

STORMWATER MANAGEMENT REPORT

for

CLIFTON IL, LLC

Proposed Independent Senior Living

Prepared for:

Clifton IL, LLC

Block 44.01; Lots 11, 14, 15 & 18
782, 784, 810 & 818 Valley Road
City of Clifton
Passaic County, New Jersey

Prepared by

BOHLER //

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1. Introduction

The purpose of this Stormwater Management Report is to analyze the stormwater drainage conditions that will occur as a result of the construction of a 15,841 SF 3-story Independent Senior Living with associated asphalt/concrete parking/circulation areas, retaining wall, sidewalks, landscaping, and stormwater management facilities. The subject property is currently occupied by a 1-story residential building and associated driveway and parking. The design constraints are based on the City of Clifton and Hudson-Essex-Passaic Soil Conservation District requirements. The subject property is known as Block 44.01, Lots 11, 14, 15 & 18 in the City of Clifton, Passaic County, New Jersey. The scope of this study includes analysis of the existing drainage characteristics of the site compared with post drainage conditions. This Report comparatively analyzes the pre-development site runoff to the post development site runoff. Calculations documenting the design of the stormwater management system, as illustrated on the Site Plan drawing documents, prepared by Bohler Engineering are included within the Appendix of this Report.

2. Existing Site Conditions

The subject property (Proposed Lot 'A') encompasses 3.86 acres. The site is located at 782, 784, 810 & 818 Valley Road and is bordered to the northwest by a residential development, to the northeast by an assisted living facility; to the southwest and to the southeast by Valley Road with a Church, School, and businesses beyond. The subject property is currently occupied by a 1-story residential building and associated driveway and parking. The drainage pattern flows via overland sheet flow and shallow concentrated flow into the Roadway Drainage System.

Based on a review of the Hudson-Essex-Passaic Soil Survey, the subject parcel contains BonDb (Boonton silt loam, 15 to 35T slopes, very stony) and USBOOC (Urban land – Boonton, red sandstone lowland, 8 to 15% slopes) which are delineated on the Soils Map located within the Appendix of this Report. The TR-55 Manual provides designation, Hydrologic Soil Type 'C' for BonDb and Hydrologic Soil Type 'D' for USBOOC.

The existing site conditions for the studied subject property is illustrated on the "Existing Drainage Area Map" included within the Appendix of this Report. This map is based on an ALTA/NSPS Land Title Survey, prepared by Control Point Associates, Inc, additional topography located outside surveyed limit has been obtained from the National Oceanic and Atmospheric (NOAA) data. Based on the analysis of the existing topography of the subject property, the existing conditions are tributary to the Roadway Drainage System (refer to the "Existing Drainage Area Map" for additional information).

Drainage Area 'E1':

Drainage Area E1 consists of 3.919 acres of woods, grass, and impervious area onsite draining towards the Roadway Drainage System via overland sheet flow

and shallow concentrated flow. A CN value of 68 was utilized for this area with a calculated time of concentration of 8.3 minutes.

3. Proposed Site Conditions

The post development conditions include the construction a 3-story 15,841 SF Independent Senior Living with associated asphalt/concrete parking/circulation areas, sidewalk, landscaping, and stormwater management facilities. The proposed site is designed in a manner that generally maintains the existing drainage patterns. Onsite stormwater management improvements to collect and control stormwater runoff include inlets, piping, roof drains, Kraken Unit, an underground detention basin, and a French Drain. These improvements are illustrated on the Site Plans, prepared by Bohler Engineering. The proposed conditions are as follows:

Drainage Area 'P1':

Drainage Area 'P1' consists of subcatchments P1-A, P1-B and P1-C which are ultimately tributary to the Roadway Drainage System.

Drainage area P1-A is the onsite area consisting of approximately 1.398 acres of the subject parcel (pavement and grass areas). Stormwater from this area is tributary to the onsite stormwater facility which is collected and stored prior to discharging to the Roadway Drainage System. A CN value of 97 was utilized for this area with a calculated time of concentration of 0.4 minutes.

Drainage Area P1-B consists of 0.693 acres and is the small portion of the onsite area which bypasses the proposed onsite stormwater facility and discharges directly to the Roadway Drainage System. A CN value of 83 was utilized for this area with a minimum time of concentration of 2.2 minutes.

