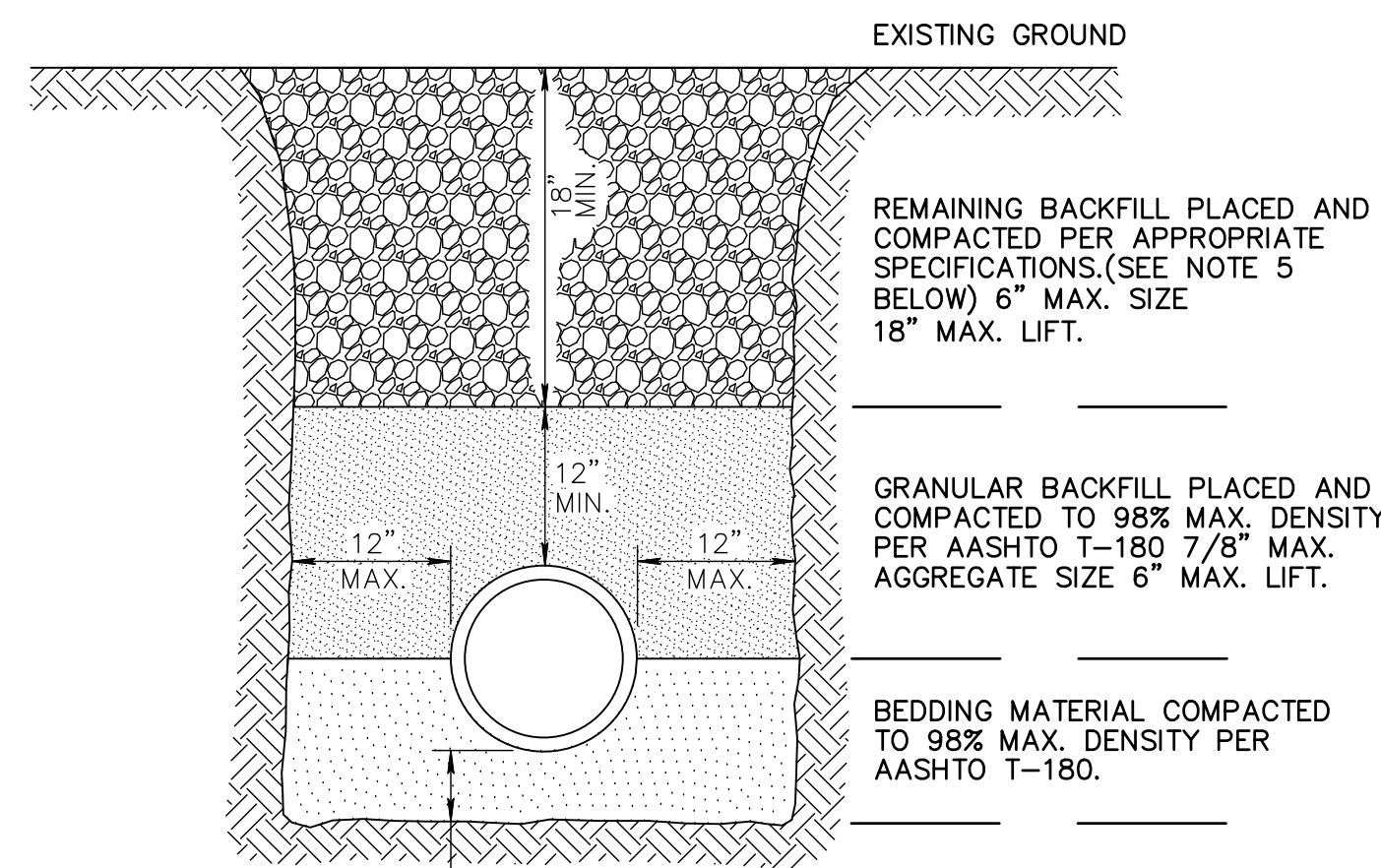


- REPLACEMENT BASE TO BE AT MIN. 12" THICK.
- BASE MATERIAL SHALL BE PLACED IN TWO LIFTS AND EACH LIFT COMPACTED TO 98% MAXIMUM DENSITY PER AASHTO T-180 (MAX. LIFT THICKNESS = 6").
- 12" EXCAVATABLE FLOWABLE FILL MIN. 100 P.S.I. MAY BE USED IN LIEU OF 12" BASE.
- ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED.
- ALL DISTURBED PAVEMENT MARKINGS SHALL BE RESTORED IN ACCORDANCE WITH CITY STANDARDS.
- SURFACE MATERIAL SHALL BE F.D.O.T. TYPE S-I OR S-III ASPHALTIC CONC. (MIN. THICKNESS 1 1/2").
- ANY PAVT. CUTS SHALL BE COLD PATCHED AT END OF EACH WORKING DAY TO FACILITATE UNHINDERED TRAFFIC FLOW.

PAVEMENT REPAIR DETAIL GU 1.1



- NOTES:**
- UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS AND LARGE ROCKS SHALL BE REMOVED; BEDDING MATERIAL AND BACKFILL CONSISTING OF WASHED AND GRADED LIMEROCK 3/8" - 7/8" SIZING.
 - THE PIPE AND/OR STRUCTURE SHALL BE FULLY SUPPORTED FOR ITS ENTIRE LENGTH WITH APPROPRIATE COMPACTION UNDER THE PIPE HAUNCHES.
 - THE PIPE AND/OR STRUCTURE SHALL BE PLACED IN A DRY TRENCH.
 - BACKFILL SHALL BE FREE OF UNSUITABLE MATERIAL SUCH AS LARGE ROCK, MUCK, AND DEBRIS.
 - COMPACT BACKFILL TO 98% DENSITY UNDER PAVEMENT AND TO 95% DENSITY ELSEWHERE. (AASHTO T-180)
 - COMPACTION AND DENSITY TESTS SHALL BE COMPLETED DURING BACKFILL OPERATIONS, CONTRACTORS NOT FOLLOWING THIS PROCEDURE, FOR WHATEVER REASONS, SHALL BE REQUIRED TO RE-EXCAVATE THE AREA IN QUESTION, DOWN TO THE BEDDING MATERIAL, THEN BACKFILL FOLLOWING THE ABOVE PROCEDURES.

