PARKING EVALUATION

PLAINSBORO PLAZA
TOWNSHIP OF PLAINSBORO
MIDDLESEX COUNTY, NEW JERSEY

Prepared for:

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October 11, 2023
BCG File No. 081045-01-003

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INTRODUCTION

The purpose of this Parking Evaluation is to evaluate the existing parking utilization and establish an appropriate parking requirement for this shopping center. We will also assess the impacts and parking demands related to the development of a 3,478 square foot stand-alone bank building with a single ATM drive-up lane (no teller service) and a bypass lane. The proposed bank pad will be located within the central portion of the existing parking lot, west of the CVS. Plainsboro Plaza currently contains a total of 228,294 square feet of which 192,969 square feet were occupied (84.5 percent occupancy) and operating at the time of our parking occupancy counts.

The existing center contains a mix of retail, day care, office/medical/dental, supermarket, restaurants and personal service uses. These are typical of a shopping center environment and the associated parking characteristics of a shopping center. While the CVS is located on a separate tax lot, its parking demand and the existing parking facilities are shared with the balance of the center. The square footage of the CVS is included within the total floor area of the shopping center.

This parking evaluation study has been prepared to provide recommendations regarding the appropriate parking requirement for this shopping center based upon a site specific parking occupancy study and a review of industry parking data. Industry parking data is based upon the Institute of Transportation Engineers (ITE) "Parking Generation Manual, 5th Edition". Further, we are also evaluating any potential impacts on parking supply as a result of the proposed bank with drive-up ATM window.

The proposed bank will generate a nominal increase in parking demand and will also eliminate a number of parking spaces. As part of this study, field observations were conducted during typical Friday afternoon hours and during typical Saturday hours during the midday period. This report will present the results of the field study, a review of ITE parking data, recommendations for appropriate parking requirements and an assessment of the change in parking demands and supply resulting from the proposed bank. The observed parking demands will be adjusted to calculate the parking demand for the unoccupied portion of the existing shopping center.

EXISTING CONDITIONS

The existing Plainsboro Plaza has been in operation for many years as a large neighborhood retail facility containing several large or anchor stores and surrounded by a number of smaller retail establishments. The main building contains approximately 215,794 square feet of space. There is also a separate building containing a CVS which contains 12,150 square feet adjacent to Schalks Crossing Road, for a total shopping center area of 228,294 square feet.

The shopping center can be accessed from four driveways, three along Schalks Crossing Road on the east side of the property and one along Plainsboro Road on the south side of the property. The parking lot supporting the retail center contains a clear

system of internal circulation aisles and right angled parking spaces. The main retail building has circulation aisles on all four sides.

Parking spaces on this property number a total of 984 parking spaces (plus 46 landbanked spaces), including 126 striped parking spaces in the rear of the main shopping center. There is a small parking area on the east side of the shopping center (by the McDonalds) which contains 53 spaces. The main parking area is located on the south side of the shopping center and contains a total of 805 parking spaces. This main parking area provides circulation aisles and access driveways permitting customers and employees to circulate freely throughout these main parking areas.

PARKING OCCUPANCY

We conducted parking occupancy counts on two typical days, Friday, November 4, 2022 between 12:00 PM and 5:30 PM and on Saturday, November 5, 2022 between 11:00 AM and 2:30 PM. The shopping center is currently at 84.5 percent occupancy. We had also previously performed parking occupancy counts on Friday, June 7, 2019 between 12:00 PM and 5:00 PM and on Saturday, June 8, 2019 between 11:30 AM and 2:30 PM. At the time of the parking counts in 2019 Plainsboro Plaza was at 46.4 percent occupancy. Based upon data published in the Institute of Transportation Engineers (ITE) Parking Generation Manual, 5th Edition, these times encompass the peak parking demand periods of a shopping center.

The parking accumulation counts were performed by circulating through the parking area and accounting for all occupied spaces in the shopping center. The observations included all of the parking areas serving the shopping center and CVS, including the rear parking areas. The overall parking for the center was divided into five (5) sectors which can be described as such:

- Area 1 – the parking area adjacent to the western portion of the shopping center, containing 384 parking spaces
- Area 2 – the parking area south of the Asian Food Market, containing 383 parking spaces
- Area 3 – the parking proximate to the CVS containing, 38 parking spaces
- Area 4 – the parking area between Schalks Crossing Road and the in-line stores facing east, containing 53 spaces
- Area 5 – the parking area behind the shopping center, containing 126 parking spaces

The summary of the 2022 parking observations for the Friday data are presented in Table 1 and for the Saturday data, in Table 2. The table includes date and time of the survey; and separates the observed parking demand into the five (5) previously described sectors. We have also calculated the parking demand using the data contained in the ITE Parking Generation Manual, 5th Edition, for the center at full occupancy.

