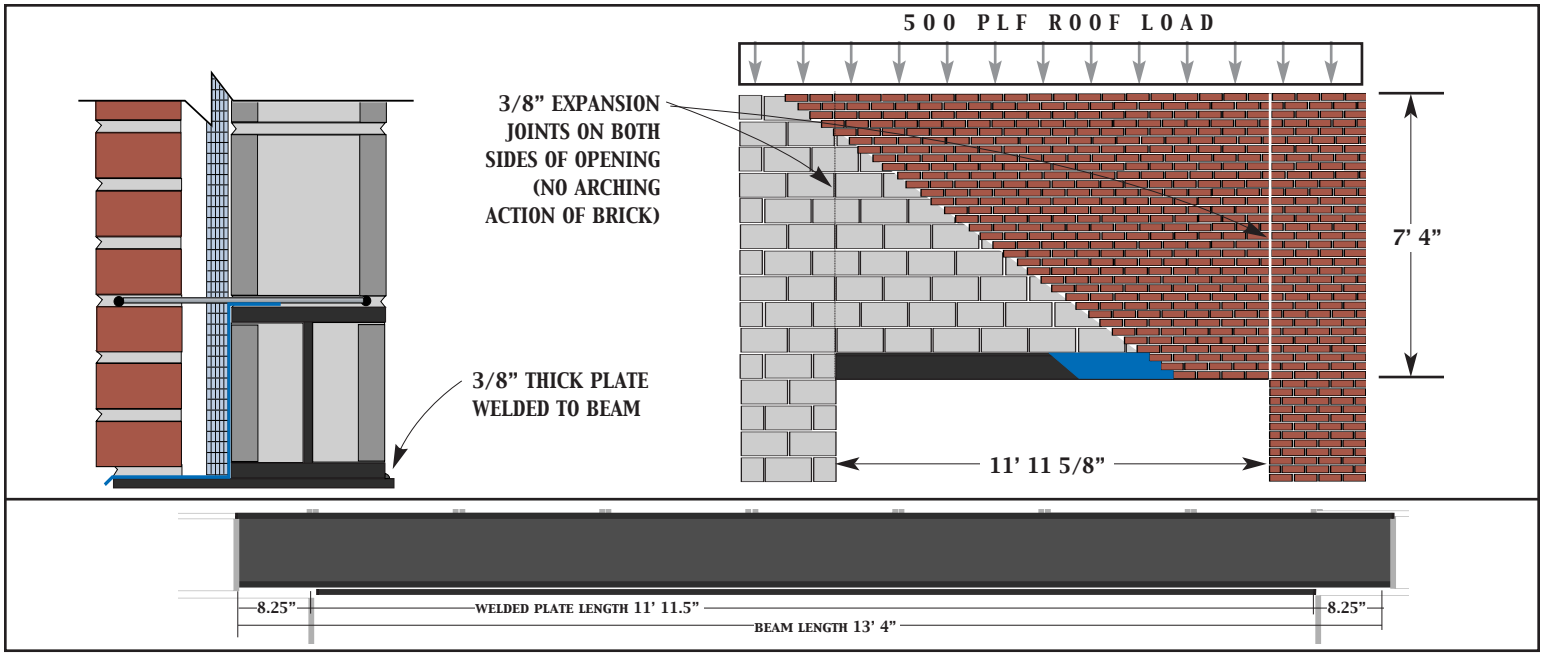
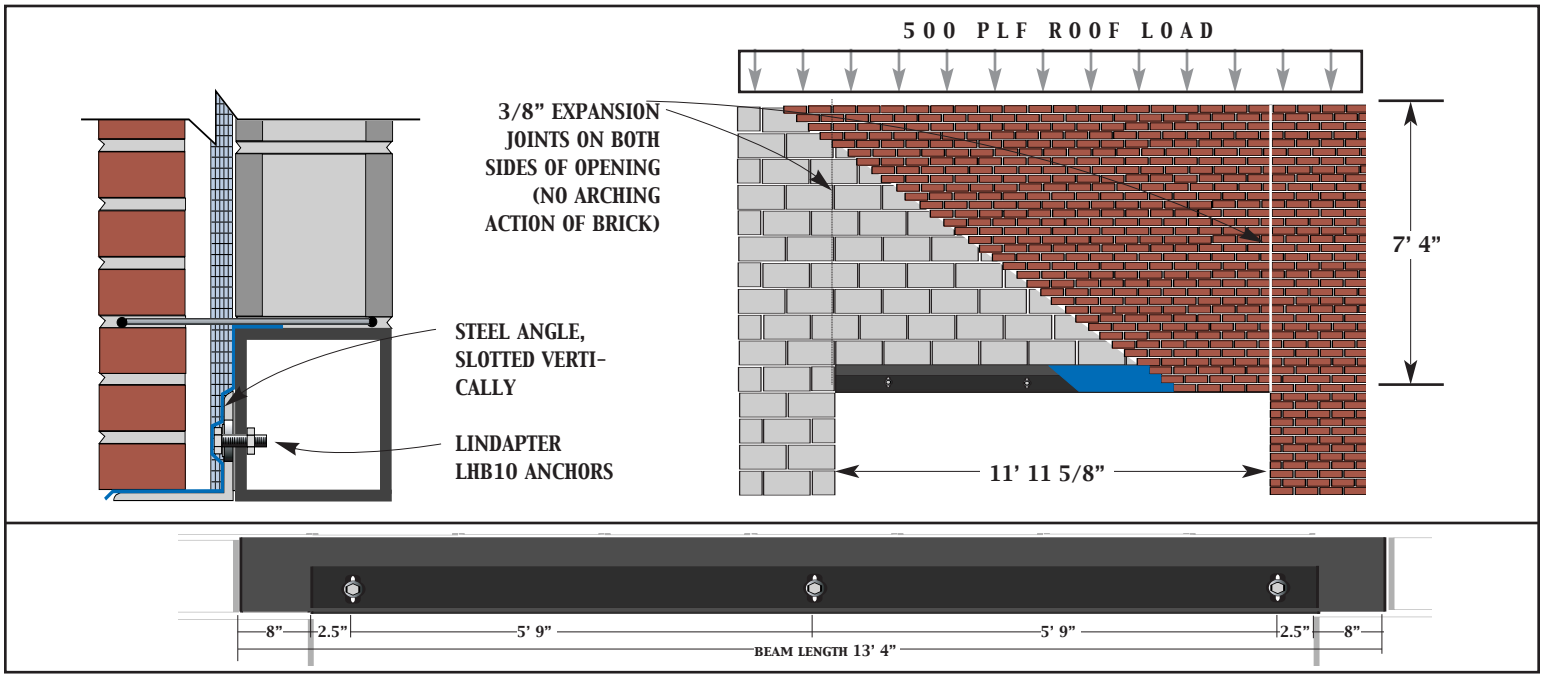
