

***WATER AND SANITARY SEWER  
ENGINEER'S REPORT***

*For*

***Harbor Group  
Proposed Warehouse & Site Improvements***

***Block 528.04, Lots 19.31 & 19.32  
110-130 Belmont Drive  
Township of Franklin  
Somerset County, New Jersey***

Prepared by:



**DYNAMIC  
ENGINEERING**

1904 Main Street  
Lake Como, NJ 07719  
(732) 974-0198

A handwritten signature in black ink, appearing to read 'Joshua M. Sewald'. The signature is written in a cursive, flowing style.

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**Joshua M. Sewald, PE, PP**  
NJ Professional Engineer License #52908

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DEC# 4035-99-001

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## **I. INTRODUCTION**

The project area is comprised of Block 528.04, Lots 19.31 & 19.32 in the Township of Franklin, Somerset County, New Jersey. The overall site currently consists of three (3) separate one-story office buildings. The proposed project consists of a 153,154 SF Warehouse. Additional site improvements include lighting, landscaping, grading, walkways, driveways, utilities, parking and other related site improvements.

## **II. PROPOSED DOMESTIC WATER SYSTEM**

An individual connection will be made to the existing water main to provide service to the proposed building via the following:

**Proposed Warehouse** – A proposed 2” domestic water service line and 10” fire service line will connect to the existing water main located within Belmont Drive.

### **a) EXISTING 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:

Store, office building – 0.125 gallons/day (GPD) per square foot

#### **Estimated domestic water demand can be calculated as follows:**

Office-1 (110 Belmont Drive) – 50,299 SF x 0.125 GPD/SF = 6,287.4 GPD

Office-2 (120 Belmont Drive) – 60,134 SF x 0.125 GPD/SF = 7,516.8 GPD

Office-3 (130 Belmont Drive) – 50,262 SF x 0.125 GPD/SF = 6,282.8 GPD

Total Existing Domestic Water Demand = 20,087.0 GPD

### **b) PROPOSED 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:

Warehouse – 25 gallons/day (GPD) per employee

Warehouse Office Space – 0.125 gallons/day (GPD) per square foot

**Estimated domestic water demand can be calculated as follows:**

Proposed Warehouse – 75 Employees x 25 GPD/Employee	= 1,875.0 GPD
Proposed Office (5% of Building Area)	
- 7,658 SF x 0.125 GPD/SF	= 957.25 GPD
Total Proposed Domestic Water Demand	= 2,832.25 GPD
Total Domestic Water Demand (Including Existing Office-3)	= 9,115.05 GPD
<b>Total Reduction</b>	<b>= 10,971.95 GPD</b>

According to NJDEP regulations, the applicant would be required to obtain a Bureau of Water System Engineering (BWSE) Permit for an increase in average daily water demand flow of 12,000 GPD. Therefore, since the development reduces the overall flow by 10,971.95 GPD, a BWSE Permit is not required.

### **III. PROPOSED SANITARY SEWER SYSTEM**

Sanitary sewer service will be provided for the proposed warehouse through a 8” SDR-35 PVC line to the existing sewer main located within Belmont Drive.

**a) EXISTING SANITARY SEWER DEMANDS**

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

Office building – 0.100 gallons/day (GPD) per square foot

**Average Daily Flow – Proposed**

Office-1 (110 Belmont Drive) – 50,299 SF x 0.100 GPD/SF	= 5,030.0 GPD
Office-2 (120 Belmont Drive) – 60,134 SF x 0.100 GPD/SF	= 6,013.4 GPD
Office-3 (130 Belmont Drive) – 50,262 SF x 0.100 GPD/SF	= 5,026.2 GPD
Total Existing Sanitary Sewer Demand	= 16,069.6 GPD

**b) PROPOSED SANITARY SEWER DEMANDS**

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

Warehouse - 25 gallons/day (GPD) per employee

Warehouse Office Space – 0.100 gallons/day (GPD) per square foot

**Average Daily Flow – Proposed**

Proposed Warehouse – 75 Employees x 25 GPD/Employee	= 1,875.0 GPD
Proposed Office (5% of Building Area) – - 7,658 SF x 0.100 GPD/SF	= 765.8 GPD
Total Proposed Sanitary Sewer Demand	= 2,640.8 GPD
Total Sanitary Sewer Demand (Including Existing Office-3)	= 7,667.0 GPD
<b>Total Reduction = 8,402.6 GPD</b>	

According to NJDEP regulations, the applicant would be required to obtain a Treatment Works Approval (TWA) Permit for a proposed average sanitary sewer demand flow of 8,000 GPD. Therefore, since the development reduces the overall flow by 8,402.6 GPD, a TWA Permit is not required.

**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 sewers.

Use	Pipe Size	Slope	Roughness (n)	Capacity at ½ Full	2 X ADF
Warehouse	8"	0.5%	0.010	167,131 GPD	5,281.6 GPD

The proposed sanitary sewer design, including the 8” PVC lateral at 0.50%, can efficiently convey two times the proposed average daily flow while flowing half full while only using 3.2% of the line’s total capacity.

**IV. CONCLUSION**

In summary, this report has been prepared to further expand on the water and sanitary sewer designs for the proposed development as seen within the Site Plan set. 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 and will be reducing flow compared to existing conditions. 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 Warehouse  
 Job #: 4035-99-001  
 Location: Township of Franklin, Somerset County, NJ

Computed By: AG  
 Checked By: DT  
 Date: 6/28/2021

PIPE DESCRIPTION	SLOPE (%)	SIZE (IN)	MANNING'S COEFFICIENT (n)	VELOCITY (FT/S)	CAPACITY (CFS)	CAPACITY (GPD)	CAPACITY (MGD)
Prop. 8" SDR-35 PVC	0.500%	6	0.010	2.63	0.26	167,131	0.17

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

Utilizing Appendix 16.A from the Civil Engineering Reference Manual-Seven 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

$A = (\pi \cdot D^2 / 4) \cdot 0.5 = 0.3927 \cdot D^2$   
 $R = A / Wp = 0.3927 \cdot D^2 / ((2 \cdot \pi \cdot D / 2) \cdot 0.5) = 0.25 \cdot D$

Therefore:

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

Unit Conversion Equations

1 Cubic Foot = 7.4805 Gallons  
 1 Day = 86,400 Seconds

Therefore:

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

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