Potable Water and Sanitary Sewer Engineer's Report

For

440 Warehouse Developers LLC

Proposed Warehouse Development
NJSH Route 440 & NJSH Route 185
Block 30305, Lots 2, 3, 4 & 5
City of Jersey City
Hudson County, NJ

Prepared By:

DYNAMIC ENGINEERING

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I. INTRODUCTION

The intention of this study is to analyze the sanitary sewer and water demands that will occur as a result of the proposed warehouse development consisting of the construction of a 2-story warehouse building with associated multi-story office, parking structures, and associated ramps and driveways. The subject site is located at Route 440 & Route 185, City of Jersey City, Hudson County, New Jersey. The site is identified as Block 30305, Lots 2, 3, 4, and 5 on the Jersey City Tax Maps. The site is currently fully developed with an aboveground storage tank facility featuring nine (9) storage tanks and ancillary structures which will be removed to allow for the proposed redevelopment.

II. PROPOSED SANITARY SEWERAGE FACILITES

The proposed sanitary sewer facilities for the warehouse and office consist of 6" PVC gravity lateral which will connect to a proposed onsite pump station. The pump station will discharge sewerage via a 2" force main that will extend to the existing 18" JCMUA sanitary sewer trunk line located within the NJDOT right-of-way.

The estimated domestic sanitary sewer demand for the warehouse and office as per NJAC 7:14A-23.3 is as follows:

Office Space = 0.1 gallons/day (GPD) per square foot
Warehouse = 25 gallons/day (GPD) per employee

Office Space = 82,271 SF X 0.1 GPD = 8,227 GPD
Warehouse Space = 250 employees X 25 GPD/employee = 6,250 GPD

TOTAL = 14,477 gallons/day (GPD)

The pump station design will be provided by others. Details of same will be provided prior to construction.

III. SANITARY SEWER PIPE DESIGN

Per NJDEP regulations, the criteria for establishing the size of gravity sanitary sewer 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 proposed sanitary sewer mains and laterals:

Pipe Size	Min. Slope	Roughness (n)	Capacity at ½ Full	ADF	2 X ADF
6"	2.08%	0.010	340,000 gpd	14,477 gpd	28,954 gpd

IV. PROPOSED WATER SYSTEM FACILITES

Domestic and fire water service to the buildings will be provided via a 10" water main that will connect to the existing 12" JCMUA water main stub within Route 440.

The installation of water service facilities will be coordinated with and under the guidelines, regulations and specifications of the Jersey City Municipal Utilities Authority. The estimated water demand for the warehouse facilities and office, as per NJAC 7:10-12.6 Water Volume Requirements, is as follows:

Domestic Water Demand:

Office Space = 0.125 gallons/day (GPD) per square foot
Warehouse = 25 gallons/day (GPD) per employee

Office Space = 82,271 SF X 0.125 GPD = 10,284 GPD
Warehouse Development = 250 employees X 25 GPD/employee = 6,250 GPD

TOTAL = 16,534 gallons/day (GPD)

Fire Water Demand:

The Facility will require 2,000GPM

APPENDIX

CAPACITY OF CIRCULAR PIPE FLOWING AT ½ FULL

DYNAMIC ENGINEERING

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Date: 9/30/2021
Project: MCR 54
Project No: 3783-99-001

Calculated By: PAF
Checked By: RJC

Manning's Equation

Design Parameters:

Pipe Diameter, D	6	in
Pipe Material	PVC	
Slope, s	2.08	%
Flow Depth, y	HALF	

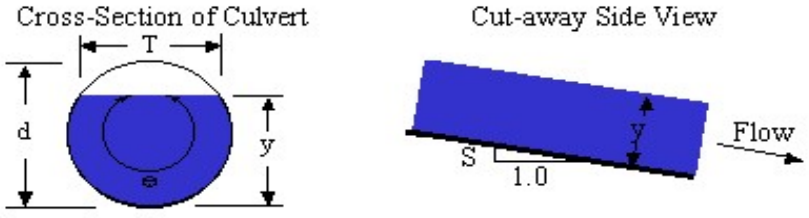
Calculations:

Cross-Sectional Area, $A = D^2/8\,[\theta - \sin(\theta)] =$	0.10	ft^2
Manning's Coefficient, n	0.010	
Hydraulic Radius, R	0.13	ft
Angle, $\theta =$	3.14	radians
Wetted Perimeter, $P = \theta D/2$	0.79	ft
Flow Depth, y	0.25	ft
Flow Top Width, $T = 2[y(D-y)]^{1/2}$	0.50	ft
Gravity Constant, g	32.174	ft/s^2
Froude Number, F	2.13	
	Supercritical Flow	

- **Flow & Velocity:**

Flow, $Q_o = \dfrac{1.486 \cdot R^{2/3} s^{1/2} A}{n}$ . . . . . **0.53 cfs**
0.34 MGD

Velocity, $V = Q/A$ . . . . . **5.36 fps**



$$Q=VA \qquad V=\frac{k}{n}R^{2/3}S^{1/2} \qquad R=\frac{A}{P} \qquad A=\frac{d^2}{8}\left(\theta-\sin(\theta)\right)$$

$$P=\frac{\theta d}{2} \qquad y=\frac{d}{2}\left[1-\cos\left(\frac{\theta}{2}\right)\right] \qquad T=2\sqrt{y(d-y)} \qquad F=V\sqrt{\frac{T}{gA\cos(Tan^{-1}S)}}$$

ESTIMATED SANITARY SEWER FLOW CALCULATIONS

DYNAMIC ENGINEERING

Date:	**9/30/2021**
Project:	**MCR 54 Rte 440, LLC**
Project No:	**3783-99-001**
Calculated By:	**SDP**
Checked By:	**RJC**

Sanitary Sewer Flow Analysis

Projected Sanitary Sewer Flow Criteria [N.J.A.C. 7:14A-23.3]

Industrial	25 GPD/Emp
Office	0.10 GPD/SF

PROPOSED CONDITIONS:

Use:	***Units***	***Flow (GPD)***
Warehouse	250 Employee	6,250
Office	82,270 SF	8,227
Total Proposed Flow:		***14,477 GPD***

Notes:

1. Existing & Proposed flows based on Projected Sanitary Sewer Flow Criteria [N.J.A.C. 7:14A-23.3].

ESTIMATED WATER DEMAND CALCULATIONS

DYNAMIC ENGINEERING

Date:	**9/30/2021**
Project:	**MCR 54 Rte 440 LLC**
Project No:	**3783-99-001**
Calculated By:	**SDP**
Checked By:	**RJC**

Water Flow Analysis

Projected Water Demand Generation [N.J.A.C. 7:10-12.6(b)2]

Industrial	25 GPD/8-hr shift
Office	0.125 GPD/SF

PROPOSED CONDITIONS:

Use:	***Units***	***Flow (GPD)***
Warehouse	250 Employee	6,250
Office	82,270 SF	10,284
Total Proposed Flow:		***16,534 GPD***

Notes:

1. Existing & Proposed flows based on Average Daily Water Demand [N.J.A.C. 7:10-12.6(b)2 - Table 1].