



SANITARY/WATER FLOW CALCULATIONS

For: 522 Valley Road
Lot 12, Block 32.01
City of Clifton
Passaic County, New Jersey
October 4, 2022

A handwritten signature in blue ink, appearing to read "Steven L. Koestner". The signature is fluid and cursive, with a long horizontal stroke at the end.

Steven L. Koestner, P.E., L.S. Lisc. # 27901

KOESTNER ASSOCIATES

Professional Engineers & Land Surveyors, since 1914

**Sanitary/Water Calculations
for
522 Valley Road
Lot 12, Block 32.01
City of Clifton
Passaic County, New Jersey**

October 4, 2022

I. EXISTING CONDITIONS:

SINGLE FAMILY DWELLING: 3 Bedroom

Gallons Per Day: 300 (see attached reference)

Calculated Flow (for Existing Use): $1 \times 300 = 300 \text{ GPD}$

II. PROPOSED CONDITIONS:

A. Townhouse Unit: 3 Bedroom

Gallons Per Day: 300 (see attached reference)

Calculated Flow (for Proposed Unit): $1 \text{ Units} \times 300 = 300 \text{ GPD (0.21 Gal/Minute)}$

B. Townhouse Unit: 3 Bedroom

Gallons Per Day: 300 (see attached reference)

Calculated Flow (for Entire Site): $21 \text{ Units} \times 300 = 6,300 \text{ GPD (4.38 Gal/Minute)}$

III. LATERAL CAPACITY (see attached calculation sheets)

A. Lateral Size: 4"

Slope: min. 2%

Manning Coefficient: 0.013

Capacity (@ ½ full): 60.4 gpm (> 0.21 gpm)

Velocity: 3.1ft/sec

B. Lateral Size: 8"

Slope: min 2%

Manning Coefficient: 0.013

Capacity (@ ½ full): 383.4 gpm (> 4.38 gpm)

Velocity: 3.1ft/sec

IV. CONCLUSION

1. There is an anticipated increase to the calculated Gallons per Day flow from the site. The prior use generated 300 GPD, while the proposed use is calculated at 6,300 GPD. This results in an increase of 6,000 GPD of flow.
2. The anticipated 4" lateral flow capacity is 60.4 Gal/min, which is 287 times the anticipated peak flow of 0.21
3. The anticipated 8" lateral flow capacity is 383.4 Gal/min, which is 87 times the anticipated peak flow of 4.38

- (a) The values specified below are to be used in computing the projected flow to wastewater conveyance and treatment facilities and when making an application for a treatment works approval pursuant to N.J.A.C. 7:14A-22. The specific measurement unit listed for each category shall be used as the basis for the projected flow. No additional provisions for inflow and infiltration are required. For the purposes of design only, other values, proposed by the design engineer, through actual water usage data, may be accepted at the Department's discretion, with an appropriate safety factor. However, all determination concerning whether or not any specific project requires a treatment works approval and/or sewer ban exemption shall be based upon the projected flow criteria established below. These criteria are not mandated to be used by sewerage authorities as a basis for establishing local user fees and/or connection fees.

Type of Establishment	Measurement Unit	Gallons Per Day
<i>Residential Dwellings</i> (single family home, duplex units, townhouses, condominiums, apartments)		
1 bedroom unit	Per Dwelling	150
2 bedroom unit	Per Dwelling	225
3 bedroom unit or larger	Per Dwelling	300
<i>Transit dwelling units</i>		
Hotels	Bedroom	75
Lodging houses and tourist homes	Bedroom	60
Motels and tourist cabins	Bedroom	60
Boarding houses (max. permitted occupancy)	Boarder	50
<i>Camps</i>		

Manning Formula Uniform Pipe Flow at Given Slope and Depth

522 Valley Road, Clifton, N.J.

Sanitary Lateral

Inputs

Pipe diameter, d_0	4	in	▼
Manning roughness, n	0.013		
Pressure slope (possibly \neq equal to pipe slope), S_0	0.02	rise/run	▼
Percent of (or ratio to) full depth (100% or 1 if flowing full)	50	%	▼

Results

Flow, Q (See notes)	60.3919	gpm	▼
Velocity, v	3.0840	ft/sec	▼
Velocity head, h_v	1.7738	in H ₂ O	▼
Flow area	6.2832	sq. in.	▼
Wetted perimeter	6.2832	in	▼
Hydraulic radius	1.0000	in	▼
Top width, T	4.0000	in	▼
Froude number, F	1.50		
Average shear stress (tractive force), τ	4.9815	N/m ²	▼



Notes:

This is the flow and depth *inside* the pipe.

Getting the flow into the pipe may require significantly higher headwater depth. Add at least 1.5 times the velocity head to get the headwater depth or [see my 2-minute tutorial](#) for standard culvert headwater calculations using HY-8.

Manning Formula Uniform Pipe Flow at Given Slope and Depth

522 Valley Road, Clifton, NJ

8" Sanitary Lateral

Inputs

Pipe diameter, d_0	8 in
Manning roughness, n	0.013
Pressure slope (possibly $\frac{1}{2}$ equal to pipe slope), S_0	0.02 rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	50 %

Results

Flow, Q (See notes)	383.4649	gpm
Velocity, v	4.8955	ft/sec
Velocity head, h_v	4.4696	in H ₂ O
Flow area	25.1328	sq. in.
Wetted perimeter	12.5664	in
Hydraulic radius	2.0000	in
Top width, T	8.0000	in
Froude number, F	1.69	
Average shear stress (tractive force), τ	9.9629	N/m ²



Notes:

This is the flow and depth *inside* the pipe.

Getting the flow into the pipe may require significantly higher headwater depth. Add at least 1.5 times the velocity head to get the headwater depth or [see my 2-minute tutorial](#) for standard culvert headwater calculations using HY-8.