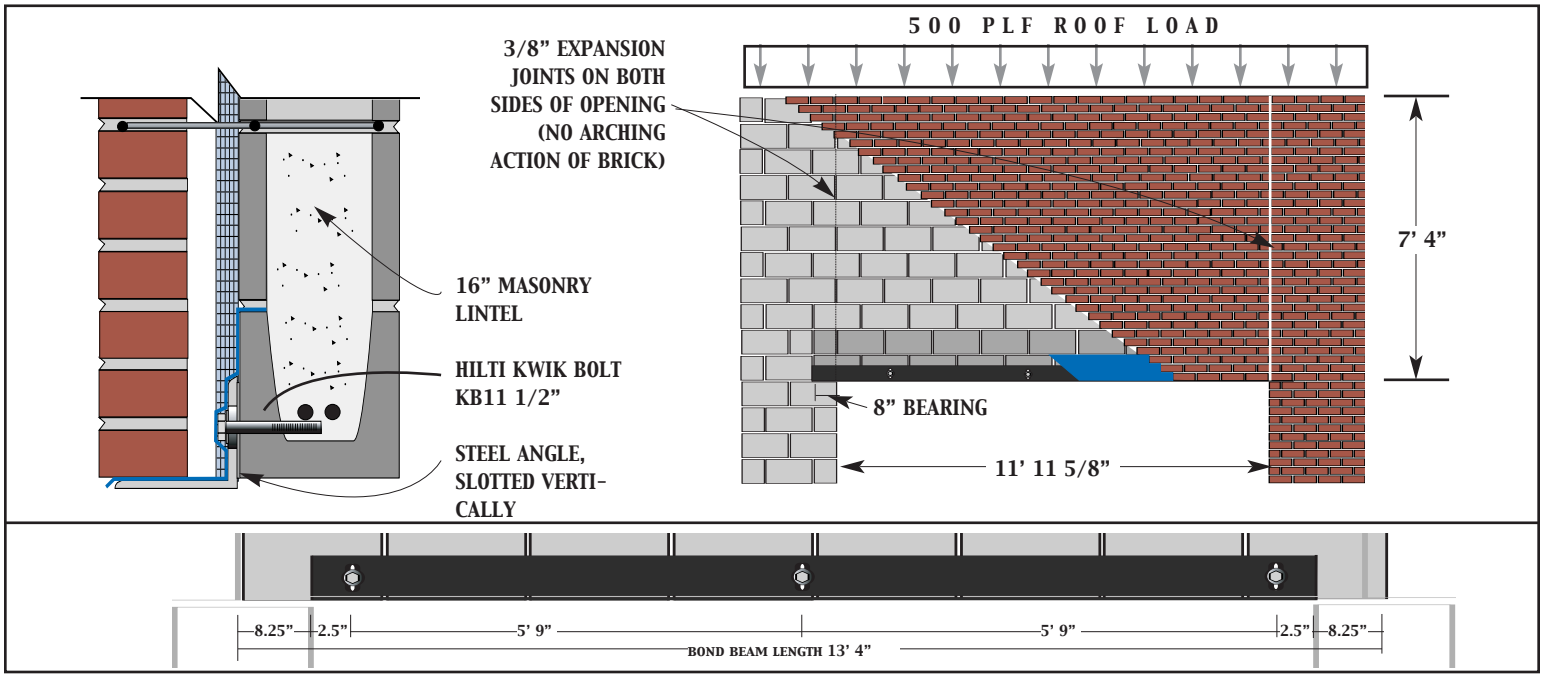

