STORMWATER MANAGEMENT AND ENGINEER'S REPORT

35 AVENUE A
LOT 12 OF BLOCK 361
LOT 3 OF BLOCK 362
CITY OF BAYONNE, HUDSON COUNTY, NEW JERSEY
DRESDNER ROBIN PROJECT NO.: 12017-001

PREPARED FOR
THE GAMAL GROUP
128 WEST 2ND STREET
BAYONNE, NJ 07020

PREPARED BY
DRESDNER ROBIN
1 EVERTRUST PLAZA, SUITE 901
JERSEY CITY, NJ 07302

DATE
JUNE 2023
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1.0 INTRODUCTION

1.1 PURPOSE

This report has been prepared to demonstrate how the proposed improvements meet the criteria of the following standards:

- Chapter 30 “Stormwater Control” of the City of Bayonne’s municipal code.

1.2 PROJECT DESCRIPTION

The project site contains approximately 2.036 acres and has frontage along Avenue A, Gertrude Street, and West 3rd Street. The site is governed by the Gamal Group East Redevelopment Plan (formerly Cashem) and currently consists of multiple industrial buildings, asphalt and concrete parking areas, and some areas of vegetation.

The applicant proposes two 6-story residential buildings containing 299 units, integrated parking garage, and ground floor retail. Additional site improvements include sidewalks and landscape areas.

1.3 FLOOD ELEVATIONS

The Project Site is located within regulated flood zone AE (El. 12) with a Base Flood Elevation (BFE) of 12.0’ referenced to the North American Vertical Datum of 1988 (NAVD88), as depicted on the FEMA Preliminary Flood Insurance Rate Map (PFIRM) for Hudson County, New Jersey, Panel 94 of 118, City of Bayonne.

The site is located in a tidal area, and per the NJAC 7:13 Flood Hazard Area Control Act Rules, Section 3 “Determining the Flood Hazard Area and Floodway,” the Flood Hazard Area Design Flood Elevation (DFE) in tidal water areas (Method 2, FEMA Tidal method) is equivalent to the BFE. Thus, the DFE for the subject site is elevation 12.0’ NAVD88.
2.0 STORMWATER MANAGEMENT

2.1 PURPOSE AND NEED

The proposed development will disturb more than 1 acre of land; therefore, the project is defined as a “major development” in accordance with the City of Bayonne’s stormwater control ordinance described above as well as New Jersey’s Stormwater Rules at NJAC 7:8. As a result, these regulations mandate the proposed development incorporate measures to address groundwater recharge, stormwater quality, and stormwater quantity.

2.2 GROUNDWATER RECHARGE

The regulations cited above specify minimum design and performance standards for groundwater recharge; however, in accordance with N.J.A.C. 7:8-5.4(a)2.ii., the groundwater recharge requirement does not apply to previously disturbed project sites within the “Metropolitan Planning Area PA-1 Zone”, which includes the project site, which has been previously disturbed; therefore groundwater recharge is not required for this project.

2.3 WATER QUALITY

Per NJDEP, “Stormwater management measures shall only be required for water quality control if an additional one-quarter acre of impervious surface is being proposed on a development site.” (N.J.A.C. 7:8-5.5). Since the project proposes to decrease impervious surface coverage, water quality treatment measures are not necessary for compliance with this requirement.

2.4 WATER QUANTITY

The City of Bayonne’s Stormwater Control Ordinance requires “major developments“ to demonstrate through hydrologic and hydraulic analysis that the post-constructed stormwater runoff rates and volumes leaving the site meet specific criteria. The requirements state that proposed peak runoff rates shall be reduced to 50%, 75% and 80% of existing rates for the 2-year, 10-year and 100-year storm events respectively. However, in tidal flood hazard areas, stormwater runoff quantity analysis in accordance with (a)3i, ii and iii above shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge. Because the proposed storm sewer improvements at the project site will be discharged directly to an outfall in the Newark Bay, increased volume is not anticipated to increase flood damages below the point of discharge, water quantity analysis is not required.
Additionally, since the project proposes to decrease impervious coverage, a modest reduction in peak flows are anticipated. Existing and proposed drainage maps have been included as appendices to this report in Appendix C.

2.5 PIPE CONVEYANCE

The proposed on-site storm sewer collection system has been designed to collect runoff from the proposed buildings and discharge directly into the Newark bay and is designed to handle the 100 year storm. Pipe conveyance calculations are included in this report in Appendix D.

