

Water and Sanitary Sewer Engineer's Report

For

Malvern School Properties, LP

Proposed Day School

*982 Georgetown-Franklin Turnpike
Block 28010, Lots 57 & 58
Township of Montgomery, Somerset County, NJ*

Prepared by:



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A handwritten signature in black ink, appearing to read 'Jeffrey S. Haberman', is written over a horizontal line.

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- Sanitary Sewer Extension Plan & Profile Drawings (under separate cover)

I. INTRODUCTION

The subject project is identified as Block 28010, Lots 57 & 58, in the Township of Montgomery, Somerset County, New Jersey. The site is approximately 2.046 acres and presently consists of one residential dwelling, with a majority of the property being open space with some dense woods and vegetation. The scope of the study includes the proposed development of the parcel with one new day school with accompanying lighting, landscaping, grading, walkways, driveways, utilities, parking, and associated items.

II. PROPOSED WATER SYSTEM

The proposed domestic and fire water services for the building will be provided via an 8" DIP lateral connection to the existing water main within the Georgetown-Franklin Turnpike Right of Way. A hotbox enclosure will be provided in accordance with New Jersey American Water requirements. The proposed water demands have been calculated based on the requirements of NJAC 7:10-12.6, Water Volume Requirements as follows:

a) DOMESTIC WATER DEMANDS

In accordance with N.J.A.C. 7:10-12.6(2) 2 – Table 1, the NJDEP Standard for Domestic Water Demand is:

Single Family Dwelling – 100 gallons per day (GPD) per person
Day School (No cafeteria or showers) – 10 gallons per day (GPD) per person

Estimated domestic water demand can be calculated as follows:

Existing:

Single Family Dwelling:
3 People x 100 GPD / Person = 300.00 GPD

Proposed:

Proposed Day School:
25 Employees x 10 GPD / Person = 250.00 GPD
155 Children x 10 GPD / Person = 1,550.00 GPD
Total Proposed Domestic Water Demand = 1,800.00 GPD

Net Increase in Domestic Water Demand = 1,500.00 GPD

b) PROPOSED FIRE PROTECTION

The project will consist of a fire suppression system that shall be designed in accordance with the International Fire Code. Fire protection for the proposed building will be provided by the proposed fire water service connection. A Fire Sprinkler Contractor has not yet been determined; however, the proposed fire services shall be designed to provide sufficient water capacity for the proposed sprinkler system within the building. Calculations will be provided upon application for building permits by the sprinkler designer.

III. PROPOSED SANITARY SEWER SYSTEM

Sanitary sewer service will be provided by way of an extension of the 8" sanitary sewer main in Tamworth Drive to the north of Lots 57/58 where the extension will terminate at a new manhole. A proposed 6" SDR-35 PVC lateral will be constructed to service the day school and will connect to the extended 8" sanitary main at the new manhole.

a) SANITARY SEWER DEMANDS

In accordance with N.J.A.C. 7:14A-23.3(a), the existing and proposed sanitary sewer demands for the project are estimated as follows:

3-Bedroom Residential Dwelling – 300 gallons per day (GPD) per dwelling
Proposed Day School (No cafeteria or showers) – 10 gallons per day (GPD) per person

Average Daily Flow

Existing:

Residential Dwelling:
3 Bedroom Unit x 300 GPD/Dwelling = 300.00 GPD

Proposed:

Proposed Day School:
25 Employees x 10 GPD/Person = 250.00 GPD
155 Students x 10 GPD/Person = 1,550.00 GPD
Total Proposed Sanitary Sewer Demand = 1,800.00 GPD

Net Increase in Sanitary Sewer Demand = 1,500.00 GPD

b) PROPOSED SANITARY SEWER DESIGN

Per NJDEP regulations, the criteria for establishing the size of sanitary sewer gravity pipes is to convey two times the average flow with the pipe flowing half full. Utilizing Manning's equation with a roughness coefficient of 0.010 for a PVC pipe, the following is the minimum capacity of the proposed gravity sewer lateral.

