

PVC Material Information:

PVC Pipe Dia.	48.000	inch
Wall Thickness	1.000	inch
l of Wall	0.083	inch ⁴ /in.
Material Modulus, E	400000.000	psi
Poisson's Ratio	0.380	
Tensile Strength	1000.000	psi
Comp. Strength	4000.000	psi
Axial Strain Limit	0.035	
Ring Strain Limit	0.050	

Soil Information:

Soil Dry Density	120.000	lbf/sq.ft.
Soil Sat. Density	135.000	lbf/sq.ft.
Internal Friction Angle	30.000	
Friction Coefficient	0.400	
Soil Modulus, E'	1000.000	psi
Active Earth Pres. Coef.	0.333	

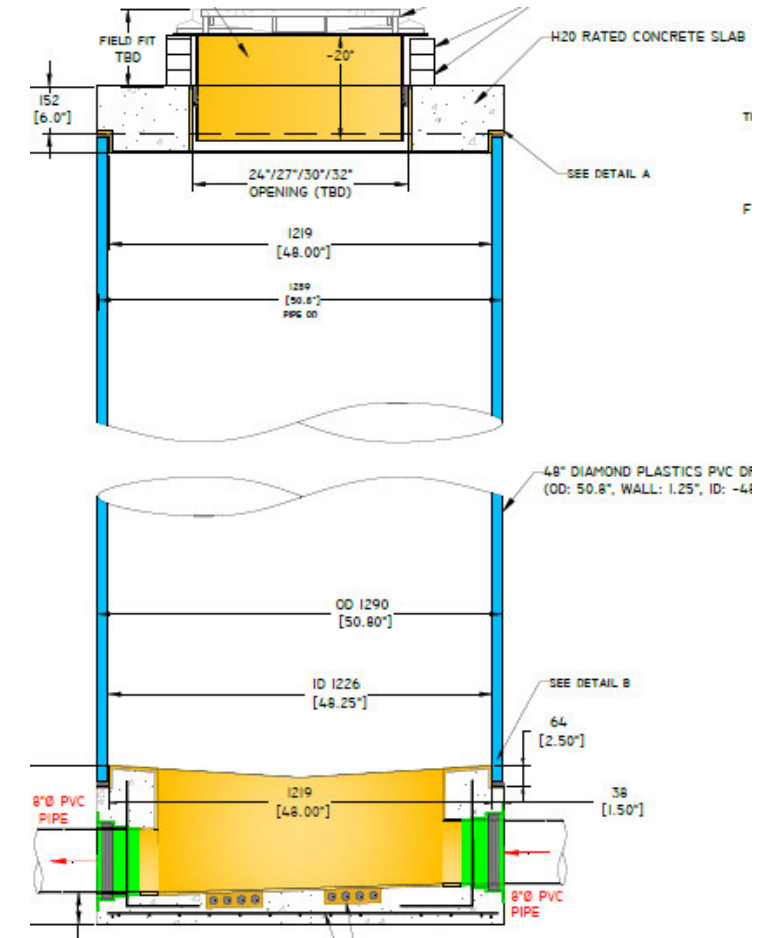
Other Information:

Critical R.T., Dry	2252.809	lbf/in
Critical Axial Strain	0.025	
H2O Wheel Load	16000	lbs

Design Calculations For 48" Dia. PVC Manhole Riser

Considerations and Assumptions to ASTM F 1759-97 (2004):

1. Dry Soil and Saturated Soil Conditions.
2. H2O Live Load.
3. Soil Modulus = 1000 psi
4. Backfill Width 24" Minimum.
5. Ring Thrust Compression and Bending.
6. Axial Soil Down Drag Load.
7. PVC Pipe Material to "Hand Book of PVC PIPE DESIGN AND CONSTRUCTION", 5th Edition.



Note: Cells in yellow are the input variables. Outputs are the Safety Factors, which are reflecting the performance of Pipe Ring Deformation, Ring Stress, Axial Deformation and Bouyancy Effect, respectively. All Safety Factors should be greater than 2, except Bouyancy Effect should be greater than 1.0

Calculation Sheet

Manhole Depth ft	PVC Length ft	Dry Radial Pres. lb/sf	Wet Radial Pres. lb/sf	D.D. Shear Stress lbf/sf	D.D. Force lbs	R.T. Stress lbf/in	R.B. Stress lbf/in	Strain of T+B %	Strain of Axial %	C.R.T Stress lbf/in	Safety Factor Index			
											Ring Deform.	Ring Stess	Axial Deform.	Bouyancy Effect
9.00	6.00	363.00	687.62	81.68	6414.74	116.99	28.66	0.072%	0.040%	1025.82	69	9	64	1.5
10.00	7.00	411.40	779.30	92.57	8481.71	132.59	32.48	0.082%	0.043%	1049.56	61	8	59	1.6
11.00	8.00	459.80	870.98	103.46	10833.78	148.19	36.31	0.092%	0.047%	1073.37	55	7	54	1.8
12.00	9.00	508.20	962.66	114.35	13470.95	163.79	40.13	0.101%	0.052%	1097.22	49	7	49	1.9
13.00	10.00	556.60	1054.34	125.24	16393.22	179.38	43.95	0.111%	0.057%	1121.07	45	6	45	2.1
14.00	11.00	605.00	1146.03	136.13	19600.59	194.98	47.77	0.120%	0.062%	1144.90	42	6	41	2.2
15.00	12.00	653.40	1237.71	147.02	23093.06	210.58	51.59	0.130%	0.068%	1168.66	38	6	37	2.4
16.00	13.00	701.80	1329.39	157.91	26870.63	226.18	55.41	0.140%	0.074%	1192.33	36	5	34	2.5
17.00	14.00	750.20	1421.07	168.80	30933.30	241.78	59.24	0.149%	0.081%	1215.86	33	5	31	2.7
18.00	15.00	798.60	1512.75	179.69	35281.07	257.38	63.06	0.159%	0.088%	1239.23	31	5	29	2.9
19.00	16.00	847.00	1604.44	190.58	39913.93	272.98	66.88	0.169%	0.096%	1262.39	30	5	27	3.0
20.00	17.00	895.40	1696.12	201.47	44831.90	288.58	70.70	0.178%	0.104%	1285.32	28	4	24	3.2

D.D. Force: Down Drag Force
R.T. Stress: Ring Thrust Stress
R.B. Stress: Ring Bending Stress
Strain of T+B: Combined Strain of Ring Thrust and Bending
C.R.T Stress: Critical Ring Thrust Stress

Counter Weight (Base and Lid) = 3500 lbs
PVC Riser Weight (per foot length) = 110 lbs



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