TABLE 1

Plainsboro Plaza Shopping Center, 10 Schalks Crossing Road, Plainsboro

Friday, November 4, 2022

11/29/2022

Rev. 3/23/23

192,969

SF occupied (as of 10/05/22)

START TIME	**TOTAL**	**Area 1**	**Area 2**	**Area 3**	**Area 4**	**Area 5**	PARKING RATIO (1)
12:00 PM	**333**	122	92	24	47	48	1.73
12:30 PM	**378**	161	109	22	38	48	1.96
1:00 PM	**350**	139	99	19	44	49	1.81
1:30 PM	**321**	122	93	13	41	52	1.66
2:00 PM	**302**	109	83	16	47	47	1.57
2:30 PM	**308**	119	100	13	33	43	1.60
3:00 PM	**311**	103	104	23	40	41	1.61
3:30 PM	**297**	114	91	20	33	39	1.54
4:00 PM	**287**	117	102	20	24	24	1.49
4:30 PM	**317**	127	98	21	43	28	1.64
5:00 PM	**353**	154	124	23	25	27	1.83
5:30 PM	**351**	178	104	27	23	19	1.82
Parking Supply	**984**	384	383	38	53	126	
Available Parking Spaces @ Peak	**606**	**223**	**274**	**16**	**15**	**78**	
Peak Hour % Occupancy (1)	**38.4%**	41.9%	28.5%	57.9%	71.7%	38.1%	
Max. % Occupancy (1)	**38.4%**	46.4%	32.4%	71.1%	88.7%	41.3%	

ITE Parking Generation, 5th Edition - LUC 820, Weekday Friday, Average Peak Rate — Per Full Occupancy (2) — 2.61

(1) per occupied square footage (192,969 SF) on date of survey (11/4/22)

(2) full occupancy is 228,294 square feet

TABLE 2

11/29/2022

Plainsboro Plaza Shopping Center, 10 Schalks Crossing Road, Plainsboro

Rev. 3/23/23

Saturday, November 5, 2022

192,969
SF occupied (as of 10/05/22)

START TIME	TOTAL	Area 1	Area 2	Area 3	Area 4	Area 5	PARKING RATIO (1)
11:00 AM	**299**	108	118	13	43	17	1.55
11:30 AM	**350**	131	145	15	43	16	1.81
12:00 PM	**357**	149	133	18	40	17	1.85
12:30 PM	**345**	146	126	16	41	16	1.79
1:00 PM	**363**	159	128	17	42	17	1.88
1:30 PM	**331**	134	125	13	42	17	1.72
2:00 PM	**287**	119	107	13	34	14	1.49
2:30 PM	**314**	109	135	17	38	15	1.63
Parking Supply	**984**	384	383	38	53	126	
Available Parking Spaces @ Peak	**621**	**225**	**255**	**21**	**11**	**109**	
Peak Hour % Occupancy (1)	**36.9%**	41.4%	33.4%	44.7%	79.2%	13.5%	
Max. % Occupancy (1)	**36.9%**	41.4%	37.9%	47.4%	81.1%	13.5%	

ITE Parking Generation, 5th Edition - LUC 820, Saturday, Average Peak Rate

Per Full Occupancy (2) 2.96

(1) per occupied square footage (192,969 SF) on date of survey (11/4/22)
(2) full occupancy is 228,294 square feet

Each table provides a total number of vehicles parked for each half-hour observation cycle and then a breakdown of the level of parking in each of the five sectors of the site's overall parking. The last column provides the parking ratio of observed parking to the current occupied square footage of the center. The shopping center had 192,969 square feet occupied (84.5% occupancy) and in operation at the time of our current parking occupancy studies.

