POTABLE WATER AND SANITARY SEWER ENGINEERING REPORT

For

AACTFR Property, LLC
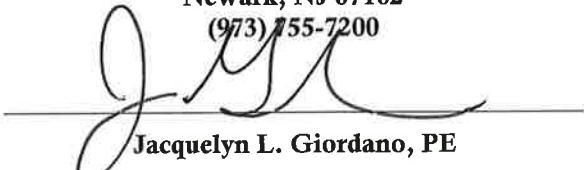
Proposed Warehouse Building

401 Cottontail Lane
Block 517.01, Lot 8.06
Franklin Township
Somerset County, New Jersey

Prepared by:

DYNAMIC ENGINEERING

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DEC # 3532-99-001

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APPENDIX

- CAPACITY CIRCULAR PIPE FLOWING HALF FULL

I) INTRODUCTION

This report has been prepared to define and analyze the potable water and sanitary sewer demand that would occur as a result of the development of Block 517.01, Lot 8.06, as shown on Franklin Township Tax Map Sheet No. 93, in the Township of Franklin, Somerset County, New Jersey. The project site is located at 401 Cottontail Lane.

Under existing conditions, the subject parcel currently consists of vacant wooded land.

The proposed project consists of constructing a new 100,125 SF warehouse building with approximately 4,500 SF of office space and 14 loading bays, 62 off-street parking spaces and associated driveways, landscaping and other related site improvements.

II) PROPOSED SANITARY SEWER DESIGN

a) PROPOSED SANITARY SEWER SYSTEM

Sanitary sewer service for the proposed project will be provided by the existing eight (8") inch sanitary sewer main located within Cottontail Lane. Two (2) proposed four (4") inch laterals will service the non-domestic process waste use within the facility.

b) EXISTING SEWAGE FLOW CALCULATION

As noted above the subject property currently consists of vacant wooded land and is not presently serviced by public sanitary sewer. Accordingly, there is no existing domestic sewage flow for the site.

c) PROPOSED SEWAGE FLOW CALCULATION

Sanitary sewage flow estimation has been calculated utilizing the NJDEP 7:14A-23.3 standard for sewage flow generated by the proposed warehouse building with office space. Considering the above, proposed sewage flows are estimated as follows:

Average Daily Flow in Gallons Per Day (GPD)

Proposed Warehouse Space: 25 GPD per Employee
               25 GPD x 41 Employees = 1,025 GPD

+

Proposed Office Space: 0.100 GPD per SF
               0.100 GPD x 4,500 SF = 450 GPD

<div align="right">=   <u>1,475 GPD Total Demand</u></div>

*41 employees assumed at this time.

d) SANITARY SEWER PIPE 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
4"	2.08%	0.010	115,618 GPD	2,950 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 3% of the line's total capacity. A copy of the supporting calculation has been provided within the Appendix of this report.

III) PROPOSED POTABLE WATER DESIGN

a) PROPOSED WATER SYSTEM

Potable water service for the proposed project will be provided by the existing water main located within Cottontail Lane. A proposed two (2") inch domestic and six (6") inch fire service are proposed for the building.

b) EXISTING WATER FLOW CALCULATION

As noted above the subject property currently consists of vacant wooded land and is not presently serviced by public water. Accordingly, there is no existing domestic water flow for the site.

c) PROPOSED WATER FLOW CALCULATIONS

Domestic water flow estimation has been calculated utilizing the NJDEP 7:10-12.6 standard for domestic water demand generated by the proposed warehouse building with office space. Considering the above, proposed water flows are estimated as follows:

Average Daily Flow in Gallons Per Day (GPD)

Proposed Warehouse Space: 25 GPD per Employee
25 GPD x 41 Employees = 1,025 GPD

+

Proposed Office Space: 0.125 GPD per SF
0.125 GPD x 4,500 = 562.5 GPD

=   <u>1,587.5 GPD Total Demand</u>

DYNAMIC ENGINEERING

Capacity of Circular Pipe Flowing 1/2 Full

Project: AACTFR Property, LLC
Job #: 3532-99-001
Location: Franklin Township, NJ

Computed By: MG
Checked By: TFD
Date: 1/21/2021

PIPE DESCRIPTION	SLOPE (%)	SIZE (IN)	MANNING'S COEFFICIENT (n)	VELOCITY (FT/S)	CAPACITY (CFS)	CAPACITY (GPD)	CAPACITY (MGD)
4" PVC Proposed Building South	2.08	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
$A=(\pi*D^2/4)*0.5=0.3927*D^2$
$R=A/Wp=0.3927*D^2/((2*\pi*D/2)*0.5)=0.25*D$

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:

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

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