500 PLF ROOF LOAD
3/8" EXPANSION JOINTS ON BOTH SIDES OF OPENING (NO ARCHING ACTION OF BRICK)
3/8" THICK PLATE WELDED TO BEAM
7' 4"
11' 11 5/8"
8.25"
WELDED PLATE LENGTH 11' 11.5"
8.25"
BEAM LENGTH 13' 4"


500 PLF ROOF LOAD
3/8" EXPANSION JOINTS ON BOTH SIDES OF OPENING (NO ARCHING ACTION OF BRICK)
STEEL ANGLE, SLOTTED VERTI-CALLY
LINDAPTER LHB10 ANCHORS
7' 4"
11' 11 5/8"
8"
2.5"
5' 9"
5' 9"
2.5"
8"
BEAM LENGTH 13' 4"


500 PLF ROOF LOAD
3/8" EXPANSION JOINTS ON BOTH SIDES OF OPENING (NO ARCHING ACTION OF BRICK)
16" MASONRY LINTEL
HILTI KWIK BOLT KB11 1/2"
STEEL ANGLE, SLOTTED VERTI-CALLY
7' 4"
8" BEARING
11' 11 5/8"
8.25"
2.5"
5' 9"
5' 9"
2.5"
8.25"
BOND BEAM LENGTH 13' 4"

BRICK LOAD - 40PSF
DEFLECTION LIMITATION - L/600
ANGLE MUST SUPPORT 2/3 BRICK BED DEPTH AT BEARING
CHECK SPACING OF HILTI KB 11 1/2” KWIK BOLT & LINDAPTER LHB10 FOR THE SPECIFIC APPLICATION