The existing peak observed parking demand on a Friday occurred at 12:30 PM with an overall parking demand ration of 1.96 spaces per 1000 square feet of occupied space, with a peak parking utilization of only 38.4 percent. The ITE data calculates for a Friday that the average peak parking demand ration for a shopping center of this size is 2.61 spaces per 1000 square feet. Therefore, for Friday conditions this center is in the lower percentiles of the data presented in the ITE Parking Generation Manual. As shown in Table 1, there are currently 606 parking spaces in the center available for use at the peak time.

This compares to an observed parking ration of 3.18 spaces per 1000 square feet based upon the counts performed on a Friday in June 2019. The occupancy changes since 2019 include the following tenants:

- The Asian Market – 43,152 SF (net rentable area, typical)
- Eden Autism Services – 13,578 SF
- Squash Tigers – 9,011 SF
- Fencing Academy – 5,449 SF
- Pho Today – 3,000 SF
- Sumi Ramen – 2,350 SF
- Shuu Café – 1,974 SF
- Kung Fu Tea – 1,800 SF
- Art & Nails – 1,655 SF
- Allied Vision – increased space by 1,400 SF

The existing peak observed parking demand on a Saturday occurred at 1:00 PM with an overall parking demand ration of 1.88 spaces per 1000 square feet with a peak utilization of 36.9 percent. The ITE data calculates for a Saturday that the average peak parking demand ration for a shopping center of this size is 2.96 spaces per 1000 square feet. Therefore, for Saturday conditions this center is also in the lower percentiles of the data presented in the ITE Parking Generation Manual. As shown in Table 2, there are currently 621 parking spaces in the center available for use at the peak time.

The existing parking demand on a Saturday is likely lower as the day care and medical/dental spaces are closed and not generating parking demands during weekend periods. This compares to an observed parking ration of 2.10 spaces per 1000 square feet based upon the counts performed on a Saturday in June 2019.

From a zoning perspective, the observed parking ratio needs to be adjusted to account for turnover of spaces and to minimize customers seeking spaces. Industry references generally indicate that the peak observed parking demands should represent 80 to 90

percent of the necessary parking supply. Therefore, adjusting the observed Friday peak parking ration (which is the higher of the two days of observations), the required parking requirement would be 2.18 to 2.45 spaces per 1000 square feet. Comparing this to the ITE Parking Generation Manual, 5th Edition, the Friday peak average parking demand is 2.61 spaces per 1000 square feet and the Saturday peak average parking demand is 2.96 spaces per 1000 square feet, both of which far exceed what has been found at this shopping center during the current parking occupancy study.

The existing parking requirement in the Plainsboro Zoning Ordinance (§85-44A) is 5.5 spaces per 1,000 square feet for the shopping center and the bank has a parking requirement of 1 space for every 250 square feet of building area. The parking requirement for the shopping center is 1,256 spaces, while the proposed bank would result in a requirement of 14 spaces, for an overall total 1,270 spaces. The center previously received a parking variance to permit 1,030 parking spaces of which 46 spaces were landbanked.

However, as our parking occupancy studies have shown, the actual parking demands for this center are significantly less than the Township requirements. Further, the ITE Parking Generation Manual, 5th Edition indicates that the average peak and the 85th percentile parking demands are also 30 to 50 percent lower than the current Township parking requirements. Therefore, it is our recommendation that the parking requirement for Plainsboro Plaza be established at 3.5 spaces per 1000 square feet. This ration represents an increase of 78 percent above the observed Friday peak period and 86 percent above the observed Saturday peak period.

FUTURE PARKING DEMANDS

As part of our determination of future parking demands, we first need to calculate the parking demand of a fully occupied shopping center (which includes the remaining 35,325 square feet of currently vacant spaces all located west of The Asian Market) to assess the sufficiency of the current parking supply of this center. To be conservative, we have used for the Friday period the parking ration of 2.61 spaces per 1000 square feet found in the ITE Parking Generation Manual as this is higher than the observed parking ration of 1.96 spaces per 1000 square feet. For the Saturday peak period, we used the ITE Parking Generation Manual ration of 2.96 spaces per 1000 square feet as this is higher than the observed parking ration of 1.88 spaces per 1000 square feet.

We have distributed the overall increase in parking demand of the existing vacant spaces to both Areas 1 and 2 with a portion to the rear parking area. Utilization of the rear parking area is based upon current utilization and the total square footage of the shopping center as a percentage of the currently occupied space (228,294 divided by 192,969 equals 1.18).

