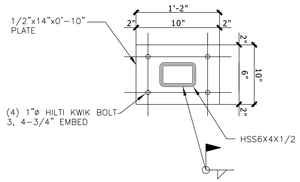
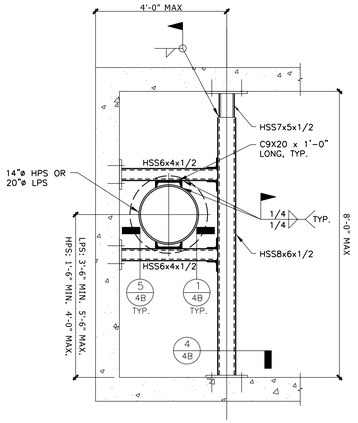
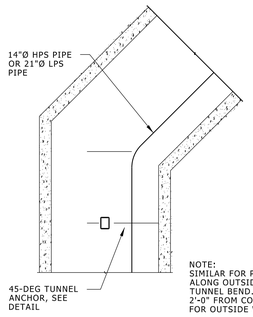


WALL PLATE
5 DETAIL
SCALE: 1" = 1'-0"



45-DEG TUNNEL ANCHOR
SCALE: 1/2" = 1'-0"



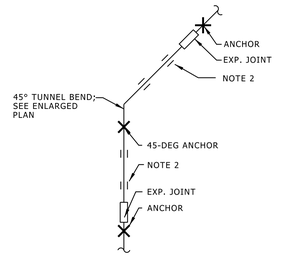
NOTE:
SIMILAR FOR PIPING LOCATED ALONG OUTSIDE WALL OF 45-DEGREE TUNNEL BEND. MINIMUM DISTANCE OF 2'-0" FROM CORNER NOT APPLICABLE FOR OUTSIDE WALL CONFIGURATION

45-DEGREE TUNNEL BEND
ENLARGED PLAN
NO SCALE

DESIGN DATA

DESIGN STRESSES
- STRUCTURAL STEEL
  - W-SHAPES ..... FY= 50,000 PSI
  - RECTANGULAR HSS ..... FY= 46,000 PSI
  - CIRCULAR HSS ..... FY= 42,000 PSI
  - ALL OTHERS ..... FY= 36,000 PSI
- CONCRETE ..... f'c= 3,000 PSI MIN.

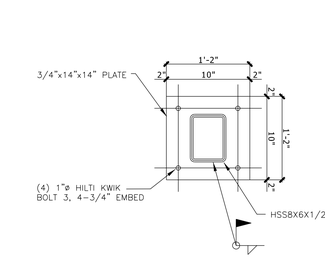
DESIGN LOADS FOR EXPANSION
- STEAM - HIGH PRESSURE & LOW PRESSURE ..... 450° F
- CONDENSATE ..... 250° F
- AMBIENT TEMPERATURE ..... 70° F



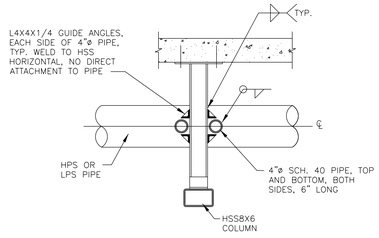
45-DEG TUNNEL BEND ANCHOR PIPING CONFIGURATION
NO SCALE

45-DEG TUNNEL BEND ANCHORS ARE EVALUATED FOR THE FOLLOWING PIPING CONFIGURATIONS:
- LOW PRESSURE STEAM (LPS): 20"ø MAIN LINE
- HIGH PRESSURE STEAM (HPS): 14"ø MAIN LINE

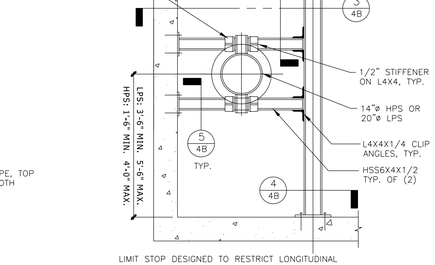
NOTES:
1. FIRST GUIDE TO BE LOCATED A MINIMUM OF 15'-0" AND MAXIMUM OF 25'-0" FROM 45-DEGREE PIPE BEND.
2. GUIDE PIPE ACCORDING TO EXPANSION JOINT MANUFACTURER'S REQUIREMENTS.



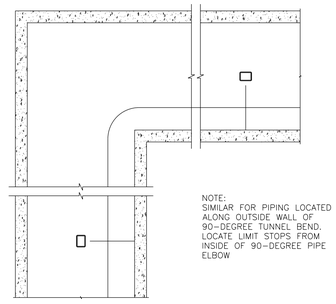
COLUMN TOP PLATE / BASE PLATE
4 SECTION
SCALE: 1" = 1'-0"



3 SECTION
SCALE: 1" = 1'-0"

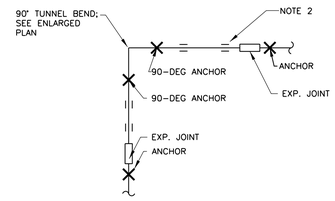


LIMIT STOP DESIGNED TO RESTRICT LONGITUDINAL AND LATERAL MOTION BUT ALLOW ROTATION
90-DEG LIMIT STOP
SCALE: 1/2" = 1'-0"



