STORMWATER MANAGEMENT REPORT

3501 STATE ROUTE 66 REDEVELOPMENT

3501 STATE ROUTE 66
BLOCK No. 3903, LOT No. 12 & 13
TOWNSHIP OF NEPTUNE, MONMOUTH COUNTY, NEW JERSEY

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EXECUTIVE SUMMARY

The proposed stormwater management and conveyance systems for the proposed 3501 State Route 66 Redevelopment project have been designed in accordance with the New Jersey Department of Environmental Protection stormwater rules (NJAC 7:8), the New Jersey Department of Transportation drainage design guidelines, and the Township of Neptune stormwater regulations.

The proposed redevelopment includes the construction of:

- A 251,022± square foot warehouse with 32 loading docks and 25 trailer parking spaces;
- A 15,000 square foot retail building with an open space amenity area; and,
- Associated driveways, sidewalks, car parking areas, stormwater and utility infrastructure, and landscaping.

The proposed redevelopment increases regulated motor vehicle surfaces by more than one-quarter acre and disturbs more than one acre of land; therefore, this project is considered a "major development" from a stormwater management perspective, and the proposed design is required to address stormwater quantity, quality, and groundwater recharge requirements. The proposed stormwater management system consists of the following:

- A subsurface conveyance system consisting of inlets, manholes, and pipes to convey stormwater runoff from the 25-year design storm event;
- 4 small-scale bioretention basins;
- 2 small-scale infiltration basins;
- 1 large-scale infiltration basin; and,
- 1 porous asphalt pavement system.

By using the stormwater management measures identified above and reviewing the results of the detailed calculations provided in this report, the stormwater management design is in accordance with the Township of Neptune, NJDOT, and NJDEP stormwater rules, regulations, and ordinance requirements in effect at the time of the preparation of this report.

1.0 INTRODUCTION

This report addresses the engineering design of the stormwater conveyance and management system for the proposed redevelopment of a former office complex at 3501 State Route 66 in Neptune Township, New Jersey. The proposed stormwater management system is designed in accordance with:

- New Jersey Department of Environmental Protection (NJDEP) stormwater rules (NJAC 7:8);

- New Jersey Standards for Soil Erosion and Sediment Control;

- New Jersey Department of Transportation Roadway Design Manual; and

- Township of Neptune Ordinance No. 21-07 – Township Stormwater Management Ordinance, Section 528 of the Land Development Ordinance

2.0 PROJECT DESCRIPTION

2.1 Existing Site Description

The project site is comprised of Block No. 3903, Lot No. 12 & 13 in the Township of Neptune, Monmouth County, New Jersey. The 47.38± acre tract consists of a vacant office complex, parking areas, and wetlands, and is bound by vacant land and industrial properties to the north, Green Grove Road to the east, State Route 66 to the south, and an office and industrial complex to the west; refer to Figure 1 – Site Location Map. Jumping Brook traverses the western portion of the property, flowing from north to south toward State Route 66.

The site topography generally slopes from northeast to southwest, predominantly toward Jumping Brook, with approximately 50 feet of grade change occurring across the site. Slopes within the site vary from generally 2% to as steep as approximately 50% along steeper embankments. The majority of existing stormwater runoff generated from the subject site is conveyed via existing conveyance networks toward Jumping Brook. The stormwater runoff generated from the southeastern portion of the tract is conveyed via an existing conveyance network southward across State Route 66 to Betty Brook, which is a tributary to Jumping Brook.

2.2 Subsurface Conditions

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, the underlying soils in the project area consist primarily of Atsion sand, Downer-urban land complex, and Evesboro-urban land complex, with smaller areas of other soil types. Soils are assumed to have a hydrologic soil group classification of "A" or "D," depending on the presence of wetlands, an indicator of a high groundwater table – refer to Figure 3 – Soils Map.

2.3 Flood Hazard Area

Based on a review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate

Map (FIRM) for Monmouth County, Map #34025C0327F, dated effective September 25, 2009, the subject property is located within a 100-year fluvial flood hazard area; refer to Figure 2 – FEMA Flood Insurance Rate Map. On FEMA flood mapping, Jumping Brook is referred to as Jumping Brook 2, in order to distinguish it from another stream of the same name (Jumping Brook 1) that is also located in Monmouth County.

According to Flood Profile 73P for Jumping Brook 2, located in the Flood Insurance Study Volume 2 of 3 for Monmouth County, New Jersey, dated effective September 25, 2009, the 100-year flood hazard elevation across the subject tract, between cross sections AD and AF, is EL. 71.4 (NAVD 88).

The NJDEP has also conducted a flood study on Jumping Brook. According to a plan numbered Plate 24, titled "Jumping Brook – Supplemental Flood Hazard Studies & Mapping – Neptune Township – Monmouth County, Sta. 173+00 to Sta. 212+16," the 100-year flood hazard elevation across the subject tract, between cross sections AC and AE, is EL. 65.00 (NGVD 29), and the New Jersey Flood Hazard Area Design Flood (NJFHADF) elevation is EL. 66.50 (NGVD 29).

In accordance with N.J.A.C 7:13-3.2.(c), where a department (NJDEP) delineation for a regulated water has been promulgated prior to January 24, 2013, the applicant shall utilize whichever results in a higher flood hazard area design flood elevation between Method 1, the department (NJDEP) delineation, or Method 2 in tidal flood hazard areas or Method 3 in fluvial flood hazard areas. According to N.J.A.C. 7:13-3.4.(e).1, under Method 3 (FEMA Fluvial Method), the flood hazard area design flood elevation shall be equal to one foot above the FEMA 100-year flood elevation, which results in the NJFHADF for the subject tract being EL. 72.4 (NAVD 88). This elevation is significantly higher than the Method 1 NJFHADF elevation, and is therefore the elevation that governs.

2.4 Proposed Development

The proposed redevelopment at the project site will consist of the following improvements:

- A 251,022± square foot warehouse with 32 loading docks and 25 trailer parking spaces;
- A 15,000 square foot retail building;
- An open space amenity area;
- Associated driveways, sidewalks, car parking areas, utility infrastructure, and landscaping; and,
- A stormwater management system consisting of 4 small-scale bioretention basins, 2 small-scale infiltration basins, 1 large-scale infiltration basin, 1 porous asphalt pavement system, and a subsurface conveyance network comprised of inlets, pipes, and manholes.

3.0 STORMWATER MANAGEMENT

The proposed redevelopment disturbs over 1 acre of land and increases regulated motor vehicle surface by more than one-quarter acre; therefore, this project is considered a major development as defined by the NJDEP stormwater rules (NJAC 7:8). Projects that qualify as major developments are required to design stormwater management systems that address:

- Stormwater quantity;
- Stormwater quality;
- Groundwater recharge; and,
- Nonstructural measures

The following sections provided additional detail regarding each of the stormwater design regulations.

3.1 Stormwater Quantity Design

3.1.1 Design Criteria

In accordance with N.J.A.C. 7:8-5.6.(b).3, stormwater management measures are to be designed so that the post-construction peak runoff rates for the 2-, 10-, and 100-year design storm events are 50, 75, and 80%, respectively, of the pre-construction runoff rates for the portion of the site on which the proposed development is to be constructed. The portions of the project site that are to remain undisturbed in the post-construction condition are not subject to rate control measures.

Alternatively, in accordance with N.J.A.C. 7:8-5.6.(b).1, it can be demonstrated through hydrologic and hydraulic analyses that the post-construction runoff hydrographs for the 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.

The proposed redevelopment results in each point of analysis varying in terms of realizing an increase in post-construction peak runoff rates when compared to pre-construction peak runoff rates. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).3 that the post-construction peak runoff rates for the 2-, 10-, and 100-year design storm events are 50, 75, and 80%, respectively, of the pre-construction runoff rates for the portion of the site on which the redevelopment is to take place and quantity control through the implementation of BMPs is required. For the points of analysis where there are no quantity control BMPs being implemented, and the total watershed area contributing to a point of analysis decreases in the

post-construction condition, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).1 that the post-construction runoff hydrographs for the 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.

3.1.2 Design Methodology

This study was prepared utilizing the Natural Resources Conservation Service (NRCS - formerly SCS) method to analyze the pre- and post-development stormwater runoff rates and volumes. This methodology meets the NJDEP stormwater calculation requirements presented in Section 7:8 of the New Jersey Administrative Code (N.J.A.C.) recognizing existing conditions. Stormwater hydrographs were developed utilizing the NOAA Atlas 14 Region D 24-hour storm distribution, and precipitation depths are referenced from the NOAA Atlas 14, Volume 2, Version 3 Point Precipitation Frequency Estimates Table for Neptune Township, New Jersey, accessed on December 16, 2021, for the 2-, 10-, 25-, and 100-year return periods. The table below summarizes the rainfall event totals.

Table 1 – NOAA Atlas 14 Precipitation Summary for 24-Hour Storm Events

2-yr (in)	10-yr (in)	25-yr (in)	100-yr (in)
3.49	5.40	6.74	9.24

A time of concentration was calculated for each watershed. The time of concentration is defined as the time for runoff to travel from the hydraulically most remote point of the watershed to the point of interest. Values of the time of concentration were determined for existing and proposed conditions based on land cover and slope of the flow path using methods described in TR-55 and Chapter 5 of the New Jersey Best Management Practices (BMP) Manual. A time of concentration calculation was performed for both the pervious and impervious land coverage areas within each watershed in order to more accurately model peak runoff rates. For the post-construction time of concentration calculations, the McCuen-Spiess limitation is applied to the sheet flow travel time portion of the calculation. Due to technical limitations of the hydrologic software used to develop hydrographs, the minimum time of concentration is 2 minutes.

A runoff curve number (CN) was selected based upon the land cover type and underlying soil hydrologic classification within each watershed. In accordance with Chapter 5 of the New Jersey BMP Manual, peak runoff rates are calculated for each individual land cover type within the watershed and then hydraulically added together to determine the peak runoff rate of the watershed, rather than using the weighted runoff curve number (CN) methodology. Runoff curve numbers are referenced from Tables 2-2a and 2-2c of TR-55: Urban Hydrology for Small

Watersheds.

3.1.3 Points of Analysis

All stormwater runoff generated from the project site eventually discharges into Jumping Brook or Betty Brook, a tributary to Jumping Brook.

Point of Analysis 1 (POA-1) refers to a location within Jumping Brook at an existing headwall structure in the southwestern portion of the subject property along State Route 66. Jumping Brook flows from north to south through the property, and enters this headwall structure, eventually flowing through a 10'-9"x7'-6" concrete box culvert that traverses State Route 66.

Point of Analysis 1A (POA-1A) refers to an existing headwall structure located in the southwestern portion of the project site, adjacent to State Route 66. Runoff is conveyed via an existing stormwater conveyance network to this headwall, directly discharging into Jumping Brook and POA-1. This point of analysis was chosen in order demonstrate for erosion control purposes that flow rates will not increase in the post-construction condition, thereby not increasing discharge velocities at the outfall.

Point of Analysis 1B (POA-1B) refers to an existing headwall structure located in the western portion of the project site. Runoff is conveyed via an existing stormwater conveyance network to this headwall, directly discharging into Jumping Brook and POA-1. This point of analysis was chosen in order to demonstrate for erosion control purposes that flow rates will not increase in the post-construction condition, thereby not increasing discharge velocities at the outfall.

Point of Analysis 2 (POA-2) refers to an existing inlet located within State Route 66, and represents the point far enough downstream within the NJDOT's existing conveyance network that captures all of the runoff generated by the project site. Runoff is conveyed via overland flow from the project site, into the right-of-way, and into the NJDOT's conveyance network. From this point, runoff is conveyed to Jumping Brook.

Point of Analysis 3 (POA-3) refers to the opening of an existing 8" clay pipe, located within the right-of-way just off of the southeastern portion of the project site. Runoff is conveyed via overland flow to this pipe opening, and from this point, runoff is conveyed via NJDOT's existing conveyance network southward, across State Route 66, and into Betty Brook, a tributary to Jumping Brook.

Point of Analysis 4 (POA-4) refers to the neighboring property abutting the northerly property line of the subject tract. Runoff is conveyed via overland flow onto this property and into yard drains, which ultimately discharge into Jumping Brook.

3.1.4 Existing Watersheds

The existing watersheds are depicted on Figure 4 – Existing Watershed Map.

Watershed EX-1A is approximately 10.34± acres and consists of portions of the existing building, parking areas, and landscape islands that are proposed to be disturbed in the post-construction condition. This watershed is conveyed via an existing conveyance network, ultimately discharging from a 27" diameter reinforced concrete pipe to Point of Analysis 1A (POA-1A) and Jumping Brook (POA-1).

Watershed EX-1B is approximately 4.90± acres and consists of portions of the existing building, parking areas, and landscape islands that are proposed to be disturbed in the post-construction condition. This watershed is conveyed via an existing conveyance network, ultimately discharging from a 42" diameter reinforced concrete pipe to Point of Analysis 1B (POA-1B) and Jumping Brook (POA-1).

Watershed EX-1C is approximately 1.50± acres and consists of primarily pervious grass and wooded areas that are proposed to be disturbed in the post-construction condition. This watershed is conveyed via overland flow to Jumping Brook (POA-1).

Watershed EX-1-UNDISTURBED is approximately 24.50± acres and consists of primarily wooded areas that are proposed to remain undisturbed in the post-construction condition. This watershed is conveyed via overland flow to Jumping Brook (POA-1).

Watershed EX-2 is approximately 3.90± acres and consists of existing woods, grass areas, and pavement areas in the southern portion of the subject property that are proposed to be disturbed in the post-construction condition. This watershed is conveyed primarily via overland flow to the State Route 66 right-of-way, where runoff is collected by the existing NJDOT conveyance network, ultimately discharging to Point of Analysis 2 (POA-2) and eventually Jumping Brook.

Watershed EX-3 is approximately 1.36± acres and consists of existing woods, grass areas, and pavement areas in the southeastern portion of the subject property. This watershed is conveyed primarily via overland flow to an existing wetland area, which discharges via an 8" diameter clay pipe within the State Route 66 right-of-way (POA-3). From this point, runoff is conveyed southward via the existing NJDOT conveyance network to Betty Brook, a tributary of Jumping Brook.

Watershed EX-3-UNDISTURBED is approximately 0.64± acres and consists of existing woods and grass areas in the southeastern portion of the subject property which are proposed to remain

undisturbed in the post-construction condition. This watershed is conveyed primarily via overland flow to an existing wetland area, which discharges via an 8" diameter clay pipe within the State Route 66 right-of-way (POA-3). From this point, runoff is conveyed southward via the existing NJDOT conveyance network to Betty Brook, a tributary of Jumping Brook.

Watershed EX-4 is approximately 0.62± acres and consists of existing woods, grass areas, and pavement areas in the northern portion of the subject property. This watershed is conveyed via overland flow to conveyance networks on the neighboring property (POA-4), before ultimately discharging to Jumping Brook.

A summary of the existing watershed characteristics and peak flows are presented in the table on the following page; refer to Appendix A for weighted curve number (CN) calculation worksheets and supporting hydrologic calculations.

Table 2 – Summary of Existing Peak Discharges

Watershed	2-yr Storm Event Peak Flow (CFS)	10-yr Storm Event Peak Flow (CFS)	100-yr Storm Event Peak Flow (CFS)
EX-1A	19.47	30.31	55.03
EX-1B	11.33	17.64	31.46
EX-1C	0.11	0.17	0.85
EX-1-UNDISTURBED	30.86	48.05	86.50
EX-2	0.99	1.54	3.29
EX-3	0.12	0.19	0.92
EX-3-UNDISTURBED	0.00	0.00	0.17
EX-4	0.14	0.21	0.47

3.1.5 Allowable Peak Discharges

The proposed redevelopment increases the amount of impervious coverage compared to the existing condition, causing post-construction peak runoff rates to exceed pre-construction peak runoff rates within the watersheds with the most concentrated areas of development. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).3 that the post-construction peak runoff rates for the 2-, 10-, and 100-year design storm events are 50, 75, and 80%, respectively, of the pre-construction runoff rates for the portions of the site on which the proposed development is to be constructed and quantity control BMPs are required to be implemented.

For the points of analysis where there are no quantity control BMPs being implemented and the total watershed area contributing to a point of analysis decreases, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).1 that the post-construction runoff hydrographs for the 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction

runoff hydrographs for the same storm events.

Watersheds noted as being "disturbed" in the watershed descriptions in Section 3.1.4 of this report represent the areas on the project site that are to be disturbed as part of the proposed redevelopment and are therefore subject to post-construction peak rate reductions if post-construction peak runoff rates exceed pre-construction peak runoff rates and quantity control BMP's are required to be implemented.

Watersheds noted as being "undisturbed" in the watershed descriptions in Section 3.1.4 of this report represent the areas on the project site that are to remain undisturbed as part of the proposed redevelopment and are therefore not subject to peak rate reductions.

The following section summarizes the quantity control criteria being established for each point of analysis, which watersheds are subject to peak rate reductions, and the allowable peak discharges for each point of analysis.

- Point of Analysis 1A (POA-1A): This point of analysis was chosen in order to demonstrate for erosion control purposes that flow rates will not increase in the post-construction condition, thereby not increasing discharge velocities at the outfall of the existing 27" diameter reinforced concrete pipe. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).1 that the post-construction runoff hydrographs for the 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events. The watershed contributing to this point of analysis, EX-1A, ultimately contributes to Point of Analysis 1 (POA-1). Refer to the Point of Analysis 1 (POA-1) allowable discharge summary.

Table 3 – POA-1A Allowable Peak Discharges

Design Storm Event	Existing Peak Discharge (CFS)	Allowable Peak Discharge (CFS)
2-Year	19.47	19.47
10-Year	30.31	30.31
100-Year	55.03	55.03

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

- Point of Analysis 1B (POA-1B): This point of analysis was chosen in order to demonstrate for erosion control purposes that flow rates will not increase in the post-construction condition, thereby not increasing discharge velocities at the outfall of the existing 42"

diameter reinforced concrete pipe. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).1 that the post-construction runoff hydrographs for the 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events. The watershed contributing to this point of analysis, EX-1B, ultimately contributes to Point of Analysis 1 (POA-1). Refer to the Point of Analysis 1 (POA-1) allowable discharge summary.

Table 4 – POA-1B Allowable Peak Discharges		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	11.33	11.33
10-Year	17.64	17.64
100-Year	31.46	31.46

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

- Point of Analysis 1 (POA-1): The proposed redevelopment within this watershed results in peak runoff rates increasing in the proposed condition, and quantity control BMPs are required to be implemented. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).3 that the post-construction peak runoff rates for the 2-, 10-, and 100-year design storm events are 50, 75, and 80%, respectively, of the pre-construction runoff rates for the disturbed portions of the overall watershed.

Table 5 – Watershed EX-1-DISTURBED Allowable Peak Discharges			
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Discharge (%)**	**Allowable Peak Discharge (CFS)**
2-Year	30.86	50%	15.43
10-Year	48.05	75%	36.03
100-Year	86.50	80%	69.20

Note: Watershed EX-1-DISTURBED is the resultant combined watershed after hydraulically adding the disturbed watersheds that are subject to peak rate reductions that contribute to POA-1. These watersheds include watershed EX-1A, watershed EX-1B, and watershed EX-1C. Total existing peak discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

Table 6 – POA-1 Allowable Peak Discharges		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	30.86	15.43
10-Year	48.05	36.03
100-Year	86.67	69.37

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

- Point of Analysis 2 (POA-2): The total contributing watershed area, including impervious area, is being reduced in the post-construction condition. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).1 that the post-construction runoff hydrographs for the 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.

