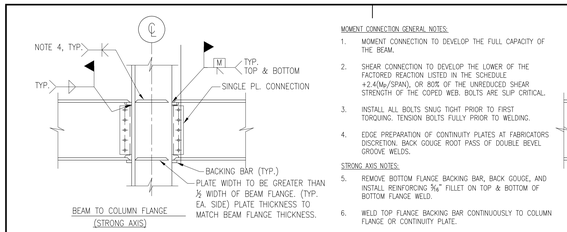


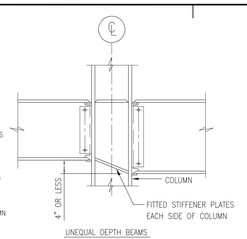
BEAM TO COLUMN FLANGE
(STRONG AXIS)

MOMENT CONNECTION GENERAL NOTES:

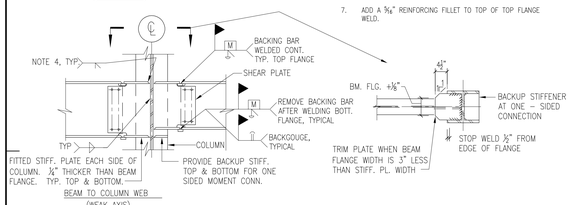
1. MOMENT CONNECTION TO DEVELOP THE FULL CAPACITY OF THE BEAM.
2. SHEAR CONNECTION TO DEVELOP THE LOWER OF THE FACTORED REACTION LISTED IN THE SCHEDULE +2.4(Mu/SPAN), OR 80% OF THE UNREDUCED SHEAR STRENGTH OF THE COPED WEB. BOLTS ARE SLIP CRITICAL.
3. INSTALL ALL BOLTS SNUG TIGHT PRIOR TO FIRST TORQUING. TENSION BOLTS FULLY PRIOR TO WELDING.
4. EDGE PREPARATION OF CONTINUITY PLATES AT FABRICATORS DISCRETION. BACK GOUGE ROOT PASS OF DOUBLE BEVEL GROOVE WELDS.

STRONG AXIS NOTES:

5. REMOVE BOTTOM FLANGE BACKING BAR, BACK GOUGE, AND INSTALL REINFORCING 5/16" FILLET ON TOP & BOTTOM OF BOTTOM FLANGE WELD.
6. WELD TOP FLANGE BACKING BAR CONTINUOUSLY TO COLUMN FLANGE OR CONTINUITY PLATE.
7. ADD A 5/16" REINFORCING FILLET TO TOP OF TOP FLANGE WELD.

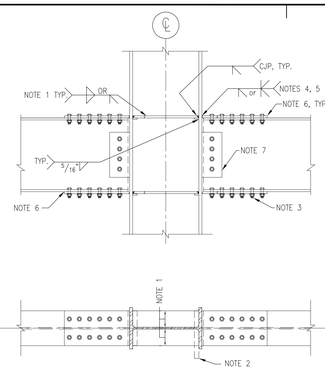


UNEQUAL DEPTH BEAMS
TO COLUMN FLANGE
(STRONG AXIS)



BEAM TO COLUMN WEB
(WEAK AXIS)

WELDED CONNECTIONS

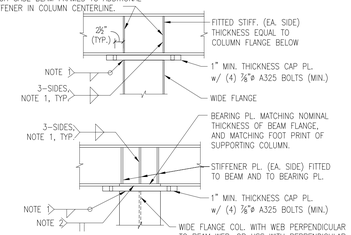


BOLTED MOMENT CONNECTION NOTES:

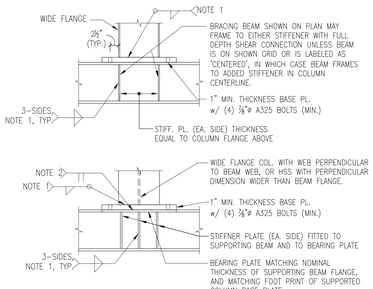
1. MINIMUM WIDTH TO MATCH BEAM FLANGE, THICKNESS TO MATCH OR EXCEED FLANGE OF THICKER BEAM FLANGE AT CONNECTION.
2. REMOVE WELD TABS TO 1/4" MAXIMUM FROM EDGE OF CONTINUITY PLATE. GRIND END OF WELD SMOOTH, NOT FLUSH; DO NOT GOUGE COLUMN FLANGE.
3. ALL BOLTS PROTENSIONED; DESIGNED FOR BEARING. BOLT HOLES IN FLANGE PLATE ARE OVERSIZED, BOLT HOLES IN BEAM FLANGE ARE STANDARD.
4. SHOP WELD: WHEN USING SINGLE BEVEL PREPARATION, REMOVE BACKING AFTER WELDING, BACKGAUGE, AND REINFORCE WITH 5/16" MIN. FILLET WELD.
5. WHEN USING DOUBLE BEVEL PREPARATION, BACKGOUGE FIRST WELD BEFORE WELDING OTHER SIDE.
6. SHIMS BETWEEN BEAM FLANGE AND FLANGE PLATES ARE ALLOWED. USE FULL COVERAGE SHIM PLATES OR FULL DEPTH FINGER SHIMS.
7. HOLES IN SHEAR TABS ARE SHORT SLOTTED HORIZONTAL HOLES: HOLES IN BEAM WEB ARE STANDARD.
8. MOMENT CONNECTION SHALL DEVELOP THE FULL CAPACITY OF THE BEAM.

BOLTED CONNECTIONS

BRACING BEAM SHOWN ON PLAN MAY FRAME TO EITHER STIFFENER WITH FULL DEPTH SHEAR CONNECTION UNLESS BEAM IS SHOWN ON GRID OR IS LABELED AS "CENTERED" IN WHICH CASE BEAM FRAMES TO ADDITIONAL STIFFENER IN COLUMN CENTERLINE.

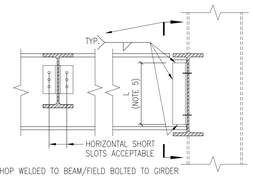


NOTES:
1. MINIMUM WELD SIZE PER TABLE J2.4 OF AISC-LRFD SPECIFICATION.
2. CJP BETWEEN BEARING PLATE AND SUPPORTING BEAM.
3. FULLY TENSION ALL BOLTS.

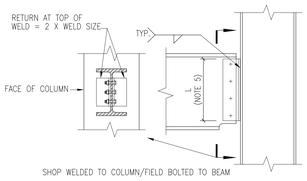


NOTES:
1. MIN. WELD SIZE PER TABLE J2.4 OF AISC-LRFD SPECIFICATION.
2. CJP BETWEEN BEARING PLATE AND SUPPORTING BEAM.
3. FULLY TENSION ALL BOLTS.

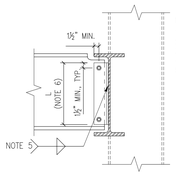
TS-1 TYPICAL "BEAM-TO-COLUMN" MOMENT CONNECTION DETAILS
3/4"=1'-0"



SHOP WELDED TO BEAM/FIELD BOLTED TO GIRDER



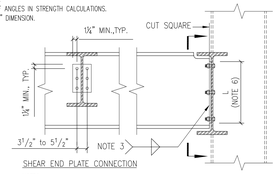
SHOP WELDED TO COLUMN/FIELD BOLTED TO BEAM



SINGLE PLATE CONNECTION

NOTES:
1. DETAIL SIMILAR AT CONNECTION TO COLUMN FLANGE OR COLUMN WEB.
2. BOLTED = BOLTED ALTERNATES ACCEPTABLE.
3. MAXIMUM ANGLE THICKNESS : 5/8".
4. NEGLECT WELD RETURNS AT TOP OF ANGLES IN STRENGTH CALCULATIONS.
5. L = GREATER THAN 0.5 X BEAM "T" DIMENSION.

DOUBLE ANGLE CONNECTION TO BEAM OR COLUMN

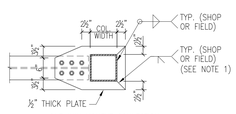


SHEAR END PLATE CONNECTION

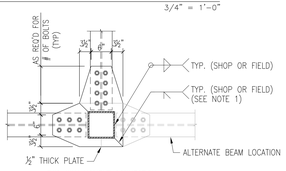
NOTES:
1. DETAIL SIMILAR AT COLUMN FLANGE OR COLUMN WEB.
2. END PLATE THICKNESS RANGE: FROM 1/4" TO 1/8" INCLUSIVE.
3. DO NOT RETURN WELD ACROSS THICKNESS OF BEAM WEB.
4. END PLATE MATERIAL: ASTM A36
5. DO NOT USE ON CAMBERED BEAMS.
6. L = GREATER THAN 0.5 X BEAM "T" DIMENSION.

