DRAINAGE STATEMENT

For

Heart of Camden

Proposed Makerspace Addition

1811 Broadway
Block 480, Lot 27
City of Camden
Camden County, NJ

Prepared by:

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APPENDIX

1. Site Description & Project Overview

The subject site is located at 1811 Broadway (County Rte 551) in the City of Camden, Camden County, New Jersey. The site is identified as Block 480, Lot 27 on the City of Camden Tax Map Sheet #8.04. The subject site is currently developed, consisting of an existing 1,095 SF footprint 3-story building with frontage on Broadway. The property is bounded to the north by commercial and residential uses, to the east by Broadway, to the south by commercial and residential uses and to the west by wooded area and residential uses.

The proposed development includes a building addition as identified on the accompanying Site Plan drawings. The total gross floor area of the proposed building after construction will be 3,985 SF. Included in the development is a proposed total building footprint of 1,621 SF, 1,976 SF of impervious surfaces, and approximately 0.03 acres of land disturbance. The proposed project will also include associated site improvements such as grading, stormwater management facilities, and lighting. The proposed development is not considered a major development in accordance with N.J.A.C. 7:8.

2. Design Methodology

This statement has been prepared to define and analyze the stormwater drainage conditions that would occur as a result of the development of the subject site. Based upon the fact that the proposed development will result in less than one (1) acre of land disturbance, increase impervious coverage by less than ¼ acre, and does not propose any motor vehicle surface, this project does not meet the definition of a "major development" as defined in NJAC 7:8. Therefore, the proposed development is not required to be designed to meet the stormwater runoff quantity, quality, and groundwater recharge standards set forth in NJAC 7:8. Further, the proposed development does not result in more than 5,000 SF of land disturbance and is not subject to NJ Soil Erosion & Sediment Control Regulations. The project will, however, result in a minimal increase of impervious coverage by 615 SF. Therefore, the proposed development is required to be designed to satisfy the stormwater runoff quantity standard, by mitigating the increase in impervious coverage for the 25-year storm, set forth in the City of Camden Ordinance.

The following documents and data were used in support of the design of the project:

- ALTA/NSPS Land Title Survey, prepared by Dynamic Survey, LLC, dated 12/04/2023
- Preliminary and Final Site Plan, prepared by Dynamic Engineering Consultants, PC, dated 4/17/2024
- NRCS Soil Survey
- City of Camden Ordinance

The hydrology for the site was calculated using the NRCS Runoff Equation and Dimensionless Unit Hydrograph as noted in Part 630, Hydrology National Engineering Handbook. The following particular references were used:

- Curve Numbers were established via Chapter 9 – Hydrologic Soil-Cover Complexes
- Time of Concentrations were calculated in accordance with Chapter 15
- Rainfall Distributions are based on NOAA Type C rainfall distribution
- The DelMarVa Unit Hydrograph was utilized
- The rainfall depths are based on Camden County NOAA Atlas 14 Data and adjusted per NJAC 7:8-5.7 Tables 5-5 and 5-6 as noted below:

Return Period	Projected Adjusted Rainfall Depth (inches)
25 Year Storm	6.46
100 Year Projected Storm	11.84

Based upon the Camden County Soil Survey and the New Jersey Stormwater Best Management Practices Manual, the soil types native to the site include:

Soil Type	Soil Type Name	Hydrologic Soil Group – Existing Conditions	Hydrologic Soil Group – Proposed Conditions
UR	Urban Land	A	D

Based on the methodology and data noted above a hydrologic evaluation of the NJDEP Water Quality, 25- and 100-year storm events was prepared.

3. Existing Drainage Conditions

The area to be analyzed consists of approximately 0.045 acres and is comprised of the existing building and accessory structures located within the rear portion of the property. Currently, stormwater runoff generated by the existing site drains to the west of the site via overland flow and overland discharging roof leaders from the existing building roof. The subject site has been evaluated with the drainage sub-watershed area as depicted on the Existing Drainage Area Map included in the Appendix of this statement.

Point of Analysis #1 Study Area West: This area consists of 0.045 acres in the west portion of the site which includes roof area, impervious areas, and pervious area. Under existing conditions, stormwater runoff generated by this area flows west overland to the rear property line.

Existing Conditions Input Summary Table

Drainage Area Name	Drainage Area (acres)	Time of Concentration (minutes)	Curve Number (CN)
DA West - Impervious	0.031	1.5	98
DA West - Pervious	0.014	9.5	39

Existing Conditions Flow Summary Table

Drainage Area Name	Q_{25} (CFS)
DA West	0.24

4. Proposed Drainage Conditions

The proposed development will incorporate a 4' diameter aboveground stormwater management cistern tank. The tank is designed to detain and release stormwater runoff generated by the development in order to meet the City of Camden stormwater runoff quantity requirements. The proposed site conditions have been evaluated using the drainage sub-watershed area as depicted on the Proposed Drainage Area Map included in the Appendix of this statement.

Point of Analysis #1 Study Area West: This area consists of 0.045 acres in the west portion of the site which includes roof area and impervious areas. Under existing conditions, stormwater runoff generated by this area flows to the proposed cistern.

Proposed Conditions Input Summary Table

Drainage Area Name	Drainage Area (acres)	Time of Concentration (minutes)	Curve Number (CN)
DA West Roof	0.040	1.5	98
DA West Impervious	0.005	0.3	98

Proposed Conditions Flow Summary Table

Drainage Area Name	Q_{25} (CFS)
DA West	0.23

5. Stormwater Management System Design

A summary of the cistern's water surface elevation (WSEL) and outflow rates for the 25- and 100-year storm event are provided below. These WSELs and outflows assume normal operating conditions for the cistern. A low-flow orifice has been designed to convey the 25-year storm, reducing flows from existing conditions. A weir has also been designed to provide emergency overflow relief in the event of larger storms.