Table 7 – POA-2 Allowable Peak Discharges		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	0.99	0.99
10-Year	1.54	1.54
100-Year	3.29	3.29

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

- Point of Analysis 3 (POA-3): The total contributing watershed area, including impervious area, is being reduced in the post-construction condition. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).1 that the post-construction runoff hydrographs for the 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.

Table 8 – POA-3 Allowable Peak Discharges		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	0.12	0.12
10-Year	0.19	0.19
100-Year	1.09	1.09

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

- Point of Analysis 4 (POA-4): The total contributing watershed area, including impervious area, is being reduced in the post-construction condition. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).1 that the post-construction runoff hydrographs for the 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.

Table 9 – POA-4 Allowable Peak Discharges		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	0.14	0.14
10-Year	0.21	0.21
100-Year	0.47	0.47

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

3.1.6 Proposed Watersheds

The proposed watersheds are depicted on Figure 5 – Proposed Watershed Map.

Watershed PR-1A is approximately 2.80± acres and consists of portions of the proposed loading dock area, warehouse car parking area, and pervious landscape areas. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to Small-Scale Infiltration Basin 1A (SSIB-1A). The watershed is then ultimately conveyed to POA-1B, prior to discharging to POA-1.

Watershed PR-1B is approximately 2.68± acres and consists of portions of the proposed warehouse roof area, car parking area, and pervious landscape areas. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to Small-Scale

Bioretention Basin 1B (SSBB-1B). The watershed is then ultimately conveyed to POA-1B, prior to discharging to POA-1.

Watershed PR-1D is approximately 1.34± acres and consists of portions of the proposed warehouse roof area, drive aisles, and pervious landscape areas. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to Small-Scale Infiltration Basin 1D (SSIB-1D). The watershed is then ultimately conveyed to POA-1B, prior to discharging to POA-1.

Watershed PR-1E is approximately 0.86± acres and consists of portions of the proposed warehouse roof area, drive aisles, and pervious landscape areas. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to Small-Scale Bioretention Basin 1E (SSBB-1E). The watershed is then ultimately conveyed to POA-1B, prior to discharging to POA-1.

Watershed PR-1F is approximately 0.77± acres and consists of portions of impervious drive aisles and pervious landscape areas. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to Small-Scale Bioretention Basin 1F (SSBB-1F). The watershed is then ultimately conveyed to POA-1B, prior to discharging to POA-1.

Watershed PR-1G is approximately 2.50± acres and consists of portions of the warehouse loading area and pervious landscape areas. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to Small-Scale Bioretention Basin 1G (SSBB-1G). The watershed is then ultimately conveyed to POA-1B, prior to discharging to POA-1.

Watershed PR-1H is approximately 5.63± acres and consists of portions of the warehouse roof area and pervious landscape areas. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to Large-Scale Infiltration Basin 1H (LSIB-1H). The watershed is then ultimately conveyed to POA-1B, prior to discharging to POA-1.

Watershed PR-1I is approximately 3.35± acres and consists of the retail building, parking areas, driveways, and pervious landscape areas. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to an existing subsurface system, which conveys runoff to POA-1A, prior to discharging to POA-1.

Watershed PR-1J is approximately 0.67± acres and consists of pervious landscape areas. Stormwater runoff is conveyed via overland flow to Jumping Brook (POA-1).

Watershed PR-1K is approximately 0.46± acres and consists of parking areas and pervious

landscape areas. Stormwater runoff is conveyed via overland flow to Porous Asphalt Pavement System 1. This BMP then conveys runoff to POA-1A, prior to discharging to POA-1.

Watershed PR-1-UNDISTURBED is approximately 24.50± acres and consists of primarily wooded areas that are proposed to remain undisturbed in the post-construction condition. This watershed is conveyed via overland flow to Jumping Brook (POA-1).

Watershed PR-2 is approximately 1.09± acres and consists of the main entrance driveways from Route 66 that service the project site, and pervious landscape areas both onsite and within the right-of-way. This watershed is conveyed via overland flow and a proposed subsurface conveyance system to the NJDOT's existing conveyance network within Route 66. Runoff is then conveyed to POA-2, ultimately discharging into Jumping Brook.

Watershed PR-3 is approximately 0.33± acres and consists of a portion of the proposed driveway and pervious landscape areas. Stormwater runoff is conveyed via overland flow to POA-3, which ultimately discharges to Betty Brook.

Watershed PR-3-UNDISTURBED is approximately 0.64± acres and consists of grassed areas and wooded areas that are proposed to remain undisturbed in the post-construction condition. Stormwater runoff is conveyed via overland flow to POA-3, which ultimately discharges to Betty Brook.

Watershed PR-4 is approximately 0.13± acres and consists of pervious landscape areas. Stormwater runoff is conveyed via overland flow to POA-4, which ultimately discharges to Jumping Brook.

A summary of the existing watershed characteristics and peak flows are presented in the table below; refer to Appendix B for runoff curve number (CN) calculation worksheets and supporting hydrologic calculations.

Table 10 – Summary of Proposed Peak Discharges				
Watershed	**2-yr Storm Peak Flow (CFS)**	**10-yr Storm Peak Flow (CFS)**	**25-yr Storm Peak Flow (CFS)**	**100-yr Storm Peak Flow (CFS)**
PR-1A	5.70	8.86	11.23	16.49
PR-1B	4.47	6.95	9.06	14.11
PR-1D	2.32	3.61	4.58	6.83
PR-1E	1.94	3.02	3.86	5.65
PR-1F	1.30	2.02	2.62	4.08
PR-1G	6.98	10.87	13.69	19.36
PR-1H	14.87	23.14	29.25	41.55
PR-1I	7.55	11.75	14.79	21.18
PR-1J	0.00	0.04	0.13	0.50
PR-1K	1.47	2.28	2.86	3.96
PR-1-UNDISTURBED	0.00	0.10	0.51	4.62
PR-2	0.72	1.11	1.48	2.76
PR-3	0.12	0.19	0.27	0.61
PR-3-UNDISTURBED	0.00	0.00	0.01	0.17
PR-4	0.00	0.01	0.06	0.24

3.1.7 Proposed Detention Routing

Two small-scale infiltration basins, 4 small-scale bioretention basins, and 1 large-scale infiltration basin are proposed in order to meet the stormwater quantity requirements. According to N.J.A.C. 7:8-5.2.(f), small-scale infiltration basins and small-scale bioretention basins qualify as green infrastructure BMP's that may be utilized for stormwater quantity, stormwater runoff quality, and groundwater recharge without a waiver or variance, while large-scale infiltration basins qualify as green infrastructure BMP's that may be utilized for stormwater quantity without a waiver or variance.

Routing calculations have been provided in order to demonstrate that the basins have adequate storage capacity to safely convey storm events up to the 100-year design storm. Emergency spillway calculations have also been provided to demonstrate that there is a clear means of safely directing and passing the 100-year design storm event should there be a complete failure of the outlet control structure. The tables below summarize the 100-year storm event results for each BMP; refer to Appendix C for supporting calculations.

Table 11 – Summary of Small-Scale Infiltration Basin 1A					
Design Storm (YR)	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Peak Water Surface EL. (FT)**	**Emergency Spillway EL. (FT)**	**Top of Berm EL. (FT)**
100	16.49	2.01	91.49	92.50	94.00

Table 12 – Summary of Small-Scale Bioretention Basin 1B					
Design Storm (YR)	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Peak Water Surface EL. (FT)**	**Emergency Spillway EL. (FT)**	**Top of Berm EL. (FT)**
100	14.11	5.42	97.48	98.50	100.00

Table 13 – Summary of Small-Scale Infiltration Basin 1D					
Design Storm (YR)	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Peak Water Surface EL. (FT)**	**Emergency Spillway EL. (FT)**	**Top of Berm EL. (FT)**
100	6.83	6.44	92.57	93.67	95.00

Table 14 – Summary of Small-Scale Bioretention Basin 1E					
Design Storm (YR)	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Peak Water Surface EL. (FT)**	**Emergency Spillway EL. (FT)**	**Top of Berm EL. (FT)**
100	5.65	1.60	87.46	88.50	90.00

Table 15 – Summary of Small-Scale Bioretention Basin 1F					
Design Storm (YR)	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Peak Water Surface EL. (FT)**	**Emergency Spillway EL. (FT)**	**Top of Berm EL. (FT)**
100	4.08	0.51	88.47	90.00	91.25

Table 16 – Summary of Small-Scale Bioretention Basin 1G					
Design Storm (YR)	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Peak Water Surface EL. (FT)**	**Emergency Spillway EL. (FT)**	**Top of Berm EL. (FT)**
100	19.36	15.13	86.65	87.67	89.00

Table 17 – Summary of Large-Scale Infiltration Basin 1H					
Design Storm (YR)	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Peak Water Surface EL. (FT)**	**Emergency Spillway EL. (FT)**	**Top of Berm EL. (FT)**
100	41.55	3.84	87.69	89.50	91.00

The total proposed peak discharge rate for the point of analysis can then be calculated by adding together the peak outflow from the proposed small-scale bioretention basins, small-scale infiltration basins, and large-scale infiltration basin, along with the peak discharges from the

undetained, undisturbed, and offsite watersheds.

Table 18 – Total Proposed Peak Discharges				
Point of Analysis	**2-Year Storm**	**10-Year Storm**	**25-Year Storm**	**100-Year Storm**
POA-1A	7.96	12.30	15.51	22.15
POA-1B	4.62	10.02	17.44	31.19
POA-1	12.14	21.45	31.32	52.47
POA-2	0.72	1.11	1.48	2.76
POA-3	0.12	0.19	0.27	0.68
POA-4	0.00	0.01	0.06	0.24

Note: Total Proposed Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to hydrograph report calculations in Appendix B.

3.1.8 Quantity Control BMP Design Summary

For small-scale infiltration basins, the following parameters must be met as part of the system design as per Chapter 9.8 of the New Jersey BMP Manual; all design criteria have been met – refer to calculations in the appendices of this report as well as the design drawings:

- Maximum contributory drainage area: 2.5 acres
- Minimum distance between basin bottom and seasonal high groundwater/bedrock: 2 feet
- Maximum water quality design storm event water depth: 24 inches
- Maximum design storm drain time: 72 hours

Exfiltration credit is not being taken for the design of the small-scale infiltration basins; therefore, pretreatment of stormwater runoff is not required.

For small-scale bioretention basins, the following parameters must be met as part of the system design as per Chapter 9.7 of the New Jersey BMP Manual; all design criteria have been met – refer to calculations in the appendices of this report as well as the design drawings:

- Maximum contributory drainage area: 2.5 acres
- Minimum distance between basin bottom and seasonal high groundwater/bedrock: 1 foot
- Maximum water quality design storm event water depth: 12 inches
- Maximum design storm drain time: 72 hours

The bioretention basins will be under-drained due to soils that are mostly unsuitable for infiltration

due to poor field-tested percolation test results of less than 1 inch per hour in various areas across the site.

For large-scale bioretention basins, the following parameters must be met as part of the system design as per Chapter 10.2 of the New Jersey BMP Manual; all design criteria have been met – refer to calculations in the appendices of this report as well as the design drawings:

- Minimum storage volume below first orifice: entire water quality design storm volume
- Minimum distance between basin bottom and seasonal high groundwater/bedrock: 2 feet
- Maximum design storm drain time: 72 hours

Per NJDEP stormwater rules, the large-scale infiltration basin is only being utilized to meet quantity control standards; although the basin is being design to meet applicable water quality standards, will provide groundwater recharge, and has been analyzed for groundwater mounding impacts, no water quality treatment or groundwater recharge volume credit are being taken for this BMP. Furthermore, per BMP Manual guidelines, exfiltration cannot be used in routing calculations.

The proposed porous pavement system consists of a porous asphalt surface course, a choker course that will filter pollutants, and an underlying stone storage bed subbase. The stone storage bed layer of the porous pavement system has been adequately sized to route the 100-year design storm event; therefore, there is more than adequate capacity to store the water quality storm event runoff volume, thus meeting the criteria to achieve 80% TSS removal. Each porous pavement system has been designed to meet the criteria set forth in Chapter 9.6 of the BMP Manual. The maximum area of additional inflow into each system is less than three times the bottom area of the system. Each porous pavement system will be designed with an underdrain, rather than infiltrate into the underlying soil; therefore, the minimum distance required between the bottom of the system and the groundwater table and bedrock is 1 foot per Chapter 9 of the BMP Manual. The underdrain systems have been sized so that the storage beds drain well under the maximum allowable 72 hour drawdown time. Refer to the sizing calculations located in Appendix E.

Table 19 – Proposed BMP Design Summary					
BMP	**Contributory Drainage Area[1] (AC)**	**WQDS Water Depth (FT)**	**Test Pits & Borings[2]**	**Bottom of BMP EL.[3]**	**Groundwater or Mottling EL.**
SSIB-1A	2.41	0.60	TP-1, B-1	88.50	76.0
SSBB-1B	2.40	0.95	B-2, B-3	91.25	82.0[4]
SSIB-1D	1.21	1.05	B-7, B-8	90.75	88.0
SSBB-1E	0.73	0.80	B-9, B-10	81.75	73.0
SSBB-1F	0.62	0.85	B-11, B-12	82.25	78.0
SSBB-1G	2.16	1.00	TP-3, B-19, B-20	80.25	77.0
LSIB-1H	4.71	0.80	B-21, B-22, B-23, B-24, B-25, B-26, B-27, B-28	83.50	78.0
Porous Asphalt System 1	0.46	N/A	B-15, B-16	85.25	81.0

Notes:

1. *Contributory drainage area is the inflow drainage area to a BMP that excludes the area of the BMP itself.*
2. *Refer to the drainage plans, drawings CG103 through CG105, for test pit and boring locations. Refer to Appendix G for supporting geotechnical investigation information including test pit and boring logs.*
3. *The bottom of BMP elevation is either the bottom of the underdrain gravel layer for an under-drained bioretention basin or the bottom of the sand layer for infiltration basins.*
4. *If groundwater or soil mottling was not encountered, the depth of the deepest test pit or boring was assumed to be the groundwater elevation as a conservative measure.*

3.1.9 Stormwater Quantity Summary

A summary for each point of analysis, detailing the existing, allowable, and proposed peak discharge rates, is outlined in the table below.

Table 20 – POA-1A Peak Discharge Summary			
Design Storm Event	**POA-1A**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	19.47	19.47	7.96
10-Year	30.31	30.31	12.30
100-Year	55.03	55.03	22.15

Table 21 – POA-1B Peak Discharge Summary			
Design Storm Event	**POA-1B**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	11.33	11.33	4.62
10-Year	17.64	17.64	10.02
100-Year	31.46	31.46	31.19

Table 22 – POA-1 Peak Discharge Summary			
Design Storm Event	**POA-1**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	30.86	15.43	12.14
10-Year	48.05	36.03	21.45
100-Year	86.67	69.37	52.47

Table 23 – POA-2 Peak Discharge Summary			
Design Storm Event	**POA-2**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	0.99	0.99	0.72
10-Year	1.54	1.54	1.11
100-Year	3.29	3.29	2.76

Table 24 – POA-3 Peak Discharge Summary			
Design Storm Event	**POA-3**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	0.12	0.12	0.12
10-Year	0.19	0.19	0.19
100-Year	1.09	1.09	0.68

Table 25 – POA-4 Peak Discharge Summary			
Design Storm Event	**POA-4**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	0.14	0.14	0.00
10-Year	0.21	0.21	0.01
100-Year	0.47	0.47	0.24

3.2 Stormwater Quality Design

3.2.1 Design Criteria

The project site is not subject to water quality treatment requirements as the development results in a decrease in regulated motor vehicle surface coverage. In accordance with N.J.A.C. 7:8-5.5.(a), major developments are subject to providing water quality treatment when the development results in an increase of one-quarter acre or more of regulated motor vehicle surface. In the existing condition, there are approximately 7.48± acres of regulated motor surface, and in the post-construction condition, there are approximately 6.93± acres of regulated motor vehicle surface; refer to Figure 8 – Existing Regulated Motor Vehicle Surface Map and Figure 9 – Proposed Regulated Motor Vehicle Surface map for delineations.

Although the project is not subject to providing water quality treatment, the stormwater BMPs for the project site must nevertheless be designed in accordance with the standards and regulations set forth in Chapter 9 of the BMP Manual and provide water quality treatment.

3.2.2 Design Methodology

The proposed stormwater quality BMPs that have been chosen for the project design consist of small-scale bioretention basins, small-scale infiltration basins, and a porous asphalt pavement system. Each of these BMPs achieves 80% TSS removal according to Chapter 9 of the BMP Manual.

The small-scale bioretention basins have been designed to achieve 80% TSS removal, meaning that they have been designed to store the entire water quality design storm event runoff volume below the first orifice opening of the outlet control structure, with the water surface elevation not exceeding 12 inches. The basins have been designed in an online configuration, and routing calculations have been provided for the 2-, 10-, and 100-year design storm events to show that the basins have been adequately sized to pass the larger design storm events safely through.

Each bioretention basin meets the criteria set forth in Chapter 9.7 of the BMP Manual for receiving TSS removal credit; refer to calculations in Appendix E.

The small-scale infiltration basins have also been designed to achieve 80% TSS removal, meaning that they have been designed to store the entire water quality design storm event runoff volume below the first orifice opening of the outlet control structures, with the water surface elevations not exceeding 24 inches. The basins meet the criteria set forth in Chapter 9.8 of the BMP Manual for receiving TSS removal credit; refer to calculations in Appendix E.

The porous asphalt pavement system has been designed to achieve 80% TSS removal, meaning that the inflow drainage area is less than three times the area of the porous asphalt, and that the stone storage bed has been adequately sized to store the volume of the water quality design storm event. The porous asphalt pavement system meets all of the design criteria set forth in Chapter 9.6 of the BMP Manual.

3.2.3 Design Summary

Although water quality treatment is not required for the project site, the small-scale bioretention basins, small-scale infiltration basins, and porous asphalt pavement system have all been designed in accordance with the design standards and regulations in the BMP Manual and provide 80% TSS removal water quality treatment.

3.2.4 Trash and Waste

Catch basins are proposed to have Type N Eco curb pieces to prevent trash and floatables from entering the proposed conveyance systems. The basin outlet control structures will also be fixed with trash racks to prevent debris and floatables from entering the downstream conveyance systems.

3.3 Groundwater Recharge

3.3.1 Design Criteria

The subject site is located within the Metropolitan Planning area PA-1 as defined by the New Jersey State Planning Area Map; however, portions of the project site are undeveloped, with wooded areas proposed to be removed in the post-construction condition. Therefore, per N.J.A.C. 7:8-5.4.(b).1.i, one hundred percent (100%) of the average annual pre-construction groundwater recharge volume for the disturbed area of the project site must be maintained in the post-construction condition.

3.3.2 Design Methodology

The groundwater recharge volume analysis has been performed using the NJDEP New Jersey Groundwater Recharge Spreadsheet (NJGRS), which is based on the data and computational procedures outlined in New Jersey Geological Survey Report GSR-32. The spreadsheet compares the pre-construction and post-construction land cover types within the property's native underlying soil classifications to develop the total annual recharge volume across the project site in both the pre-construction and post-construction conditions.

The post-development annual groundwater recharge deficit for the project site is calculated to be 224,832 cubic feet.

3.3.3 BMP Design

Small-Scale Infiltration Basin 1A and Small-Scale Infiltration Basin 1D have been designed to meet the recharge volume requirement for the project site.