Drainage area P1-C is the onsite area consisting of approximately 1.828 acres of the subject parcel (gravel, grass and wooded areas). Stormwater from this area is tributary to the French Drain along the rear retaining wall which drains to the onsite stormwater facility which is collected and stored prior to discharging to the Roadway Drainage System. A CN value of 71 was utilized for this area with a calculated time of concentration of 7.6 minutes.

3.1 Non-Structural Stormwater Management Facilities

In accordance with the NJDEP regulations, several non-structural stormwater management strategies have been incorporated into this design and are listed below:

3.1.1 Low Maintenance Landscaping

A comprehensive Landscape Plan has been incorporated within the subject development, which provides low maintenance landscaping. Furthermore, the use of lawn areas has been minimized where applicable and fertilizers and pesticides are to be used sparingly.

3.1.2 Preventive Source Controls

The proposed development has addressed this area by providing trash receptacles located throughout the site at key points. Furthermore, floatable and total suspended solids are routinely eliminated through the implementation of an onsite maintenance program.

3.2 Structural Stormwater Management Facilities

In addition to the above non-structural BMP strategies, the following types of structural BMPs are employed in this design:

3.2.1 Pervious Paving System

The proposed porous pavement system serves as the stormwater detention system for Sub-Drainage Areas 'P1-A' and 'P1-C'. The proposed porous pavement system collects stormwater runoff from the proposed development as noted above through inlets, underground piping system, the French Drain and overland sheet flow. The porous pavement system is designed to store and release stormwater at a controlled rate to meet the stormwater quantity reduction requirements. Underdrains and overflow pipes have been provided to convey stormwater for events larger than the water quantity storm to the outlet structure.

3.2.2 Outlet Control Structures

Stormwater from the proposed development as discussed above in association with the porous pavement system is released at a controlled rate to the Roadway Drainage System by the proposed precast reinforced concrete outlet control structure. The proposed precast reinforced concrete Outlet Control Structure is equipped with a 4.5" orifice at elevation 323.22 to convey the runoff from the Water Quality Storm and a 4' wide weir at elevation 323.78 to convey stormwater for larger storm events.

3.3 Soil Erosion and Sediment Control Design

The Soil Erosion and Sediment Control Plan is included within the Site Plans and shall be followed throughout construction. Silt fences, stabilized construction entrances, a temporary soil stockpile, and inlet filters are proposed to be utilized during construction. The proposed development retains pre-developed runoff characteristics and does not increase the rate of runoff. As such, the offsite stability should be considered as ‘stable.’

4. Methodology

The methodology utilized to design the subject stormwater management system is in compliance with all jurisdictional agency regulations. Specifically, the proposed design was developed for the subject site utilizing the TR-55 Method. Runoff curve numbers were determined for each drainage area based on Type ‘C’ and ‘D’ soils and were calculated for each drainage area through the use of the stormwater design software, HydroCAD 10.00. Design calculations are included within the Appendix of this Report. Hydrographs were generated for each watershed under the existing and proposed conditions. These hydrographs were created with HydroCAD 10.00 and are included in the Appendix of the report.

The primary design constraints for this project are based on the requirements set forth in the New Jersey Department of Environmental Protection (NJDEP) ‘Stormwater Management Regulations’. By design, the requirements set forth by the City of Clifton, Passaic County, and Hudson-Essex-Passaic Soil Conservation District are met. The stormwater NJDEP management regulations can be separated into three primary categories:

1. Water Quality (Total Suspended Solids)
2. Quantity Reductions
3. Groundwater Recharge

4.1 Water Quality

The NJDEP’s Stormwater Management Rules require 80% Total Suspended Solids (TSS) reduction in the post-construction runoff from a land development site for areas of new impervious. The required TSS reduction is to be achieved by conveying the site’s developed runoff through the porous pavement system. The porous pavement system is proven to remove 80% TSS by the NJDEP; therefore, water quality requirements have been met.

