Engineer's Report
Sanitary Sewer Design Report

September 27, 2021

1100 Randolph Road

Block 517.04, Lot 1.01
Franklin Township, Somerset County, New Jersey

Prepared for:

Prepared by:

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Engineers Report: Sanitary Sewer Design Report

Introduction

This report was prepared in accordance with the Township of Franklin Site Plan Submission Checklist for the Preliminary and Final Major Site Plan application for the project known as 1100 Randolph Road. This report has been prepared in accordance with accepted engineering standards, including those of the Township of Franklin and the New Jersey Department of Environmental Protection.

The applicant, JWH Real Estate Holding Corp., proposes a 100,265 SF, 1-story warehouse building addition with 4,000 SF office space, ancillary site improvements and a new stormwater management system on Lot 1.01, Block 517.04. The total proposed lot area is 20.9± acres and is currently developed with a 202,165 GFA, 2-story structure, containing office, light manufacturing and warehouse space, and an approximate 28,000 SF outdoor storage area within the existing paved areas for material storage related to the light manufacturing use. The subject property is located in the Suburban State Planning Area (PA-2).

Sanitary Sewer Service

The subject property is currently serviced by the Franklin Township Sewerage Authority. The existing sanitary sewer facilities on site will serve the proposed warehouse addition. A private pump station is located on-site next to the existing warehouse. The duplex pump station discharges flow through a 2" PVC force main to a sanitary manhole adjacent to School House Road before discharging via gravity directly sanitary Township sewer system.

Sanitary Sewer Projected Flow

The proposed sewer flow associated with this development was computed based on N.J.A.C. 7:14A-23.3(a). The NJDEP calculates sanitary sewer flow for a warehouse building based on the number of employees per shift and the area of office space in the building. The project includes a 100,265 SF warehouse building addition consisting of 96,265 SF of warehouse space and 4,000 SF office space. The number of warehouse employees was computed based on 1 employee per 5,000 SF of warehouse space.

Type of Establishment	Measurement Unit	Units	GPD Per Unit	Total GPD
Warehouse Facility 1 employee/5,000 s.f. for (1) 8-hour shift	Employees	20	25	500 gpd
Office	Sq. Ft.	4,000	.10	400 gpd
Total				**900 gpd**

Sanitary Sewer Design

The existing site is serviced by a private sanitary pump station located on site adjacent to the existing warehouse. The existing pump station is a duplex system with each pump rated at 25 GPM at 25 total dynamic head (TDH). The proposed improvements will utilize the pump station without modification.

The original site plans of the warehouse indicate a base flow demand of 5,750 GPD. The addition of the proposed warehouse expansion would estimate that the pump station would receive approximately 6,650 GPD or 4.71 GPM average.

Pump viability shall be considered based on the following criteria:

1. One pump shall be capable of handing the average daily flow with a minimum factory of safety of 2.5 per 7:14A-23.10(b). Based on the average daily flow of 4.71 GPM, the resulting minimum pump capacity is 11.78 GPM, say 12.0 GPM. The existing submersible pump is rated at operate at 25 GPM @ 25 TDH, appropriately sized given the project flows of the building.

2. The estimated length of the force main based on the previous construction drawings is 683 feet from pump station to discharge. Accounting for friction and minor losses within the pipe include: one (1) 45-degree bend, one (1) entrance loss and one (1) exit loss. The total equivalent pipe length is calculated to be 730 feet. The centerline of the force main leaving the pump station is approximately EL 70 (1929 datum), the discharge point within the manhole is approximately EL 75 (1929 datum), leading to a static head of approximately 5 feet vertical. Using a coefficient C value of 130 for PVC pipe, the calculated TDH at 25 GPM using Hazen-Williams equations, the system total dynamic head demand is 17.38 ft, which is within operating range of the existing duplex pump system and suitable to remain in service without modification.

3. During pumping, the fluid velocity shall be at least 2.0 feet per second (fps) to maintain solids in suspension and a maximum velocity of 10.0 fps to prevent excessive pressure losses (per 7:14A-23.10(g)). In a nominal 2" diameter force main the minimum pump rate to maintain 2 fps is 20 GPM. Based on the projected pump flow of 25 GPM, the force main will

have a scour velocity of 2.55 feet per second, an acceptable scour velocity to promote resuspension of solids within the main.

The NJDEP regulates the design of proposed Treatment Works in N.J.A.C. 7:14A. Subchapter 23.6(b) requires sanitary sewer pipes to be designed to carry at least twice the estimated average flow when flowing half full.

Therefore, to satisfy the above referenced design requirement and confirming an existing 4" PVC pipe the maximum depth of flow within the proposed sanitary sewer system is half full for twice the estimated average flow. The calculated slope for the sewer lateral is 2.0% from the discharge manhole to the top of the calculated sewer main at the lateral.

Utilizing Manning's equation:

$$Q = (0.963/n)AR^{2/3}S^{1/2}$$

Where:

Q = capacity [MGD]
n = Manning coefficient; 0.010 (PVC pipe)
A = cross-sectional area of flowing when flowing ½ full, sq. ft.
R = hydraulic radius when flowing ½ full, ft.
S = slope of pipe, minimum slope 2.0 ft./ft.

Therefore,

For 4" PVC pipe at minimum .02 ft/ft Slope:

Q = 0.036 MGD

Twice Estimated Average Flow = 0.0360 MGD * 2 = <u>0.072 MGD</u>

Therefore, since twice the estimated average flow is less than the capacity of the pipe flowing half full, the 4" PVC sewer pipe is sized appropriately.

For 4" PVC pipe at minimum .02 ft/ft slope:

Q = .114 MGD

Twice Estimated Average Flow = 0.072 MGD <= 0.114 MGD [OK]

Therefore, since twice the estimated average flow is less than the capacity of the pipe flowing half full, the 4" PVC sewer pipe is sized appropriately.

This report and site plan were prepared following currently accepted engineering standards, including those of the Franklin Township and the New Jersey Department of Environmental Protection.

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