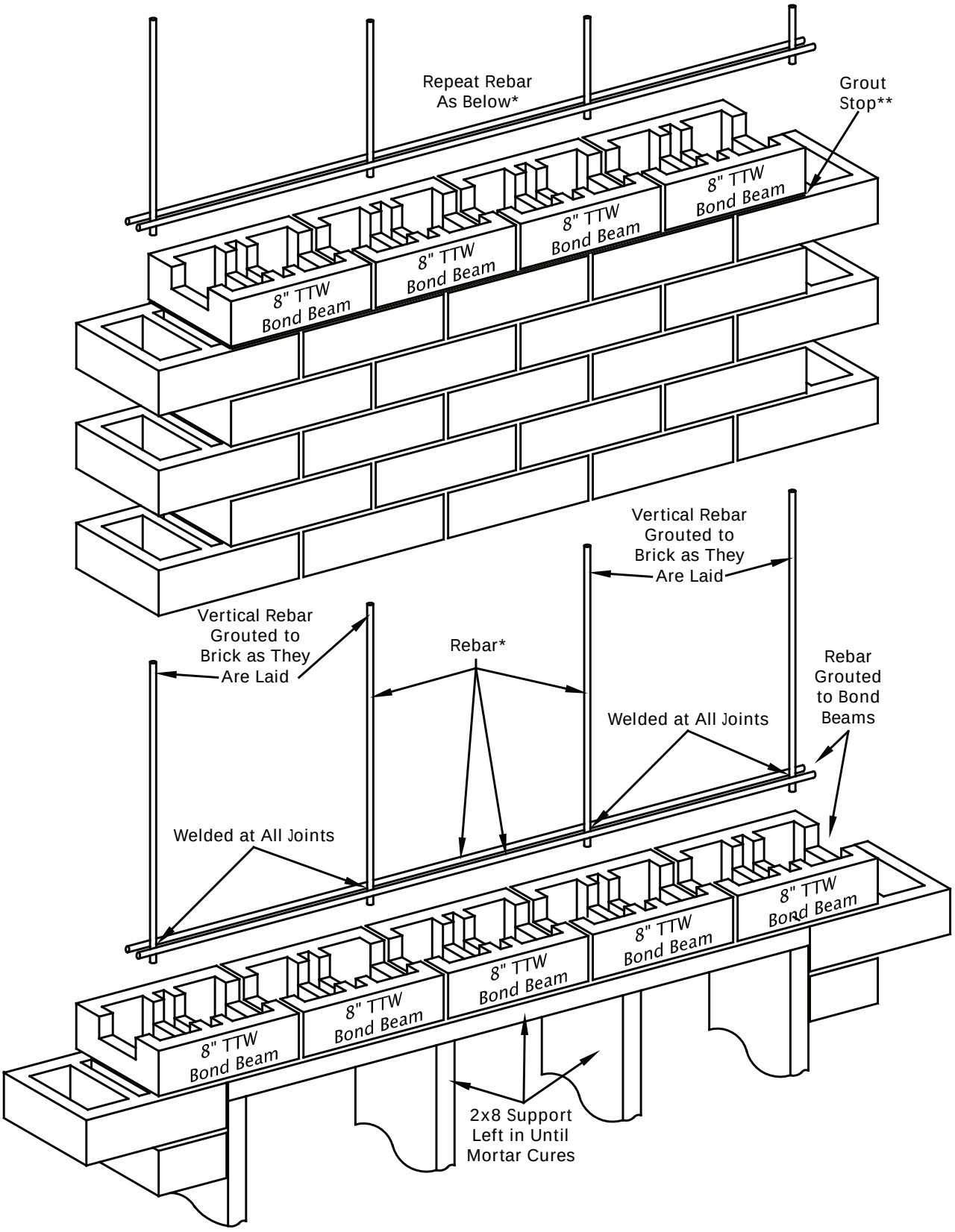
*NOTE: Size and amount of reinforcing steel, as well as span to be determined by structural engineer.

6” TTW LINTEL



*NOTE: Size and amount of reinforcing steel to be determined by a structural engineer.
**NOTE: See "Bond Beam Placement" tech sheet for instructions.

8″ TTW LINTEL



*NOTE: Size and amount of reinforcing steel to be determined by a structural engineer.
**NOTE: See "Bond Beam Placement" tech sheet for instructions.

Comparative Cost of Brick Walls			
Brick Unit*	Wall Type	Units/SQ.FT.	Cost/SQ.FT.
Standard Brick	Veneer	6.75	
Engineer Kingsize	Veneer	4.5	
Economy Norman (Utility)	Veneer	3.0	
6"Thru Wall	Structural/Curtain	3.0	
8" Thru Wall	Structural/Curtain	3.0	
4"Economy Norman Brick	Structural/Curtain	3.0	
8" Concrete Block		1.5	

*Masonry units are listed dimensionally as follows: bed depth x face height x face length.

Square foot costs will vary from one area to another depending upon local job, labor and material conditions; nevertheless, the comparison between wall types will remain much the same.

Estimated Wall Costs	
	Local Job Pricing/SQ.FT.
Face Brick	$_____
Mortar	_____
Labor	_____
Contractor (other cost, overhead and Profit)	_____
Total	$_____

Heat Transmission

Heat transmission in buildings takes place by conductance of heat through various assemblies such as floors, ceilings and walls. The passage of heat through the assembly is from the warmer to the cooler side. In designing heating systems, heat conducted through these assemblies is termed heat loss. In air-conditioning design, heat conducted through the assembly to the inside is known as heat gain.

The U values given for the walls indicate the relative insulation value of the particular wall assembly; the lower the U value the better the insulating value of the wall and the less heating capacity is required.

Single Wythe (Thru-Wall)Brick Walls

This is another common type of masonry wall and consists of a wall one brick unit in thickness, usually with an interior finish applied. U values are given for 4-in., 6-in., and 8-in. units. (A solid unit is cored up to 25 percent of its area. A hollow unit is cored in excess of 25 percent but less than 40 percent). The use of expanded polystyrene or polyurethane board applied directly to the brick with mastic has greatly enhanced the insulating value of this type of wall construction. Interior finish may be applied directly to the insulation. An alternate method would be to apply the interior finish to furring.

Single Wythe Wall, Hollow Units [b]	
Reinforced 4 inch Brick	U
1 by 2 inch Wood Furring	0.32
1-inch Polystyrene Board	0.13
1-inch Polyurethane Board	0.11
2-inch Polystyrene Board	0.08
2-inch Polyurethane Board	0.06

6 Inch Brick	
Reinforced 4 inch Brick	U
1 by 2 inch Wood Furring	0.30
1-inch Polystyrene Board	0.13
1-inch Polyurethane Board	0.11
2-inch Polystyrene Board	0.08
2-inch Polyurethane Board	0.06

8 inch Brick	
Reinforced 4 inch Brick	U
1 by 2 inch Wood Furring	0.32
1-inch Polystyrene Board	0.13
1-inch Polyurethane Board	0.11
2-inch Polystyrene Board	0.08
2-inch Polyurethane Board	0.06

6 Inch Brick	
1 by 2 inch Wood Furring	U
Vermiculite filled cores [c]	0.32
Perlite filled cores [c]	0.13
Urea-formaldehyde foam filled cores	0.11

8 Inch Brick	
1 by 2 inch Wood Furring	U
Vermiculite filled cores [c]	0.16
Perlite filled cores [c]	0.16
Urea-formaldehyde foam filled cores	0.14

[b] Values for hollow units are calculated data based upon products of one manufacturer. These values will vary with core size and brick density.

[c] Water-repellent loose fill insulation.

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