TYPICAL BACKFILL DETAIL GU 2.1

PRESSURE PIPE NOTES:

- THERE SHALL BE 30" MINIMUM COVER FROM FINISHED GRADE TO TOP OF PIPE. FOR PIPE SIZE 10" AND LARGER THERE SHALL BE 36" MINIMUM COVER.
- DUCTILE IRON PIPE (DIP) FOR FORCE MAINS SHALL BE CLASS 350 EPOXY LINED IN ACCORDANCE WITH AWWA C550.
- DUCTILE IRON PIPE (DIP) FOR WATER MAINS SHALL BE CLASS 350 IN ACCORDANCE WITH AWWA C151 (ANSI A21.51), AND SHALL HAVE AN INTERNAL LINING OF CEMENT MORTAR IN ACCORDANCE WITH AWWA C104/ A21.4.
- C-900 PVC PRESSURE PIPE MAY BE USED IN LIEU OF DIP WATER MAIN METAL TAPE ABOVE C-900
- ALL FITTINGS SHALL BE CLASS 350 DUCTILE IRON WITH MECHANICAL JOINTS AND EPOXY LINING.
- WATER MAIN AND SEWAGE FORCE MAIN VALVES 12 INCHES AND SMALLER SHALL BE RESILIENT WEDGE GATE VALVES IN ACCORDANCE WITH AWWA C509. WATER MAIN VALVES LARGER THAN 12 INCHES SHALL BE BUTTERFLY VALVES IN ACCORDANCE WITH AWWA C504. SEWAGE FORCE MAIN VALVES LARGER THAN 12 INCHES SHALL BE RESILIENT WEDGE GATE VALVES IN ACCORDANCE WITH AWWA C515
- ALL TRENCHING, PIPE-LAYING, BACKFILL, PRESSURE TESTING, AND DISINFECTION MUST COMPLY WITH CITY AND HEALTH DEPARTMENT STANDARDS.
- WATER AND FORCE MAINS SHALL BE PIGGED, AS WELL AS, PRESSURE TESTED FOR A PERIOD OF NOT LESS THAN TWO HOURS AT 150 PSI IN ACCORDANCE WITH ANSI/AWWA C600 LATEST STANDARDS. ALLOWABLE LEAKAGE SHALL BE DETERMINED AS FOLLOWS:

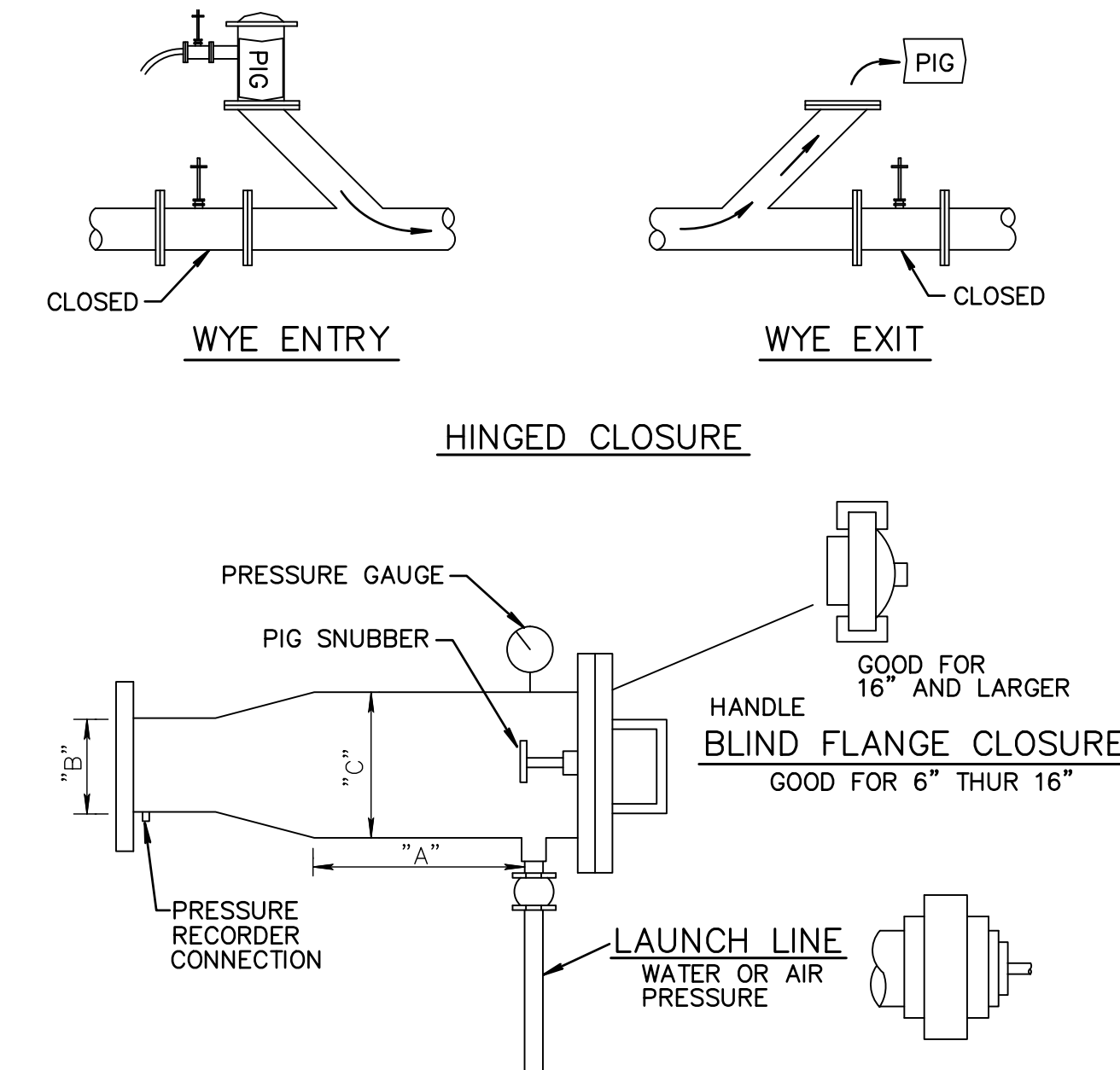
$$L = \frac{(S)(D)(P)}{148,000} \times (50)$$