Cistern Summary Table

Storm Event (years)	Water Surface Elevation (ft)	Outflow (CFS)
25 Year	21.37	0.20

6. Water Quantity Control Compliance

The site has been designed to meet the 25-year storm peak flow reduction requirements as noted in City of Camden Stormwater Requirements. The point of analysis has been identified on the Drainage Area Maps as previously described. Below is a summary table demonstrating compliance with the flow reduction requirements.

Point of Analysis West

Storm Event	Existing Peak Flow Rate (CFS)	Proposed Peak Flow Rate (CFS)	Reduction (CFS)
25 Year Storm	0.24	0.23	0.01

7. Conclusion

The proposed development has been designed with provisions for the safe and efficient control of stormwater runoff in a manner that will not adversely impact the existing drainage patterns, adjacent roadways, or adjacent parcels. In addition, the proposed development satisfies the stormwater management requirements set forth by the City of Camden Land Use Ordinance through the use of the proposed stormwater management system. With this stated, it is evident that the proposed development will not have a negative impact on the existing drainage conditions, on-site or within the vicinity of the subject site.

APPENDIX

NRCS WEB SOIL SURVEY

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Camden County, New Jersey

March 29, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:246 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 3 7 14 21

Feet: 0 10 20 40 60

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Camden County, New Jersey
Survey Area Data: Version 17, Aug 28, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 5, 2022—Jul 4, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
UR	Urban land	0.3	100.0%
Totals for Area of Interest		**0.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Camden County, New Jersey

UR—Urban land

Map Unit Setting

National map unit symbol: rvrf
Elevation: 0 to 170 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents

Percent of map unit: 5 percent
Landform: Low hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

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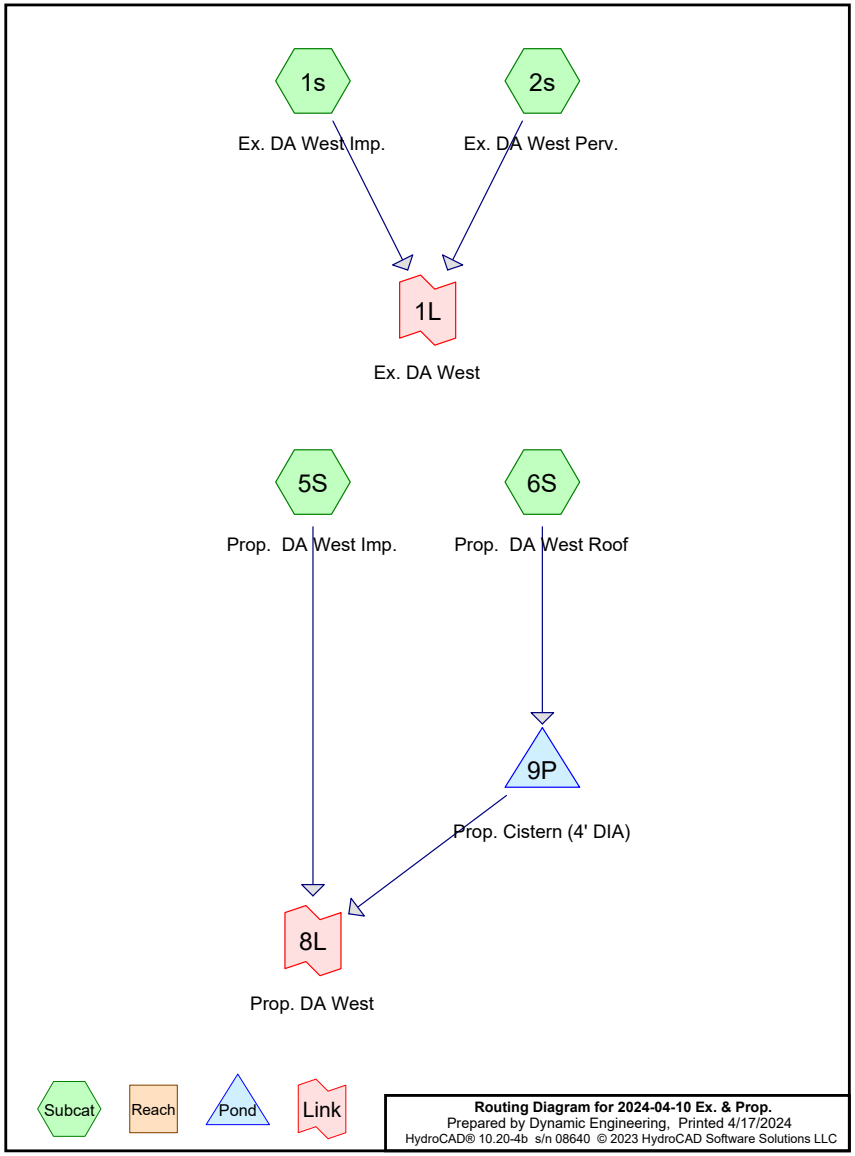
HYDROGRAPH SUMMARY REPORTS – EXISTING AND PROPOSED CONDITIONS 25-YR. STORM



Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 6601 NJ Bergen-D
Rainfall events imported from "NRCS-Rain.txt" for 6601 NJ Bergen-D
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Rainfall events imported from "NRCS-Rain.txt" for 6613 NJ Morris-D
Rainfall events imported from "NRCS-Rain.txt" for 6602 NJ Burlington-C
Rainfall events imported from "NRCS-Rain.txt" for 6603 NJ Camden-C
Rainfall events imported from "NJ-Rain.txt" for 6603 NJ Camden-C
Rainfall events imported from "NJ-Rain.txt" for 6603 NJ Camden-C
Rainfall events imported from "NRCS-Rain.txt" for 6603 NJ Camden-C
Rainfall events imported from "NRCS-Rain.txt" for 6603 NJ Camden-C
Rainfall events imported from "NRCS2-Rain.txt" for 1161 NJ Atlantic-C