3.0 WATER AND SEWER DEMAND

3.1 SANITARY SEWER

Survey information indicates the presence of an 18-inch diameter Vitrified Clay Pipe combined sewer in Avenue A and Gertrude Street. An 8-inch lateral will connect to said main in Avenue A and an another 8-inch lateral will connect to said main on Gertrude street. The projected sanitary flow can be found in Appendix A, which was developed based upon the New Jersey Technical Requirements for Treatment Works Approvals at N.J.A.C. 7:14A-23.3.

Because the anticipated flow to be generated by the development is greater than 8,000 gallons per day, a Treatment Works Approval will be required from the New Jersey Department of Environmental Protection (NJDEP) prior to construction.

3.2 WATER SERVICE

Water service to the project site is provided by Veolia New Jersey. Record mapping indicates the presence of an 8-inch diameter water main in West 3rd Street and in Gertrude Street. Two (2) 8-inch combined service laterals are proposed for the project, which will connect to said mains.

The estimated average-daily and peak water demand for the development can be found in Appendix B, which was calculated in accordance with Table 5.1 and 5.2 of the New Jersey Residential Site Improvements Standards (N.J.A.C. 5:21-5.1) and the Safe Drinking Water Act Rules (N.J.A.C. 7:10-12.6, Table 1: Average Daily Water Demand).
# SANITARY SEWER CALCULATIONS

**35 AVENUE A**  
BLOCK 326, LOT 3 AND BLOCK 361, LOT 12  
BAYONNE, NEW JERSEY  
DR PROJECT NO. 12017-001

<table>
<thead>
<tr>
<th>Type of Establishment</th>
<th>Measurement</th>
<th># Units</th>
<th>GPD/Unit</th>
<th>GPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio</td>
<td>Per Dwelling</td>
<td>16</td>
<td>150</td>
<td>2400</td>
</tr>
<tr>
<td>1 Bedroom</td>
<td>Per Dwelling</td>
<td>101</td>
<td>150</td>
<td>15150</td>
</tr>
<tr>
<td>2 Bedroom</td>
<td>Per Dwelling</td>
<td>58</td>
<td>225</td>
<td>13050</td>
</tr>
<tr>
<td>3 Bedroom</td>
<td>Per Dwelling</td>
<td>2</td>
<td>300</td>
<td>600</td>
</tr>
<tr>
<td>Retail</td>
<td>Sq. Ft.</td>
<td>4667</td>
<td>0.100</td>
<td>467</td>
</tr>
</tbody>
</table>

*Projected Estimates per N.J.A.C. 7:14A-23.3*

<table>
<thead>
<tr>
<th>Pipe</th>
<th>Length (ft)</th>
<th>n*</th>
<th>Slope</th>
<th>Diameter (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>38</td>
<td>0.013</td>
<td>2.00%</td>
<td>8</td>
</tr>
</tbody>
</table>

*Per JCMUA Rules and Regulations, Section 5.01*

**Half Flow Pipe Capacity**

- Depth of Flow, h (in) 4
- h/D 0.500
- Pipe Radius, r (ft) 0.333
- Circ. Segment Height, h (ft) 0.333
- Central Angle, θ (radians) 3.142
- Cross-Sectional Area, A (ft²) 0.175
- Wetted Perimeter, P (ft) 1.047
- Hydraulic Radius, R (ft) 0.167
- Discharge, Q (cfs) 0.857
- Q_projected (x2) (cfs) 0.098
- Pipe % Full ([A/A_hull]*100%) 50.00%
- Average Velocity, V (ft/sec) 4.909

**Actual Pipe Velocity**

- **Depth of Flow, h (in) 0.930**
- Pipe Radius, r (ft) 0.333
- Circ. Segment Height, h (ft) 0.078
- Central Angle, θ (radians) 1.392
- Cross-Sectional Area, A (ft²) 0.023
- Wetted Perimeter, P (ft) 0.464
- Hydraulic Radius, R (ft) 0.049
- Pipe % Full ([A/A_hull]*100%) 6.49%

**Actual Velocity, V (ft/sec) 2.165**

**Must have h < r**

**Compare**

- Discharge, Q (cfs) 0.049
- Q_projected (cfs) 0.049
Equations used for calculations:

