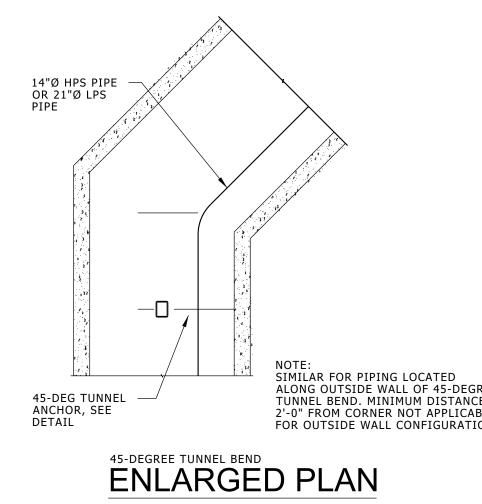
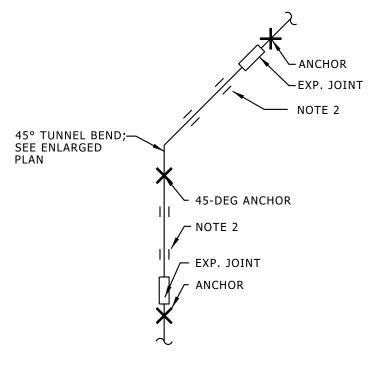
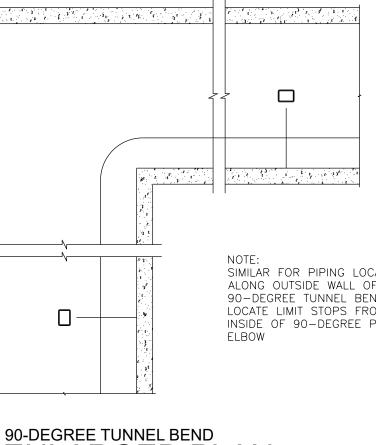


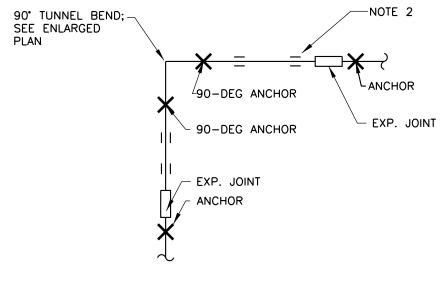
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45-DEG TUNNEL BEND ANCHOR PIPING CONFIGURATION





90-DEG TUNNEL BEND PIPING CONFIGURATION

NU SCALE				
FOLLOWING PIF	PING	END LIMIT STOPS ARE EVALUATED FOR THE CONFIGURATIONS;		
 LOW PRESSURE STEAM (LPS): 20"Ø MAIN LINE HIGH PRESSURE STEAM (HPS): 14"Ø MAIN LINE 				
 HIGH PRES 	SURE	STEAM (HPS): 14 Ø MAIN LINE		
NOTES:				
	1.	NO GUIDES PERMITTED WITHIN 25'-0" OF		
		c		

90-deg Limit Stops JOINT MANUFACTURER'S REQUIREMENTS.