Pipe Size	Minimum Slope	Roughness (n)	Capacity at ½ Full	2 X ADF
6"	1.04%	0.010	241,040 GPD	3,000 GPD

The proposed sanitary sewer design can efficiently convey two times the proposed average daily flow at minimum required pipe slope while flowing half full while utilizing approximately 1.2% of the line's total capacity.

IV. CONCLUSION

In summary, this report has been prepared to describe the water and sanitary sewer designs for the proposed development as seen within the accompanying site plan drawings for the proposed Day School for Malvern School Properties, LP. It is the intention of this report that the water and sewer demands generated from this final build out will not exceed the approved demands and allocated flows based on the actual usages. It does not appear the proposed development will have a negative impact on the existing infrastructure.

APPENDIX

CAPACITY OF CIRCULAR PIPE FLOWING $\frac{1}{2}$ FULL



Capacity of Circular Pipe Flowing 1/2 Full

Project: Proposed Day School
 Job #: 4447-22-01334
 Location: Township of Montgomery, Somerset County, NJ

Computed By: SS
 Checked By: JSH
 Date: 8/21/2023

PIPE DESCRIPTION	SLOPE (%)	SIZE (IN)	MANNING'S COEFFICIENT (n)	VELOCITY (FT/S)	CAPACITY (CFS)	CAPACITY (GPD)	CAPACITY (MGD)
Prop. 6" PVC	1.040%	6	0.010	3.80	0.37	241,040	0.24

Variables Defined

Q=Capacity of Pipe (CFS)
 V=Velocity in Pipe Section (FT/S)
 R=Hydraulic Radius of Pipe Section
 S=Slope of Pipe Section (FT/FT)
 D=Diameter of Pipe (FT)
 d=Depth of Flow in Pipe (FT)
 n=Manning's Coefficient
 Wp=Wetted Perimeter (FT)

Typical Values for Manning's Coefficient (n)

n(RCP)= 0.013
 n(HDPE-Smooth Interior)= 0.012 *Varies with Manufacturer
 n(DIP)= 0.013
 n(PVC)= 0.010
 n(CMP)= 0.024

Equations used:

Q=VA
 $V = (1.49/n) * R^{2/3} * S^{1/2}$
 $Q = (1.49/n) * R^{2/3} * S^{1/2} * A$

Utilizing Appendix 16.A from the Civil Engineering Reference Manual-Seventh Edition, by Micheal Lindeburg, Copyright 1999

The following equations were utilized to calculate the Hydraulic Radius and Area of a Circular Pipe Section flowing 1/2 full

$A = (\pi * D^2 / 4) * 0.5 = 0.3927 * D^2$

$R = A / Wp = 0.3927 * D^2 / ((2 * \pi * D / 2) * 0.5) = 0.25 * D$

Therefore:

$Q = (1.49/n) * (0.25 * D)^{2/3} * S^{1/2} * (0.3927 * D^2)$

$V = (1.49/n) * (0.25 * D)^{2/3} * S^{1/2}$

Unit Conversion Equations

1 Cubic Foot=7.4805 Gallons

1 Day = 86,400 Seconds

Therefore:

$$\frac{\text{Cubic Foot}}{\text{Second}} \times \frac{86,400 \text{ Seconds}}{1 \text{ Day}} \times \frac{7.4805 \text{ Gallons}}{1 \text{ Cubic Foot}} = \frac{\text{Gallon}}{\text{Day}}$$

$$\frac{\text{Gallon}}{\text{Day}} \times \frac{1 \text{ Million Gallons}}{1,000,000 \text{ Gallons}} = \frac{\text{Million Gallons}}{\text{Day}}$$

**SANITARY SEWER EXTENSION PLAN & PROFILE
DRAWINGS (UNDER SEPARATE COVER)**