
SANITARY SEWER ENGINEER'S REPORT

RWJ BARNABAS HEALTH SOUTH BUILDING EXPANSION CITY OF NEW BRUNSWICK MIDDLESEX COUNTY, NEW JERSEY

Applicant:

**RWJ Barnabas Health
One Robert Wood Johnson Place
New Brunswick, NJ 08901**

Prepared By:

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NJ Professional Engineer
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**24 May 2019
130089201**

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INTRODUCTION

This Engineer's Report has been prepared on behalf of RWJ Barnabas Health by Langan Engineering and Environmental Services, Inc. (Langan) to support the design and permitting associated with the sanitary sewer service connection for the proposed RWJ Barnabas Health South Building Expansion project, in New Brunswick, New Jersey. The proposed development includes the construction of approximately 29,000 square feet (sf) of new hospital space and the renovation of approximately 60,000 sf of existing hospital space.

The proposed sanitary sewer system improvements for the project consist of a cleanout and approximately 51 linear feet of 4-inch-diameter polyvinyl chloride (PVC) sewer lateral pipe as shown on Drawing CU-101. The proposed lateral will connect to the recently installed sanitary cleanout within the site.

A summary of the site's existing conditions, proposed development scope, existing sanitary system, and proposed sanitary sewer improvements are given herein.

EXISTING SITE DESCRIPTION

The property (approximately 8.25 acre per the City tax map) is located in the City of New Brunswick, Middlesex County, New Jersey. Approximately one acre of the property will be developed as part of this project. The project site is bound by the RWJ 1958 and Tower Building to the north, French Street (Middlesex County Road 27) to the south, Core Building and an existing parking garage to the east, and the RWJ Utility Building to the west.

The site is currently occupied by non-emergency ambulance parking lot.

PROPOSED DEVELOPMENT

The proposed improvements will consist of constructing 29,000 sf of new hospital space and renovating approximately 60,000 sf of existing hospital space. On the ground level, the project will consist of constructing new columns and elevators for the infill building structure above. This will result in the reconfiguration of the existing non-emergency ambulance parking lot.

PROJECTED SEWAGE FLOW

Based on the New Jersey Administrative Code (NJAC) Section 7:14A-23.3, a typical medical office space will generate sewage flows at a rate of 0.10 gallons per day (gpd) per square foot. We have estimated the proposed sewage flows from the development based on the net increase of 29,000

gross square foot of new space. A breakdown of the RWJ South Building Expansion project's projected sewage flows are as follows:

- Medical Office Space – 29,000 sf x 0.10 gpd/sf = 2,900 gpd

TOTAL ESTIMATED SANITARY DEMAND 2,900 GPD

EXISTING SANITARY SYSTEM

City owned sanitary sewers exist below French Street. Existing sanitary sewers south of the site within French Street are approximately 18-inches in diameter with slopes of approximately one percent. The French Street system conveys sewage to the east.

PROPOSED SANITARY IMPROVEMENTS

This report addresses the proposed construction of a sanitary cleanout and approximately 51 linear feet of 4-inch-diameter polyvinyl chloride (PVC) sewer lateral pipe as shown on Drawing CU-101. The sewage generated from the proposed development will connect to a sanitary cleanout of an on-site sewer lateral that eventually discharges to the French Street sewer system. A breakdown of the proposed sanitary sewer system components is presented below:

- 5 linear feet of 4-inch-diameter PVC pipe will flow in a southerly direction from the south side of the existing building to a proposed sanitary cleanout located south of the building.
- 46 linear feet of 4-inch-diameter PVC pipe will flow from the sanitary cleanout in a southerly direction and connect to a sanitary cleanout of an on-site sewer lateral that eventually discharges to the City-owned sewer system within French Street.

PIPE CAPACITY ANALYSIS

Based on NJAC 7:14A-23.6, gravity sewers shall be designed to carry at least twice the estimated average projected flow when flowing half full. Based on the City of New Brunswick's engineering standards, we have designed the gravity sewers to carry at least four times the estimated average project flow when flowing half full. The proposed four-inch-diameter sanitary sewer pipe sloped at 0.50 percent has a design capacity of approximately 113,315 gpd. When half full, the pipe has a capacity of 54,391 gpd, which is greater than four times the required capacity of the pipe (2,900 gpd x 4 = 11,600 gpd). Therefore, the pipe sizing requirements have been met.

In addition, NJAC 7:14A-23.6 requires sanitary sewer pipes to be designed for a minimum velocity of two feet per second and a max velocity no greater than ten fps. The proposed pipes have a

minimum velocity of 2.01 fps and a maximum velocity of 2.31 fps. Therefore, the velocity requirement has been met.