Manning’s Formula:

\[ Q = \left( \frac{1.49}{n} \right) A R^{1/3} \sqrt{S} \]

- \( Q \) = Flow Rate, (ft\(^3\)/s)
- \( n \) = Manning’s Coefficient
- \( A \) = Flow Area, (ft\(^2\))
- \( R \) = Hydraulic Radius, (ft)
- \( S \) = Channel Slope, (ft/ft)

\[ \theta = 2 \arccos \left( \frac{r - h}{r} \right) \]

\[ A = \frac{r^2 (\theta - \sin \theta)}{2} \]

\[ P = r \theta \]
### SANITARY SEWER CALCULATIONS
35 AVENUE A
BLOCK 326, LOT 3 AND BLOCK 361, LOT 12
BAYONNE, NEW JERSEY
DR PROJECT NO. 12017-001

<table>
<thead>
<tr>
<th>Type of Establishment</th>
<th>Measurement</th>
<th># Units</th>
<th>GPD/Unit</th>
<th>GPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio</td>
<td>Per Dwelling</td>
<td>17</td>
<td>150</td>
<td>2,550</td>
</tr>
<tr>
<td>1 Bedroom</td>
<td>Per Dwelling</td>
<td>56</td>
<td>150</td>
<td>8,400</td>
</tr>
<tr>
<td>2 Bedroom</td>
<td>Per Dwelling</td>
<td>48</td>
<td>225</td>
<td>10,800</td>
</tr>
<tr>
<td>3 Bedroom</td>
<td>Per Dwelling</td>
<td>1</td>
<td>300</td>
<td>300</td>
</tr>
</tbody>
</table>

Projected Estimates per N.J.A.C. 7:14A-23.3

- Flow Received: 100%
- Total Flow (GPD) ($Q_{projected}$): 22,050
- Total Flow (CFS) ($Q_{projected}$): 0.034

<table>
<thead>
<tr>
<th>Pipe</th>
<th>Length (ft)</th>
<th>n*</th>
<th>Slope</th>
<th>Diameter (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>34</td>
<td>0.013</td>
<td>2.00%</td>
<td>8</td>
</tr>
</tbody>
</table>

* Per JCMUA Rules and Regulations, Section 5.01

### Half Flow Pipe Capacity
- Depth of Flow, h (in): 4
- h/D: 0.500
- Pipe Radius, r (ft): 0.333
- Circ. Segment Height, h (ft): 0.333
- Central Angle, θ (radians): 3.142
- Cross-Sectional Area, A (ft²): 0.175
- Wetted Perimeter, P (ft): 1.047
- Hydraulic Radius, R (ft): 0.167
- Discharge, Q (cfs): 0.857
- $Q_{projected}$ (x2) (cfs): 0.068
- Pipe % Full [(A/A_{full})*100%]: 50.00%
- Average Velocity, V (ft/sec): 4.909
- $Q_{pipe}$ > 2x$Q_{projected}$: TRUE
- V > 2.2 ft/sec: TRUE
- Therefore, design is: ADEQUATE

### Actual Pipe Velocity
- **Depth of Flow, h (in):** 0.780
- Pipe Radius, r (ft): 0.333
- Circ. Segment Height, h (ft): 0.065
- Central Angle, θ (radians): 1.270
- Cross-Sectional Area, A (ft²): 0.018
- Wetted Perimeter, P (ft): 0.423
- Hydraulic Radius, R (ft): 0.041
- Pipe % Full [(A/A_{full})*100%]: 5.01%
- **Actual Velocity, V (ft/sec):** 1.938
- **Must have h < r**

### Compare
- Discharge, Q (cfs): 0.034
- $Q_{projected}$ (cfs): 0.034
Equations used for calculations:

Manning's Formula:

\[ Q = \left( \frac{1.49}{n} \right) A R^{1/2} S^{3/2} \]