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.014	39	>75% Grass cover, Good, HSG A (2s)
0.031	98	Roofs, HSG A (1s)
0.040	98	Roofs, HSG D (6S)
0.005	98	Unconnected roofs, HSG D (5S)
0.090	**89**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.045	HSG A	1s, 2s
0.000	HSG B	
0.000	HSG C	
0.045	HSG D	5S, 6S
0.000	Other	
0.090		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.014	0.000	0.000	0.000	0.000	0.014	>75% Grass cover, Good	2s
0.031	0.000	0.000	0.040	0.000	0.071	Roofs	1s, 6S
0.000	0.000	0.000	0.005	0.000	0.005	Unconnected roofs	5S
0.045	**0.000**	**0.000**	**0.045**	**0.000**	**0.090**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	9P	14.00	13.90	7.0	0.0143	0.012	0.0	3.0	0.0	

Time span=0.00-72.00 hrs, dt=0.010 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1s: Ex. DA West Imp. Runoff Area=0.031 ac 100.00% Impervious Runoff Depth=6.22"
Flow Length=112' Tc=1.5 min CN=98 Runoff=0.23 cfs 0.016 af

Subcatchment2s: Ex. DA West Perv. Runoff Area=0.014 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=54' Slope=0.0150 '/' Tc=9.5 min CN=39 Runoff=0.00 cfs 0.001 af

Subcatchment5S: Prop. DA West Imp. Runoff Area=0.005 ac 100.00% Impervious Runoff Depth=6.22"
Flow Length=16' Slope=0.0175 '/' Tc=0.3 min CN=98 Runoff=0.04 cfs 0.003 af

Subcatchment6S: Prop. DA West Roof Runoff Area=0.040 ac 100.00% Impervious Runoff Depth=6.22"
Flow Length=96' Slope=0.0100 '/' Tc=1.5 min CN=98 Runoff=0.30 cfs 0.021 af

Pond 9P: Prop. Cistern (4' DIA) Peak Elev=21.37' Storage=85 cf Inflow=0.30 cfs 0.021 af
Outflow=0.20 cfs 0.021 af

Link 1L: Ex. DA West Inflow=0.24 cfs 0.017 af
Primary=0.24 cfs 0.017 af

Link 8L: Prop. DA West Inflow=0.23 cfs 0.023 af
Primary=0.23 cfs 0.023 af

Total Runoff Area = 0.090 ac Runoff Volume = 0.040 af Average Runoff Depth = 5.34"
15.56% Pervious = 0.014 ac 84.44% Impervious = 0.076 ac

Summary for Subcatchment 1s: Ex. DA West Imp.

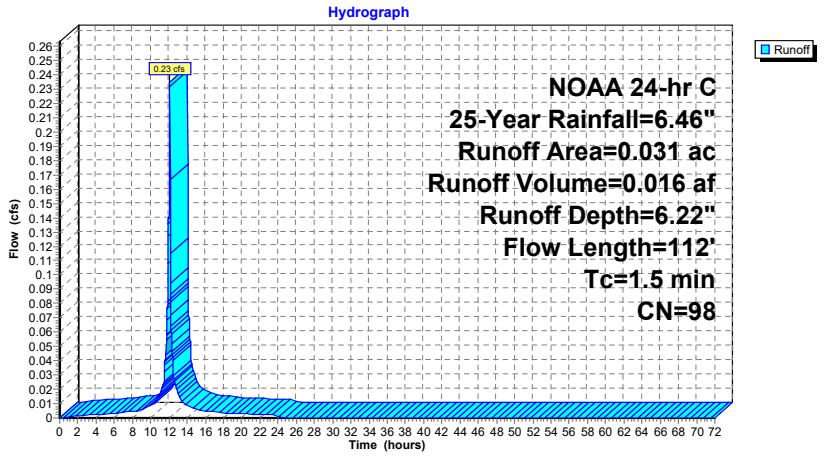
Runoff = 0.23 cfs @ 12.09 hrs, Volume= 0.016 af, Depth= 6.22"
Routed to Link 1L : Ex. DA West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.010 hrs
NOAA 24-hr C 25-Year Rainfall=6.46"

Area (ac)	CN	Description
0.031	98	Roofs, HSG A
0.031		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	58	0.0100	0.97		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.41"
0.5	54	0.0150	1.97		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.5	112	Total			

Subcatchment 1s: Ex. DA West Imp.



Summary for Subcatchment 2s: Ex. DA West Perv.

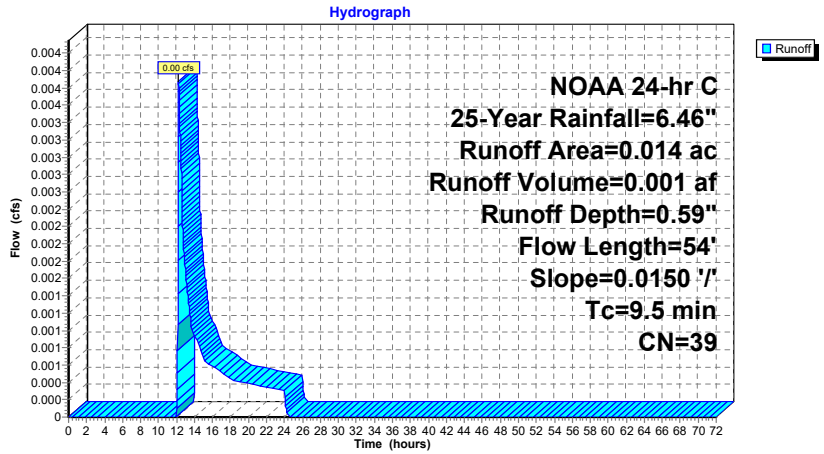
Runoff = 0.00 cfs @ 12.24 hrs, Volume= 0.001 af, Depth= 0.59"
Routed to Link 1L : Ex. DA West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.010 hrs
NOAA 24-hr C 25-Year Rainfall=6.46"

Area (ac)	CN	Description
0.014	39	>75% Grass cover, Good, HSG A
0.014		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	54	0.0150	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.41"

Subcatchment 2s: Ex. DA West Perv.