Based on our previous conversations with the City engineer, there are no known capacity issues with the 18-inch-diameter City-owned sewer main beneath French Street. The existing sewer main has capacity to serve the proposed project.

Supporting sewer design calculations have been provided in Appendix A of this report.

An engineer's construction cost estimate has been provided in Appendix B. Design details associated with this report are given on Drawing CS-502.

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FIGURES



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Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

**ROBERT WOOD JOHNSON
BARNABAS HEALTH
SOUTH BUILDING
EXPANSION**

BLOCK No. 24.01, LOT No. 1.01
CITY OF NEW BRUNSWICK

MIDDLESEX COUNTY NEW JERSEY

Drawing Title

**USGS SITE
LOCATION MAP**

Project No.

130089201

Date

5/24/19

Scale

1"=1,000'

Drawn By

ARL

Figure

1

DRAWINGS

APPENDIX A

DESIGN CALCULATIONS

A handwritten signature in black ink, reading "Chris Roche". The signature is written in a cursive, flowing style.

Christian M. Roche, P.E., LEED AP
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SANITARY SEWER SYSTEM CALCULATIONS
RWJ BARNABAS HEALTH SOUTH BUILDING EXPANSION
NEW BRUNSWICK, NJ
24 MAY 2019
130141101

Q_{NJDEP}	Hospital Space 175 gpd per Hospital Bed (PER N.J.A.C. 7:14A-23.3)			
Use	SF	Unit Demand per unit	Sanitary Demand	
Medical Office Spa	29,000	gpd/bed	0.1	2,900
Total				2,900 gpd

Q_{NJDEP} 2,900 gpd

$Q_{design} = 4 * Q_{NJDEP} = 11,600 \text{ gpd}$
 Q_{full} CAPACITY OF PIPE = $1.49/n * A_{pipe} * R^{2/3} * S^{1/2}$
 Q_{half} FLOW AT HALF FULL = $0.48 * Q_{full}$
 V_{max} VELOCITY AT 80% FULL = $1.15 * Q_{full} / A_{pipe}$
 $V_{half, fps}$ VELOCITY AT HALF FULL = $Q_{half} / (A_{pipe} * 0.5)$
 PIPE SIZED ACCORDINGLY CHECKS IF Q_{design} IS LESS THAN Q_{half} , (PER N.J.A.C.)

PROPOSED SANITARY SYSTEM

BUILDING TO SAN CO-1

MATERIAL	PVC	$Q_{full, cfs}$	$Q_{full, gpd}$	$Q_{half, cfs}$	$Q_{half, gpd}$	$V_{max, fps}$	$V_{half, fps}$
LENGTH, ft	5	0.18	113,315	0.08	54,391	2.31	2.01
DIAMETER, in	4						
SLOPE	0.50%	PIPE SIZED ACCORDINGLY:			TRUE		
n	0.01	2 fps < VELOCITY < 10 fps:			TRUE		
$Q_{NJDEP, gpd}$	2,900						
$Q_{design, gpd}$	11,600						

SAN CO-1 TO EXISTING SEWER LATERAL SANITARY CLEANOUT

MATERIAL	PVC	Q _{full} , cfs	Q _{full} , gpd	Q _{half} , cfs	Q _{half} , gpd	V _{max} , fps	V _{half} , fps
LENGTH, ft	51	0.18	113,315	0.08	54,391	2.31	2.01
DIAMETER, in	4						
SLOPE	0.50%	PIPE SIZED ACCORDINGLY:			TRUE		
n	0.01	2 fps < VELOCITY < 10 fps:			TRUE		
Q _{NJDEP} , gpd	2,900						
Q _{design} , gpd	11,600						

APPENDIX B

**ENGINEER'S ESTIMATE OF
CONSTRUCTION COSTS**

**ENGINEER'S COST ESTIMATE FOR
PROPOSED SANITARY SEWER SYSTEM
RWJ Barnabas Health South Building Expansion
New Brunswick, New Jersey
24 May 2019
130141101**

DESCRIPTION OF ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
A. 4" PVC Sewer Pipe Main (SDR 35)	51	LF	\$ 50.00	\$ 2,550.00
B. Sanitary Cleanout	1	EA	\$ 3,500.00	\$ 3,500.00
SUBTOTAL				\$ 6,050.00
10% Contingency				\$ 605.00
10% Inspection Fee				\$ 605.00
2% Asbuilt Drawing				\$ 121.00
TOTAL				\$ 7,381.00

Note:

1. Estimate is based on plans titled "RWJ Barnabas Health South Building Expansion" - dated 24 May 2019
2. Cost includes material and labor for installing pipe, trench excavation and backfill.