On a Friday, the peak parking demand for a fully occupied shopping center calculates to 492 parking spaces (existing observed parking demand plus 35,325 square feet times 2.61). On a Saturday, the peak parking demand for a fully occupied shopping center calculates to 481 parking spaces (existing peak demand plus 35,325 square feet times

2.96). Both future peak parking demands are similar in magnitude and are appropriate in evaluating the required parking for the shopping center.

With full occupancy of the shopping center, this is approximately 48 percent of the existing available parking spaces on site for a Friday and 47 percent for a Saturday, which is a fairly low utilization and affirms that there is plentiful parking available on site. During the peak period on a Friday, there will be 505 spaces available and on a Saturday there are 513 spaces available.

The owner of Plainsboro Plaza proposes the construction of a stand-alone bank building containing 3,478 square feet plus one drive-up ATM lane based upon site plans prepared by Van Note – Harvey Division of Pennoni dated July 20, 2023. This bank pad is proposed in the southcentral portion of the Area 2 sector. The construction of this building and associated improvements would reduce the parking supply by a net of 63 parking spaces (75 spaces removed, 12 new spaces added) reducing the total number of on-site spaces to 921 spaces, and reducing the available landbanked spaces to 38, which are not included in the above parking totals.

Parking demand for this proposed bank is calculated with the use of the ITE Parking Generation Manual, 5th Edition. The calculated average peak parking demand for the building is presented in Table 3 for a typical weekday and Saturday.

TABLE 3
PARKING GENERATION – DRIVE-THRU BANK

LAND USE CATEGORY	SIZE	Average Demand	
		Weekday	Saturday
Bank w/Drive-Thru	3,478 SF	13	11

As can be seen in this table, the additional parking demand generated by the bank is fairly small. Adding the bank's peak parking demand to the parking demand of a fully occupied shopping center, the future parking demand (based upon ITE data) with the bank is 492 spaces (479 + 13) on a Friday and 482 spaces (471 + 11) on a Saturday.

We have then added the proposed parking demand for the bank to Area 2 and reduced the available parking in this sector as a result of the proposed bank construction. The proposed parking demand and utilization for Friday conditions is presented in Table 4; and for Saturday conditions in Table 5.

With the proposed bank and full occupancy of the existing shopping center there will still be 429 parking spaces available, at peak parking utilization of 53.4 percent, during the Friday peak period. On a Saturday with the proposed bank and full occupancy of the shopping center there will be 439 spaces available, at a peak parking utilization of 52.3 percent for the Saturday peak hour. **There will continue to be more than sufficient available parking on-site at full occupancy of the shopping center and with the proposed bank.**

TABLE 4

11/29/2022

Plainsboro Plaza Shopping Center, 10 Schalks Crossing Road, Plainsboro

Last Rev. 10/11/2023

Proposed Friday Conditions

	TOTAL	Area 1	Area 2	Area 3	Area 4	Area 5
Peak Existing Demand	**378**	161	109	22	38	48
Parking Demand - Occupancy of Existing Space [1]	**101**	39	53	0	0	9
Bank Demand	**13**		13			
TOTAL	**492**	200	175	22	38	57
Parking Supply [2]	**921**	384	320	38	53	126
Available Parking Spaces	**429**	**184**	**145**	**16**	**15**	**69**
Peak Hour % Occupancy [3]	**53.4%**	52.1%	54.7%	57.9%	71.7%	45.2%

(1) Vacant space @ ITE parking demand ratio of 2.61

(2) Main sector supply is reduced by a net of 63 spaces related to proposed bank, does not include 38 landbanked spaces

TABLE 5

11/29/2022

Plainsboro Plaza Shopping Center, 10 Schalks Crossing Road, Plainsboro

Last Rev. 10/11/2023

Proposed Saturday Conditions

	TOTAL	Area 1	Area 2	Area 3	Area 4	Area 5
Peak Existing Demand	**363**	159	128	17	42	17
Parking Demand - Occupancy of Existing Space [1]	**108**	44	60	0	0	3
Bank Demand	**11**		11			
TOTAL	**482**	203	199	17	42	20
Parking Supply [2]	**921**	384	320	38	53	126
Available Parking Spaces	**439**	**181**	**121**	**21**	**11**	**106**
Peak Hour % Occupancy [3]	**52.3%**	52.9%	62.3%	44.7%	79.2%	15.9%