- \( Q \) = Flow Rate, \((\text{ft}^3/\text{s})\)
- \( n \) = Manning's Coefficient
- \( A \) = Flow Area, \((\text{ft}^2)\)
- \( R \) = Hydraulic Radius, \((\text{ft})\)
- \( S \) = Channel Slope, \((\text{ft/ft})\)

\[
\theta = 2 \arccos \left( \frac{r - h}{r} \right)
\]

\[
A = \frac{r^2(\theta - \sin \theta)}{2}
\]

\[
P = r \theta
\]
APPENDIX B
WATER SERVICE DEMAND CALCULATIONS
# WATER DEMAND CALCULATIONS

35 AVENUE A  
BLOCK 326, LOT 3 AND BLOCK 361, LOT 12  
BAYONNE, NEW JERSEY  
DR PROJECT NO. 12017-001

## Residential Demand

<table>
<thead>
<tr>
<th>Type of Establishment</th>
<th>Measurement</th>
<th># Units</th>
<th>GPD/Unit</th>
<th>Daily Demand (GPD)</th>
<th>Daily Demand (MGD)</th>
<th>Peaking Factor</th>
<th>Peak Daily Demand (GPD)</th>
<th>Peak Daily Demand (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio</td>
<td>Per Dwelling</td>
<td>16</td>
<td>95</td>
<td>1,520</td>
<td>0.002</td>
<td>3</td>
<td>4,560</td>
<td>0.005</td>
</tr>
<tr>
<td>1-Bedroom</td>
<td>Per Dwelling</td>
<td>101</td>
<td>95</td>
<td>9,595</td>
<td>0.010</td>
<td>3</td>
<td>28,785</td>
<td>0.029</td>
</tr>
<tr>
<td>2-Bedroom</td>
<td>Per Dwelling</td>
<td>58</td>
<td>140</td>
<td>8,120</td>
<td>0.008</td>
<td>3</td>
<td>24,360</td>
<td>0.024</td>
</tr>
<tr>
<td>3-Bedroom</td>
<td>Per Dwelling</td>
<td>2</td>
<td>215</td>
<td>430</td>
<td>0.000</td>
<td>3</td>
<td>1,290</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>Total Units</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>177</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Residential Demand</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>19,665</strong></td>
<td><strong>0.020</strong></td>
<td></td>
<td><strong>58,995</strong></td>
<td><strong>0.059</strong></td>
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</tbody>
</table>

## Non-Residential Demand

<table>
<thead>
<tr>
<th>Type of Establishment</th>
<th>Measurement</th>
<th># Units</th>
<th>GPD/Unit</th>
<th>Daily Demand (GPD)</th>
<th>Daily Demand (MGD)</th>
<th>Peaking Factor</th>
<th>Peak Daily Demand (GPD)</th>
<th>Peak Daily Demand (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail</td>
<td>SF</td>
<td>4,667</td>
<td>0.125</td>
<td>583</td>
<td>0.001</td>
<td>3</td>
<td>1,750</td>
<td>0.002</td>
</tr>
<tr>
<td><strong>Total Non-Residential Demand</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>583</strong></td>
<td><strong>0.001</strong></td>
<td></td>
<td><strong>1,750</strong></td>
<td><strong>0.002</strong></td>
</tr>
</tbody>
</table>

## Total Site Demand

<table>
<thead>
<tr>
<th>Daily Demand (GPD)</th>
<th>Daily Demand (MGD)</th>
<th>Peak Daily Demand (GPD)</th>
<th>Peak Daily Demand (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20,248</td>
<td>0.020</td>
<td>60,745</td>
<td>0.061</td>
</tr>
</tbody>
</table>

---

**Notes:**

1. Residential demand as per N.J.A.C. 5:21-5.2
2. Non-residential demand as per N.J.A.C. 7:10-12.6 (Table 1)
# Water Demand Calculations

**35 Avenue A**
**Block 326, Lot 3 and Block 361, Lot 12**
**Bayonne, New Jersey**
**DR Project No. 12017-001**

## Residential Demand

<table>
<thead>
<tr>
<th>Type of Establishment</th>
<th>Measurement</th>
<th># Units</th>
<th>GPD/Unit</th>
<th>Daily Demand (GPD)</th>
<th>Daily Demand (MGD)</th>
<th>Peaking Factor</th>
<th>Peak Daily Demand (GPD)</th>
<th>Peak Daily Demand (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio</td>
<td>Per Dwelling</td>
<td>17</td>
<td>95</td>
<td>1,615</td>
<td>0.002</td>
<td>3</td>
<td>4,845</td>
<td>0.005</td>
</tr>
<tr>
<td>1-Bedroom</td>
<td>Per Dwelling</td>
<td>56</td>
<td>95</td>
<td>5,320</td>
<td>0.005</td>
<td>3</td>
<td>15,960</td>
<td>0.016</td>
</tr>
<tr>
<td>2-Bedroom</td>
<td>Per Dwelling</td>
<td>48</td>
<td>140</td>
<td>6,720</td>
<td>0.007</td>
<td>3</td>
<td>20,160</td>
<td>0.020</td>
</tr>
<tr>
<td>3-Bedroom</td>
<td>Per Dwelling</td>
<td>1</td>
<td>215</td>
<td>215</td>
<td>0.000</td>
<td>3</td>
<td>645</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>Total Units</strong></td>
<td></td>
<td>122</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Residential Demand</strong></td>
<td></td>
<td>13,870</td>
<td></td>
<td></td>
<td>0.014</td>
<td></td>
<td>41,610</td>
<td>0.042</td>
</tr>
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</table>