WHERE:

- L = ALLOWABLE LEAKAGE (GALLONS PER HOUR)
- S = PIPE LENGTH (FEET)
- D = NOMINAL DIAMETER OF PIPE (INCHES)
- P = AVERAGE TEST PRESSURE (PSI)

- RESTRAINTS SHALL BE PROVIDED AT ALL FITTINGS AS SHOWN ON PP.2.1
- PRIOR TO ANY TESTING UNDER FUTURE PAVEMENT, ROCK SHALL BE FINISHED & PRIMED OR 1ST LIFT OF ASPHALT PLACED.
- PIG SIZE SHALL BE PIPE DIA. PLUS 2" OR NEXT LARGER DIA.
- NO PROPOSED STRUCTURES SHALL BE INSTALLED WITHIN A HORIZONTAL DISTANCE OF 10- FEET FROM ANY EXISTING OR PROPOSED WATER MAINS, OR FORCE MAINS.
- LINE STOPS SHALL BE INSTALLED A MINIMUM OF 3 PIPE LENGTHS FROM LOCATION OF PIPE REMOVED, OTHERWISE, PROVIDE NECESSARY JOINT RESTRAINTS.

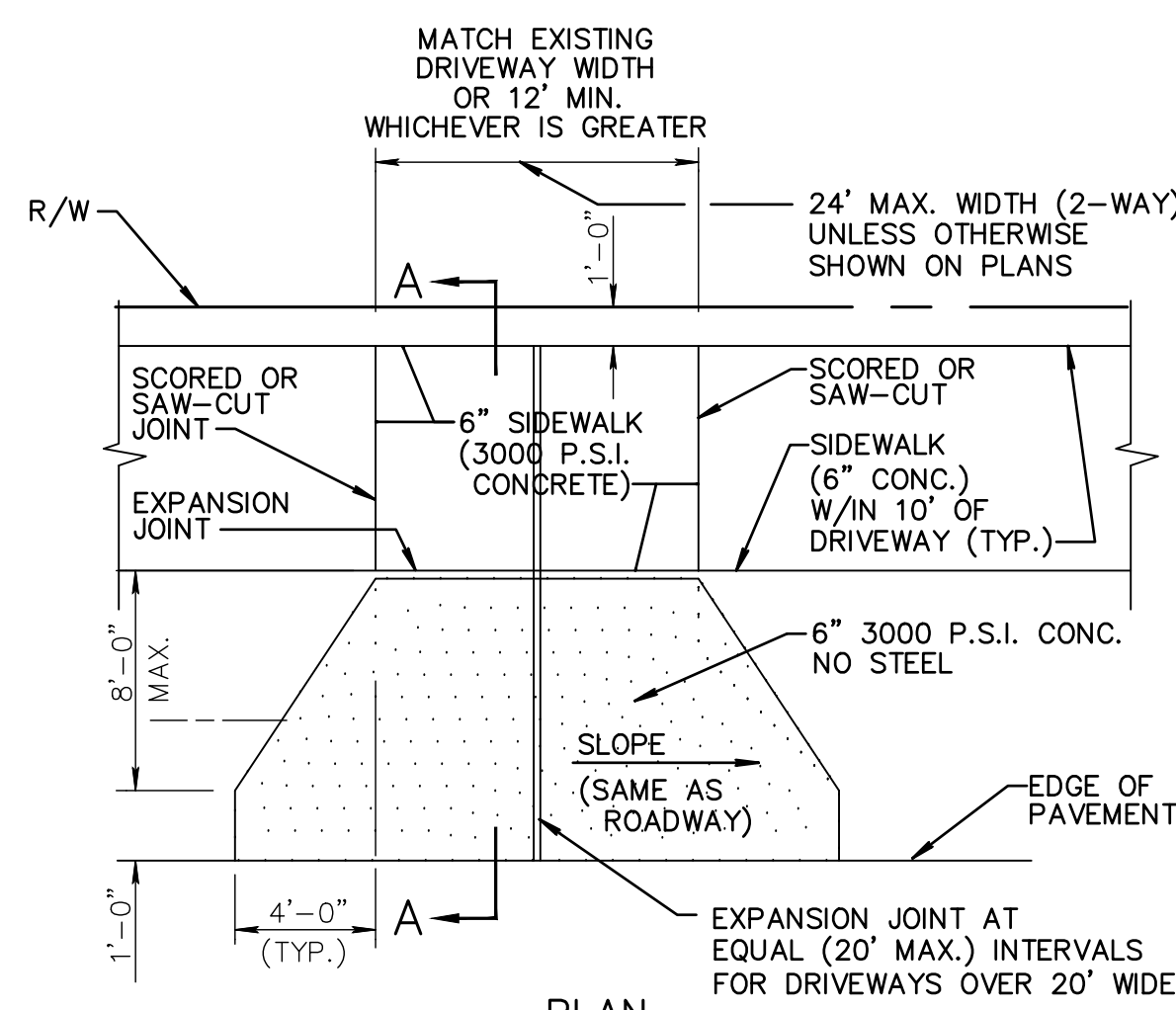
PRESSURE PIPE NOTES PP 1.1



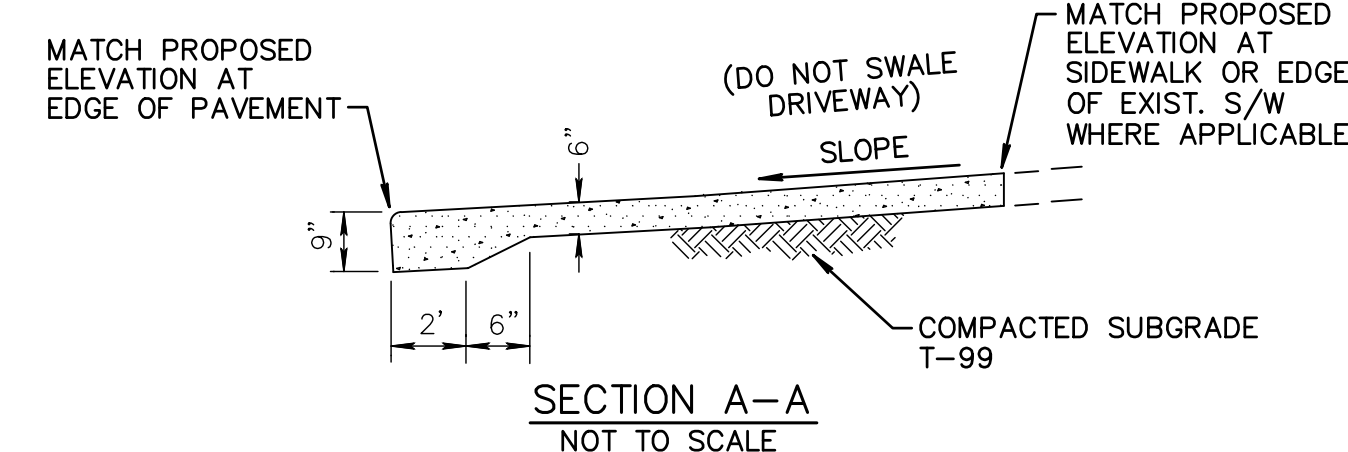
DIMENSIONS:
 "A" TWO TO FOUR TIMES DIA. OF PIG
 "B" DIA. OF LINE TO BE CLEANED
 "C" ONE PIPE SIZE LARGER THAN PIG