The small-scale infiltration basins are designed with 6-inch thick sand bottoms. Test pits and infiltration tests performed within the basin footprint indicate that rock and groundwater are at a sufficient depth to enable infiltration. A summary of the test pit and infiltration test results are summarized below:

Table 26 – Small-Scale Infiltration Basin 1A Design Infiltration Rate Calculation

Exploration	Permeability Test Result (in/hr)	Factor of Safety	Design Infiltration Rate (in/hr)
B-1	> 20	2	3.6
TP-1	7.2		

Table 27 – Small-Scale Infiltration Basin 1D Design Infiltration Rate Calculation

Exploration	Permeability Test Result (in/hr)	Factor of Safety	Design Infiltration Rate (in/hr)
B-7	9.9	2	4.95
B-8	13.6		

Large-Scale Infiltration Basin 1H has been designed meet quantity control requirements for the project site and cannot be utilized in meeting the groundwater recharge requirement; however, it has been designed to infiltrate due to favorable subsurface conditions. Test pits and infiltration

tests performed within the basin footprint indicate that rock and groundwater are at a sufficient depth to enable infiltration. A summary of the test pit and infiltration test results are summarized below:

Table 28 – Large-Scale Infiltration Basin 1H Design Infiltration Rate Calculation			
Exploration	**Permeability Test Result (in/hr)**	**Factor of Safety**	**Design Infiltration Rate (in/hr)**
B-21	1.4	2	0.65
B-22	1.3		
B-24	1.4		
B-28	1.3		

A groundwater mounding analysis, utilizing the NJDEP Hantush Excel Spreadsheet, was performed for each infiltration BMP as outlined in Chapter 13 of the BMP Manual. Each basin has been designed so that the maximum groundwater mounding height occurs below the respective 6-inch thick sand layer; refer the basin design summary in the tables below. The maximum mounding height produced by the Hantush spreadsheet occurs at the geometric center of the basin, with lower mounding heights occurring at the perimeter.

Table 29 – Infiltration BMP Design Summary				
Infiltration Basin	**Max. Groundwater Elevation**	**Bottom of BMP**	**Max. Mounding Height (FT)**	**Max. Mounding Elevation**
SSIB-1A	76.0	88.50	3.80	79.80
SSIB-1D	88.0	90.75	2.71	90.71
LSIB-1H	78.0	83.50	5.41	83.41

Refer to supporting calculations for this entire analysis in Appendix E.

3.3.4 Design Summary

For the project site, the combined proposed annual post-construction groundwater recharge volume between Small-Scale Infiltration Basin 1A and Small-Scale Infiltration Basin 1D was calculated to be approximately 282,045 cubic feet, which exceeds the post-development annual groundwater recharge volume deficit of 224,832 cubic feet.

3.4 Non-Structural Stormwater Management Strategies

Nonstructural strategies were analyzed and implemented to the maximum extent practical for this project.

As per NJAC 7:8-5.3(b), there are nine nonstructural strategies:

1. Protect areas that provide water quality or are susceptible to erosion;
2. Minimize, break up and/or disconnect impervious surfaces;
3. Maximize protection of natural drainage features and vegetation;
4. Minimize decrease in time of concentration;
5. Minimize land disturbance, clearing and grading;
6. Minimize soil compaction;
7. Provide low maintenance vegetation;
8. Provide vegetated conveyance systems; and,
9. Provide pollutant source controls.

3.5 Stormwater Conveyance Design

3.5.1 Design Criteria

The on-site subsurface collection and conveyance system is designed to convey the 25-year design storm event. The conveyance systems conveying discharge from basins have been designed to convey the 100-year design storm event.

The proposed off-site subsurface collection and conveyance system within the NJDOT State Route 66 right-of-way is designed to convey the 25-year design storm event. The existing drainage swales within the right-of-way were also analyzed for capacity and stability, utilizing the 10-year design storm event per Table 10.2-C of the NJDOT Roadway Design Manual. Inlet spread calculations must be performed for all inlets which may have an effect on the NJDOT right-of-way. The inlet spread calculations analyze the spread of flow across roadways and driveways for the 10-year design storm event utilizing the minimum 10-minute duration rainfall intensity.

3.5.2 Design Methodology

The conveyance system was analyzed using the rational method for estimating runoff for the 25-year design storm event. The project site was divided into subareas based upon topography to determine the contributing runoff to each individual inlet or roof drain. Weighted runoff coefficients were calculated based upon the land cover type within each delineated sub-area. A runoff coefficient (C) was selected in accordance with Table 10-4: Recommended Coefficient of Runoff Values for Various Selected Land Uses from Section 10 of the 2015 New Jersey

Department of Transportation (NJDOT) Roadway Design Manual. Values of time of concentration were chosen based on land cover and slope of the flow path from the hydraulically most distant point in the subarea to the appropriate inlet. Unless otherwise specified, the minimum time of concentration used for each on-site inlet is 5 minutes. The minimum time of concentration used for each off-site inlet within the NJDOT right-of-way is 10 minutes per Section 10.3.5.C.1.e of the NJDOT Roadway Design Manual. Rainfall intensities were taken from the National Oceanic and Atmospheric Administration (NOAA) Precipitation Frequency Data Server for the project site; refer to Appendix D.

The proposed conveyance systems have been analyzed utilizing a starting tailwater elevation corresponding to the maximum design water elevation for the 25-year design storm event for the respective BMP that each conveyance network discharges into.

Detailed design calculations for the stormwater conveyance system are included in Appendix D of this report.

4.0 SOIL EROSION AND SEDIMENT CONTROL

Soil erosion and sediment control measures have been designed and located within the project site to minimize the amount of sediment carried by stormwater runoff, both during and after construction of the project. The SESC design was completed in accordance with the New Jersey Standards for Soil Erosion and Sediment Control.

5.0 STORMWATER MAINTENANCE PLAN

The stormwater management systems for the proposed development area is intended to collect, convey and detain the stormwater runoff. Regular maintenance procedures are required to verify the consistent and proper operation of the stormwater management facilities and prevent problems and malfunctions. The maintenance program provides the stormwater maintenance procedures for the site, which can be found under separate cover.

6.0 CONCLUSION

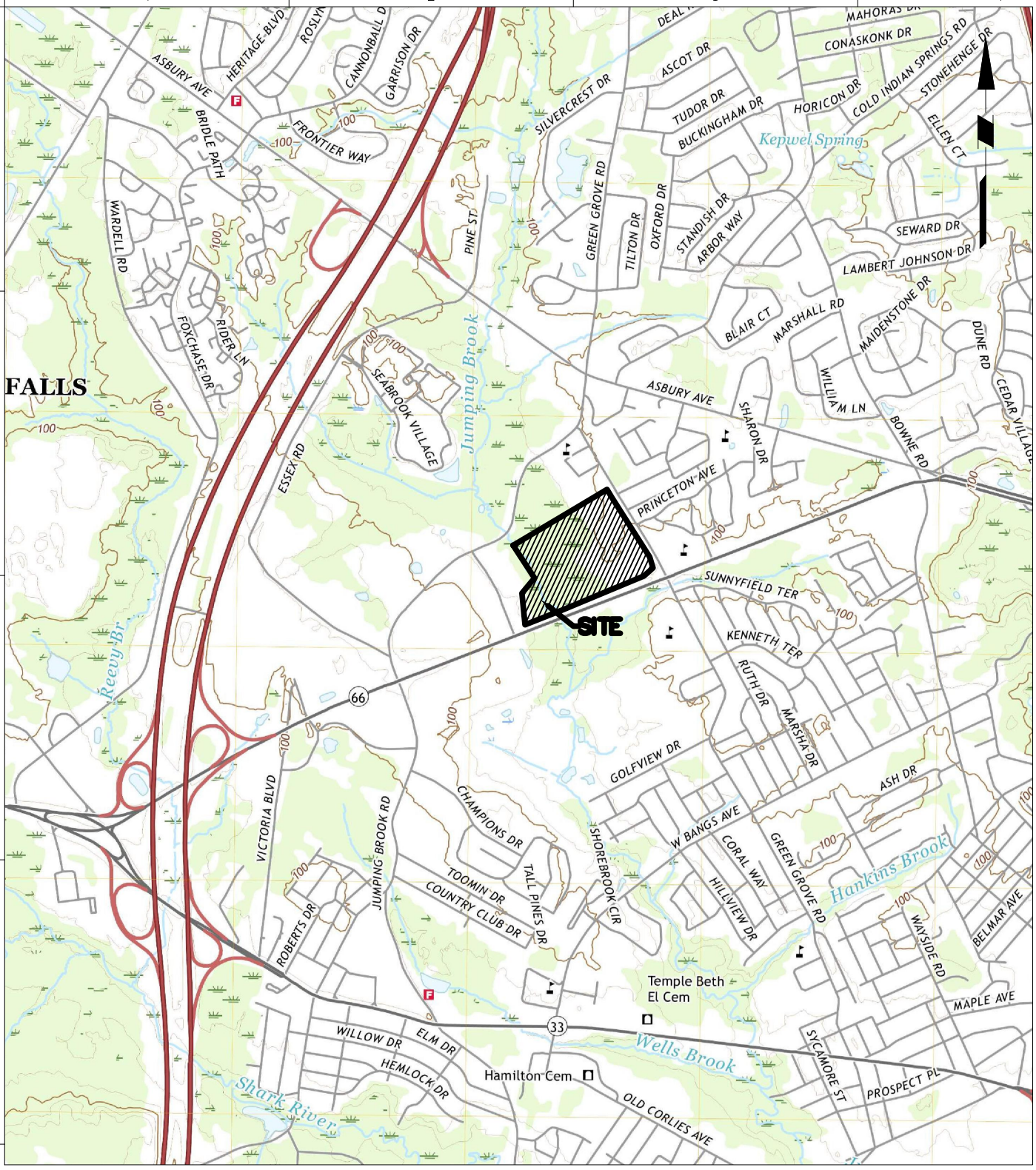
The stormwater management systems have been designed so that the post-construction peak runoff rates either meet the required peak rate reductions, or do not exceed at any point in time the pre-construction peak runoff rates, for the 2-, 10-, and 100-year design storm events, depending on the design criteria governing each point of analysis. The proposed small-scale bioretention basins and small-scale infiltration basin have been designed in accordance with the BMP Manual in order to achieve the required TSS removal rate for the project site, while simultaneously providing quantity control for the 2-, 10-, and 100-year design storm events. The

large-scale infiltration basin has been designed to also provide quantity control for the respective storm events. The small-scale infiltration basins have been designed to satisfy the annual groundwater recharge requirements. The proposed stormwater conveyance systems have been designed to safely and effectively convey the runoff generated from the 25-year design storm event. Therefore, the engineering design of the stormwater management systems has been performed in accordance with and meets the regulations specified under the Township of Neptune Code of Ordinances, NJDOT, and the NJDEP stormwater rules.

7.0 REFERENCES

1. Hydrology Studio. Hydrology Studio 2022 v 3.0.0.26.
2. Hydrology Studio. Stormwater Studio 2022 v 3.0.0.29.
3. Urban Hydrology for Small Watersheds, Technical Release No. 55, USDA Soil Conservation Service Publication, June 1986.
4. New Jersey Stormwater Best Management Practices Manual, New Jersey Department of Environmental Protection, Division of Watershed Management, April 2004, last revised April 2021.
5. Township of Neptune Ordinance No. 21-07 – Township Stormwater Management Ordinance, Section 528 of the Land Development Ordinance
6. The Standards for Soil Erosion and Sediment Control in New Jersey, New Jersey Department of Agriculture, revised July 2017.
7. New Jersey Department of Transportation 2015 Roadway Design Manual, last revised July 13, 2022.

FIGURES



SOURCE: 2019 ASBURY PARK, NJ USGS QUADRANGLE MAP.

2000 0 1000 2000

SCALE: 1 INCH = 2000 FEET

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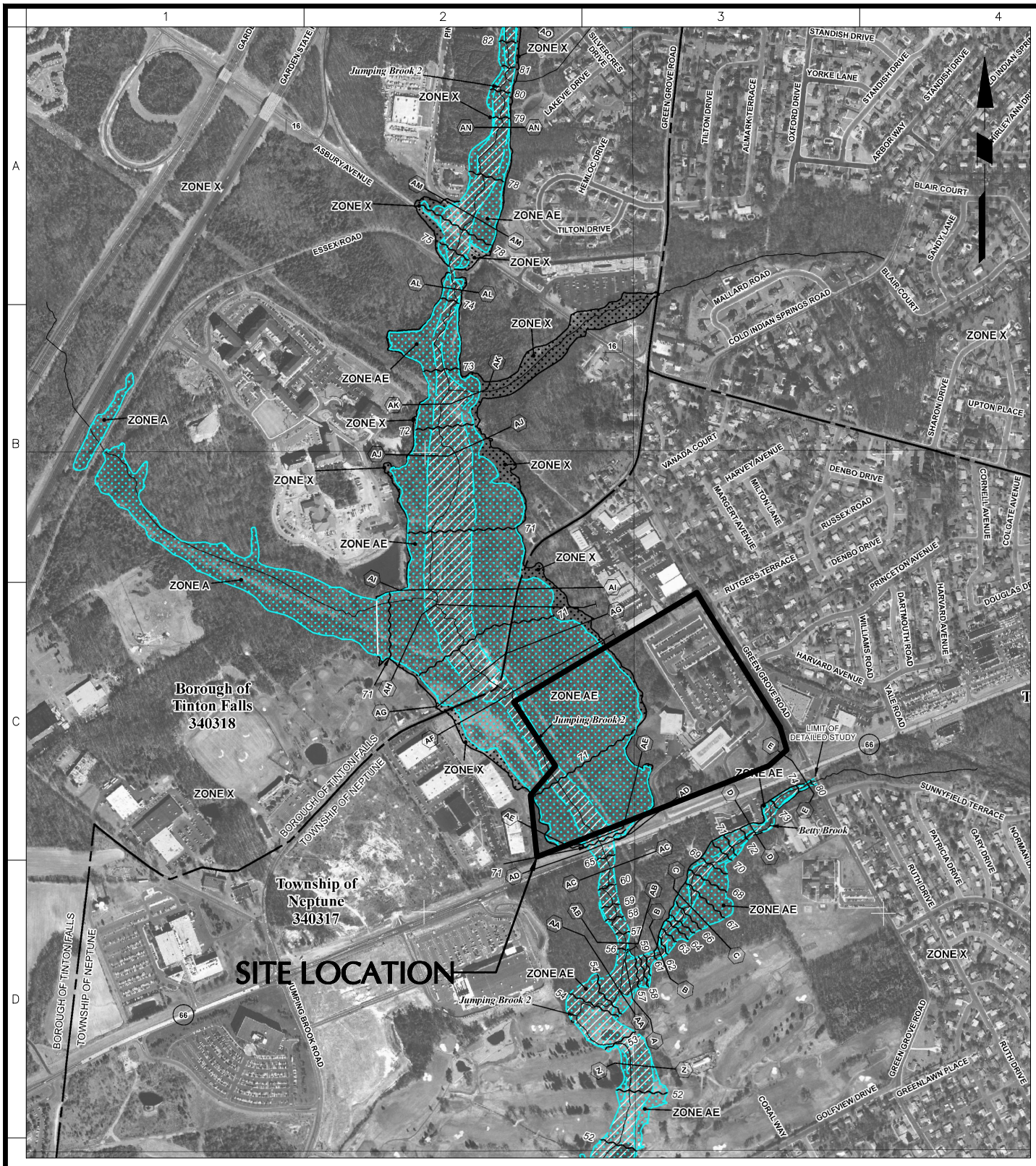
Project	3501 STATE ROUTE 66 REDEVELOPMENT BLOCK No. 3903, LOT No 12 &13 NEPTUNE TOWNSHIP MONMOUTH COUNTY NEW JERSEY
Drawing Title	SITE LOCATION MAP
Project No.	100775002
Date	AUGUST 26, 2022
Drawn By	SS
Checked By	MV
Figure	FG01
Sheet	1 of 1

Date: 8/19/2022 Time: 13:23 User: gmekhail Style Table: Langan.stb Layout: FG01 Document Code: FG01-100775002-0201-GR101-0101



REFERENCE: FEMA FLOOD INSURANCE RATE MAP OF MONMOUTH COUNTY, NEW JERSEY, MAP NUMBER 34025C0327F, EFFECTIVE DATE SEPTEMBER 25, 2009.

1000 0 500 1000

SCALE: 1 INCH = 1000 FEET

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Project	3501 STATE ROUTE 66 REDEVELOPMENT BLOCK No. 3903, LOT No 12 &13 NEPTUNE TOWNSHIP MONMOUTH COUNTY NEW JERSEY
Drawing Title	FLOOD MAP
Project No.	100775002
Date	AUGUST 26, 2022
Drawn By	SS
Checked By	MV
Figure	FG02
Sheet	1 of 1

Date: 8/19/2022 Time: 13:24 User: gmekhail Style Table: Langan.stb Layout: Layout1 Document Code: FG02-100775002-0201-GR101-0101

GENERAL NOTES:

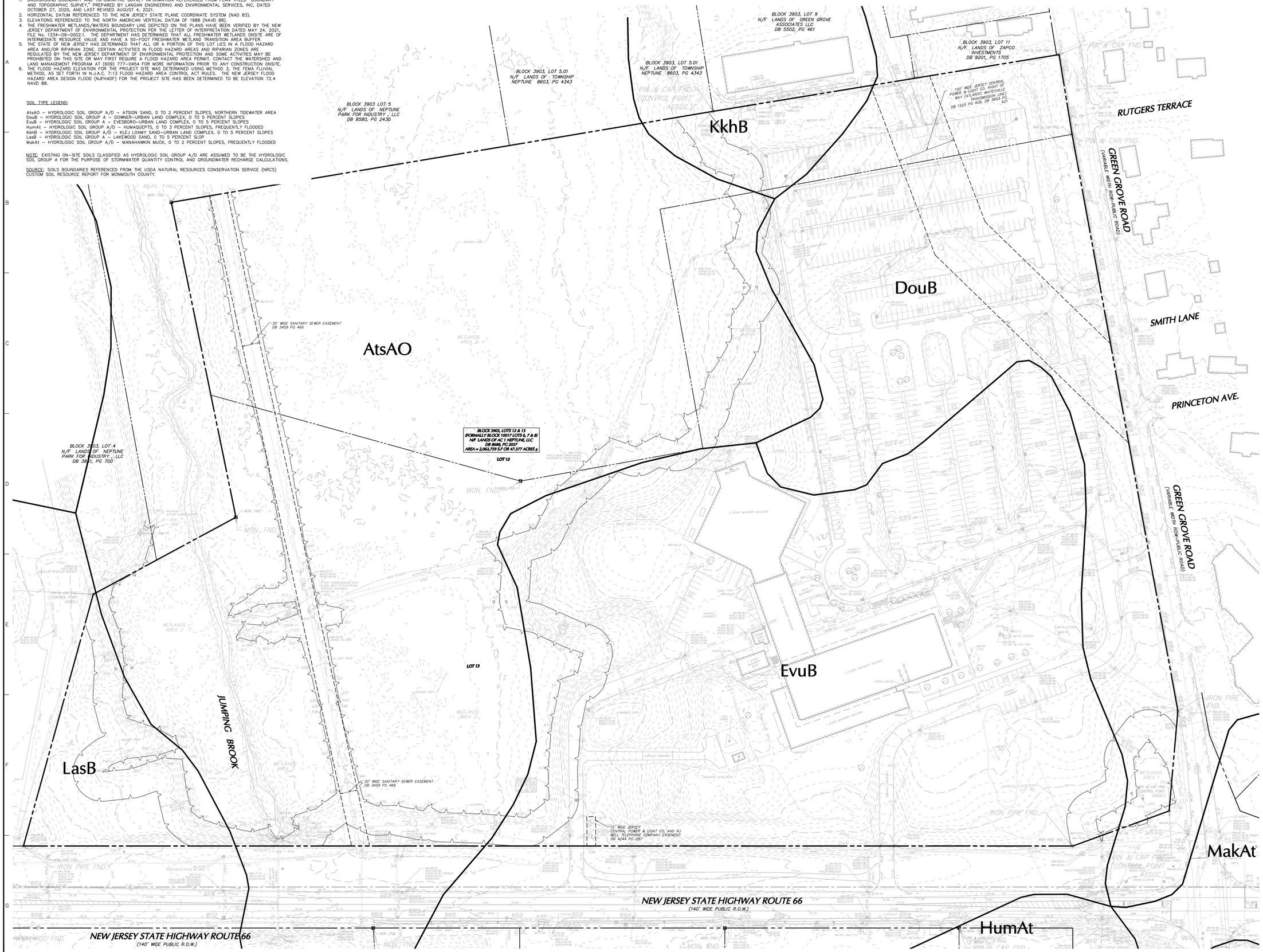
1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY AND TOPOGRAPHIC SURVEY," PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC, DATED OCTOBER 27, 2020, AND LAST REVISED AUGUST 4, 2021.
2. HORIZONTAL DATUM REFERENCED TO THE NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD 83).
3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. THE FRESHWATER WETLANDS/WATERS BOUNDARY LINE DEPICTED ON THE PLANS HAVE BEEN VERIFIED BY THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION PER THE LETTER OF INTERPRETATION DATED MAY 24, 2021, FILE No. 1334-09-0002.1. THE DEPARTMENT HAS DETERMINED THAT ALL FRESHWATER WETLANDS ONSITE ARE OF INTERMEDIATE RESOURCE VALUE AND HAVE A 50-FOOT FRESHWATER WETLAND TRANSITION AREA BUFFER.
5. THE STATE OF NEW JERSEY HAS DETERMINED THAT ALL OR A PORTION OF THIS LOT LIES IN A FLOOD HAZARD AREA AND/OR RIPARIAN ZONE. CERTAIN ACTIVITIES IN FLOOD HAZARD AREAS AND RIPARIAN ZONES ARE REGULATED BY THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND SOME ACTIVITIES MAY BE PROHIBITED ON THIS SITE OR MAY FIRST REQUIRE A FLOOD HAZARD AREA PERMIT. CONTACT THE WATERSHED AND LAND MANAGEMENT PROGRAM AT (609) 777-0454 FOR MORE INFORMATION PRIOR TO ANY CONSTRUCTION ONSITE.
6. THE FLOOD HAZARD ELEVATION FOR THE PROJECT SITE WAS DETERMINED USING METHOD 3, THE FEMA FLUVIAL METHOD, AS SET FORTH IN N.J.A.C. 7:13 FLOOD HAZARD AREA CONTROL ACT RULES. THE NEW JERSEY FLOOD HAZARD AREA DESIGN FLOOD (NJFHADF) FOR THE PROJECT SITE HAS BEEN DETERMINED TO BE ELEVATION 72.4 NAVD 88.

SOIL TYPE LEGEND:

AtsAO – HYDROLOGIC SOIL GROUP A/D – ATSION SAND, 0 TO 2 PERCENT SLOPES, NORTHERN TIDEWATER AREA
DouB – HYDROLOGIC SOIL GROUP A – DOWNER-URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES
EvuB – HYDROLOGIC SOIL GROUP A – EVESBORO-URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES
HumAt – HYDROLOGIC SOIL GROUP A/D – HUMAQUEPTS, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED
KkhB – HYDROLOGIC SOIL GROUP A/D – KLEJ LOAMY SAND-URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES
LasB – HYDROLOGIC SOIL GROUP A – LAKEWOOD SAND, 0 TO 5 PERCENT SLOP
MakAt – HYDROLOGIC SOIL GROUP A/D – MANAHAWKIN MUCK, 0 TO 2 PERCENT SLOPES, FREQUENTLY FLOODED

NOTE: EXISTING ON-SITE SOILS CLASSIFIED AS HYDROLOGIC SOIL GROUP A/D ARE ASSUMED TO BE THE HYDROLOGIC SOIL GROUP A FOR THE PURPOSE OF STORMWATER QUANTITY CONTROL AND GROUNDWATER RECHARGE CALCULATIONS.

SOURCE: SOILS BOUNDARIES REFERENCED FROM THE USDA NATURAL RESOURCES CONSERVATION SERVICE (NRCS) CUSTOM SOIL RESOURCE REPORT FOR MONMOUTH COUNTY.



60 0 30 60
SCALE: 1 INCH = 60 FEET

Date	Description	No.
REVISIONS		

SIGNATURE JOHN COTE DATE SIGNED
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

LANGAN
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NJ Certificate of Authorization No. 24GA27996400

Project
3501 STATE ROUTE 66 REDEVELOPMENT
BLOCK No. 3903, LOT No. 12 &13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
SOILS MAP

Project No.	Figure
100775002	FG03
Date: AUGUST 26, 2021	
Drawn By: SS	
Checked By: MJV	Sheet 1 of 1

Project No. 100775002

GENERAL NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY AND TOPOGRAPHIC SURVEY," PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC, DATED OCTOBER 27, 2020, AND LAST REVISED AUGUST 4, 2021.
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3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
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6. THE FLOOD HAZARD ELEVATION FOR THE PROJECT SITE WAS DETERMINED USING METHOD 3, THE FEMA FLUVIAL METHOD, AS SET FORTH IN N.J.A.C. 7:13 FLOOD HAZARD AREA CONTROL ACT RULES. THE NEW JERSEY FLOOD HAZARD AREA DESIGN FLOOD (NJFHADF) FOR THE PROJECT SITE HAS BEEN DETERMINED TO BE ELEVATION 72.4 NAVD 88.

LEGEND	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	90	
SPOT ELEVATION	x 88.53	
WATERSHED BOUNDARY		
TIME OF CONCENTRATION PATH		

POINT OF ANALYSIS 4 (POA-4)

BLOCK 3903, LOT 9
N/F LANDS OF GREEN GROVE ASSOCIATES LLC
DB 5502, PG 461

EX-4
AREA = 0.62 AC
CN = 36
PERVIOUS Tc = 16 min
IMPERVIOUS Tc = 2 min

BLOCK 3903, LOT 5.01
N/F LANDS OF TOWNSHIP NEPTUNE 8603, PG 4343

BLOCK 3903, LOT 11
N/F LANDS OF ZAPCO INVESTMENTS
DB 9201, PG 1705

RUTGERS TERRACE

GREEN GROVE ROAD
(VARIABLE WIDTH ROW-PUBLIC ROAD)

EX-1B
AREA = 4.90 AC
CN = 78
PERVIOUS Tc = 13 min
IMPERVIOUS Tc = 5 min

EX-3

SMITH LANE

PRINCETON AVE.

EX-1C
AREA = 1.50 AC
CN = 38
PERVIOUS Tc = 54 min
IMPERVIOUS Tc = 34 min

BLOCK 3903, LOT 4
N/F LANDS OF NEPTUNE PARK FOR INDUSTRY, LLC
DB 3851, PG 709

EX-1-UNDISTURBED
AREA = 24.50 AC
CN = 30
Tc = 48 min

POINT OF ANALYSIS 1B (POA-1B)

EX-1A
AREA = 10.34 AC
CN = 75
PERVIOUS Tc = 16 min
IMPERVIOUS Tc = 7 min

JUMPING BROOK

EX-3
AREA = 1.36 AC
CN = 37
PERVIOUS Tc = 27 min
IMPERVIOUS Tc = 8 min

EX-3-UNDISTURBED
AREA = 0.64 AC
CN = 31
Tc = 18 min

POINT OF ANALYSIS 1A (POA-1A)

POINT OF ANALYSIS 1 (POA-1)

POINT OF ANALYSIS 2 (POA-2)

POINT OF ANALYSIS 3 (POA-3)

EX-2
AREA = 3.90 AC
CN = 39
PERVIOUS Tc = 24 min
IMPERVIOUS Tc = 5 min

NEW JERSEY STATE HIGHWAY ROUTE 66
(140' WIDE PUBLIC R.O.W.)

NEW JERSEY STATE HIGHWAY ROUTE 66
(140' WIDE PUBLIC R.O.W.)

SCALE: 1 INCH = 60 FEET

Date	Description	No.
REVISIONS		

SIGNATURE JOHN COTE DATE SIGNED
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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NJ Certificate of Authorization No. 24GA27996400

Project
3501 STATE ROUTE 66 REDEVELOPMENT
BLOCK No. 3903, LOT No. 12 &13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
EXISTING WATERSHED MAP

Project No.	Figure
100775002	FG04
Date: AUGUST 26, 2022	
Drawn By: TEG	
Checked By: MJV	Sheet 1 of 1

Project No. 100775002

Date: 7/26/2023 Time: 11:24 User: tgreen Style Table: Langan.stb Layout: FG04 Document Code: FG04-100775002-0201-CG103-0101

GENERAL NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY AND TOPOGRAPHIC SURVEY," PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC, DATED OCTOBER 27, 2020, AND LAST REVISED AUGUST 4, 2021.
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LEGEND	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	90	95
SPOT ELEVATION	×88.53	×92.08
WATERSHED BOUNDARY		
TIME OF CONCENTRATION PATH		

POINT OF ANALYSIS 4 (POA-4)

PR-4
AREA = 0.13 AC
CN = 39
Tc = 4 min

PR-1A
AREA = 2.80 AC
CN = 74
PERVIOUS Tc = 9 min
IMPERVIOUS Tc = 2 min

PR-1B
AREA = 2.68 AC
CN = 68
PERVIOUS Tc = 5 min
IMPERVIOUS Tc = 2 min

PR-1H
AREA = 5.63 AC
CN = 85
PERVIOUS Tc = 7 min
IMPERVIOUS Tc = 6 min

PR-1D
AREA = 1.34 AC
CN = 69
PERVIOUS Tc = 11 min
IMPERVIOUS Tc = 2 min

PR-1E
AREA = 0.86 AC
CN = 78
PERVIOUS Tc = 6 min
IMPERVIOUS Tc = 2 min

PR-3

PR-1F
AREA = 0.77 AC
CN = 68
PERVIOUS Tc = 6 min
IMPERVIOUS Tc = 2 min

PR-3-UNDISTURBED
AREA = 0.64 AC
CN = 31
Tc = 18 min

PR-3
AREA = 0.33 AC
CN = 47
PERVIOUS Tc = 15 min
IMPERVIOUS Tc = 7 min

PR-1G
AREA = 2.50 AC
CN = 85
PERVIOUS Tc = 7 min
IMPERVIOUS Tc = 4 min

PR-1J
AREA = 0.67 AC
CN = 39
Tc = 39 min

PR-1I
AREA = 3.35 AC
CN = 76
PERVIOUS Tc = 13 min
IMPERVIOUS Tc = 4 min

PR-1K
AREA = 0.46 AC
CN = 93
PERVIOUS Tc = 5 min
IMPERVIOUS Tc = 2 min

PR-2
AREA = 1.09 AC
CN = 51
PERVIOUS Tc = 11 min
IMPERVIOUS Tc = 3 min

PR-1-UNDISTURBED
AREA = 24.50 AC
CN = 30
Tc = 48 min

POINT OF ANALYSIS 1B (POA-1B)

POINT OF ANALYSIS 1A (POA-1A)

POINT OF ANALYSIS 1 (POA-1)

POINT OF ANALYSIS 2 (POA-2)

POINT OF ANALYSIS 3 (POA-3)

RUTGERS TERRACE

GREEN GROVE ROAD (VARIABLE WIDTH ROW-PUBLIC ROAD)

SMITH LANE

PRINCETON AVE.

NEW JERSEY STATE HIGHWAY ROUTE 66 (140' WIDE PUBLIC R.O.W.)

JUMPING BROOK

BLOCK 3903, LOT 9 N/F LANDS OF GREEN GROVE ASSOCIATES LLC DB 5502, PG 461

BLOCK 3903, LOT 11 N/F LANDS OF ZAPCO INVESTMENTS DB 9201, PG 1705

BLOCK 3903, LOT 5.01 N/F LANDS OF TOWNSHIP NEPTUNE 8603, PG 4343

N/F LANDS OF NEPTUNE PARK FOR INDUSTRY / LLC DB 8580, PG 2436

BLOCK 3903, LOT 4 N/F LANDS OF NEPTUNE PARK FOR INDUSTRY, LLC DB 3831, PG 700

30' WIDE SANITARY SEWER EASEMENT DB 3459 PG 466

SCALE: 1 INCH = 60 FEET

Date	Description	No.
REVISIONS		

SIGNATURE JOHN COTE DATE SIGNED
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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Project
3501 STATE ROUTE 66 REDEVELOPMENT
BLOCK No. 3903, LOT No. 12 &13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
PROPOSED WATERSHED MAP

Project No.	Figure
100775002	FG05
Date: AUGUST 26, 2022	
Drawn By: TEG	
Checked By: MJV	Sheet 1 of 1

Project No. 100775002

Date: 4/2/2024 Time: 09:40 User: tgreen Style Table: Langan.stb Layout: FG05 Document Code: FG05-100775002-0201-CG104-0101

GENERAL NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY AND TOPOGRAPHIC SURVEY," PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC, DATED OCTOBER 27, 2020, AND LAST REVISED AUGUST 4, 2021.
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LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	90	95
SPOT ELEVATION	x 88.53	x 92.08
STORM MANHOLE		
CATCH BASIN		
STORM SEWER		
DRAINAGE AREA BOUNDARY		

BLOCK 3903, LOT 9
N/F LANDS OF GREEN GROVE ASSOCIATES LLC
DB 5502, PG 461

BLOCK 3903, LOT 11
N/F LANDS OF ZAPCO INVESTMENTS
DB 9201, PG 1705

BLOCK 3903, LOT 5.01
N/F LANDS OF TOWNSHIP NEPTUNE 8603, PG 4343

BLOCK 3903, LOT 5.01
N/F LANDS OF TOWNSHIP NEPTUNE 8603, PG 4343

DB 8580, PG 2430

RUTGERS TERRACE

GREEN GROVE ROAD
(VARIABLE WIDTH ROW-PUBLIC ROAD)

SMITH LANE

PRINCETON AVE.

30' WIDE SANITARY SEWER EASEMENT
DB 3459 PG 466

WETLANDS AREA 2

WETLANDS AREA 1

WETLANDS AREA 3

BLOCK 3903, LOT 4
N/F LANDS OF NEPTUNE PARK FOR INDUSTRY, LLC
DB 3851, PG 700

LOT 12

LOT 13

JUMPING BROOK

NEW JERSEY STATE HIGHWAY ROUTE 66
(140' WIDE PUBLIC R.O.W.)

CB1-1, CB1-2, CB1-3, CB1-4, CB1-5, CB1-6, CB1-7, CB1-8, CB1-9, CB1-10, CB1-11, CB1-12, CB1-13, CB1-14, CB1-15, CB1-16, CB1-17, CB1-18, CB1-19, CB1-20, CB1-21, CB1-22, CB1-23, CB1-24, CB1-25, CB1-26, CB1-27, CB1-28, CB1-29, CB1-30, CB1-31, CB1-32, CB1-33, CB1-34, CB1-35, CB1-36, CB1-37, CB1-38, CB1-39, CB1-40, CB1-41, CB1-42, CB1-43, CB1-44, CB1-45, CB1-46, CB1-47, CB1-48, CB1-49, CB1-50, CB1-51, CB1-52, CB1-53, CB1-54, CB1-55, CB1-56, CB1-57, CB1-58, CB1-59, CB1-60, CB1-61, CB1-62, CB1-63

RD1-1, RD1-2, RD1-3, RD1-4, RD1-5, RD1-6, RD1-7, RD1-8, RD1-9, RD1-10, RD1-11, RD1-12, RD1-13, RD1-14

MH1-28

EX-CB2-1/SWALE2-1, CB2-1, EX-CB2-2, CB2-2, CB2-3, CB2-4/SWALE2-2, EX-CB2-3, CB2-5, EX-CB2-5, EX-CB2-6

60 0 20 40 60
SCALE: 1 INCH = 60 FEET

Date	Description	No.
REVISIONS		

SIGNATURE JOHN COTE DATE SIGNED
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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Project
3501 STATE ROUTE 66 REDEVELOPMENT
BLOCK No. 3903, LOT No. 12 &13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
PROPOSED DRAINAGE SUBAREA MAP

Project No. 100775002	Figure FG06
Date AUGUST 26, 2022	
Drawn By TEG	
Checked By MJV	Sheet 1 of 1

Project No. 100775002

GENERAL NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY AND TOPOGRAPHIC SURVEY," PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC, DATED OCTOBER 27, 2020, AND LAST REVISED AUGUST 4, 2021.
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LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	90	95
SPOT ELEVATION	x 88.53	x 92.08
STORM MANHOLE		
CATCH BASIN		
STORM SEWER		
DRAINAGE AREA BOUNDARY		

SMALL SCALE INFILTRATION BASIN 1A
AREA = 2.80 AC

SMALL SCALE BIORETENTION BASIN 1B
AREA = 2.68AC

SMALL-SCALE INFILTRATION BASIN 1D
AREA = 1.34 AC

SMALL-SCALE BIORETENTION BASIN 1E
AREA = 0.86 AC

SMALL SCALE BIORETENTION BASIN 1F
AREA = 0.77 AC

SMALL SCALE BIORETENTION BASIN 1G
AREA = 2.50 AC

POROUS ASPHALT PAVEMENT SYSTEM 1
AREA = 0.46 AC

PROPOSED WAREHOUSE
251,022± SF FOOTPRINT
237,022± SF WAREHOUSE SPACE
14,000± SF OFFICE SPACE
32 LOADING DOCKS
25 TRAILER PARKING SPACES

RETAIL
15,000± SF

OFFICE AREA

BLOCK 3903, LOT 9
N/F LANDS OF GREEN GROVE ASSOCIATES LLC
DB 5502, PG 461

BLOCK 3903, LOT 11
N/F LANDS OF ZAPCO INVESTMENTS
DB 9201, PG 1705

BLOCK 3903, LOT 5.01
N/F LANDS OF TOWNSHIP NEPTUNE 8603, PG 4343

BLOCK 3903, LOT 4
N/F LANDS OF NEPTUNE PARK FOR INDUSTRY, LLC
DB 3851, PG 700

RUTGERS TERRACE

GREEN GROVE ROAD
(VARIABLE WIDTH ROW-PUBLIC ROAD)

SMITH LANE

PRINCETON AVE.

JUMPING BROOK

NEW JERSEY STATE HIGHWAY ROUTE 66
(140' WIDE PUBLIC R.O.W.)