GENERAL NOTES:
1. DESIGN CONNECTIONS FOR THE GREATER OF THE FORCES SHOWN ON PLAN OR THE FORCES SHOWN ON THE BEAM SHEAR REACTION TABLE.
2. MINIMUM BOLT SIZE IS 3/4"ø A325, U.O.N.
3. FULLY TENSION ALL BOLTS.
4. REINFORCE WEBS AS REQUIRED BY COPES, WEB CUTS, ETC.
5. ALTERNATE CONNECTION TYPES, SUCH AS SINGLE ANGLE, TEE, SEATED CONNECTIONS, ETC. MAY BE ACCEPTABLE UNDER CERTAIN CIRCUMSTANCES. REVIEW WITH ENGINEER.
6. SEE DETAILS & SECTIONS FOR BEAMS REQUIRING FULL DEPTH SHEAR CONNECTIONS.
7. DETAIL CONNECTIONS IN CONFORMANCE WITH THE REQUIREMENTS OF "29 CFR PART 1926, SUBPART R – STEEL ERECTION".
8. GRIND COPES FOR GROUP 4 AND 5 SECTIONS PER THE AISC LRFD SPECIFICATION SECTION J1.6.

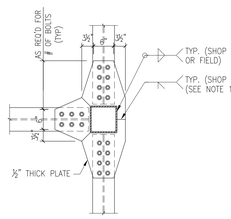
TS-4 STANDARD BEAM SHEAR CONNECTION
3/4" = 1'-0"



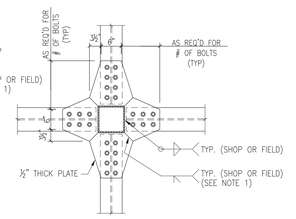
ONE-WAY MOMENT CONNECTION



TWO-WAY MOMENT CONNECTION



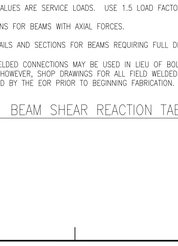
THREE-WAY MOMENT CONNECTION



FOUR-WAY MOMENT CONNECTION

NOTES:
1. PLATE SPLICES W/ FULL-PENETRATION WELDS ARE OPTIONAL. ALTERNATIVE METHOD OF SLIDING A CONTINUOUS PLATE OVER TOP OF COLUMN ALSO ACCEPTABLE.
2. PROVIDE THE FOLLOWING # OF ¾"ø A325 S.C. BOLTS FOR EA. BEAM SIZE:
   W16 6 BOLTS
   W18, W21, & W24 8 BOLTS
3. SHEAR CONNECTION NOT SHOWN FOR CLARITY. PROVIDE SIMPLE SHEAR CONNECTION FROM WEB OF BEAM TO FACE OF HSS COLUMN AS INDICATED IN TS-7.

TS-7B STANDARD WIDE FLANGE BEAM TO HSS COLUMN MOMENT CONNECTION
3/4" = 1'-0"



NOTES:
1. DESIGN FLANGE PLATES FOR (0.8 FHI)(Z)(FY) OF THE SMALLER BEAM.
2. U.O.N. ON PLAN, DESIGN SHEAR CONNECTION FOR 80% OF THE SHEAR STRENGTH OF THE COPED BEAM. REINFORCE WEB AS REQUIRED BY REACTIONS SHOWN ON PLAN. DOUBLE ANGLE, SINGLE PLATE, AND END PLATE CONNECTIONS ACCEPTABLE.
3. ALL BOLTS ARE SLIP CRITICAL.
4. FIELD WELDED FLANGE PLATE ALTERNATES ACCEPTABLE.
5. DETAIL SHIMS AND/ OR FILLERS PER AISC LRFD SPECIFICATION SECTION J6.
6. PROVIDE DECK SUPPORT AS REQUIRED. DECK SUPPORT BY OVERSIZE TOP FLANGE FILLER PLATE IS ACCEPTABLE IF IT HAS A ½" MIN. THICKNESS AND IT EXTENDS A MINIMUM OF 3" BEYOND THE BEAM FLANGES.

