WATER AND SANITARY SEWER ENGINEER'S REPORT

For

B9 Cottontail Owner, LLC
Proposed Industrial Development

Block 517.06, Lot 15.10
200 Cottontail Lane
Township of Franklin
Somerset County, New Jersey

Prepared by:

DYNAMIC ENGINEERING

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TABLE OF CONTENTS

I.   INTRODUCTION

The project area is comprised of Block 517.06, Lot 15.10 in the Township of Franklin, Somerset County, New Jersey. The site currently consists of an existing office building with associated driveways, parking areas and open space areas. The proposed development includes the construction of two (2) warehouse facilities (116,530 SF and 119,325 SF). Additional site improvements include lighting, landscaping, grading, walkways, driveways, utilities, parking and other related site improvements.

II.   PROPOSED DOMESTIC WATER SYSTEM

Two (2) individual connections will be made to the existing water main within Cottontail Lane to provide service to both of the proposed buildings. In addition, a fire loop is proposed around the proposed buildings.

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:

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

Estimated domestic water demand can be calculated as follows:

Office – 100,250 SF x 0.125 GPD/SF	= 12,531.25 GPD
Total Existing Domestic Water Demand	= 12,531.25 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

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

Estimated domestic water demand can be calculated as follows:

    Proposed Warehouse A:

42 Employees x 25 GPD/Employee	= 1,050.0 GPD
5,826 SF (Office) x 0.125 GPD/SF	= 728.25 GPD
Total Proposed Domestic Water Demand (Warehouse A)	= 1,778.25 GPD

    Proposed Warehouse B:

43 Employees x 25 GPD/Employee	= 1,075.0 GPD
5,967 SF (Office) x 0.125 GPD/SF	= 745.88 GPD
Total Proposed Domestic Water Demand (Warehouse B)	= 1,820.88 GPD

Total Proposed Domestic Water Demand	= 3,599.13 GPD
Total Existing Domestic Water Demand	= 12,531.25 GPD
Total Reduction in Domestic Water Demand	**= 8,932.12 GPD**

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 8,932.12 GPD, a BWSE Permit is not required.

III. PROPOSED SANITARY SEWER SYSTEM

Sanitary sewer service will be provided for both proposed buildings via 8" SDR-35 PVC connection to an existing sanitary sewer manhole that connects to the existing sanitary sewer main within Cottontail Lane.

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 – 0.100 gallons/day (GPD) per square foot

Average Daily Flow – Proposed

Office – 100,250 SF x 0.100 GPD/SF	= 10,025.00 GPD
Total Existing Sanitary Sewer Demand	= 10,025.00 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

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

Average Daily Flow – Proposed

Proposed Warehouse A:

42 Employees x 25 GPD/Employee	= 1,050.00 GPD
5,826 SF (Office) x 0.100 GPD/SF	= 582.60 GPD
Total Proposed Sanitary Sewer Demand (Warehouse A)	= 1,632.60 GPD

Proposed Warehouse B:

43 Employees x 25 GPD/Employee	= 1,075.00 GPD
5,967 SF (Office) x 0.100 GPD/SF	= 596.70 GPD
Total Proposed Sanitary Sewer Demand (Warehouse B)	= 1,671.70 GPD

Total Proposed Sanitary Sewer Demand	= 3,304.30 GPD
Total Existing Sanitary Sewer Demand	= 10,025.00 GPD
Total Reduction in Sanitary Sewer Demand	**= 6,720.70 GPD**

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 6,720.70 GPD, a TWA Permit is not required.