Summary for Subcatchment 5S: Prop. DA West Imp.

[49] Hint: Tc<2dt may require smaller dt

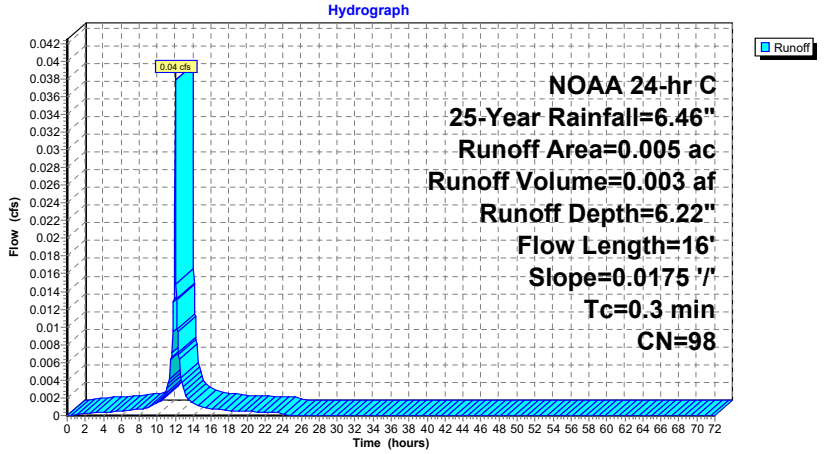
Runoff = 0.04 cfs @ 12.09 hrs, Volume= 0.003 af, Depth= 6.22"
Routed to Link 8L : Prop. DA West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.010 hrs
NOAA 24-hr C 25-Year Rainfall=6.46"

Area (ac)	CN	Description
0.005	98	Unconnected roofs, HSG D
0.005		100.00% Impervious Area
0.005		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	16	0.0175	0.93		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.41"

Subcatchment 5S: Prop. DA West Imp.



Summary for Subcatchment 6S: Prop. DA West Roof

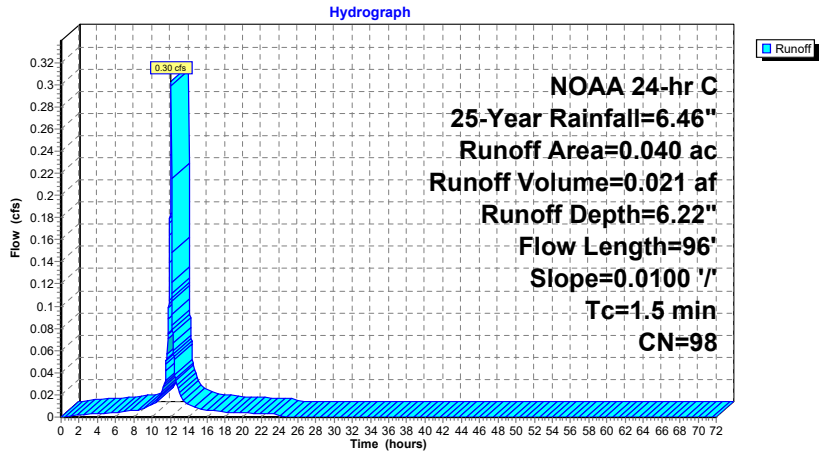
Runoff = 0.30 cfs @ 12.09 hrs, Volume= 0.021 af, Depth= 6.22"
Routed to Pond 9P : Prop. Cistern (4' DIA)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.010 hrs
NOAA 24-hr C 25-Year Rainfall=6.46"

Area (ac)	CN	Description
0.040	98	Roofs, HSG D
0.040		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	96	0.0100	1.07		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.41"

Subcatchment 6S: Prop. DA West Roof



Summary for Pond 9P: Prop. Cistern (4' DIA)

Prop. 5.5 x 10 x 2.5 Cistern w/ 1.75" Cone Orifice and 4" x 12" 25 Year Overflow

Inflow Area = 0.040 ac,100.00% Impervious, Inflow Depth = 6.22" for 25-Year event
Inflow = 0.30 cfs @ 12.09 hrs, Volume= 0.021 af
Outflow = 0.20 cfs @ 12.12 hrs, Volume= 0.021 af, Atten= 35%, Lag= 2.0 min
Primary = 0.20 cfs @ 12.12 hrs, Volume= 0.021 af
Routed to Link 8L : Prop. DA West

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.010 hrs
Peak Elev= 21.37' @ 12.12 hrs Surf.Area= 13 sf Storage= 85 cf