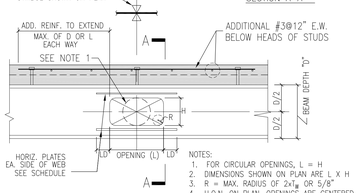
TS-5 BEAM-TO-BEAM MOMENT CONNECTION
3/4" = 1'-0"

BEAM SHEAR REACTION TABLE		
BEAM SIZE	REACTION (KIPS)	MINIMUM NUMBER OF BOLTS
W8	12	2
W10	15	2
W12	35	3
W14	40	3
W16	50	3
W18	50	4
W21	75	4
W24	90	5
W27	100	5
W30	110	7
W33	120	7

NOTES:
1. SHEAR VALUES SHOWN ON PLAN SUPERCEDE TABLE VALUES.
2. SHEAR VALUES ARE SERVICE LOADS. USE 1.5 LOAD FACTOR FOR LRFD CONVERSIONS.
3. SEE PLANS FOR BEAMS WITH AXIAL FORCES.
4. SEE DETAILS AND SECTIONS FOR BEAMS REQUIRING FULL DEPTH SHEAR CONNECTIONS.
5. FIELD WELDED CONNECTIONS MAY BE USED IN LIEU OF BOLTED CONNECTIONS AT CONTRACTOR'S OPTION, HOWEVER, SHOP DRAWINGS FOR ALL FIELD WELDED CONNECTIONS MUST BE SUBMITTED AND APPROVED BY THE EOR PRIOR TO BEGINNING FABRICATION.

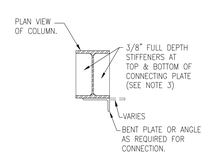
TS-8 BEAM SHEAR REACTION TABLE
3/4"=1'-0"

NOMINAL BEAM DEPTH	REINFORCEMENT PLATE DIMENSIONS			WELD SIZE
D	B	T	LD	T
14	4"	1"	8"	5/16"
18	3"	1/2"	6"	3/16"
21	3"	1/2"	6"	3/16"
24	3"	1/2"	6"	3/16"



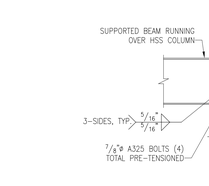
NOTES:
1. FOR CIRCULAR OPENINGS, L = H
2. DIMENSIONS SHOWN ON PLAN ARE L X H
3. R = MAX. RADIUS OF 2xl/8 OR 5/8"
4. U.O.N. ON PLAN, OPENINGS ARE CENTERED ON BEAM SPAN.

TS-6 DETAILS OF OPENINGS IN STEEL BEAMS
3/4"=1'-0"



NOTES:
1) WELDED CONNECTION AT CONTRACTOR'S OPTION IS ACCEPTABLE.
2) FULLY TENSIONED BOLTED CONNECTION
3) FOR BEAMS PARALLEL TO COLUMN FLANGE, DIRECT WEB-TO-FLANGE CONNECTION IS ACCEPTABLE IF IT CAN DEVELOP REQUIRED STRENGTH. CAN USE ONE PAIR OF STIFFENERS ON CONNECTION SIDE OF COLUMN AT LEVEL OF BEAM FLANGES.

TS-9 TYPICAL OFFSET BEAM CONNECTION TO COLUMN FLANGE
3/4"=1'-0"



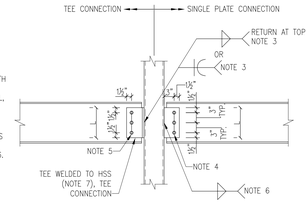
CLEAR SPAN	ANGLE SIZE (LLV)
4'-0"	L3½x3½x5/16
6'-0"	L3½x3½x5/16
8'-0"	L3½x4x5/16
10'-0"	L3½x5x5/16

NOTES:
1) ALL LINTELS ARE GALVANIZED
2) 6" MINIMUM BEARING
3) FOR DOUBLE WYTHE WALLS, USE TWO ANGLES BACK TO BACK. PLUG WELD TOGETHER AT 2'-0" O.C.

TS-10 BRICK LOOSE LINTEL SCHEDULE
3/4"=1'-0"

NOTES:
1. DETAIL ALSO APPLIES FOR SLOPING SUPPORTED BEAMS.
2. INVERTED DETAIL APPLIES FOR HSS COLUMN OVER WIDE FLANGE BEAM

TS-7A WIDE FLANGE BEAM OVER HSS COLUMN CONNECTION DETAIL
3/4" = 1'-0"