30' WIDE SANITARY SEWER EASEMENT
DB 3459 PG 466

WETLANDS AREA 1

WETLANDS AREA 2

WETLANDS AREA 3

WETLAND BUFFER

LOT 12

LOT 13

SCALE: 1 INCH = 60 FEET

Date	Description	No.
REVISIONS		

SIGNATURE JOHN COTE DATE SIGNED
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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Project
3501 STATE ROUTE 66 REDEVELOPMENT
BLOCK No. 3903, LOT No. 12 &13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
WATER QUALITY DRAINAGE AREA MAP

Project No.	100775002
Date	AUGUST 26, 2022
Drawn By	GM
Checked By	MJV

Figure
FG07

Sheet 1 of 1

Project No. 100775002

Date: 4/2/2024 Time: 10:10 User: tgreen Style Table: Langan.stb Layout: FG07 Document Code: FG09-100775002-0201-CG104-0101

GENERAL NOTES:

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EXISTING MOTOR VEHICLE SURFACE AREA = 325,860 SF (7.48 AC)

BLOCK 3903, LOT 9
N/F LANDS OF GREEN GROVE ASSOCIATES LLC
DB 5502, PG 461

BLOCK 3903, LOT 11
N/F LANDS OF ZAPCO INVESTMENTS
DB 9201, PG 1705

BLOCK 3903, LOT 5.01
N/F LANDS OF TOWNSHIP NEPTUNE 8603, PG 4343

BLOCK 3903, LOT 4
N/F LANDS OF NEPTUNE PARK FOR INDUSTRY, LLC
DB 3851, PG 700

100' WIDE JERSEY CENTRAL POWER & LIGHT CO. RIGHT OF WAY (ATLANTIC WHITESVILLE TRANSMISSION LINE)
DB 1525 PG 409, DB 3653 PG 621

RUTGERS TERRACE

GREEN GROVE ROAD
(VARIABLE WIDTH ROW-PUBLIC ROAD)

SMITH LANE

PRINCETON AVE.

JUMPING BROOK

WETLANDS AREA 1

WETLANDS AREA 2

WETLANDS AREA 3

50' WETLAND BUFFER

30' WIDE SANITARY SEWER EASEMENT
DB 3459 PG 466

70' WIDE SANITARY SEWER EASEMENT
DB 3459 PG 466

15' WIDE JERSEY CENTRAL POWER & LIGHT CO. AND NJ BELL TELEPHONE COMPANY EASEMENT
DB 4244 PG 287

LOT 12

LOT 13

NEW JERSEY STATE HIGHWAY ROUTE 66
(140' WIDE PUBLIC R.O.W.)

3 STORY MASONRY BUILDING

1 STORY MASONRY BUILDING

MASONRY SHED BLDG.

ASPHALT DRIVEWAY

ASPHALT PAVEMENT

WOODED AREA

GRASS AREA

SCALE: 1 INCH = 60 FEET (60 0 20 40 60)

Date	Description	No.
REVISIONS		

SIGNATURE JOHN COTE DATE SIGNED
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

LANGAN
Langan Engineering and Environmental Services, Inc.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ Certificate of Authorization No. 24GA27996400

Project
3501 STATE ROUTE 66 REDEVELOPMENT
BLOCK No. 3903, LOT No. 12 &13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
EXISTING REGULATED MOTOR VEHICLE SURFACE MAP

Project No.	Figure
100775002	FG08
Date: AUGUST 26, 2022	
Drawn By: GM	
Checked By: MJV	Sheet 1 of 1

Project No. 100775002

GENERAL NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY AND TOPOGRAPHIC SURVEY," PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC, DATED OCTOBER 27, 2020, AND LAST REVISED AUGUST 4, 2021.
2. HORIZONTAL DATUM REFERENCED TO THE NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD 83).
3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
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PROPOSED MOTOR VEHICLE SURFACE AREA = 301,912 SF (6.93 AC)

RUTGERS TERRACE

GREEN GROVE ROAD (VARIABLE WIDTH ROW-PUBLIC ROAD)

SMITH LANE

PRINCETON AVE.

JUMPING BROOK

NEW JERSEY STATE HIGHWAY ROUTE 66 (140' WIDE PUBLIC R.O.W.)

SCALE: 1 INCH = 60 FEET

Date	Description	No.
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BLOCK No. 3903, LOT No. 12 &13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
PROPOSED REGULATED MOTOR VEHICLE SURFACE MAP

Project No.	Figure
100775002	FG09
Date: AUGUST 26, 2022	
Drawn By: GM	
Checked By: MJV	Sheet 1 of 1

Project No. 100775002

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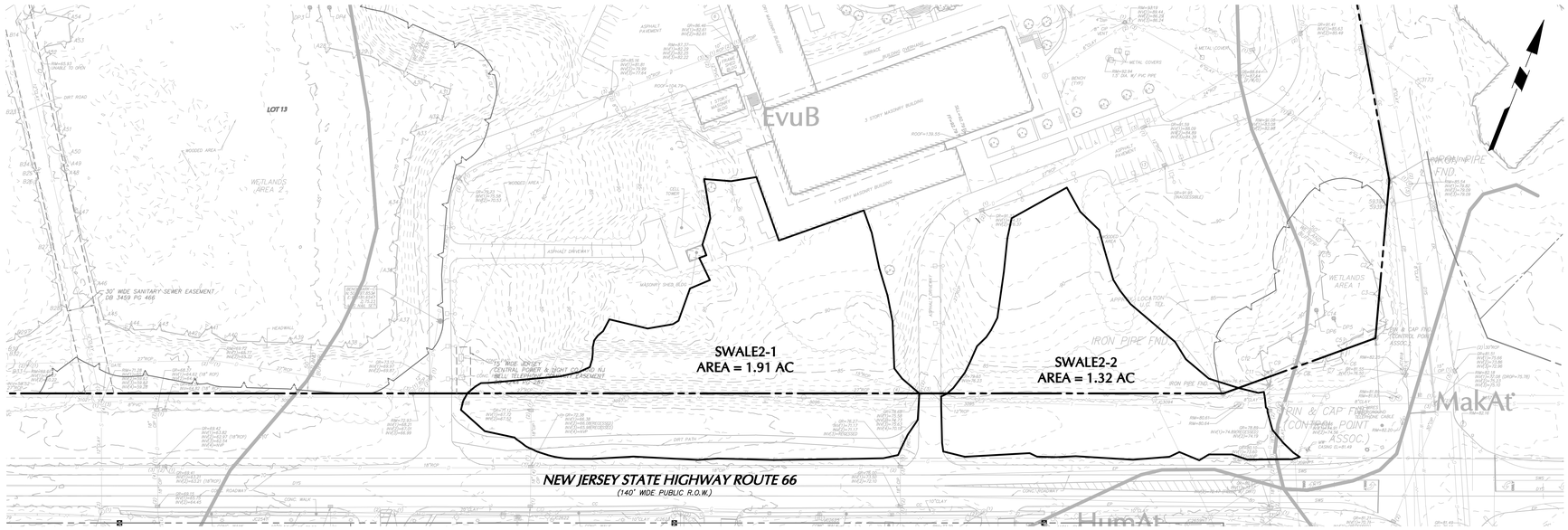
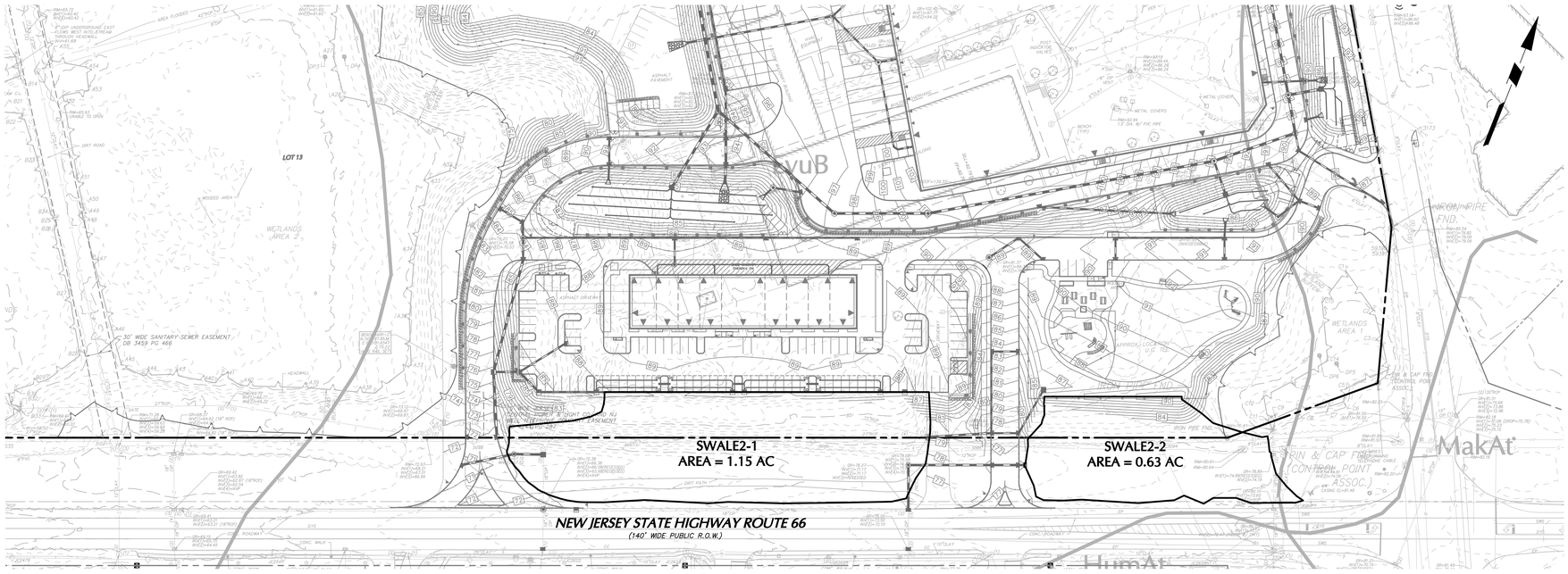
LEGEND	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	90	95
SPOT ELEVATION	×88.53	×92.08
WATERSHED BOUNDARY		
TIME OF CONCENTRATION PATH		



EXISTING SWALE WATERSHED MAP



PROPOSED SWALE WATERSHED MAP

60 0 20 40 60
SCALE: 1 INCH = 60 FEET

Date	Description	No.
REVISIONS		

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BLOCK No. 3903, LOT No. 12 &13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
NJDOT SWALE WATERSHED MAP

Project No.	Figure
100775002	FG10
Date: MAY 5, 2023	
Drawn By: TEG	
Checked By: MJV	Sheet 1 of 1

Project No. 100775002

Date: 4/2/2024 Time: 10:29 User: tgreen Style Table: Langan.stb Layout: FG05 Document Code: FG10-100775002-0201-CG104-0101

DRAWINGS

LEGEND	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	90	95
SPOT ELEVATION	x 88.53	x 92.08
STORM MANHOLE		
SANITARY MANHOLE		
CATCH BASIN		
STORM SEWER		
SANITARY SEWER	S	
RETAINING WALL		

SCALE: 1 INCH = 60 FEET (60 0 20 40 60)

GRADING AND DRAINAGE PLAN NOTES:

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND / OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES, WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
2. CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS AND SPECIFICATIONS FOR ACTUAL LOCATIONS OF ALL UTILITY ENTRANCES TO INCLUDE SANITARY SEWER LATERALS, DOMESTIC WATER SERVICE, ELECTRICAL TELEPHONE AND GAS SERVICE. CONTRACTOR SHALL COORDINATE INSTALLATION OF UTILITIES IN SUCH A MANNER AS TO AVOID CONFLICTS AND TO ENSURE PROPER DEPTHS ARE ACHIEVED AS WELL AS COORDINATING WITH THE UTILITY COMPANIES AS TO LOCATION AND SCHEDULING OF CONNECTIONS TO THEIR FACILITIES.
3. PVC = POLYVINYL CHLORIDE PIPE
   HDPE = HIGH DENSITY POLYETHYLENE PIPE
   RCP = REINFORCED CONCRETE PIPE
4. STORM DRAINAGE PIPING TO UTILIZE WATER TIGHT JOINTS.
5. COMPACTION CRITERIA FOR FILL PLACEMENT IN THE FOLLOWING AREAS SHALL MEET OR EXCEED THE FOLLOWING MINIMUM PERCENTAGE OF MAXIMUM MODIFIED PROCTOR DRY DENSITY AS DETERMINED BY ASTM D-1557 USED ON REPRESENTATIVE SOIL SAMPLES, UNLESS MORE STRINGENT CRITERIA GIVEN ELSEWHERE:

FILL AREA	PERCENT OF MAXIMUM MODIFIED PROCTOR DRY DENSITY
BUILDING FOOTPRINT	95%
PAVEMENT AND ROADWAYS	98%
SIDEWALKS	95%
LANDSCAPE AREAS	90%
TRENCH BACKFILL	95%

6. PROTECT SUBGRADE FROM EXCESSIVE WHEEL LOADING DURING CONSTRUCTION, INCLUDING CONCRETE TRUCKS AND DUMP TRUCKS.
7. REMOVE AREAS OF FINISHED SUBGRADE FOUND TO HAVE INSUFFICIENT COMPACTION DENSITY TO DEPTH NECESSARY AND REPLACE IN A MANNER THAT WILL COMPLY WITH COMPACTION REQUIREMENTS BY USE OF MATERIAL EQUAL TO OR BETTER THEN BEST SUBGRADE MATERIAL ONSITE. SURFACE OF SUBGRADE AFTER COMPACTION SHALL BE HARD, UNIFORM, SMOOTH, STABLE, AND TRUE TO GRADE AND CROSS SECTION.
8. ALL CONCRETE, UNLESS OTHERWISE NOTED OR SPECIFIED BY REGULATORY AUTHORITIES, SHALL BE A MINIMUM OF 4,000 PSI.
9. THE CONTRACTOR SHALL REVIEW THE STORM DRAINAGE CONNECTIONS TO THE INLETS, MANHOLES, ETC. AND PROVIDE THE APPROPRIATE BOX SIZE, MANHOLES SIZE, TOP PIECES, ETC. AS NECESSARY TO ACCOMMODATE THE PROPOSED INLET AND OUTLET PIPES.
10. CONTRACTOR TO PROVIDE A SHOP DRAWING FOR REVIEW AND APPROVAL BY THE OWNER'S ENGINEER FOR EACH CATCH BASIN, MANHOLE, AND OTHER PRECAST STORM STRUCTURES DETAILING STRUCTURE DIMENSIONS, LOCATION OF STEPS, PIPE CONNECTIONS AND OPENINGS, AND RIM/GRATE/INVERT ELEVATIONS. A SHOP DRAWING, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY, SHALL BE PROVIDED FOR EACH TYPE OF PRECAST CONCRETE STRUCTURE THAT DETAILS THE STRUCTURAL DESIGN. ALL PRECAST STRUCTURES AND FRAMES/GRATES SHALL MEET H-20 TRAFFIC LOADING REQUIREMENTS. CATCH BASINS, MANHOLES, AND DETENTION SYSTEM PIPING SHALL BE CONSTRUCTED IN A MANNER THAT WILL PREVENT FLOATATION DUE TO GROUNDWATER. CONTRACTOR SHALL SUBMIT METHODOLOGY AND SUPPORTING BUOYANCY CALCULATIONS PREPARED BY AND SIGNED/SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY FOR ANTI-FLOATATION OF THE STORM STRUCTURES IF THEY ARE TO BE LOCATED WITHIN THE GROUNDWATER TABLE.
11. THE CONTRACTOR SHALL PROVIDE A RETAINING WALL DESIGN FOR EACH PROPOSED WALL PREPARED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY FOR REVIEW BY THE OWNER'S ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR AND THE RETAINING WALL DESIGNER SHALL SPECIFICALLY NOTE ANY EXISTING OR PROPOSED STRUCTURES THAT ARE LOCATED IN OR NEAR THE WALL (INLETS, LIGHT POLES, FENCES, STORM PIPES, UTILITIES, GUIDE RAILS, AND OTHER FEATURES) AND SHALL COORDINATE DESIGN AND INSTALLATION OF RETAINING WALL SUCH THAT THE FEATURES ARE ACCOMMODATED IN THE DESIGN AS APPROPRIATE.
12. PIPE LENGTHS PROVIDED ARE MEASURED FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
13. CONTRACTOR SHALL CLEAR EXISTING STORM PIPES OF ANY DEBRIS OR SEDIMENT.
14. TRENCH DEPTH REQUIREMENTS MEASURED FROM FINISHED GRADE OR PAVED SURFACE SHALL MEET THE FOLLOWING REQUIREMENTS OR APPLICABLE CODES AND ORDINANCES:
    a. SANITARY SEWER: DEPTHS, ELEVATIONS AND GRADES AS INDICATED ON DRAWINGS.
    b. STORM SEWER: DEPTHS, ELEVATIONS, AND GRADES AS SHOWN ON DRAWINGS.
    c. ELECTRICAL CONDUITS: 24 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY NEC 300-5, NEC 710-36 CODES, OR THE LOCAL UTILITY COMPANY REQUIREMENTS, WHICHEVER IS DEEPER.
    d. TV CONDUITS: 18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
    e. TELEPHONE CONDUITS:18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
    f. GAS MAINS AND SERVICE: 30 INCHES MINIMUM TO TOP OF PIPE, OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
15. SITE GRADING SHALL NOT PROCEED UNTIL ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
16. CONTRACTOR SHALL PROVIDE WRITTEN REQUESTS FOR INFORMATION TO THE OWNER AND OWNER'S ENGINEER PRIOR TO THE CONSTRUCTION OF ANY SPECIFIC SITEWORK ITEM IF ANY SPECIFIC SITEWORK ITEM DEPICTED ON THE PLANS WARRANTS ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION AND IS NOT RELATED TO MEANS AND METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SPECIFIC SITE WORK ITEMS INSTALLED DIFFERENTLY THAN INTENDED AS DEPICTED ON THE PLANS IN THE ABSENCE OF SUBMITTING AND ADDRESSING WRITTEN REQUESTS FOR INFORMATION.
17. PROPOSED SIDEWALKS SHALL BE CONSTRUCTED WITH CROSS-SLOPES THAT DO NOT EXCEED 1.5%.
18. PROPOSED RCP PIPE IS TO BE CLASS V PIPE.

DRAINAGE PIPE INSTALLATION WITHIN WETLAND TRANSITION AREA NOTES:

1. THE PROPOSED 36" DIA. HDPE DRAINAGE PIPE FROM PROPOSED DRAINAGE MANHOLE MH1-9 TO THE EXISTING DRAINAGE MANHOLE LOCATED WITHIN THE WETLAND TRANSITION AREA SHALL BE INSTALLED USING HORIZONTAL DIRECTIONAL DRILLING (HDD) FOR THE LENGTH OF PROPOSED PIPE LOCATED WITHIN THE WETLAND TRANSITION AREA, IN ORDER TO AVOID SOIL DISTURBANCE AND IMPACTS TO THE WETLAND TRANSITION AREA.

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5/3/24	REVISED FOR SUBMISSION TO NEPTUNE	4
8/30/23	REVISED PER NJDEP COMMENTS	3
7/28/23	REVISED PER NJDOT, NJDEP, & FIRST ENERGY COMMENTS	2
5/10/23	REVISED RETAIL LAYOUT & PER NJDOT COMMENTS	1
Date	Description	No.

REVISIONS

SIGNATURE JOHN COTE DATE SIGNED 5/3/2024
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3501 STATE ROUTE 66 REDEVELOPMENT
BLOCK No. 3903, LOT No. 12 & 13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
OVERALL GRADING PLAN

Project No.	Drawing No.
100775002	CG100
Date: AUGUST 26, 2022	
Drawn By: TEG	
Checked By: MJV	Sheet 19 of 48

LANGAN
Project No. 100775002

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	90	95
SPOT ELEVATION	x 88.53	92.08
STORM MANHOLE		
SANITARY MANHOLE		
CATCH BASIN		
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RETAINING WALL		

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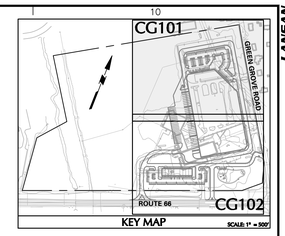

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BLOCK No. 3903, LOT No. 12 & 13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
PARTIAL GRADING PLAN

Project No. 100775002	Drawing No. CG101
Date AUGUST 26, 2022	
Drawn By TEG	
Checked By MJV	Sheet 20 of 48

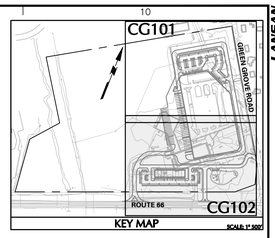
30 0 15 30
SCALE: 1 INCH = 30 FEET

Project No. 100775002

Date: 5/3/2024 Time: 12:58 User: sswarav Style Table: Langan.stb Layout: CG101 Document Code: 100775002-0301-CG101-0102

MATCH LINE SHEET CG101

MATCH LINE SHEET CG103



RETAIL
15,000± SF
FFE: 90.00

FFE: 102.00

TRANSITION FROM 6" CONCRETE CURB TO 12" CONCRETE CURB BEHIND TRAILER PARKING STALLS

MEET EXISTING GRADES (TYP.)