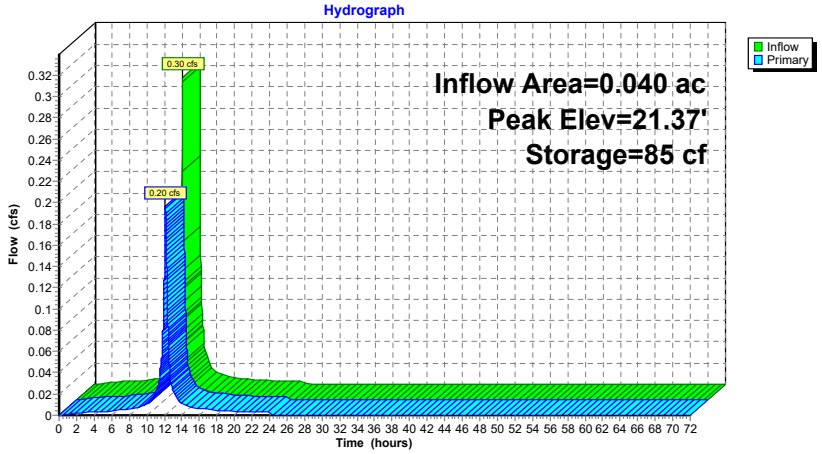
Plug-Flow detention time= 3.0 min calculated for 0.021 af (100% of inflow)
Center-of-Mass det. time= 3.0 min (743.6 - 740.6)

Volume	Invert	Avail.Storage	Storage Description
#1	14.58'	96 cf	**4.00'D x 7.63'H Vertical Cone/Cylinder**

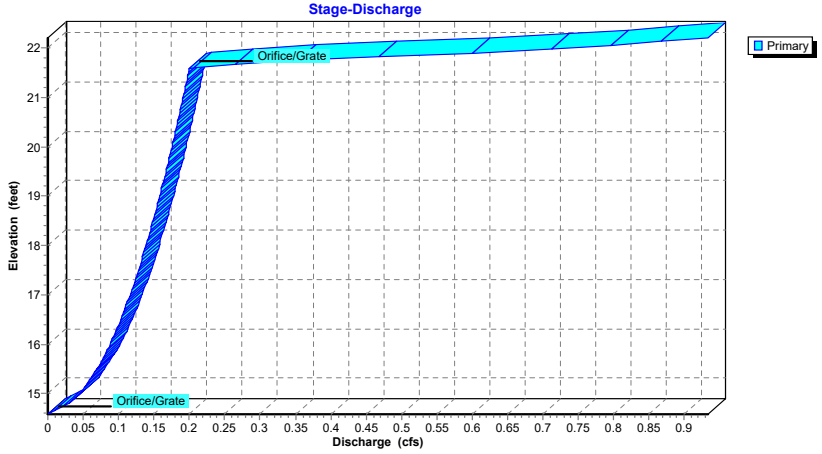
Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**3.0" Round Culvert** L= 7.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 14.00' / 13.90' S= 0.0143 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.05 sf
#2	Device 1	14.58'	**1.7" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	21.58'	**8.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.20 cfs @ 12.12 hrs HW=21.34' (Free Discharge)
└**1=Culvert** (Passes 0.20 cfs of 0.50 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.20 cfs @ 12.46 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

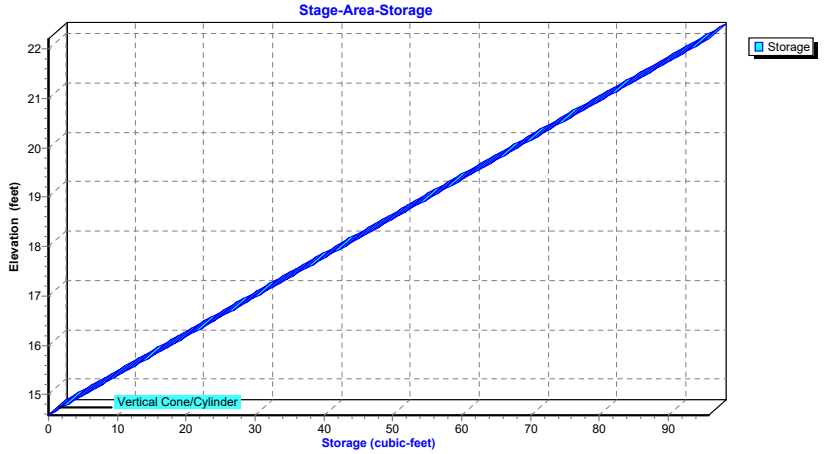
Pond 9P: Prop. Cistern (4' DIA)



Pond 9P: Prop. Cistern (4' DIA)



Pond 9P: Prop. Cistern (4' DIA)