MAIN LINE

- ANCHOR

- EXP. JOINT

	ESIGN STRESSES STRUCTURAL STEEL W-SHAPES RECTANGULAR HSS CIRCULAR HSS ALL OTHERS STRUCTURAL STEEL FY = 50,000 FY = 46,000 FY = 42,000 FY = 36,000 FY = 36,000 FY = 36,000 FY = 36,000 FY = 50,000 FY = 50,000 FSI FY = 50,000 FY = 50,000 FSI FY = 50,000 FY = 50	ARCHITECTURE, ENGINEERING AND CONSTRUCTION ARCHITECTURE & ENGINEERING 326 East Hoover, Mail Stop B Ann Arbor, MI 48109-1002 Phone: 734-764-3414 Fax: 734-936-3334
DI	CONCRETEf'c= 3,000PSI MIN.ESIGN LOADS FOR EXPANSIONSTEAM - HIGH PRESSURE & LOW PRESSURE450° FCONDENSATE250° FAMBIENT TEMPERATURE70° F	TUNNEL TOOL-KIT
1. 2. 3. 4. 5.	ANCHORS ARE INDIVIDUALLY LISTED BELOW. ANCHOR AXIS CONVENTION IS AS FOLLOWS:	REFERENCE DETAILS, SUPPORTS & SECTIONS For Design Professionals Use if Deemed Applicable and Adequate for Project Not For Construction
8.	 a. Fx - LOADS ALONG X-AXIS, PARALLEL TO PIPE CENTERLINE. b. Fz - LOADS ALONG Z-AXIS, PERPENDICULAR TO PIPE CENTERLINE. c. MT - TORSIONAL MOMENT ABOUT VERTICAL AXIS OF ANCHOR. 45° TUNNEL ANCHOR ARE ANCHORS LOCATED NEAR A 45-DEGREE BEND IN A TUNNEL, WITHOUT VALVES OR BRANCH LINES PRESENT. THIS SHEET SHOWS THE GENERAL PIPE CONFIGURATION EVALUATED, AND PROVIDES DIMENSIONAL CONSTRAINTS FOR THE ANCHOR FOR BOTH HPS AND LPS SERVICE. ANY DEVIATIONS FROM THE CONFIGURATIONS SHOWN REQUIRE FURTHER ENGINEERING. BASED ON THE DETAILED 45-DEGREE TUNNEL BEND ANCHOR, THE MAXIMUM ALLOWABLE LOADS ARE AS FOLLOWS: a. Fx = 22,000 LB. MAX. b. Fz = 22,000 LB. MAX. c. MT = 76,000 LB-FT MAX. 	DETAILS, SUPPORTS & SECTIONS FOR DESIGN PROFESSIONAL USE IF DEEMED APPLICABLE & ADEQUATE APPROVED BY AEC - Architecture & Engineering REPRESENTING PS/BB CAD DRAWN BY PROJECT LEAD CAD/BB DESIGNED BY REVIEWED BY
9.	 THESE LOAD MAXIMUMS ARE APPLICABLE FOR HPS PIPES UP TO 14" IN DIAMETER OR LPS PIPES UP TO 20" IN DIAMETER. 90° LIMIT STOP IS A LIMIT STOP DESIGNED FOR INSTALLATION AT EACH OF A 90-DEGREE BEND IN THE TUNNEL. THE LIMIT STOP IS DESIGNED TO RESTRICT PIPE MOVEMENT LATERALLY AND LONGITUDINALLY, WHILE ALLOWING SOME ROTATION OF THE PIPE THROUGH THE SUPPORT, RESULTING IN NO TORSIONAL MOMENT AT THE SUPPORT. THIS SHEET PROVIDES DIMENSIONAL CONSTRAINTS FOR THE LIMIT STOP CONFIGURATION, AS WELL AS LOCATION REQUIREMENTS WITH RELATION TO THE 90-DEGREE BEND IN THE TUNNEL. DEVIATIONS FROM THE CONFIGURATIONS AND LIMITATIONS SHOWN REQUIRE FURTHER ENGINEERING. BASED ON THE DETAILED 90-DEGREE TUNNEL BEND LIMIT STOP, THE MAXIMUM ALLOWABLE LOADS ARE AS FOLLOWS: a. HIGH PRESSURE STEAM UP TO 14" IN DIAMETER: i. Fx = 27,000 LB. MAX. ii. Fz = 4,000 LB. MAX. ii. Fx = 30,000 LB. MAX. ii. Fz = 7,000 LB. MAX. 	
10.	 BRANCH ANCHORS ARE INTENDED TO BE USED WHERE A PERPENDICULAR BRANCH LINE IS LOCATED NEAR A MAIN-LINE ANCHOR, AND PROVIDES ANCHORAGE FOR BOTH THE MAIN LINE PIPE AND THE BRANCH LINE PIPE. TWO BRANCH ANCHOR CONFIGURATIONS ARE PERALLED; ONE INTENDED FOR USE ON HIGH PRESSURE STEAM AND ONE INTENDED FOR USE FOR LOW PRESSURE STEAM SERVICE. DIMENSIONAL CONSTRAINTS FOR WHERE THE PIPING MAY BE LOCATED WITHIN THE ANCHOR CONFIGURATION ARE PROVIDED ON THE INDIVIDUAL DETAILS. DESIGNER MUST ALSO VERIFY THAT THE OVERALL LAYOUT OF THE BRANCH LINE / ANCHOR / AND MAIN LINE PIPING CONFIGURATION FROM THESE CONFIGURATIONS WILL REQUIRE FURTHER ENGINEERING. BASED ON THE DETAILED BRANCH ANCHORS, THE MAXIMUM ALLOWABLE LOADS ARE AS FOLLOWS: a. HIGH PRESSURE STEAM UP TO 14" IN DIAMETER: i. Fx = 20,000 LB. MAX. ii. MT = 31,000 LB. MAX. b. LOW PRESSURE STEAM UP TO 20" IN DIAMETER: i. Fx = 38,000 LB. MAX. ii. MT = 38,000 LB. MAX. iii. MT = 38,000 LB. MAX. 	 Posted to Web New Master Draft Master for Review D5/08/23 D5/08/23 D5/08/23 DATE Tool Kit University Of Michigan Ann Arbor, MI
		INTERVIEW OF A MONTY OF MICHIGAN ARCHITECTURE, ENGINEERING AND CONSTRUCTION 326 East Hoover, Mail Stop E Ann Arbor, MI 48109-1002 Phone: 734-763-3020 Fax: 734-763-3020 Fax: 734-763-3020 Fax: 734-763-3020 TAX VOF M PROJECT NO. BUILDING NO. SHEET TITLE TUNNELS Pipe Bends & Branch Anchors Typical Supports, SLEET NO. SHEET NO. SHEET NO. SHEET NO. SHEET NO. 0F 13 SHEET FILE NO. TK-048 04 15.dgn