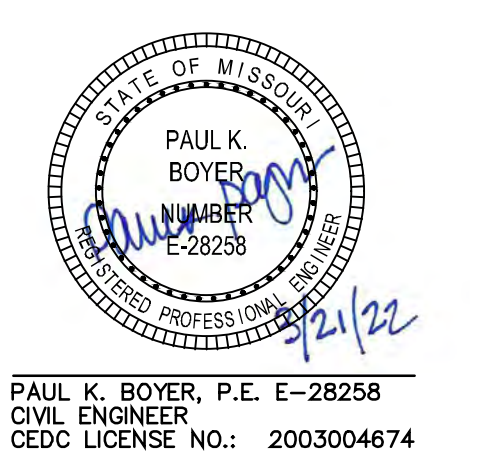
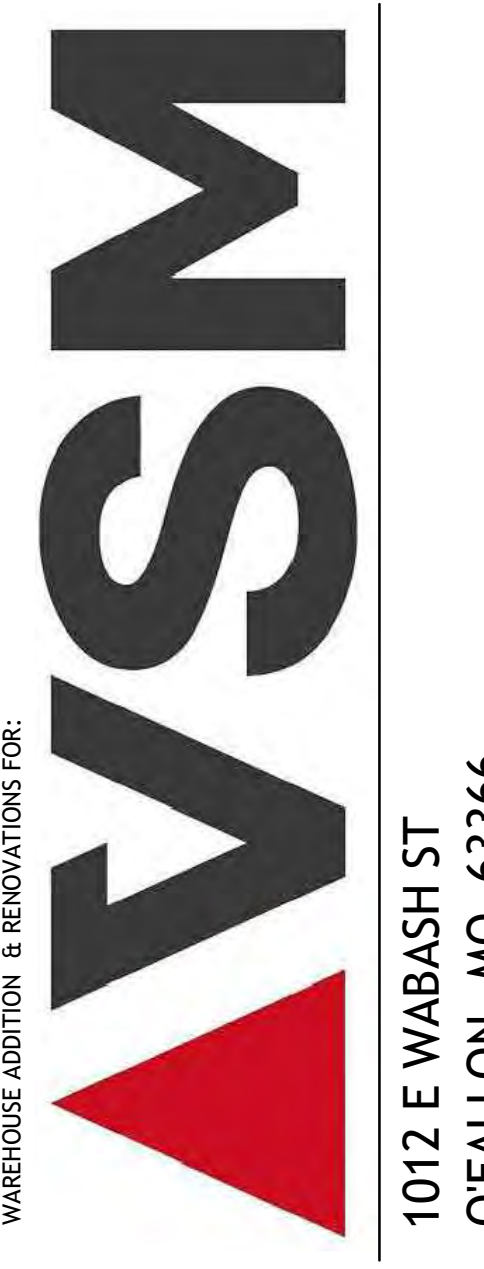


**15 YR/20 MIN. STORM**

HYDRAULIC CALCULATION SHEET (SEE DRAINAGE AREA PLAN FOR P.I. AND Q (inflow) FOR EACH STRUCTURE)

Project name: <i>VSM Abrasives</i>		Calculated By: <i>PKB</i>		<i>Bend Coefficients :</i>										HEAD LOSS			Hydraulic Elevations			Structure	TOP	Free	Structure						
Project number: <i>1981.1</i>		Checked By: <i>PKB</i>												Total	Upper F.I.	Lower H.E.	Lower H.E.	Structure Upper H.E. + H <sub>mt</sub>	TOP Structure Elevation	Board	Structure Number								
Project Location: <i>1012 Wabash Street</i>		Date: <i>01.03.2022</i>		5° = 0.06	20° = 0.24	35° = 0.40	50° = 0.50	65° = 0.57	80° = 0.65	H <sub>f</sub>	Junction	Bend	H <sub>mt</sub>									+ Dia.	+H <sub>f</sub>	H.E.	Elevation	Number			
Structure Number	Upper structure	Lower structure	Upper structure	Lower structure	Length (ft)	Flowline Grade ft/ft	Pipe Size (in.)	Full Flow Cap. (cfs)	Total (Q) (cfs)					Mean Full Flow Vel.(V) (ft/s)	Bend Coef.	Velocity Head (V <sub>n</sub> ) (ft)	QV <sub>n</sub> (ft <sup>3</sup> /s)	Pipe Coef. (n)											
7	7	6	507.00	506.30	41.55	0.017	12	4.64	0.37	0.47	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	508.00	507.62	507.61	508.00	511.57	3.57	7				
6	6	5	506.10	505.55	53.96	0.010	15	6.54	4.37	3.56	0.55	0.20	0.86	0.01	0.25	0.26	0.00	0.26	507.35	507.15	506.90	507.61	509.65	2.04	6				
5	5	4	504.97	503.44	180.10	0.008	18	9.71	7.52	4.26	0.00	0.28	2.11	0.01	0.92	0.00	0.00	0.00	506.47	506.90	505.98	506.90	509.65	2.75	5				
4	4	3	503.24	503.00	28.50	0.008	18	9.67	8.26	4.67	0.00	0.34	2.80	0.01	0.18	0.11	0.00	0.11	504.74	505.87	505.69	505.98	508.75	2.77	4				
3	3		503.00																						3				
ASSUME STARTING HYD.GRD. 100 YR HW ELEV W/ LOW FLOW BLOCKED = 505.69																													
8	8	5	507.00	505.55	41.55	0.03	12	6.67	0.46	0.59	0.00	0.01	0.00	0.013	0.01	0.00	0.00	0.00	508.00	506.91	506.90	508.00	510.65	2.65	8				
5	5		505.35																						5				
SEE REACH 6 TO 5 FOR STARTING HYDRAULIC GRADE = 506.90																													
2	2	1	497.00	496.00	69.00	0.0145	24	27.31	9.64	3.07	0.00	0.15	1.41	0.013	0.13	0.00	0.00	0.00	499.00	498.13	498.00	499.00	505.00	6.00	2				
1	1		496.00																						1				
ASSUME STARTING HYD.GRD. AT TOP OF PIPE = 498.00																													
MEAN FULL FLOW VELOCITY: $V = Q_{ACT}/A_{PIPE}$										JUNCTION LOSSES (JUNC.) = $[Q_{out} V_{h,out} - \sum (Q_{in} V_{h,in})] \times 1.33 / Q_{out}$										Note: 1. IF MORE THAN ONE INCOMING LINE, CALCULATE EACH BEND LOSS AND ADD TOGETHER. 2. NO STRUCTURE LOSSES TO BE CALCULATED AT A DROP. 3. IF $QV_{h(in)} > QV_{h(out)}$ , NO JUNCTION LOSSES TO BE CALCULATED.									
FRICTION LOSS (H <sub>f</sub> ): $H_f = 2.87 n^2 (LV^3/d^{1.33})$										BEND LOSSES (BEND) = $(V^3/d^{1.48}) \times \text{ANGLE COEFFICIENT}$																			
VELOCITY HEAD: $V_h = V^2/2g$																													



DESCRIPTION:

01/05/22	Construction Site Plan Submittal
01/14/22	Permit / Bid Set
02/24/22	City comments
03/21/22	City comments

Issue Date:	01/14/22
Job Number:	1981.1
Drawn By:	PKB
Checked By:	PKB
Drawing Title:	

Sewer Profiles and Hydraulic Calculations