Stage-Discharge for Pond 9P: Prop. Cistern (4' DIA)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
14.58	0.00	17.18	0.12	19.78	0.17
14.63	0.00	17.23	0.12	19.83	0.17
14.68	0.01	17.28	0.12	19.88	0.17
14.73	0.02	17.33	0.12	19.93	0.17
14.78	0.03	17.38	0.13	19.98	0.18
14.83	0.03	17.43	0.13	20.03	0.18
14.88	0.04	17.48	0.13	20.08	0.18
14.93	0.04	17.53	0.13	20.13	0.18
14.98	0.04	17.58	0.13	20.18	0.18
15.03	0.05	17.63	0.13	20.23	0.18
15.08	0.05	17.68	0.13	20.28	0.18
15.13	0.05	17.73	0.13	20.33	0.18
15.18	0.06	17.78	0.13	20.38	0.18
15.23	0.06	17.83	0.14	20.43	0.18
15.28	0.06	17.88	0.14	20.48	0.18
15.33	0.06	17.93	0.14	20.53	0.18
15.38	0.06	17.98	0.14	20.58	0.18
15.43	0.07	18.03	0.14	20.63	0.19
15.48	0.07	18.08	0.14	20.68	0.19
15.53	0.07	18.13	0.14	20.73	0.19
15.58	0.07	18.18	0.14	20.78	0.19
15.63	0.08	18.23	0.14	20.83	0.19
15.68	0.08	18.28	0.14	20.88	0.19
15.73	0.08	18.33	0.15	20.93	0.19
15.78	0.08	18.38	0.15	20.98	0.19
15.83	0.08	18.43	0.15	21.03	0.19
15.88	0.08	18.48	0.15	21.08	0.19
15.93	0.09	18.53	0.15	21.13	0.19
15.98	0.09	18.58	0.15	21.18	0.19
16.03	0.09	18.63	0.15	21.23	0.19
16.08	0.09	18.68	0.15	21.28	0.20
16.13	0.09	18.73	0.15	21.33	0.20
16.18	0.09	18.78	0.15	21.38	0.20
16.23	0.10	18.83	0.16	21.43	0.20
16.28	0.10	18.88	0.16	21.48	0.20
16.33	0.10	18.93	0.16	21.53	0.20
16.38	0.10	18.98	0.16	21.58	0.20
16.43	0.10	19.03	0.16	21.63	0.22
16.48	0.10	19.08	0.16	21.68	0.27
16.53	0.10	19.13	0.16	21.73	0.33
16.58	0.11	19.18	0.16	21.78	0.39
16.63	0.11	19.23	0.16	21.83	0.47
16.68	0.11	19.28	0.16	21.88	0.56
16.73	0.11	19.33	0.16	21.93	0.64
16.78	0.11	19.38	0.17	21.98	0.71
16.83	0.11	19.43	0.17	22.03	0.77
16.88	0.11	19.48	0.17	22.08	0.82
16.93	0.11	19.53	0.17	22.13	0.86
16.98	0.12	19.58	0.17	22.18	**0.91**
17.03	0.12	19.63	0.17		
17.08	0.12	19.68	0.17		
17.13	0.12	19.73	0.17		

Stage-Area-Storage for Pond 9P: Prop. Cistern (4' DIA)

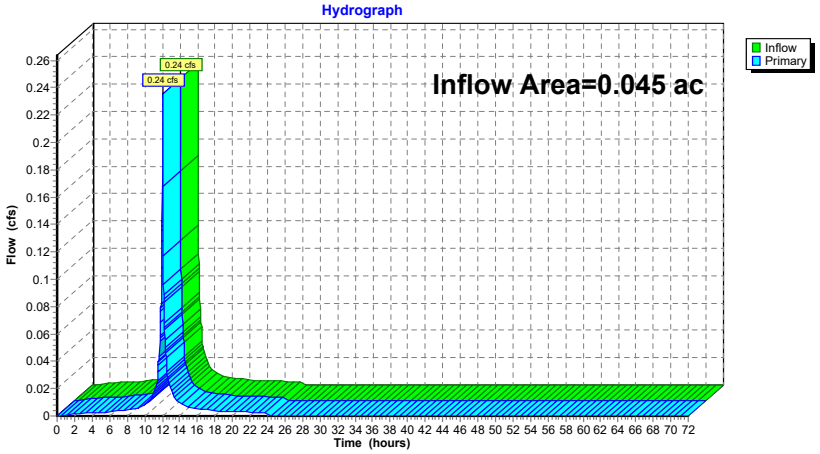
Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
14.58	0	17.18	33	19.78	65
14.63	1	17.23	33	19.83	66
14.68	1	17.28	34	19.88	67
14.73	2	17.33	35	19.93	67
14.78	3	17.38	35	19.98	68
14.83	3	17.43	36	20.03	68
14.88	4	17.48	36	20.08	69
14.93	4	17.53	37	20.13	70
14.98	5	17.58	38	20.18	70
15.03	6	17.63	38	20.23	71
15.08	6	17.68	39	20.28	72
15.13	7	17.73	40	20.33	72
15.18	8	17.78	40	20.38	73
15.23	8	17.83	41	20.43	74
15.28	9	17.88	41	20.48	74
15.33	9	17.93	42	20.53	75
15.38	10	17.98	43	20.58	75
15.43	11	18.03	43	20.63	76
15.48	11	18.08	44	20.68	77
15.53	12	18.13	45	20.73	77
15.58	13	18.18	45	20.78	78
15.63	13	18.23	46	20.83	79
15.68	14	18.28	46	20.88	79
15.73	14	18.33	47	20.93	80
15.78	15	18.38	48	20.98	80
15.83	16	18.43	48	21.03	81
15.88	16	18.48	49	21.08	82
15.93	17	18.53	50	21.13	82
15.98	18	18.58	50	21.18	83
16.03	18	18.63	51	21.23	84
16.08	19	18.68	52	21.28	84
16.13	19	18.73	52	21.33	85
16.18	20	18.78	53	21.38	85
16.23	21	18.83	53	21.43	86
16.28	21	18.88	54	21.48	87
16.33	22	18.93	55	21.53	87
16.38	23	18.98	55	21.58	88
16.43	23	19.03	56	21.63	89
16.48	24	19.08	57	21.68	89
16.53	25	19.13	57	21.73	90
16.58	25	19.18	58	21.78	90
16.63	26	19.23	58	21.83	91
16.68	26	19.28	59	21.88	92
16.73	27	19.33	60	21.93	92
16.78	28	19.38	60	21.98	93
16.83	28	19.43	61	22.03	94
16.88	29	19.48	62	22.08	94
16.93	30	19.53	62	22.13	95
16.98	30	19.58	63	22.18	**96**
17.03	31	19.63	63		
17.08	31	19.68	64		
17.13	32	19.73	65		

Summary for Link 1L: Ex. DA West

Inflow Area = 0.045 ac, 68.89% Impervious, Inflow Depth = 4.47" for 25-Year event
Inflow = 0.24 cfs @ 12.10 hrs, Volume= 0.017 af
Primary = 0.24 cfs @ 12.10 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.010 hrs