TEE CONNECTION

1. MAXIMUM FLANGE WIDTH OF TEE EQUAL TO WIDTH OF HSS AT CONNECTION.
2. DESIGN MODEL: AISC HSS CONNECTIONS MANUAL, FIRST EDITION, SECTION 4.
3. WELD EFFECTIVE THROAT = 5/16" OF CORNER RADIUS. SIZE FOR DUCTILITY PER EQUATION 4-18. FILLET WELDS ACCEPTABLE IF TEE FLANGE WIDTH IS LESS THAN HSS WIDTH.
4. TEE MATERIAL: ASTM A572 GR 50 OR ASTM A36.
5. 7/8"ø MIN. ASTM A325 BOLTS SNUG TIGHT; PRETENSIONED ACCEPTABLE.
6. L=GREATER THAN 0.5xBEAM "T" DIMENSION.
7. MINIMUM TEE STEM THICKNESS: 1/4"

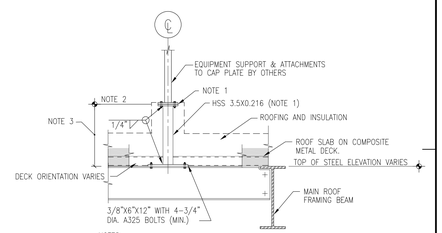
SINGLE PLATE CONNECTION

1. DESIGN MODEL: AISC HSS CONNECTIONS MANUAL, FIRST EDITION, SECTION 4.
2. TREAT AS RIGID CONNECTION UNLESS HSS WALL SECTION IS SLENDER.
3. PLATE MATERIAL: ASTM A36.
4. 7/8"ø MIN. ASTM A325 BOLTS SNUG TIGHT; PRETENSIONED ACCEPTABLE.
5. L= GREATER THAN 0.5xBEAM "T" DIMENSION.
6. MIN. WELD SIZE: 3/4 OF PLATE THICKNESS OR AS REQUIRED BY LRFD 3RD EDITION TABLE J2.4

TS-2 STANDARD BEAM OVER COLUMN DETAIL
3/4"=1'-0"

TS-3 COLUMN BASE TO STEEL SUPPORT
3/4"=1'-0"

TS-7 WIDE FLANGE TO HSS SIMPLE SHEAR CONNECTIONS
3/4" = 1'-0"



NOTES:
1. 1/2"X12"X1'-0" CAP PLATE; COORDINATE WITH EQUIPMENT SUPPORTS FOR STUB LOCATION HOLES, NOTCHES, OR ANY OTHER ATTACHMENT DETAILS.
2. COORDINATE TOP OF PLATE ELEVATION WITH ROOFING, INSULATION, FLASHING DETAILS AND SLOPING ROOF STEEL STRUCTURE.
3. GALVANIZE STEEL AND CONNECTORS FROM CAP PLATE TO BASE PLATE.
4. SEE A AND H SERIES DRAWINGS FOR ROOFING, INSULATION & FLASHING.
5. PLUG WELD GALVANIZING DRAIN HOLE. PAINT WELD WITH ZINC-RICH PAINT FORMULATION.

TS-11 ROOF TOP EQUIPMENT SUPPORT
3/4"=1'-0"

General Notes:

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Simpson Gumpertz & Heger Inc.
Consulting Engineers

Boston, MA — 41 Seyon Street, Building 1, Suite 500, Waltham, MA 02453 — Telephone: (781) 907 9000, Facsimile: (781) 907 9009
San Francisco, CA — The Landmark at One Market, Suite 600, San Francisco, CA 94105 — Telephone: (415) 495 3700, Facsimile: (415) 495 3550
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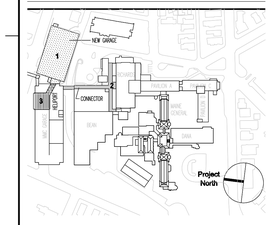
MARK	ISSUE DATE	DESCRIPTION
PERMIT	09/16/04	PERMIT SET
BID	08/26/04	BID SET

Issue Log



TRO
ARCHITECTURE PLANNING ENGINEERING INTERIOR DESIGN
The Ritchie Organization
80 Bridge Street
Newton, MA 02458-1154
617-969-9400

Maine Medical Center
Pkg F - Garage / Vault / Conn / Heliport
Portland, ME MMC Project No. 21845

Drawing Title
TYPICAL STEEL DETAILS (SHEET 1 OF 2)

0' 4' 8' 16' 32'

Commission No.	4678	Date Issued	08/26/04
Scale	3/4"=1'-0"	Sheet Number	PKG-F
Drawn By	SWW		S102
Approved By	JHT/JJZ		
Filename			

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