NOTE:
 ALL NEWLY INSTALLED WATER PRESSURE PIPE SHALL BE "PIGGED" DURING THE FILLING AND FLUSHING OPERATION. WASTEWATER PRESSURE PIPE SHALL BE "PIGGED" PRIOR TO FINAL ACCEPTANCE BY THE CITY. PIG SIZE SHALL BE PIPE DIA. PLUS 2" OR NEXT LARGER DIA.

PIG LAUNCHER DETAIL PP 5.1

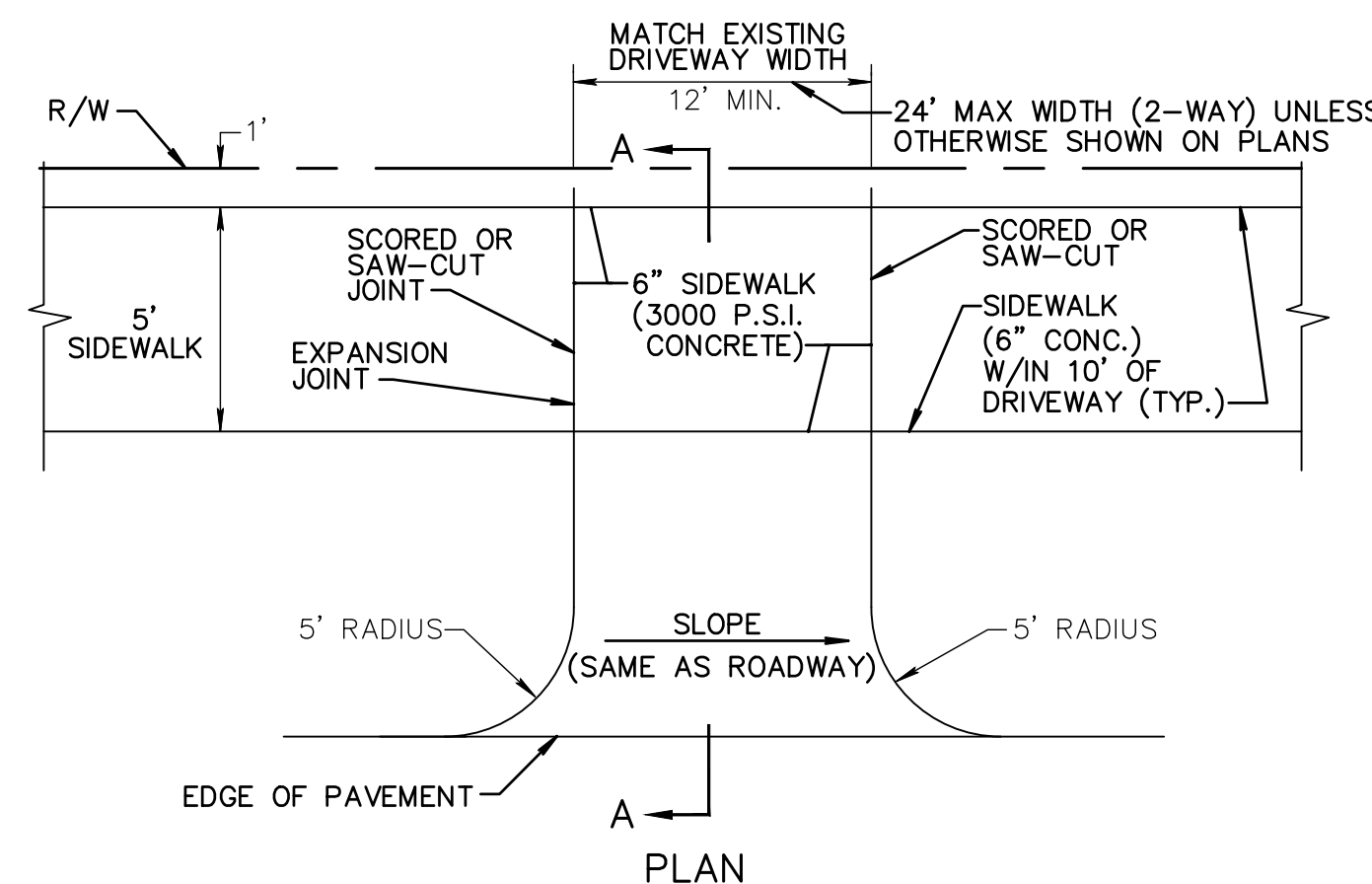