Link 1L: Ex. DA West

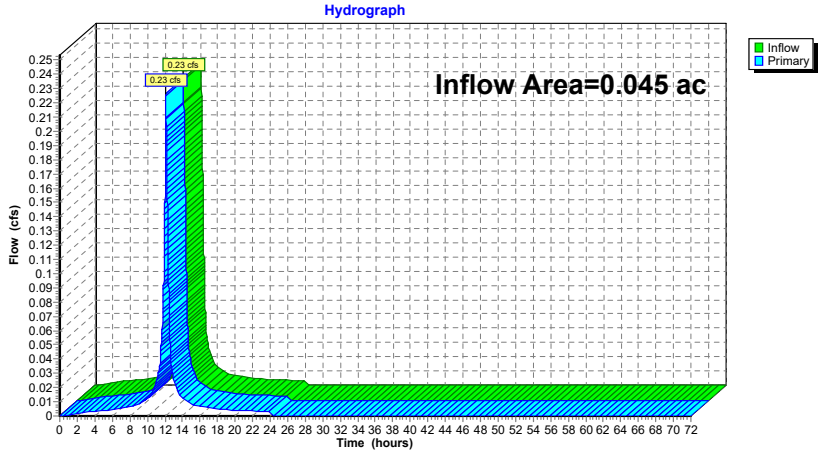


Summary for Link 8L: Prop. DA West

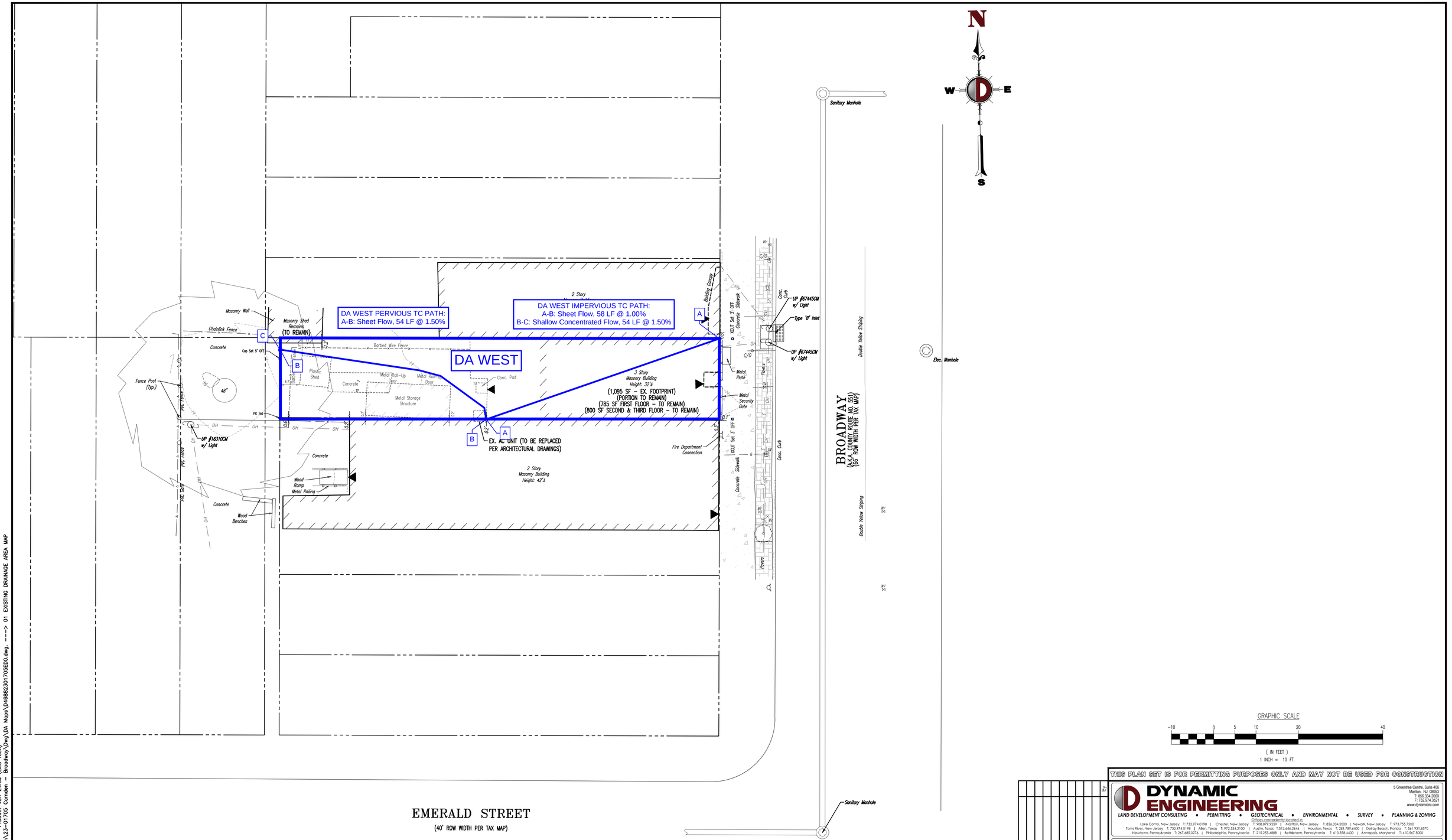
Inflow Area = 0.045 ac,100.00% Impervious, Inflow Depth = 6.22" for 25-Year event
Inflow = 0.23 cfs @ 12.10 hrs, Volume= 0.023 af
Primary = 0.23 cfs @ 12.10 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.010 hrs

Link 8L: Prop. DA West



DRAINAGE AREA MAPS



GRAPHIC SCALE

−10 0 5 10 20 40

(IN FEET)
1 INCH = 10 FT.

