SANITARY SEWER & POTABLE WATER ENGINEER'S REPORT

For

Hope Presbyterian Church

Proposed Site Improvements

140 Denow Road
Block 5401, Lot 118
Township of Lawrence
Mercer County, New Jersey

Prepared by:

DYNAMIC ENGINEERING

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DEC # 6201-26-00267

TABLE OF CONTENTS

APPENDIX

I. INTRODUCTION

The subject property is known as Block 5401, Lot 118 as shown on the Tax Map Sheet 54 of the Township of Lawrence, Mercer County, New Jersey.

The site is currently developed with the Presbyterian Church and associated parking, canopy and open space. The property is bounded to the north and east by residential uses, and to the south and west by commercial uses (The Learning Center and Montessori Preschool).

The proposed project consists of the development of a 4,566 SF sanctuary expansion, as well as the addition of a 186 SF foyer to the existing building, for a total gross floor area of ±11,338 SF. Additional improvements include 108 parking spaces, landscaping, lighting, stormwater management facilities, and utilities.

II. PROPOSED SANITARY SEWER SYSTEM

The proposed building addition will utilize the existing sanitary sewer lateral for the building. This lateral connects to the existing sanitary sewer infrastructure within Denow Road.

III. SEWERAGE FLOW CALCULATION

Sanitary sewage flow estimation has been calculated utilizing N.J.A.C. 7:14A-23.3. Considering the above, proposed sewage flows are estimated as follows:

Average Daily Sanitary Sewer Demand - Existing

Churches (worship area only)	=	3 GPD / Seat		
	=	(200 Seats * (3 GPD / Seat)	=	600 GPD
		Total Existing Demand	=	600 GPD

Average Daily Sanitary Sewer Demand - Proposed

Churches (worship area only)	=	3 GPD / Seat		
	=	(360 Seats) * (3 GPD / Seat)	=	1,080 GPD
		Total Proposed Demand	=	1,080 GPD
		Net Increase in Sewer Demand	**=**	**480 GPD**

IV. SANITARY SEWER PIPE DESIGN

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

Pipe Size	Slope	Roughness (n)	Capacity at ½ Full	2 X ADF
4"	2.08%	0.010	115,618 GPD	2,160 GPD

The existing sanitary sewer is to be utilized and verified in the field, however, the anticipated sanitary lateral can efficiently convey two times the proposed average daily flow at minimum required pipe slope while flowing half full while utilizing approximately 1.86% of the line's total capacity.

V. PROPOSED WATER SYSTEM

The proposed building addition will utilize the existing domestic water and fire service internally to the building. Fire flow/sprinkler design calculations will be prepared by the MEP Engineer of Record and will be permitted through the Building Code Department. It is not anticipated that the building expansion will generate a significant amount of additional water usage and will not have any significant impact on the Township's water supply system.

VI. DOMESTIC WATER DEMAND CALCULATION

In accordance with N.J.A.C. 7:10-12.6(2) 2 – Table 1 the applicable NJDEP standards for the average daily domestic water demand is as follows:

Average Daily Water Demand – Existing

Churches	=	15 GPD / Seat		
	=	(200 Seats) * (15 GPD / Seat)	=	3,000 GPD
		Total Existing Demand	=	3,000 GPD

Average Daily Water Demand – Proposed

Churches	=	15 GPD / Seat		
	=	(360 Seats) * (15 GPD / Seat)	=	5,400 GPD
		Total Proposed Demand	=	5,400 GPD

Net Increase in Water Demand = 2,400 GPD

VII. 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 Preliminary & Final Major Site Plan for Hope Presbyterian Church. 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 ½ FULL

DYNAMIC ENGINEERING

Capacity of Circular Pipe Flowing 1/2 Full

Project: Proposed Site Improvements
Job #: 2601-26-00267
Location: Township of Lawrence

Computed By: DL
Checked By: RM
Date: 5/15/2026

PIPE DESCRIPTION	SLOPE (%)	SIZE (IN)	MANNING'S COEFFICIENT (n)	VELOCITY (FT/S)	CAPACITY (CFS)	CAPACITY (GPD)	CAPACITY (MGD)
Approximate 4" PVC	0.02	4.00	0.01	4.10	0.18	115,618	0.12

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=(π*D^2/4)*0.5=0.3927*D^2
R=A/Wp=0.3927*D^2/((2*π*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:

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

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