4.2 Quantity Reductions

The quantity reduction for post-construction development as detailed in the NJDEP Stormwater Management Regulations requires a 50% reduction for the 2-year storm, a 25% reduction for the 10-year storm, and 20% reduction

for the 100-year storm for areas where detention is required due to development or prove hydrographs for the 2-, 10-, and 100- year storms do not exceed existing hydrographs. As demonstrated by the Runoff Rate Summary Charts found in the Appendix of this Report, the post-development runoff rates for the onsite watershed for the subject property have met the percent reduction requirements when compared to the pre-development runoff rates when comparing Drainage Area 'P1' vs 'E1'.

4.3 Groundwater Recharge

Stormwater Management Rules require that a proposed land development site comply with either of the following groundwater recharge requirements:

- Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100% of the average annual pre-construction groundwater recharge volume for the site; or
- Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the 2-year storm is infiltrated.

Based on the Geotechnical Investigation prepared by Whitestone Associates, LLC (included in the Appendix of this report) the infiltration rates on site do not support groundwater recharge and therefore is not feasible. Refer to the Appendix for the Geotechnical data referenced.

5. Pipe Sizing Calculations

Calculations for pipe sizing for the stormwater conveyance system are contained in the Appendix of this Report. The Rational Method has been utilized to size the on-site storm piping for the 25-year occurrence storm. The calculations are conservatively based on a minimum six (6.0) minute time of concentration to any particular inlet except for areas tributary to the swales, the time of concentration is calculated. Inlet Drainage Area Map and time of concentration calculations for the swales are included in the Appendix of this Report.

6. Conclusion

In summary, the proposed stormwater management system illustrated on the drawings, prepared by Bohler Engineering meets the requirements set forth by all reviewing jurisdictional agencies and the NJDEP Stormwater Regulations. The results of the design calculations performed demonstrate that the stormwater runoff rates from the proposed development are reduced when compared to the existing runoff rates. A pre-development versus post development discharge Runoff Rate Summary Chart is provided for complete runoff rate comparison for Drainage

Area 'E1' versus Drainage Area 'P1'. Note that the existing drainage patterns are being maintained, runoff rates are being reduced, and water quality is increased for the property in question. Due to the fact that the post-development runoff rates are less than the pre-development runoff rates, our office anticipates no negative impacts to the surrounding areas.

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APPENDICES

A. PRE- vs. POST-DEVELOPMENT HYDROGRAPHS

- ◆ **Runoff Rate Summary Chart**
- ◆ **Water Quality Storm Event**
- ◆ **2-Year Storm Event**
- ◆ **10-Year Storm Event**
- ◆ **25-Year Storm Event**
- ◆ **100-Year Storm Event**

A. PRE- vs. POST-DEVELOPMENT HYDROGRAPHS

◆ Runoff Rate Summary Chart

RUNOFF RATE SUMMARY CHART

**Analysis of Drainage Area ‘E1’ versus Drainage Area ‘P1’
Drainage Area Tributary to the Passaic County Drainage System**

Storm	E1	P1	Required Reduction	Allowed	Actual Reduction
	cfs	cfs	%	cfs	%
2 Yr	3.61	1.76	50%	1.81	51%
10 Yr	8.42	4.25	25%	6.31	50%
25 Yr	12.14	6.52	N/A	N/A	N/A
100 Yr	19.44	15.22	20%	15.55	22%

A. PRE- vs. POST-DEVELOPMENT HYDROGRAPHS

◆ **Water Quality Storm Event**

A. PRE- vs. POST-DEVELOPMENT HYDROGRAPHS

◆ **2-Year Storm Event**

A. PRE- vs. POST-DEVELOPMENT HYDROGRAPHS

◆ 10-Year Storm Event

A. PRE- vs. POST-DEVELOPMENT HYDROGRAPHS

◆ 25-Year Storm Event

A. PRE- vs. POST-DEVELOPMENT HYDROGRAPHS

◆ 100-Year Storm Event

B. DESIGN CALCULATIONS

◆ Pipe Sizing Calculations

C. REFERENCE

- ◆ **Report of Supplemental Geotechnical Investigation
prepared by Whitestone Associates, LLC, dated November
4, 2020**

D. MAPS

- ◆ **Aerial Map**
- ◆ **Soil Map**
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