NOTE:
SIMILAR FOR PIPING LOCATED ALONG OUTSIDE WALL OF 90-DEGREE TUNNEL BEND. LOCATE LIMIT STOPS FROM INSIDE OF 90-DEGREE PIPE ELBOW

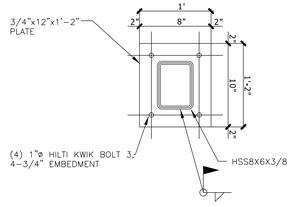
90-DEGREE TUNNEL BEND
ENLARGED PLAN
NO SCALE



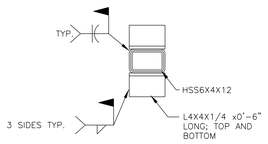
90-DEG TUNNEL BEND PIPING CONFIGURATION
NO SCALE

90-DEG TUNNEL BEND LIMIT STOPS ARE EVALUATED FOR THE FOLLOWING PIPING CONFIGURATIONS:
- LOW PRESSURE STEAM (LPS): 20"ø MAIN LINE
- HIGH PRESSURE STEAM (HPS): 14"ø MAIN LINE

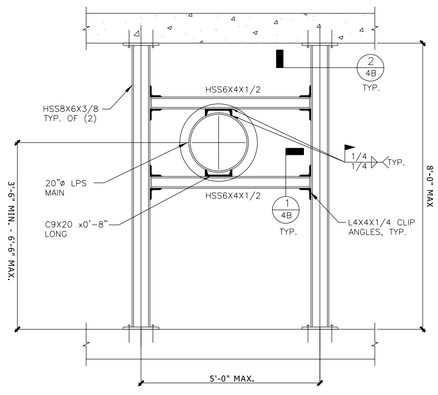
NOTES:
1. NO GUIDES PERMITTED WITHIN 25'-0" OF 90-DEG LIMIT STOPS
2. GUIDE PIPE ACCORDING TO EXPANSION JOINT MANUFACTURER'S REQUIREMENTS.



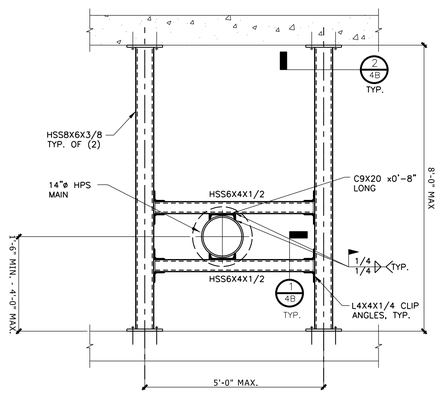
COLUMN TOP PLATE / BASE PLATE
2 SECTION
SCALE: 1" = 1'-0"



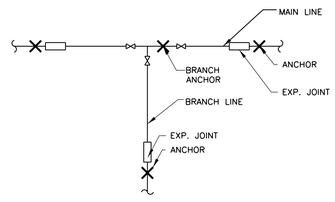
1 SECTION
SCALE: 1" = 1'-0"



NOT TO BE COMBINED WITH OTHER PIPE SYSTEMS
LPS BRANCH ANCHOR
SCALE: 1/2" = 1'-0"



NOT TO BE COMBINED WITH OTHER PIPE SYSTEMS
HPS BRANCH ANCHOR
SCALE: 1/2" = 1'-0"



BRANCH ANCHOR PIPING CONFIGURATION
NO SCALE

BRANCH ANCHORS ARE EVALUATED FOR THE FOLLOWING PIPING CONFIGURATIONS:
- LOW PRESSURE STEAM (LPS): 20"ø MAIN LINE W/ 14"ø BRANCH LINE
- HIGH PRESSURE STEAM (HPS): 14"ø MAIN LINE W/ 12"ø BRANCH LINE
- ANY COMBINATION OF VALVES OPEN OR CLOSED

UNIVERSITY OF MICHIGAN
ARCHITECTURE, ENGINEERING AND CONSTRUCTION
ARCHITECTURE & ENGINEERING
326 East Hoover, Mall Stop B
Ann Arbor, MI 48109-1002
Phone: 734-764-3414
Fax: 734-936-3334

Tom Girard
U OF M DESIGN SUPERVISOR

APPROVED BY
AEC - Architecture & Engineering
REPRESENTING

AF/BB — DRAWN BY
CVW — PROJECT LEAD
FTCH — DESIGNED BY
REVIEWED BY

MARK	ISSUED FOR/REVISIONS	DATE
•	New Master	03/20/15

Tunnels

Tool Kit

University Of Michigan
Ann Arbor , MI

UNIVERSITY OF MICHIGAN
ARCHITECTURE, ENGINEERING AND CONSTRUCTION
326 East Hoover, Mall Stop E
Ann Arbor, MI 48109-1002
Phone: 734-763-3020
Fax: 734-763-3238

P00009388 — U OF M PROJECT NO.
9980 — BUILDING NO.

SHEET TITLE
TUNNELS

Typical Tunnel Anchor Details

SHEET NO.
TK-4B

SHEET NO. 6 OF 13 SHEET FILE NO. TK-04B 04 15.dgn

4/7/2015 9:24:44 AM bbegg G:\10009980 - Tunnels\Consultations\P00009388-Tunnel Technical Support FY15\Tunnel Toolkit\To Be Posted\TK-04B 04 15.dgn