NEW JERSEY STATE HIGHWAY ROUTE 66
(140' WIDE PUBLIC R.O.W.)

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
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SANITARY MANHOLE		
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DRAINAGE PIPE INSTALLATION WITHIN WETLAND TRANSITION AREA NOTES:

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30 0 15 30
SCALE: 1 INCH = 30 FEET

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5/3/24	REVISED FOR SUBMISSION TO NEPTUNE	4
8/30/23	REVISED PER NJDEP COMMENTS	3
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REVISIONS

SIGNATURE _____ JOHN COTE 5/3/2024 DATE SIGNED
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NJ Certificate of Authorization No. 24GA27996400

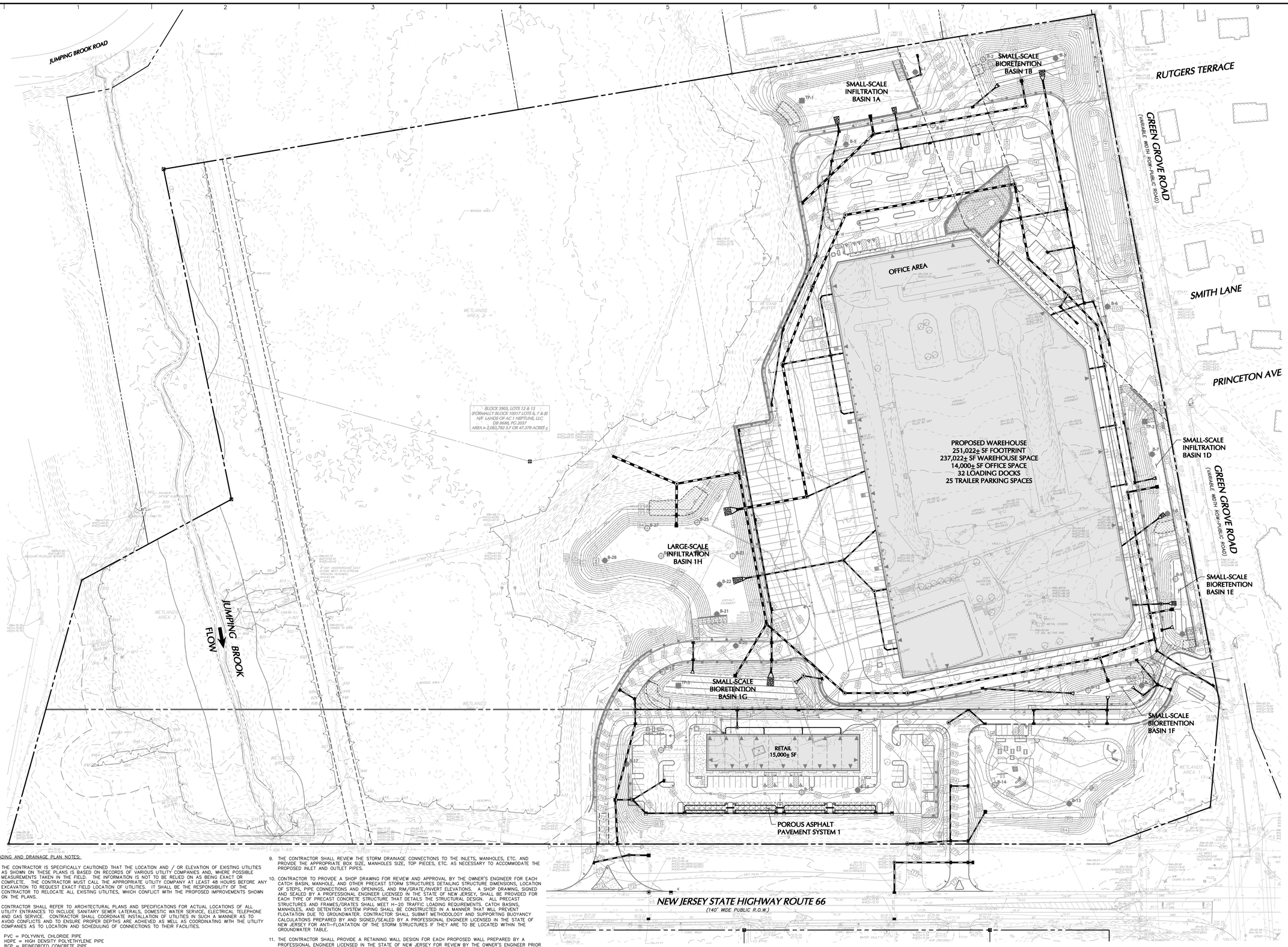
Project
3501 STATE ROUTE 66 REDEVELOPMENT
BLOCK No. 3903, LOT No. 12 & 13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
PARTIAL GRADING PLAN

Project No. 100775002
Date AUGUST 26, 2022
Drawn By TEG
Checked By MJV

Drawing No. CG102
Sheet 21 of 48

Project No. 100775002



LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	90	95
SPOT ELEVATION	x 88.53	x 92.08
STORM MANHOLE		
SANITARY MANHOLE		
CATCH BASIN		
STORM SEWER		
SANITARY SEWER		
RETAINING WALL		

GRADING AND DRAINAGE PLAN NOTES:

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND / OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES, WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
2. CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS AND SPECIFICATIONS FOR ACTUAL LOCATIONS OF ALL UTILITY ENTRANCES TO INCLUDE SANITARY SEWER LATERALS, DOMESTIC WATER SERVICE, ELECTRICAL TELEPHONE AND GAS SERVICE. CONTRACTOR SHALL COORDINATE INSTALLATION OF UTILITIES IN SUCH A MANNER AS TO AVOID CONFLICTS AND TO ENSURE PROPER DEPTHS ARE ACHIEVED AS WELL AS COORDINATING WITH THE UTILITY COMPANIES AS TO LOCATION AND SCHEDULING OF CONNECTIONS TO THEIR FACILITIES.
3. PVC = POLYVINYL CHLORIDE PIPE
   HDPE = HIGH DENSITY POLYETHYLENE PIPE
   RCP = REINFORCED CONCRETE PIPE
4. STORM DRAINAGE PIPING TO UTILIZE WATER TIGHT JOINTS.
5. COMPACTION CRITERIA FOR FILL PLACEMENT IN THE FOLLOWING AREAS SHALL MEET OR EXCEED THE FOLLOWING MINIMUM PERCENTAGE OF MAXIMUM MODIFIED PROCTOR DRY DENSITY AS DETERMINED BY ASTM D-1557 USED ON REPRESENTATIVE SOIL SAMPLES, UNLESS MORE STRINGENT CRITERIA GIVEN ELSEWHERE;

FILL AREA	PERCENT OF MAXIMUM MODIFIED PROCTOR DRY DENSITY
BUILDING FOOTPRINT	95%
PAVEMENT AND ROADWAYS	98%
SIDEWALKS	95%
LANDSCAPE AREAS	90%
TRENCH BACKFILL	95%

6. PROTECT SUBGRADE FROM EXCESSIVE WHEEL LOADING DURING CONSTRUCTION, INCLUDING CONCRETE TRUCKS AND DUMP TRUCKS.
7. REMOVE AREAS OF FINISHED SUBGRADE FOUND TO HAVE INSUFFICIENT COMPACTION DENSITY TO DEPTH NECESSARY AND REPLACE IN A MANNER THAT WILL COMPLY WITH COMPACTION REQUIREMENTS BY USE OF MATERIAL EQUAL TO OR BETTER THEN BEST SUBGRADE MATERIAL ONSITE. SURFACE OF SUBGRADE AFTER COMPACTION SHALL BE HARD, UNIFORM, SMOOTH, STABLE, AND TRUE TO GRADE AND CROSS SECTION.
8. ALL CONCRETE, UNLESS OTHERWISE NOTED OR SPECIFIED BY REGULATORY AUTHORITIES, SHALL BE A MINIMUM OF 4,000 PSI.
9. THE CONTRACTOR SHALL REVIEW THE STORM DRAINAGE CONNECTIONS TO THE INLETS, MANHOLES, ETC. AND PROVIDE THE APPROPRIATE BOX SIZE, MANHOLES SIZE, TOP PIECES, ETC. AS NECESSARY TO ACCOMMODATE THE PROPOSED INLET AND OUTLET PIPES.
10. CONTRACTOR TO PROVIDE A SHOP DRAWING FOR REVIEW AND APPROVAL BY THE OWNER'S ENGINEER FOR EACH CATCH BASIN, MANHOLE, AND OTHER PRECAST STORM STRUCTURES DETAILING STRUCTURE DIMENSIONS, LOCATION OF STEPS, PIPE CONNECTIONS AND OPENINGS, AND RIM/GRATE/INVERT ELEVATIONS. A SHOP DRAWING, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY, SHALL BE PROVIDED FOR EACH TYPE OF PRECAST CONCRETE STRUCTURE THAT DETAILS THE STRUCTURAL DESIGN. ALL PRECAST STRUCTURES AND FRAMES/GRATES SHALL MEET H-20 TRAFFIC LOADING REQUIREMENTS. CATCH BASINS, MANHOLES, AND DETENTION SYSTEM PIPING SHALL BE CONSTRUCTED IN A MANNER THAT WILL PREVENT FLOATATION DUE TO GROUNDWATER. CONTRACTOR SHALL SUBMIT METHODOLOGY AND SUPPORTING BUOYANCY CALCULATIONS PREPARED BY AND SIGNED/SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY FOR ANTI-FLOATATION OF THE STORM STRUCTURES IF THEY ARE TO BE LOCATED WITHIN THE GROUNDWATER TABLE.
11. THE CONTRACTOR SHALL PROVIDE A RETAINING WALL DESIGN FOR EACH PROPOSED WALL PREPARED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY FOR REVIEW BY THE OWNER'S ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR AND THE RETAINING WALL DESIGNER SHALL SPECIFICALLY NOTE ANY EXISTING OR PROPOSED STRUCTURES THAT ARE LOCATED IN OR NEAR THE WALL (INLETS, LIGHT POLES, FENCES, STORM PIPES, UTILITIES, GUIDE RAILS, AND OTHER FEATURES) AND SHALL COORDINATE DESIGN AND INSTALLATION OF RETAINING WALL SUCH THAT THE FEATURES ARE ACCOMMODATED IN THE DESIGN AS APPROPRIATE.
12. PIPE LENGTHS PROVIDED ARE MEASURED FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
13. CONTRACTOR SHALL CLEAR EXISTING STORM PIPES OF ANY DEBRIS OR SEDIMENT.
14. TRENCH DEPTH REQUIREMENTS MEASURED FROM FINISHED GRADE OR PAVED SURFACE SHALL MEET THE FOLLOWING REQUIREMENTS OR APPLICABLE CODES AND ORDINANCES:
    a. SANITARY SEWER: DEPTHS, ELEVATIONS AND GRADES AS INDICATED ON DRAWINGS.
    b. STORM SEWER: DEPTHS, ELEVATIONS, AND GRADES AS SHOWN ON DRAWINGS.
    c. ELECTRICAL CONDUITS: 24 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY NEC 300-5, NEC 710-36 CODES, OR THE LOCAL UTILITY COMPANY REQUIREMENTS, WHICHEVER IS DEEPER.
    d. TV CONDUITS: 18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
    e. TELEPHONE CONDUITS:18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
    f. GAS MAINS AND SERVICE: 30 INCHES MINIMUM TO TOP OF PIPE, OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
15. SITE GRADING SHALL NOT PROCEED UNTIL ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
16. CONTRACTOR SHALL PROVIDE WRITTEN REQUESTS FOR INFORMATION TO THE OWNER AND OWNER'S ENGINEER PRIOR TO THE CONSTRUCTION OF ANY SPECIFIC SITEWORK ITEM IF ANY SPECIFIC SITEWORK ITEM DEPICTED ON THE PLANS WARRANTS ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION AND IS NOT RELATED TO MEANS AND METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SPECIFIC SITE WORK ITEMS INSTALLED DIFFERENTLY THAN INTENDED AS DEPICTED ON THE PLANS IN THE ABSENCE OF SUBMITTING AND ADDRESSING WRITTEN REQUESTS FOR INFORMATION.
17. PROPOSED SIDEWALKS SHALL BE CONSTRUCTED WITH CROSS-SLOPES THAT DO NOT EXCEED 1.5%.
18. PROPOSED RCP PIPE IS TO BE CLASS V PIPE.

DRAINAGE PIPE INSTALLATION WITHIN WETLAND TRANSITION AREA NOTES:

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60 0 20 40 60
SCALE: 1 INCH = 60 FEET

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REVISIONS

SIGNATURE JOHN COTE DATE SIGNED 5/3/2024
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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300 Kimball Drive
Parsippany, NJ 07054
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NJ Certificate of Authorization No. 24GA27996400

Project
3501 STATE ROUTE 66 REDEVELOPMENT
BLOCK No. 3903, LOT No. 12 & 13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
OVERALL DRAINAGE PLAN

Project No.	100775002
Date	AUGUST 26, 2022
Drawn By	TEG
Checked By	MJV
Drawing No.	CG103
Sheet	22 of 48

LANGAN
Project No. 100775002

Date: 5/3/2024 Time: 13:00 User: sswora Style Table: Langan.stb Layout: CG103 Document Code: 100775002-0301-CG102-0101

GENERAL NOTES:

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LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	90	95
SPOT ELEVATION	x 88.53	x 92.08
STORM MANHOLE		
SANITARY MANHOLE		
CATCH BASIN		
STORM SEWER		
SANITARY SEWER		
RETAINING WALL		

OFFICE AREA

PROPOSED WAREHOUSE
251,022± SF FOOTPRINT
237,022± SF WAREHOUSE SPACE
14,000± SF OFFICE SPACE
32 LOADING DOCKS
25 TRAILER PARKING SPACES

MATCH LINE SHEET CG105

GREEN GROVE ROAD
(VARIABLE WIDTH ROW-PUBLIC ROAD)

RUTGERS TERRA

SMITH

PR

GIKELL
(VARIABLE WIDTH

SCALE: 1 INCH = 30 FEET

KEY MAP (SCALE: 1" = 800')
CG104
CG105
ROUTE 66
GREEN GROVE ROAD

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5/3/24	REVISED FOR SUBMISSION TO NEPTUNE	4
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REVISIONS

SIGNATURE 5/3/2024 DATE SIGNED
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PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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Project
3501 STATE ROUTE 66 REDEVELOPMENT
BLOCK No. 3903, LOT No. 12 & 13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
PARTIAL DRAINAGE PLAN

Project No.	100775002
Date	AUGUST 26, 2022
Drawn By	TEG
Checked By	MJV

Drawing No. CG104
Sheet 23 of 48

Project No. 100775002

MATCH LINE SHEET CG104

RETAIL
15,000± SF

NEW JERSEY STATE HIGHWAY ROUTE 66
(140' WIDE PUBLIC R.O.W.)

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	90	95
SPOT ELEVATION	x 88.53	x 92.08
STORM MANHOLE		
SANITARY MANHOLE		
CATCH BASIN		
STORM SEWER		
SANITARY SEWER		
RETAINING WALL		

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SCALE: 1 INCH = 30 FEET

CG104 / CG105 KEY MAP — SCALE 1" = 200'

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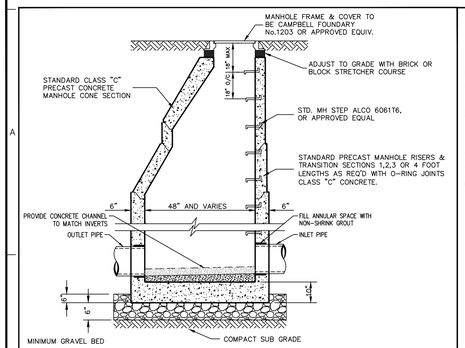
Project No. 100775002
Date AUGUST 26, 2022
Drawn By TEG
Checked By MJV
Drawing No. CG105
Sheet 24 of 48

Project No. 100775002

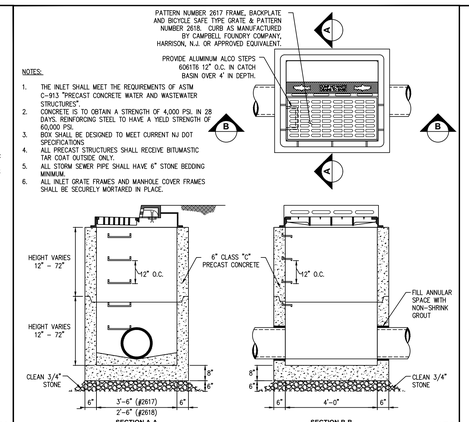


NOTES:

1. DIAMETER OF MANHOLE SHALL BE REVIEWED BY THE CONTRACTOR TO DETERMINE A LEGEND OF STANDARD MANHOLE DIMENSIONS WITH RESPECT TO PROPOSED PIPE SIZES, NUMBER AND GEOMETRY, OVER SIZE MANHOLES SHALL BE PROVIDED IF MINIMUM 6" WALL DIMENSION BETWEEN PIPES IS NOT MANUFACTURED.
2. MANHOLES SHALL BE STANDARD PRECAST CONCRETE UNITS AND SHALL BE DESIGNED AND CONSTRUCTED BY THE MANUFACTURER TO SUPPORT TRUCK HS20 LOADING.
3. EXISTING PIPES AND PROPOSED PIPES TO BE ACCOMMODATED IN PRECAST DESIGN DURING SHOP DRAWING REVIEW.

N.T.S.

STORM MANHOLE

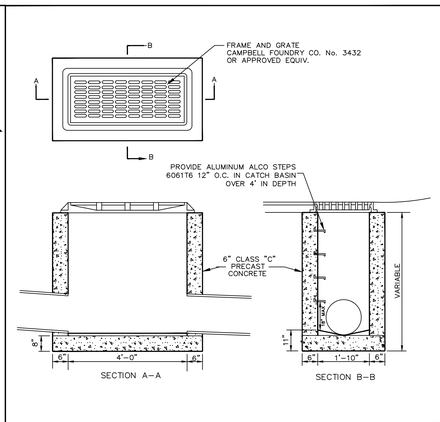


NOTES:

1. THE INLET SHALL MEET THE REQUIREMENTS OF ASTM C-913 "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES".
2. CONCRETE IS TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS. REINFORCING STEEL TO HAVE A YELD STRENGTH OF 60,000 PSI.
3. BOX SHALL BE DESIGNED TO MEET CURRENT NJ DOT SPECIFICATIONS.
4. ALL PRECAST STRUCTURES SHALL RECEIVE BITUMASTIC TAR COAT OUTSIDE ONLY.
5. ALL STORM SEWER PIPE SHALL HAVE 6" STONE BEDDING MINIMUM.
6. ALL INLET GRATE FRAMES AND MANHOLE COVER FRAMES SHALL BE SECURELY MORTARED IN PLACE.