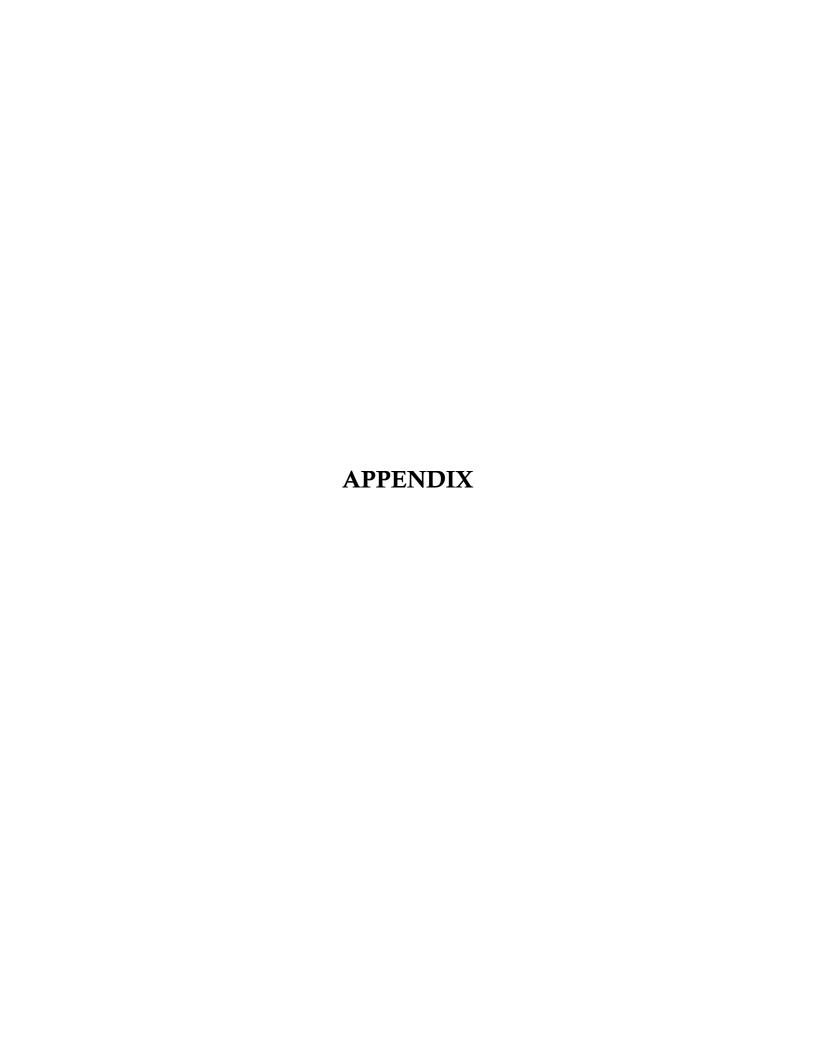**b) PROPOSED SANITARY SEWER DESIGN**

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.
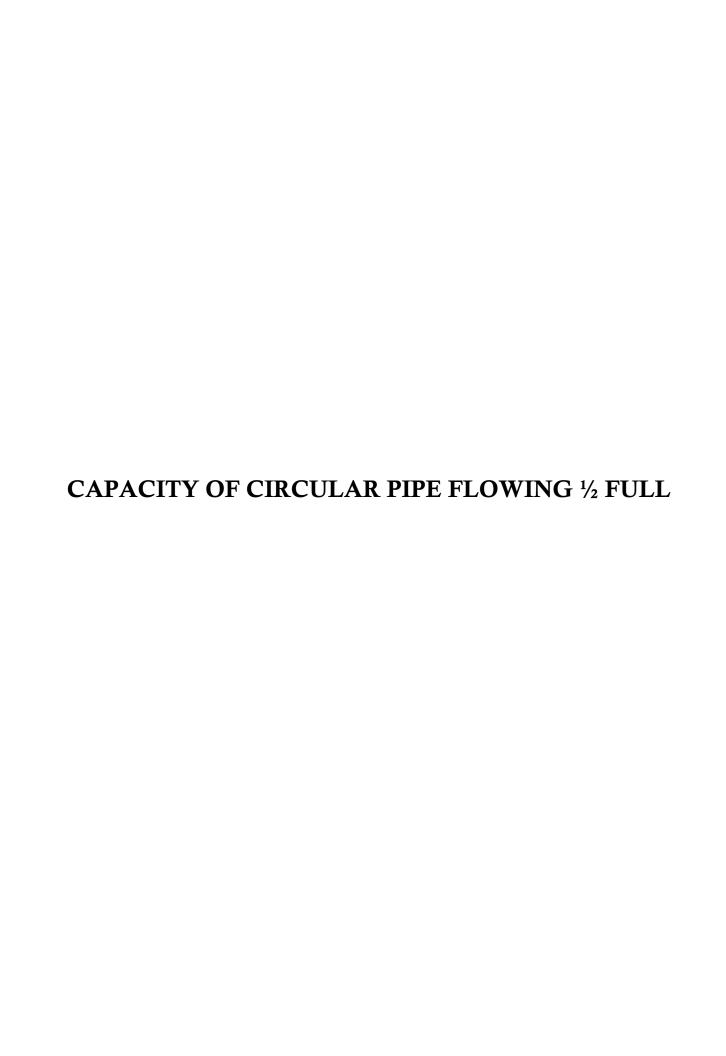
Use	Pipe Size	Slope	Roughness (n)	Capacity at ½ Full	2 X ADF
Warehouse A	8"	0.50%	0.010	359,937 GPD	3,265.20 GPD
Warehouse B	8"	1.50%	0.010	623,429 GPD	3,343.40 GPD

The proposed sanitary sewer design, including each 8" PVC lateral at 0.50% and 1.50%, can efficiently convey two times the proposed average daily flow while flowing half full while only using 0.91% and 0.54% 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 ½ FULL

DYNAMIC ENGINEERING

Capacity of Circular Pipe Flowing 1/2 Full

Project: Proposed Warehouses

Job #: 3566-99-004

Location: Township of Franklin, Somerset County, NJ

Computed By: AG

Checked By: DT

Date: 2/14/2022

PIPE DESCRIPTION	SLOPE (%)	SIZE (IN)	MANNING'S COEFFICIENT (n)	VELOCITY (FT/S)	CAPACITY (CFS)	CAPACITY (GPD)	CAPACITY (MGD)
Prop. 8" SDR-35 PVC	1.500%	8	0.010	5.53	0.96	623,429	0.62
Prop. 8" SDR-35 PVC	0.500%	8	0.010	3.19	0.56	359,937	0.36

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:

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

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