SHELF ANGLE SIZING CHART

CAVITY CONFIGURATION	SHELF ANGLE SIZE
3/8” COLLAR JOINT	3 1/2” X 3 1/2” X 5/16”
1” AIRSPACE OR INSULATION	4” X 4” X 5/16”
2” AIRSPACE / INSULATON	5” X 5” X 3/8”
3” AIRSPACE / INSULATON	6” X 6” X 3/8”

Adjustability

The *Code of Standard Practice for Steel Buildings and Bridges* (AISC) designates that the owner is responsible for providing clearances and adjustments of materials furnished by other trades, in order to accommodate all of the foregoing tolerances of the structural steel frame. Simply stated, the designer must provide adjustable connections for the attachment of masonry to the structural steel frame.

An adjustable bolted connection should be used to connect shelf angles to the beam. A brick wythe is structurally supported by a shelf angle. A shelf angle will transfer the weight of the brick back to the structural steel frame. Never specify welded steel connections for shelf angles. The adjustable bolted connection should have provisions for movement in three directions *(Figure 11)*.

This connection will allow the workmen to adjust the angle to compensate for construction tolerances. The clip angle and shelf angle are loosely bolted to the beam. When the mason has laid the brick to the shelf angle level, the proper adjustments will be made.

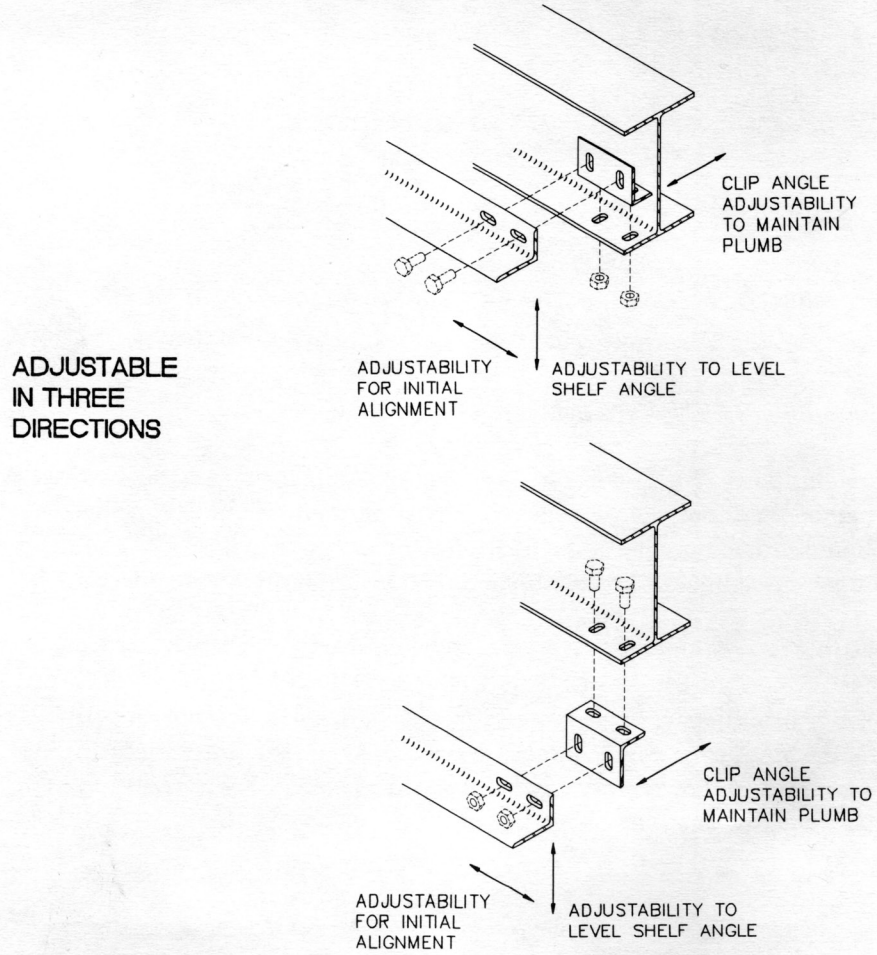


Figure 11 *Connections Adjustable in Three Directions*

The lower beam flange, clip angle, and shelf angle are fabricated with a series of horizontal and vertical slots. The slot dimensions should provide enough adjustment to accommodate the permissible variations of both systems. The dimensions of the slots should not impair the structural integrity of the steel member. Also, clip angles should be designed and sized to resist bending or torsion of the shelf angle due to eccentric loading.