N.T.S.

TYPE B INLET

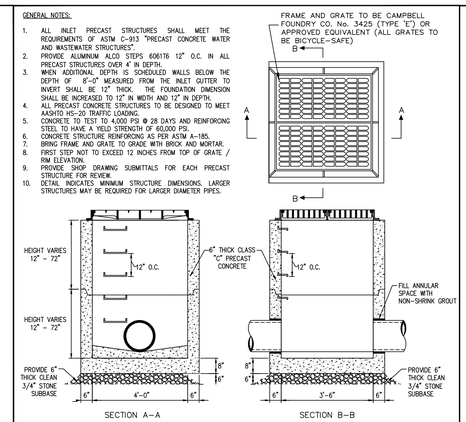


N.T.S.

TYPE A INLET

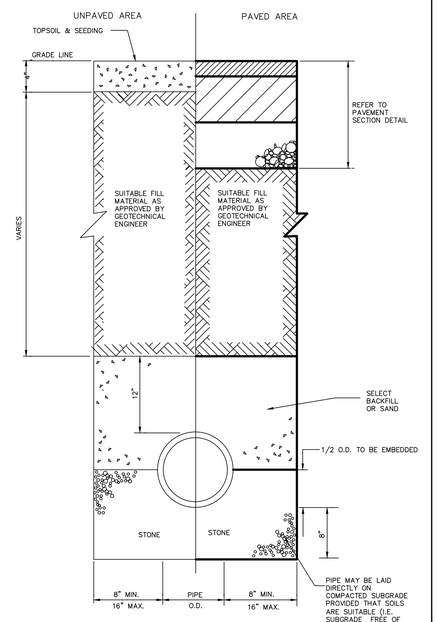
GENERAL NOTES:

1. ALL INLET PRECAST STRUCTURES SHALL MEET THE REQUIREMENTS OF ASTM C-913 "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES".
2. PROVIDE ALUMINUM ALCO STEPS 6061T6 12" O.C. IN ALL PRECAST STRUCTURES OVER 4' IN DEPTH.
3. WHEN ADDITIONAL DEPTH IS SCHEDULED WALLS BELOW THE DEPTH OF 8'-0" MEASURED FROM THE INLET GUTTER TO INVERT SHALL BE 12" THICK. THE FOUNDATION DIMENSION SHALL BE INCREASED TO 12" IN WIDTH AND 12" IN DEPTH.
4. ALL PRECAST CONCRETE STRUCTURES TO BE DESIGNED TO MEET AASHTO HS-20 TRAFFIC LOADING.
5. CONCRETE TO TEST TO 4,000 PSI @ 28 DAYS AND REINFORCING STEEL TO HAVE A YIELD STRENGTH OF 60,000 PSI.
6. CONCRETE STRUCTURE REINFORCING AS PER ASTM A-185.
7. BRING FRAME AND GRATE TO GRADE WITH BRICK AND MORTAR.
8. FIRST STEP NOT TO EXCEED 12 INCHES FROM TOP OF GRATE / RIM ELEVATION.
9. PROVIDE SHOP DRAWING SUBMITTALS FOR EACH PRECAST STRUCTURE FOR REVIEW.
10. DETAIL INDICATES MINIMUM STRUCTURE DIMENSIONS. LARGER STRUCTURES MAY BE REQUIRED FOR LARGER DIAMETER PIPES.



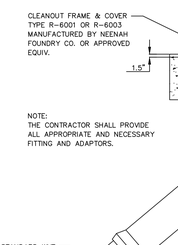
N.T.S.

TYPE E INLET



N.T.S.

STORM SEWER TRENCH AND BEDDING



PLAN – MANHOLE FRAME

SECTION – MANHOLE FRAME

MANHOLE COVERS AND FRAMES SHALL BE:

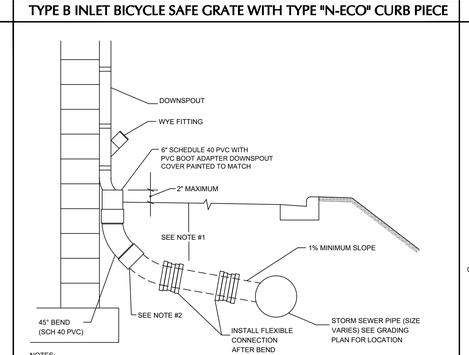
STANDARD (HEAVY TRAFFIC TYPE):
CAMPBELL FOUNDRY COMPANY PATTERN NO. 1203, OR APPROVED EQUAL.

CONSTRUCTION NOTES:

1. MANHOLE FRAME AND COVER CASTINGS SHALL CONFORM TO THE LATEST ASTM A-48 CLASS 30 SPECIFICATION.
2. FRAME AND COVERS SHALL BE COATED WITH TWO COATS OF ASPHALTUM VARNISH.

N.T.S.

MANHOLE FRAME AND COVER

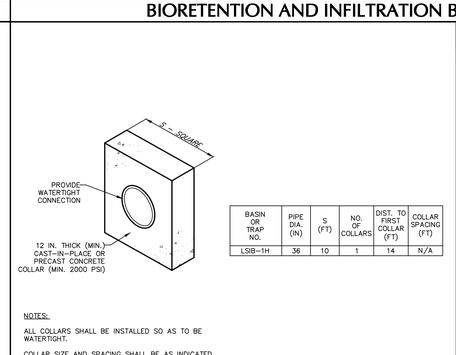


NOTES:

1. MATERIAL: GRAY CAST IRON ASTM A48-83, CLASS 30B.
2. AASHTO HS-25 LOADING.
3. SUPPLIED WITHOUT SURFACE COATING.
4. GRATE TO BE CAMPBELL FOUNDRY #2618 OR APPROVED EQUAL.

N.T.S.

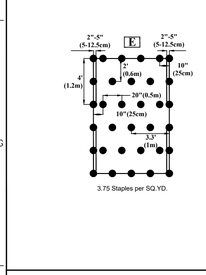
TYPE B INLET BICYCLE SAFE GRATE WITH TYPE "N-ECO" CURB PIECE



	ORIFICE "A"		ORIFICE "B"		RECT. WEIR		OUTLET PIPE		GRATE EL.
	SIZE	INVERT	SIZE	INVERT	LENGTH	CREST EL.	SIZE	INVERT	
OCS-1A	4.5" DIA.	89.60	N/A	N/A	2'	91.15	30" HDPE	85.50	92.00
OCS-1B	3"x6"	95.95	3"x36"	96.55	2'	97.15	24" HDPE	91.50	98.00
OCS-1D	N/A	N/A	N/A	N/A	N/A	N/A	24" HDPE	87.75	92.30
OCS-1E	N/A	N/A	4"x12"	86.30	N/A	N/A	24" HDPE	82.00	87.50
OCS-1F	4" DIA.	86.85	N/A	N/A	N/A	N/A	18" HDPE	82.50	88.50
OCS-1G	N/A	N/A	3"x36"	85.50	N/A	N/A	24" HDPE	80.50	86.25
OCS-1H	3" DIA.	84.80	6"x12"	86.00	2'	87.50	36" HDPE	79.00	89.00

N.T.S.

BIORETENTION AND INFILTRATION BASIN OUTLET CONTROL STRUCTURE



NOTES:

1. WALL HEIGHT TO VARY – REFER TO GRADING PLAN FOR ELEVATIONS BEHIND TOP OF WALL AND IN FRONT OF BOTTOM OF WALL.
2. CONTRACTOR TO PROVIDE SIGNED AND SEALED SHOP DRAWINGS BY A NJ-LICENSED STRUCTURAL ENGINEER FOR REVIEW AND APPROVAL.
3. IT IS ACCEPTABLE TO PLACE THE FENCE LESS THAN 2 FEET AWAY FROM THE WALL IF "SLEEVE IT" PRODUCT IS USED.
4. ALL RETAINING WALL CONSTRUCTION SHALL BE INSPECTED BY A NJ-LICENSED PROFESSIONAL ENGINEER.
5. A CERTIFICATION SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY SHALL BE PROVIDED TO THE BOROUGH STATING THAT THE RETAINING WALL WAS CONSTRUCTED IN CONFORMANCE WITH APPROVED RETAINING WALL PLANS AND DESIGN CALCULATIONS.

N.T.S.

TYPICAL REINFORCED MODULAR WALL

NOTE:
THE CONTRACTOR SHALL PROVIDE ALL APPROPRIATE AND NECESSARY FITTING AND ADAPTORS.

N.T.S.

STORM CLEANOUT

NOTES:

1. FOR ALL DEPTHS OF COVER LESS THAN TWO (2) FEET, PIPE MUST BE SCHEDULE 40 PVC. FOR DEPTHS OF COVER GREATER THAN TWO (2) FEET, FLEXIBLE PIPE MAY BE USED. REFER TO SPECIFICATIONS FOR ALLOWABLE PIPE TYPES.
2. A WATERTIGHT CONNECTION SHALL BE MAINTAINED WITH ANY TRANSITION FROM SCHEDULE 40 PVC PIPE TO ANY OTHER PIPE TYPE.
3. THE DOWNSPOUT COLLECTOR DRAIN SHALL BE INSTALLED BEFORE THE DOWNSPOUTS ARE INSTALLED ON THE BUILDING. SITEWORK CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK INCLUDING THE RODENT SCREEN. BUILDING CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONNECTION AT THE POINT OF THE RODENT SCREEN.
4. IF NECESSARY, ADJUST FOOTING TO ALLOW DOWNSPOUT TO BE INSTALLED TIGHT AGAINST BUILDING

N.T.S.

BUILDING DOWNSPOUT CONNECTION

BASIN OR TRAP NO.	PIPE DIA. (IN)	S (FT)	NO. OF COLLARS	DIST. TO FIRST COLLAR (FT)	COLLAR SPACING (FT)
LSB-1H	36	10	1	14	N/A

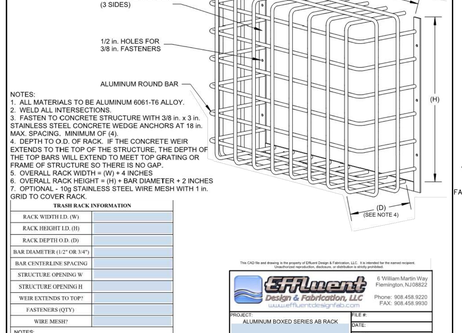
NOTES:

ALL COLLARS SHALL BE INSTALLED SO AS TO BE WATERTIGHT.

COLLAR SIZE AND SPACING SHALL BE AS INDICATED WITHIN TABLE.

N.T.S.

CONCRETE ANTI-SEEP COLLAR



NOTES:

1. ALL MATERIALS TO BE ALUMINUM 6061-T6 ALLOY.
2. WELD ALL INTERSECTIONS.
3. FASTEN TO CONCRETE STRUCTURE WITH 3/8 in. x 3 in. STAINLESS STEEL CONCRETE WEDGE ANCHORS AT 18 in. MAX. SPACING, MINIMUM OF (4).
4. DEPTH TO O.D. OF RACK. IF THE CONCRETE WEIR EXTENDS TO THE TOP OF THE STRUCTURE, THE DEPTH OF THE TOP BARS WILL EXTEND TO MEET TOP GRATING OR FRAME OF STRUCTURE SO THERE IS NO GAP.
5. OVERALL RACK WIDTH = (W) + 4 INCHES
6. OVERALL RACK HEIGHT = (H) + BAR DIAMETER + 2 INCHES
7. OPTIONAL – 10g STAINLESS STEEL WIRE MESH WITH 1 in. GRID TO COVER RACK.

TRASH RACK INFORMATION	
RACK WIDTH I.D. (W)	
RACK HEIGHT I.D. (H)	
RACK DEPTH O.D. (D)	
BAR DIAMETER (1/2" OR 3/4")	
BAR CENTERLINE SPACING	
STRUCTURE OPENING W	
STRUCTURE OPENING H	
WEIR EXTENDS TO TOP?	
FASTENERS (QTY)	
WIRE MESH?	

NOTES:

Effluent Design & Fabrication, LLC
Guaranteed Solutions Delivered Fabricated
6 William Martin Way
Flemington, NJ 08822
Phone: 908.458.9220
FAX: 908.458.9930

PROJECT: ALUMINUM BOXED SERIES AB RACK

FILE #:
DATE:
SCALE:
DRAWN BY:

N.T.S.

ALUMINUM TRASH RACK

1. Prepare soil before installing rolled erosion control products (RECPs), including any necessary application of lime, fertilizer, and seed.
2. Begin at the top of the channel by anchoring the RECPs in a 6"(15cm) deep X 6"(15cm) wide trench with approximately 12"(30cm) of RECPs extended beyond the up-slope portion of the trench. Use ShoreMax mat at the channel/culvert outlet as supplemental scour protection as needed. Anchor the RECPs with a row of staples/stakes approximately 12"(30cm) apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to the compacted soil and fold the remaining 12"(30cm) portion of RECPs back over the seed and compacted soil. Secure RECPs over compacted soil with a row of staples/stakes spaced approximately 12" apart across the width of the RECPs.
3. Roll center RECPs in direction of water flow in bottom of channel. RECPs will unroll with appropriate side against the soil surface. All RECPs must be securely fastened to soil surface by placing staples/stakes in appropriate locations as shown in the staple pattern guide.
4. Place consecutive RECPs end-over-end (Shingle style) with a 4"-6" overlap. Use a double row of staples staggered 4" apart and 4" on center to secure RECPs.
5. Full length edge of RECPs at top of side slopes must be anchored with a row of staples/stakes approximately 12"(30cm) apart in a 6"(15cm) deep X 6"(15cm) wide trench. Backfill and compact the trench after stapling.
6. Adjacent RECPs must be overlapped approximately 2"-5" (5-12.5cm) (Depending on RECPs type) and stapled.
7. In high flow channel applications a staple check slot is recommended at 30 to 40 foot (9 -12m) intervals. Use a double row of staples staggered 4"(10cm) apart and 4"(10cm) on center over entire width of the channel.
8. The terminal end of the RECPs must be anchored with a row of staples/stakes approximately 12" (30cm) apart in a 6"(15cm) deep X 6"(15cm) wide trench. Backfill and compact the trench after stapling.

NOTES:
*Horizontal staple spacing should be altered if necessary to allow staples to secure the critical points along the channel surface.

**In loose soil conditions, the use of staple or stake lengths greater than 6"(15cm) may be necessary to properly secure the RECP's.

N.T.S.

TURF REINFORCEMENT MAT INSTALLATION DETAIL

–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
5/3/24	REVISED FOR SUBMISSION TO NEPTUNE	3
7/28/23	REVISED PER NJDOT, NJDEP, & FIRST ENERGY COMMENTS	2
5/10/23	REVISED RETAIL LAYOUT & PER NJDOT COMMENTS	1
Date	Description	No.

REVISIONS

NEW JERSEY LICENSED PROFESSIONAL ENGINEER 24GE03705800

SIGNATURE 5/3/2024 DATE SIGNED
JOHN COTE
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

LANGAN
Langan Engineering and Environmental Services, LLC
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ Certificate of Authorization No. 24GA27996400

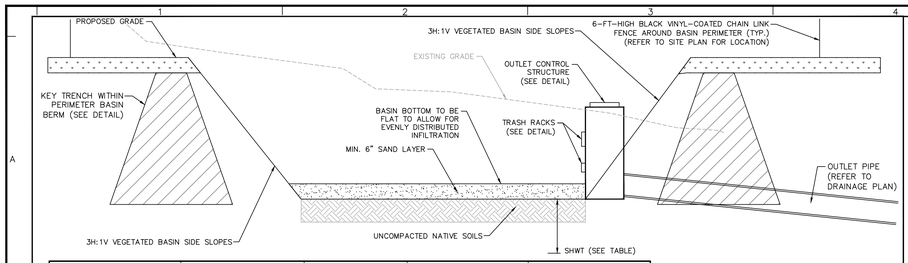
Project
3501 STATE ROUTE 66 REDEVELOPMENT
BLOCK No. 3903, LOT No. 12 & 13
NEPTUNE TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

Drawing Title
DRAINAGE DETAILS

Project No.	100775002
Date	AUGUST 26, 2022
Drawn By	TEG
Checked By	MJV

Drawing No. CG501
Sheet 30 of 48

Project No. 100775002

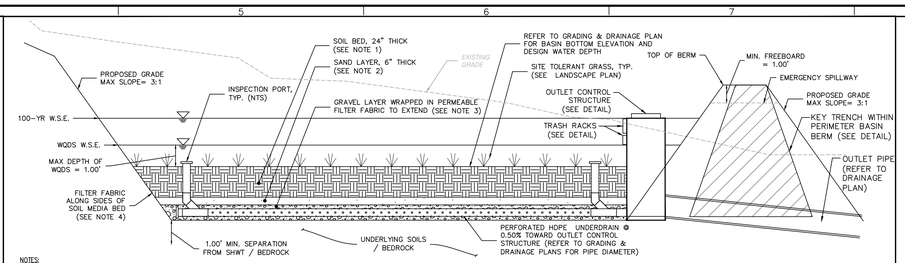


INFILTRATION BASIN	MAX. BEDROCK / GROUNDWATER EL.	GROUNDWATER MOUNDING HEIGHT AT CENTER (FT)	MAX. GROUNDWATER MOUNDING EL.	BOTTOM OF SAND LAYER EL.
SSIB-1A	76.0	3.42	79.42	88.50
SSIB-1D	88.0	2.62	90.62	90.75
LSIB-1H	78.0	5.32	83.32	83.50

Notes:
1. Groundwater was not encountered within test pits and borings performed in Large Scale Infiltration Basin 1H. Evidence of mottling was found in Boring B-22 at EL. 78.0, making this the seasonal high groundwater elevation.

N.T.S.

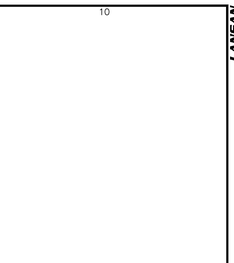
INFILTRATION BASIN TYPICAL CROSS SECTION



NOTES:
1. SOIL BED SPECIFICATIONS
   - 1.1. THE SOIL BED MATERIAL MUST CONSIST OF THE FOLLOWING MIX, BY WEIGHT: 85 TO 95% SAND, WITH NO MORE THAN 25% OF THE SAND AS FINE OR VERY FINE SANDS; NO MORE THAN 15% SILT AND CLAY WITH 2% TO 5% CLAY CONTENT. THE ENTIRE MIX MUST THEN BE AMENDED WITH 3 TO 7% ORGANICS, BY WEIGHT.
   - 1.2. PRE-MIXED SOIL MUST BE CERTIFIED TO BE CONSISTENT WITH THE REQUIREMENT ABOVE BY EITHER THE VENDOR OR BY A PROFESSIONAL ENGINEER LICENSED BY THE STATE OF NEW JERSEY; IN ADDITION, THE ENGINEER MUST BE PRESENT WHILE THE SOIL IS MIXED.
   - 1.3. THE PH OF THE SOIL BED MATERIAL MUST RANGE FROM 5.5 TO 6.5.
   - 1.4. THE SOIL BED MATERIAL MUST BE PLACED IN LIFTS NOT TO EXCEED 8 INCHES. ADDITIONAL MATERIALS MAY BE NECESSARY TO ACCOUNT FOR SETTLING OVER TIME.
2. SAND LAYER SPECIFICATIONS
   - 2.1. THE SAND LAYER MUST BE AT LEAST 6 INCHES IN DEPTH AND MUST CONSIST OF CLEAN, MEDIUM-AGGREGATE CONCRETE SAND (AASHTO M-6/ASTM C-33).
3. GRAVEL LAYER SPECIFICATIONS
   - 3.1. THE GRAVEL LAYER MUST BE AASHTO #57 AND HAVE SUFFICIENT DEPTH TO PROVIDE AT LEAST 3 INCHES OF GRAVEL ABOVE AND BELOW THE PERFORATED UNDERDRAIN AND MUST CONSIST OF 0.5 TO 1.5 INCH CLEAN, BROKEN STONE OR PEA GRAVEL (AASHTO M-43).
4. GEOTEXTILE FILTER FABRIC SHALL BE INSTALLED ALONG THE SIDES AND THE BOTTOM OF THE BASIN AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
5. FLEXIBLE CORRUGATED PERFORATED PLASTIC DRAIN PIPE SHOULD NOT BE USED AS UNDERDRAIN PIPE.
6. REFER TO THE GRADING & DRAINAGE PLANS FOR BASIN ELEVATIONS, PIPE INVERTS, AND GRATE ELEVATIONS.
7. REFER TO THE OUTLET CONTROL STRUCTURE DETAIL FOR SPECIFICATIONS.
8. REFER TO LANDSCAPING PLANS AND DETAILS FOR PROPOSED PLANTINGS WITHIN BIORETENTION BASINS AND FOR PLANTING SOIL DETAILS AND SPECIFICATIONS.

