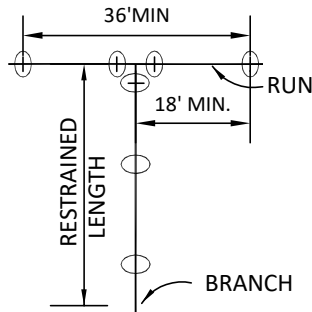
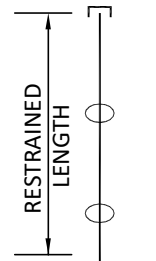


BEND



TEE



DEAD END


PIPE SIZE	11 1/4° BEND	22 1/2° BEND	45° BEND	90° BEND	TEE*	DEAD END
4"	2'	5'	10'	24'	11'	50'
6"	3'	7'	14'	34'	31'	70'
8"	4'	9'	18'	43'	51'	90'
10"	5'	10'	21'	52'	69'	109'
12"	6'	12'	25'	60'	86'	127'
16"	7'	15'	31'	75'	120'	161'

* BRANCH LENGTH

NOTES:

- USE THE FOLLOWING GUIDELINES WHEN OTHER PIPE JOINTS ARE WITHIN 10 FEET OF THE JOINT BEING RESTRAINED:
 - USE THE "DEAD END" LENGTH FOR CONNECTIONS TO ANY MATERIAL EXCEPT DUCTILE IRON AND CAST IRON.
 - USE THE "DEAD END" LENGTH WHEN ANOTHER PIPE JOINT IS WITHIN 10 FEET OF A BEND BEING RESTRAINED.
 - USE THE "90 BEND" LENGTH WHEN ANOTHER PIPE JOINT IS WITHIN 10 FEET OF A TEE BEING RESTRAINED.
- DIVIDE RESTRAINED LENGTH BY 0.85 FOR SILTY SOIL.
- THIS TABLE IS BASED ON THE ASSUMPTION THAT THE TRENCH IS BACKFILLED TO A MINIMUM DEPTH OF 2.5 FEET WITH A SILTY SAND WHICH HAS BEEN LIGHTLY COMPACTED.
- FOR PIPE DIAMETERS LARGER THAN 16", OR FOR CONDITIONS OTHER THAN THOSE DESCRIBED ABOVE, PLEASE REFER TO DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA) GUIDELINES FOR CALCULATING RESTRAINED LENGTH. CALCULATIONS MUST BE SUBMITTED FOR APPROVAL.
- RESTRAINED LENGTH ON TEES ASSUMES THE SAME SIZE BRANCH AND RUN. TEES WHICH HAVE BRANCH DIAMETERS LESS THAN THE DIAMETER OF THE RUN MAY REQUIRE A SHORTER RESTRAINED LENGTH. CALCULATIONS MUST BE SUBMITTED JUSTIFYING A SHORTER RESTRAINED LENGTH.
- ALL PIPELINES LARGER THAN 16" DIAMETER REQUIRE RESTRAINED LENGTH CALCULATIONS INCLUDING SOILS REPORT.

REVISION DATE: 1/13/2011

		SAN BERNARDINO MUNICIPAL WATER DEPARTMENT		DRAWING NUMBER
M.J.N	JAN. 11	RESTRAINED JOINT DETAIL		
M.H.L	FEB. 04			
S.W.L	APR. 02			
REVISION	DATE			APPROVED 
SCALE: NONE		WARREN HUANG, P.E. RCE 49208		