Bolt Dia.	Hole Dimensions			
	Standard (Dia.)	Oversize (Dia.)	Short-slot (Width x length)	Long-slot (Width x length)
1/2	9/16	5/8	9/16 x 11/16	9/16 x 1 1/4
5/8	11/16	13/16	11/16 x 7/8	11/16 x 19/16
3/4	13/16	15/16	13/16 x 1	13/16 x 1 7/8
7/8	15/16	1 1/16	15/16 x 1 1/8	15/16 x 2 3/16
1	1 1/16	1 1/4	1 1/16 x 1 5/16	1 1/16 x 2 1/2
≥1 1/8	d + 1/16	d + 5/16	(d+1/16) x (d+3/8)	(d+1/16) x (2.5 x d)

AISC

Table 6 *Allowable Slotted Hole Dimensions*

Table 6 indicates the allowable slot size and the maximum distance from the edge of the steel members. The amount of adjustability required depends upon the bolt size used. Longer slots can be achieved with larger diameter bolts, therefore, the designer also should consider the flange width of the beam. Sizing of the slots and the flange width to accommodate construction tolerances may prevent problems from occurring in the field *(Figure 12)*.

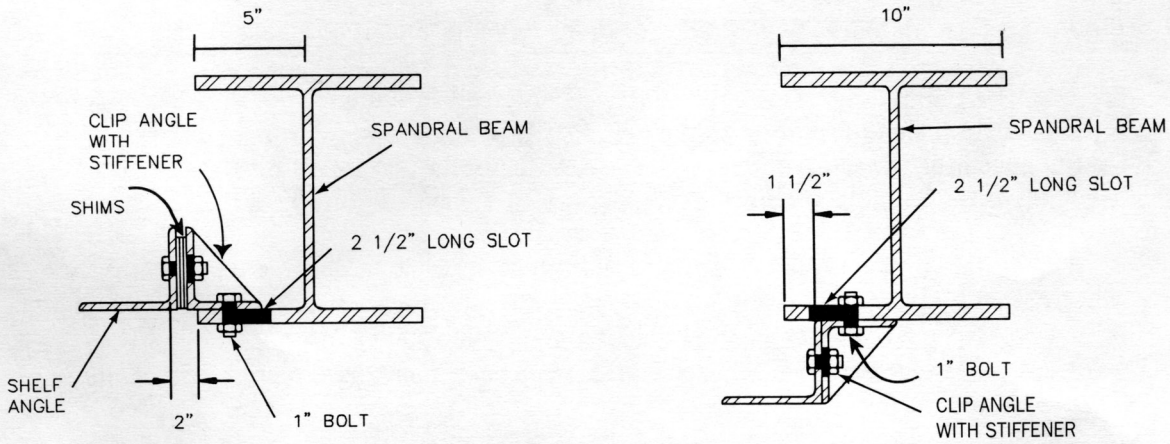


Figure 12 *Adjustability Provided by Slotted Holes*

After we now have the theoretical shelf angle design, that's all the General Conctractor or Structural Engineer has to do .. . . . Incorrect!

In a concrete frame building, call out the maximum allowed shimming on the job and pre design angle and inserts assuming that the cocnrete will be poured out of plumb with additionally supplied angles (if out of plumb to the inside) and chipping hammer (if out of plumb to the outside of the building).

In a structural steel framed building, the tolerances in fabrication of stell members plus the tolerance in erection of the steel elements afford greater tolerance than the acceptable masonry tolerance. Therefore, a good design should entail the ideal condition and alternative designs for worse case scenarios. Such scenarios include the steel being out of plumb to the outside of the building and the worse condition of the steel being out of plumb to the inside of the building. All three conditions should be detailed on the design drawings.