N.T.S.

UNDERDRAINED BIORETENTION BASIN TYPICAL CROSS SECTION



DIMENSION in (mm)	PIPE DIAMETER, in (mm) 10/12 (250/300)	15 (375)	18 (450)	24 (600)	30 (750)	36 (900)
A	42 (1781)	41 (1738)	49 (2078)	59.5 (2523)	88 (3731)	88 (3731)
B	14.5 (615)	19 (806)	22 (933)	28 (1187)	36 (1526)	43 (1823)
C	33 (1399)	34 (1442)	43 (1823)	48 (2035)	63.5 (2692)	66.5 (2820)
D	6 (254)	6 (254)	6 (254)	6 (254)	6 (254)	6 (254)

SCOPE:

THIS SPECIFICATION DESCRIBES 10-THROUGH 36-INCH (250 TO 900 mm) HI-Q FLARED END SECTIONS FOR USE IN CULVERT AND DRAINAGE OUTLET APPLICATIONS.

REQUIREMENTS:

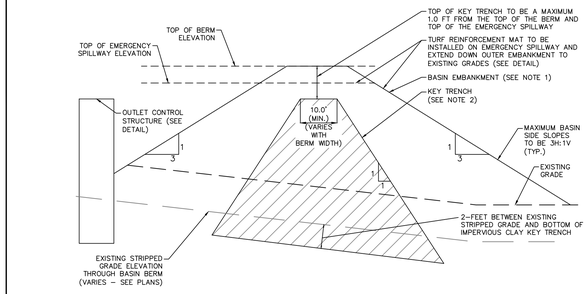
THE INVERT OF THE PIPE AND THE END SECTION SHALL BE AT THE SAME ELEVATION. HI-Q FLARED END SECTION SHALL BE HIGH DENSITY POLYETHYLENE MEETING ASTM D3350 MINIMUM CELL CLASSIFICATION 213320C. EACH END SECTION SHALL HAVE A CARBON BLACK ADDITIVE FOR UV PROTECTION. THE METAL THREADED FASTENER SHALL BE STAINLESS STEEL.

INSTALLATION:

INSTALLATION SHALL BE IN ACCORDANCE WITH HANCOR INSTALLATION INSTRUCTIONS AND WITH THOSE ISSUED BY STATE OR LOCAL AUTHORITIES.

N.T.S.

HDPE FLARED END SECTION



BASIN	TOP OF BERM ELEV.	TOP OF SPILLWAY ELEV.	TOP OF 100-YEAR STORM ELEV.
SSIB-1A	94.00	92.50	91.34
SSBB-1B	100.00	98.50	97.47
SSIB-1D	95.00	93.67	92.51
SSBB-1E	90.00	88.50	87.50
SSBB-1F	90.00	91.25	88.34
SSBB-1G	89.00	87.67	86.65
LSIB-1H	91.00	89.50	87.68

NOTES:

1. ALL BASIN EMBANKMENTS SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO A DEPTH OF TWO FEET PRIOR TO ANY PLACEMENT AND COMPACTION OF EARTHEN FILL. FILL MATERIAL FOR THE EMBANKMENTS SHALL BE FREE OF ROOTS, OR OTHER WOODY VEGETATION, ORGANIC MATERIAL, LARGE STONES, AND OTHER OBJECTIONABLE MATERIALS. THE EMBANKMENT SHALL BE COMPACTED IN LAYERED LIFTS CONSISTING OF MAXIMUM 8-INCH LIFTS. THE MAXIMUM ROCK SIZE SHALL BE NO GREATER THAN 2/3 THE LIFT THICKNESS. EMBANKMENTS SHALL BE COMPACTED TO A MINIMUM OF 95% DRY DENSITY. COMPACTION TESTS SHALL BE PERFORMED USING THE MODIFIED PROCTOR METHOD IN ACCORDANCE WITH ASTM-D-1557.
2. KEY TRENCH SHALL HAVE A MINIMUM DEPTH OF FILL MATERIAL THAT IS 2' BELOW THE STRIPPED GRADE (OR SHALLOWER IF BEDROCK IS ENCOUNTERED), MINIMUM WIDTH=4', MAXIMUM SIDE SLOPE STEEPNESS IS 1H:1V AND FILLED WITH HIGHLY IMPERVIOUS AND WELL COMPACTED CLAY MATERIAL. THE TRENCH MUST BE INSTALLED IN ALL AREAS OF FILL AND EXTEND UP BOTH ABUTMENTS TO 1' BELOW THE TOP OF BERM ELEVATION AND TO 1' BELOW THE TOP OF THE EMERGENCY SPILLWAY ELELVATION, AND EXCAVATED UNDER THE ENTIRE LENGTH OF THE BERM AND LOCATED AT OR UPSTREAM OF THE CENTERLINE OF THE BERM. COMPACTION REQUIREMENTS SHOULD BE THE SAME AS THOSE FOR THE EMBANKMENT. THE TRENCH SHOULD BE DEWATERED DURING BACKFILLING AND COMPACTION OPERATIONS IF NECESSARY.

N.T.S.

BASIN EMBANKMENT & KEY TRENCH DETAIL

Specification Sheet

VMax® C350® Turf Reinforcement Mat

ROLLMAX™ ROLLED EROSION CONTROL

The composite turf reinforcement mat (C-TRM) shall be a machine-produced mat of 100% coconut fiber matrix incorporated into permanent three-dimensional turf reinforcement matting. The matrix shall be evenly distributed across the entire width of the matting and stitch bonded between super heavy duty UV-stabilized nettings with 0.50 x 0.50 in. (1.27 x 1.27 cm) openings, an ultra heavy duty UV-stabilized, dramatically corrugated (crimped) intermediate netting with 0.5 x 0.5 in. (1.27 x 1.27 cm) openings, and covered by a super heavy duty UV-stabilized nettings with 0.50 x 0.50 in. (1.27 x 1.27 cm) openings. The middle corrugated netting shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50 in. (3.81 cm) centers with UV-stabilized polypropylene thread to form permanent three-dimensional turf reinforcement matting. All mats shall be manufactured with colored thread stitched along both outer edges as an overlap guide for adjacent mats.

The C350 shall meet Type 5A, B and C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) *FP-03 Section 713.18*.

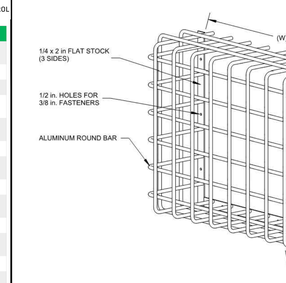
Material Content		
Matrix	100% Coconut Fiber	0.5 lb/sy (0.27 kg/sm)
Netting	Top and Bottom, UV-Stabilized Polypropylene Middle, Corrugated UV-Stabilized Polypropylene	8 lb/1000 sf (3.91 kg/100 sm) 24 lb/1000 sf (11.7 kg/100 sm)
Thread	Polypropylene. UV Stable	

Standard Roll Sizes		
Width	6.5 ft (2.0 m)	8 ft (2.44 m)
Length	55.5 ft (16.9 m)	90 ft (27.4 m)
Weight ± 10%	37 lbs (16.8 kg)	74 lbs (33.6 kg)
Thread	40 sy (33.4 sm)	80 sy (66.8 sm)

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.73 in. (18.54 mm)
Resiliency	ASTM D6524	90%
Density	ASTM D792	0.917 g/cm³
Mass/Unit Area	ASTM D6566	18.36 oz/sy (624 g/sm)
UV Stability	ASTM D4355/ 1000 HR	80%
Porosity	ECTC Guidelines	99%
Stiffness	ASTM D1388	0.24 in.-lb (27590 mg-cm)
Light Penetration	ASTM D6567	7.2%
Tensile Strength - MD	ASTM D6818	585.8 lbs/ft (8.70 kN/m)
Elongation - MD	ASTM D6818	45.3%
Tensile Strength - TD	ASTM D6818	687.6 lbs/ft (10.20 kN/m)
Elongation - TD	ASTM D6818	19.5%
Biomass Improvement	ASTM D7322	380%

Design Permissible Shear Stress	Short Duration	Long Duration
Phase 1 Unvegetated	3.2 psf (153 Pa)	3.0 psf (144 Pa)
Phase 2 Partially Veg.	10.0 psf (480 Pa)	10.0 psf (480 Pa)
Phase 3 Fully Veg.	12.0 psf (576 Pa)	10.0 psf (480 Pa)
Unvegetated Velocity	10.5 fps (3.2 m/s)	
Vegetated Velocity	20 fps (6.0 m/s)	

EMERGENCY SPILLWAY TURF REINFORCEMENT MAT



TRASH RACK INFORMATION	
RACK WIDTH I.D. (W)	
RACK HEIGHT I.D. (H)	
RACK DEPTH O.D. (D)	
BAR DIAMETER (1/2" OR 3/4")	
BAR CENTERLINE SPACING	
STRUCTURE OPENING W	
STRUCTURE OPENING H	
WEIR EXTENDS TO TOP?	
FASTENERS (QTY)	
WIRE MESH?	
NOTES:	

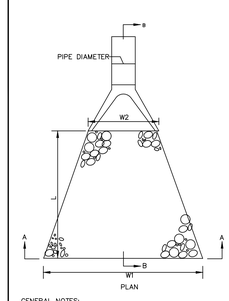
NOTES:
1. ALL MATERIALS TO BE ALUMINUM 6061-T6 ALLOY.
2. WELD ALL INTERSECTIONS.
3. FASTEN TO CONCRETE STRUCTURE WITH 3/8 in. x 3 in. STAINLESS STEEL CONCRETE WEDGE ANCHORS AT 18 in. MAX. SPACING. MINIMUM OF (4).
4. DEPTH TO O.D. OF RACK. IF THE CONCRETE WEIR EXTENDS TO THE TOP OF THE STRUCTURE, THE DEPTH OF THE TOP BARS WILL EXTEND TO MEET TOP GRATING OR FRAME OF STRUCTURE SO THERE IS NO GAP.
5. OVERALL RACK WIDTH = (W) + 4 INCHES
6. OVERALL RACK HEIGHT = (H) + BAR DIAMETER + 2 INCHES
7. OPTIONAL - 10g STAINLESS STEEL WIRE MESH WITH 1 in. GRID TO COVER RACK.

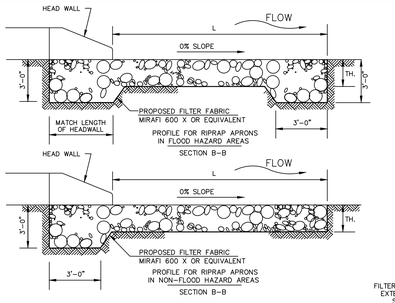
Effluent Design & Fabrication, LLC
6 William Martin Way
Flemington, NJ 08822
Phone: 908.458.9220
FAX: 908.458.9930

PROJECT: ALUMINUM BOXED SERIES AB RACK
FILE #:
DATE:
SCALE:
DRAWN BY:

N.T.S.

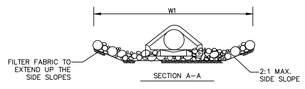
POROUS PAVEMENT OUTLET CONTROL STRUCTURE ALUMINUM ROCK SCREEN





OUTLET	LENGTH	d50	W1	W2	THICKNESS
HW1-1	12.0'	3"	9.0'	4.5'	6"
HW1-2	10.0'	3"	8.0'	3.75'	6"
FES1-3	2.0'	3"	5.0'	3.75'	6"
FES1-4	10.0'	3"	10.0'	6.0'	6"
FES1-6	2.0'	3"	5.0'	3.75'	6"
FES1-7	7.0'	3"	7.0'	3.75'	6"
FES1-8	7.0'	3"	7.0'	3.75'	6"
FES1-15	13.0'	3"	11.0'	6.0'	6"
FES1-17	11.0'	3"	13.0'	9.0'	6"
FES1-18	16.0'	3"	11.0'	4.5'	6"

LENGTH, W1 AND W2 ARE DIMENSIONED IN FEET



GENERAL NOTES:

1. THE INDICATED d50, APRON LENGTH AND WIDTH HAS BEEN DESIGNED IN ACCORDANCE WITH "STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY"
2. FOR ALL PIPE SIZES, SLOPES, AND INVERTS SEE GRADING PLAN.
3. RIPRAP APRON LOCATED ALONG THE EMBANKMENT EDGE CAN BE FLARED UP TO ALIGN WITH GRADES OF THE DRAINAGE DITCH, REFER TO SECTION A-A.

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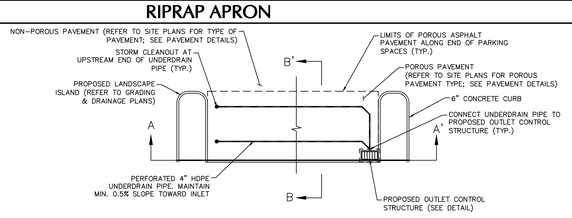
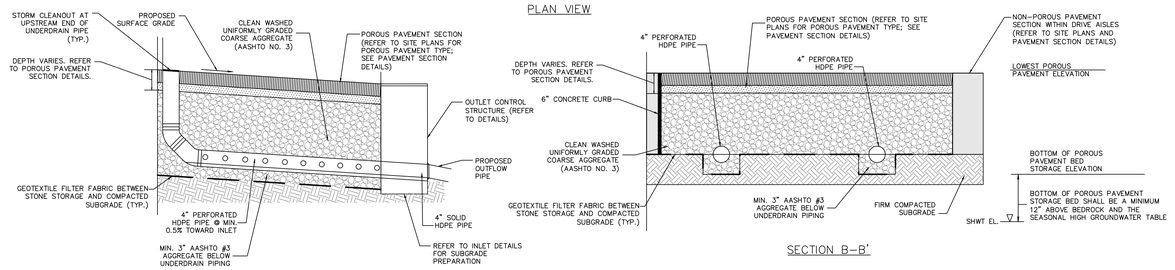
RIPRAP APRON



PLAN VIEW



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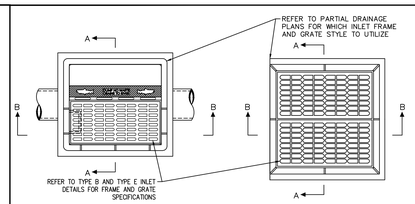
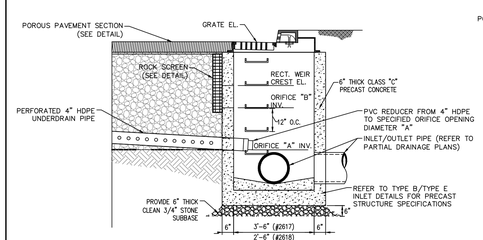
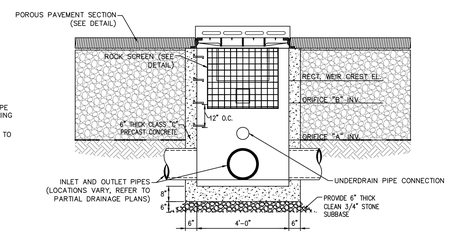
TYPICAL POROUS PAVEMENT CROSS SECTION DETAIL



PLAN VIEW

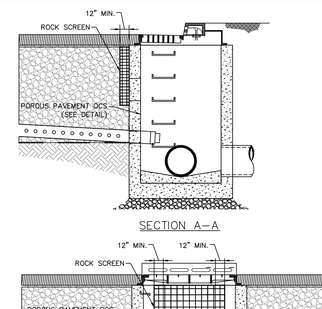
	ORIFICE "A"		ORIFICE "B"		RECT. WEIR		INLET PIPE		OUTLET PIPE		GRATE EL.
	SIZE	INVERT	SIZE	INVERT	LENGTH	CREST EL.	SIZE	INVERT	SIZE	INVERT	
OCS-1I-1	2.5" DIA.	85.25	3"x3"	86.00	12"	86.67	15" HDPE	82.24	18" HDPE	82.14	87.74
OCS-1I-2	2.5" DIA.	85.25	3"x3"	86.00	12"	86.67	15" HDPE	83.08	15" HDPE	82.98	88.02
OCS-1I-3	2.5" DIA.	85.25	3"x3"	86.00	12"	86.67	15" HDPE	83.25	15" HDPE	83.15	88.01
OCS-1I-4	2.5" DIA.	85.25	3"x3"	86.00	12"	86.67	15" HDPE	84.10	15" HDPE	84.00	88.00



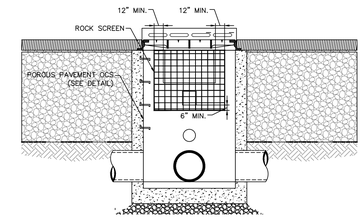


N.T.S.

POROUS PAVEMENT SYSTEM OUTLET CONTROL STRUCTURE



SECTION A-A



SECTION B-B

NOTES:
1. MAX OPENING BETWEEN PARALLEL BARS TO BE 4"
2. ROCK SCREEN TO EXTEND MIN. 12" IN BOTH DIRECTIONS BEYOND WIDTH OF RECTANGULAR WEIR, MIN 6" BELOW RECTANGULAR WEIR INVERT, AND MIN. 12" OUT FROM FACE OF OUTLET CONTROL STRUCTURE

N.T.S.

POROUS PAVEMENT OUTLET CONTROL STRUCTURE ALUMINUM ROCK SCREEN

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–	–	–
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–	–	–
–	–	–
–	–	–
–	–	–
5/3/24	REVISED FOR SUBMISSION TO NEPTUNE	3
7/28/23	REVISED PER NJDOT, NJDEP, & FIRST ENERGY COMMENTS	2
5/10/23	REVISED RETAIL LAYOUT & PER NJDOT COMMENTS	1
Date	Description	No.

REVISIONS

SIGNATURE — 5/3/2024 DATE SIGNED

JOHN COTE
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

LANGAN
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NJ Certificate of Authorization No. 24GA27996400

Project

3501 STATE ROUTE 66 REDEVELOPMENT

BLOCK No. 3903, LOT No. 12 & 13
NEPTUNE TOWNSHIP

MONMOUTH COUNTY **NEW JERSEY**

Drawing Title

DRAINAGE DETAILS

Project No.	Drawing No.
100775002	CG502
Date: AUGUST 26, 2022	
Drawn By: TEG	
Checked By: MJV	Sheet 31 of 48

Project No. 100775002