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Newtown, Pennsylvania T: 267.685.0276 | Philadelphia, Pennsylvania T: 215.253.4888 | Bethlehem, Pennsylvania T: 610.598.4400 | Annapolis, Maryland T: 410.567.5000

TITLE: EXISTING DRAINAGE AREA MAP

PROJECT: **HEART OF CAMDEN**
PROPOSED MAKERSPACE ADDITION
BLOCK 480, LOT 27
1811 BROADWAY
CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

JOB No:	4688-23-01705
DRAWN BY:	CAM
DESIGNED BY:	MJP
CHECKED BY:	RTO
CHECKED BY:	_
DATE:	04/17/2024
SCALE: (H) 1"=10' (V)	
SHEET No:	1 OF 2
Rev. #	0

RICHARD T. ORTIZ
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NEW JERSEY LICENSE No. 60149

RODMAN R. RITCHIE
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Comments | By | Date | Rev.

Plotted: 04/17/24 - 1:58 PM, By: uvarace, - Product Ver: 24.3s (LMS Tech)
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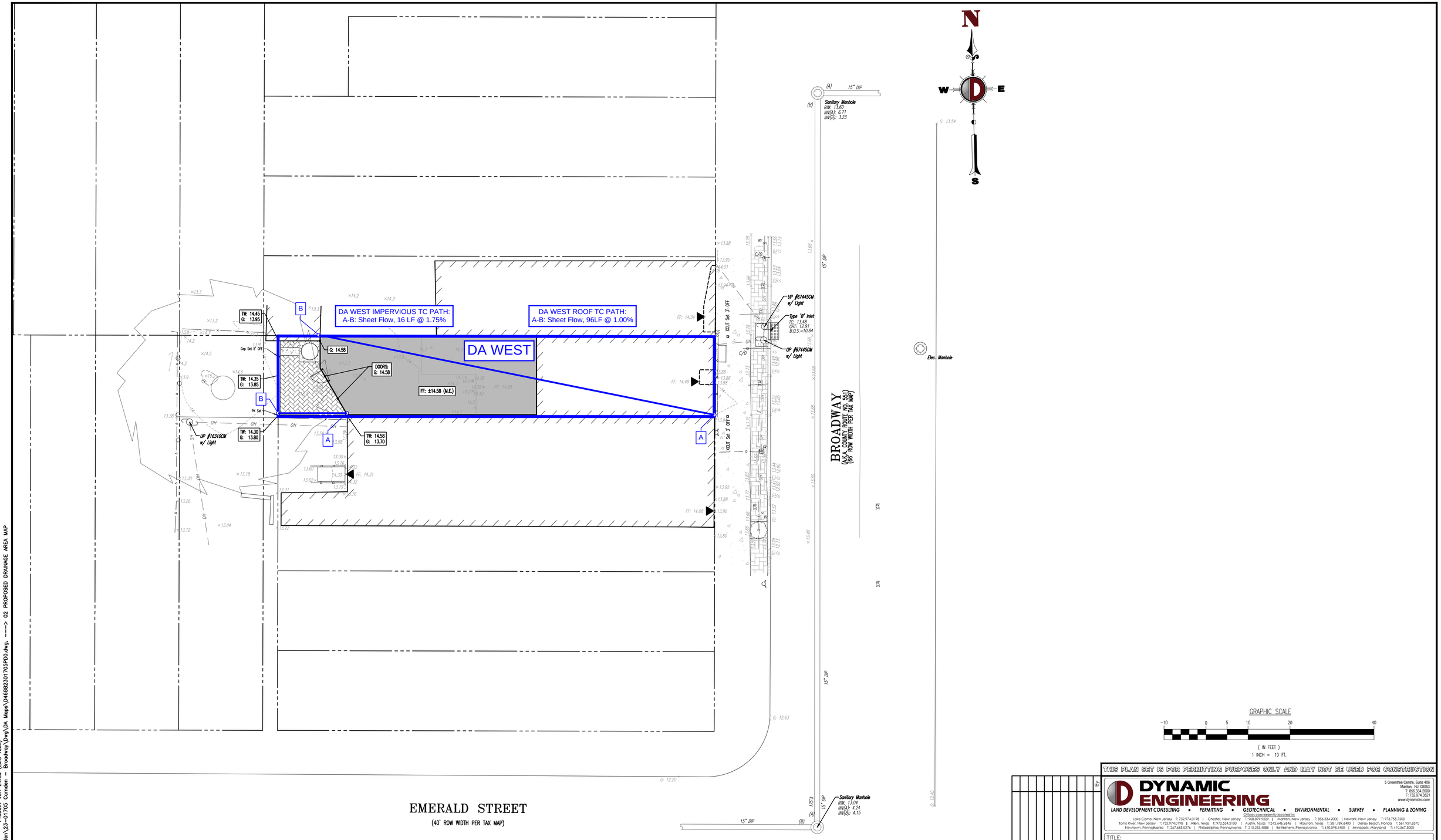

GRAPHIC SCALE

−10 0 5 10 20 40

(IN FEET)
1 INCH = 10 FT.

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TITLE:

PROPOSED DRAINAGE AREA MAP

PROJECT: **HEART OF CAMDEN**
PROPOSED MAKERSPACE ADDITION
BLOCK 480, LOT 27
1811 BROADWAY
CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

JOB No:	4688-23-01705
DRAWN BY:	CAM
DESIGNED BY:	MJP
CHECKED BY:	RTO
CHECKED BY:	_
DATE:	04/17/2024
SCALE: (H) 1"=10' (V)	
SHEET No:	2 OF 2
Rev. #	0

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Rev. | Date | Comments | By

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