NOTE: SIDEWALK SHALL BE CONSTRUCTED THROUGH DRIVEWAY.

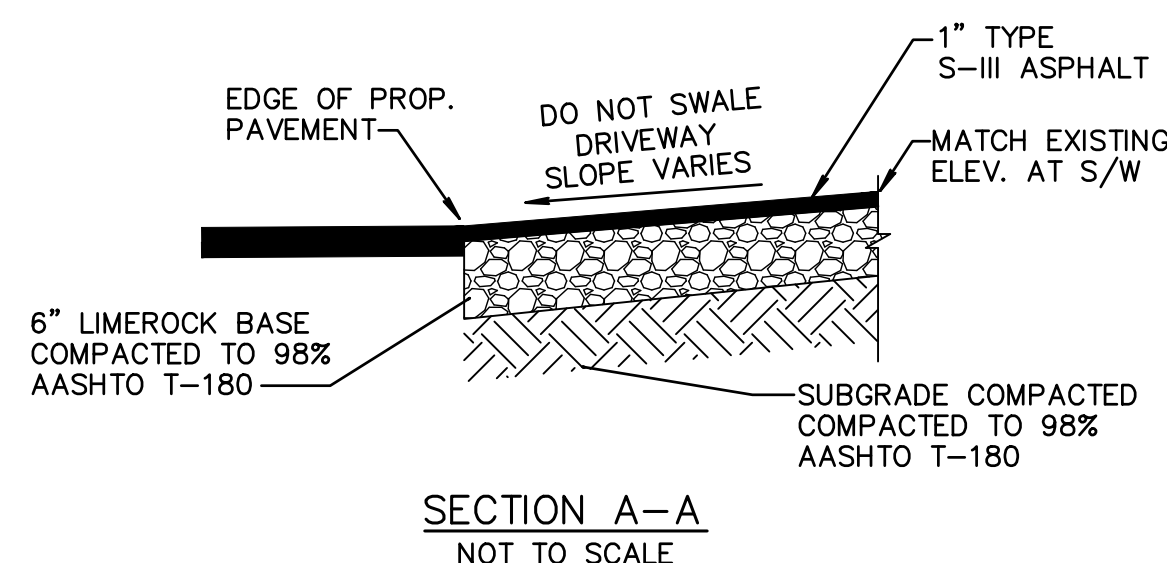


NOTE: ALL SIDEWALKS WITH CENTRAL BUSINESS DISTRICT SHALL BE A MINIMUM WIDTH OF 8'

CONCRETE DRIVEWAY APRON RT 9.1



NOTE: SIDEWALK SHALL BE CONSTRUCTED THROUGH DRIVEWAY.



NOTE: ALL SIDEWALK WITH CENTRAL BUSINESS DISTRICT SHALL BE A MINIMUM WIDTH OF 8'.