## Non-Residential Demand

<table>
<thead>
<tr>
<th>Type of Establishment</th>
<th>Measurement</th>
<th># Units</th>
<th>GPD/Unit</th>
<th>Daily Demand (GPD)</th>
<th>Daily Demand (MGD)</th>
<th>Peaking Factor</th>
<th>Peak Daily Demand (GPD)</th>
<th>Peak Daily Demand (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail</td>
<td>SF</td>
<td>0</td>
<td>0.125</td>
<td>0</td>
<td>0.000</td>
<td>3</td>
<td>0</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Total Non-Residential Demand</strong></td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td>0.000</td>
<td></td>
<td>0</td>
<td>0.000</td>
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</tbody>
</table>

## Total Site Demand

<table>
<thead>
<tr>
<th></th>
<th>Daily Demand (GPD)</th>
<th>Daily Demand (MGD)</th>
<th>Peak Daily Demand (GPD)</th>
<th>Peak Daily Demand (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>13,870</td>
<td>0.014</td>
<td>41,610</td>
<td>0.042</td>
</tr>
</tbody>
</table>

**Notes:**

1. Residential demand as per N.J.A.C. 5:21-5.2
2. Non-residential demand as per N.J.A.C. 7:10-12.6 (Table 1)
APPENDIX C
STORM PIPE CONVEYANCE CALCULATIONS
APPENDIX D
EXISTING AND PROPOSED DRAINAGE AREA MAPS
APPENDIX E
STORMWATER OPERATIONS AND MAINTENANCE MANUAL
<table>
<thead>
<tr>
<th>% Run</th>
<th>Flow (cu ft/sec)</th>
<th>Rate Ground</th>
<th>Capacity</th>
<th>Length (ft)</th>
<th>Width (ft)</th>
<th>Reverse</th>
<th>Velocity</th>
<th>Storm Trace</th>
<th>Pipe Diameter</th>
<th>Gravel</th>
<th>Slope</th>
<th>Gutter</th>
<th>&amp;</th>
<th>Storm Pipe</th>
<th>Depth</th>
<th>Area</th>
<th>Gravel</th>
<th>Rainfall Curve</th>
<th>Rainfall Curve Rise Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>27%</td>
<td>13.8</td>
<td>0.03</td>
<td>1.7</td>
<td>2.7</td>
<td>6.0</td>
<td>0.101</td>
<td>0.020</td>
<td>0.020</td>
<td>0.003</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td>0.001</td>
<td>0.003</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
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</tr>
<tr>
<td>68%</td>
<td>0.7</td>
<td>0.07</td>
<td>0.25</td>
<td>4.7</td>
<td>1.0</td>
<td>0.013</td>
<td>0.004</td>
<td>0.031</td>
<td>0.010</td>
<td>0.007</td>
<td>0.007</td>
<td>0.010</td>
<td>0.010</td>
<td>0.007</td>
<td>0.007</td>
<td>0.007</td>
<td>0.007</td>
<td>0.010</td>
<td>0.010</td>
</tr>
<tr>
<td>90%</td>
<td>0.1</td>
<td>0.09</td>
<td>0.1</td>
<td>4.9</td>
<td>2.5</td>
<td>0.013</td>
<td>0.007</td>
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<td>0.020</td>
<td>0.010</td>
<td>0.010</td>
<td>0.013</td>
<td>0.013</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.013</td>
<td>0.013</td>
</tr>
</tbody>
</table>

PROJECT NO: 1207-001
PROJECT: 45 Avenue A

DRESNER ROBIN DRAINAGE CALCULATIONS

REV: A  DATE: 6/29/22
MODIFIED BY: MR