ASPHALT DRIVEWAY APRON RT 9.2

MINIMUM LENGTHS OF PIPE (FT) TO BE RESTRAINED

FITTING TYPE	PIPE SIZE								
	4"	6"	8"	10"	12"	16"	20"	24"	
90° HORIZ. BEND	14	20	25	30	35	45	54	62	
45° HORIZ. BEND	6	8	11	13	15	19	22	26	
22.5° HORIZ. BEND	3	4	5	6	7	9	11	12	
11.25° HORIZ. BEND	1	2	3	3	4	4	5	6	
90° VERT. OFFSET	UPPER BEND	55	79	103	125	147	189	228	266
	LOWER BEND	22	38	49	59	69	88	106	123
45° VERT. OFFSET	UPPER BEND	22	32	42	51	60	77	93	109
	LOWER BEND	10	14	19	23	28	35	43	50
22.5° VERT. OFFSET	UPPER BEND	7	12	17	21	26	34	42	49
	LOWER BEND	2	4	6	8	10	14	17	21
11.25° VERT. OFFSET	UPPER BEND	3	4	6	9	11	15	19	22
	LOWER BEND	1	1	1	2	3	5	7	8
PLUG (DEAD END)	32	45	59	70	83	107	129	151	
INLINE VALVE	32	45	59	70	83	107	129	151	
TEE (BRANCH RESTRAINT)	4"X0	23							
	6"X0	21	35						
	8"X0	18	34	47					
	10"X0	16	32	46	58				
	12"X0	13	30	44	57	69			
	16"X0	7	26	41	55	67	90		
REDUCER (LARGER PIPE RESTRAINT)	20"X0	1	21	38	52	65	88	109	
	24"X0	1	16	34	49	62	86	108	
	6"X0	23							
	8"X0	38	25						
	10"X0	57	43	24					
	12"X0	72	60	44	41				
16"X0	99	90	78	75	45				
20"X0	123	116	107	105	81	45			
24"X0	146	140	132	131	111	82	45		

RESTRAIN PIPE ONE BELL PAST MINIMUM DISTANCE

PIPE RESTRAINT TABLE FOR PRESSURE PIPE PP 2.1A (SHEET 1 OF 2)

- NOTES:**
- THE DATA IN THE PREVIOUS TABLE ARE BASED UPON THE FOLLOWING INSTALLATION CONDITIONS:
 SOIL TYPESAND
 TEST PRESSURE150 PSI, 200 PSI FOR PIPES LARGER THAN 24"
 DEPTH OF BURY3'
 TRENCH TYPE3
 SAFETY FACTOR1.5
 VERTICAL OFF-SET3'
 MINIMUM PIPE LENGTHS ALONG TEE RUN5'
 - THE RESTRAINED PIPE LENGTHS APPLY TO DUCTILE IRON PIPE AND PVC PIPE.
 - ALL JOINTS BETWEEN UPPER AND LOWER BENDS SHALL BE RESTRAINED.
 - RESTRAINED PIPE LENGTHS FOR VALVES APPLY TO PIPE ON BOTH SIDES OF VALVES
 - THE PREVIOUS TABLE SHALL SERVE AS A GENERAL DESIGN GUIDE ONLY. IT IS THE ENGINEER OF RECORD'S RESPONSIBILITY TO JUSTIFY AND DOCUMENT ANY DEVIATIONS FROM THE PIPE LENGTHS SPECIFIED IN THE PREVIOUS TABLE.
 - SOURCES: EBAA IRON RESTRAINT LENGTH CALCULATION PROGRAM FOR PVC PIPE, RELEASE 3.1 AND DIPRA THRUST RESTRAINT FOR DUCTILE IRON PIPE, RELEASE 3.2.
 - RESTRAINED JOINTS SHALL EXTEND ONE JOINT BEYOND MIN. LENGTH REQUIRED.

PIPE RESTRAINT TABLE FOR PRESSURE PIPE PP 2.1B (SHEET 2 OF 2)



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CHECKED BY	IK				
DATE	JAN. 2016	REVISION	DATE	DESCRIPTION	BY

MARINE WAY (CANAL STREET)
 WATER MAIN IMPROVEMENTS

DETAIL SHEET

PROJECT NO.
 2016-061
 SHEET NO.
 2 OF 3
 FILE ID.