(1) Vacant space @ ITE parking demand ratio of 2.96

(2) Main sector supply is reduced by a net of 63 spaces related to proposed bank, does not include 38 landbanked spaces

We have also prepared an analysis of the parking demand for the shopping center using the 85th percentile rates as contained in the ITE Parking Generation Manual, 5th Edition for the shopping center and drive-in bank land use categories. The findings of this calculation is contained in Table 6, which is based upon the full occupancy of the shopping center plus the proposed bank. As shown in Table 6, based upon current occupancy levels plus the proposed bank, the total 85th percentile parking demand would be 750 spaces on a Friday and 739 spaces on a Saturday. This represents approximately 80 to 81 percent capacity of the available parking not including the land banked spaces. These parking levels are approximately double of what we observed at this center.

The 85th percentile parking demand for a fully occupied shopping center plus the proposed bank would be 884 spaces on a Friday and 871 spaces on a Saturday. This represents approximately 91 to 92 percent of the existing parking supply including the land banked parking spaces.

These are very conservative parking demands and experience has shown they are unlikely to occur and even if they were to occur it would be for very few hours throughout the year. The mix of non-retail space and restaurants results in less peaking of the parking demand as it is spread over a larger period of time on a given day.

SITE PLAN REVIEW

The proposed bank layout is shown on the Van Note-Harvey site plans dated July 20, 2023. These site plans were preliminarily reviewed by the Township earlier this year and the current site plans incorporate the prior comments received from the Township. The size of the bank has been refined to comply with Chase's current prototype containing 3,478 square feet; and provides a single drive-up ATM lane with a bypass lane. There is no teller service available through the drive-up lane. The drive-up lane provides queuing for at least six (6) vehicles without blocking the bypass lane. This exceeds the five (5) vehicle queue storage requirement as set forth in §101-52R(6). Given that the drive-up lane only provides ATM service this queue length is more than sufficient as it is not anticipated there would be a queue of more than 1 or 2 vehicles behind the vehicle being serviced at the ATM.

The drive-up and associated bypass lane has been moved further from the southern site driveway, providing a minimum separation of approximately 45 feet which is an increase over the previously submitted concept plan. Further we note that the drive-up lane is further from the southern driveway than the existing parking spaces along this parking aisle. There is a minimum sight distance of 200 feet from the drive-up lane toward the southwest which represents the stopping sight distance for a 30 MPH design speed. We note that an approaching vehicle has even greater sight lines to the drive-up lane so they will be able to observe this traffic from a greater distance.

We have also relocated the refuse/recycling enclosure for the bank to the adjacent parking aisle. For this location Chase may not require a dumpster as their cleaning service may remove the refuse and recycling from the site. As this will be accessed

TABLE 6

3/23/2023

Plainsboro Plaza Shopping Center, 10 Schalks Crossing Road, Plainsboro
ITE Parking Generation Manual, 5th Ed., 85th Percentile Parking Demand

Last Rev. 10/11/2023

EXISTING OCCUPANCY	85th Percentile Parking Ration	Friday	85th Percentile Parking Ration	Saturday
Existing Parking Demand (192,929 SF)	3.78	729	3.74	722
Bank Demand (3,478 SF)	6.00	21	4.77	17
TOTAL - Existing Occupancy + Prop. Bank		**750**		**739**
Parking Supply [1]		**921**		**921**
Available Parking Spaces		**171**		**182**
Peak Hour % Occupancy		**81.4%**		**80.2%**

FULL OCCUPANCY	85th Percentile Parking Ration	Friday	85th Percentile Parking Ration	Saturday
Total Parking Demand (228,294 SF)	3.78	863	3.74	854
Bank Demand (3,478 SF)	6.00	21	4.77	17
TOTAL - Full Occupancy + Prop. Bank		**884**		**871**
Parking Supply [2]		**959**		**959**
Available Parking Spaces		**75**		**88**
Peak Hour % Occupancy		**92.2%**		**90.8%**

(1) Main sector supply is reduced by the 63 spaces lost to proposed bank, does not include 38 landbanked spaces

(2) Main sector supply is reduced by the 63 spaces lost to proposed bank, includes 38 landbanked spaces

during early morning hours, there will be minimal conflicts with the adjacent parking spaces and circulation within the center. This masonry enclosure also is integrated into an evergreen landscape buffer that will shield the headlights of vehicles using the drive-up lane. This is an enhancement from the current parking configuration where screening does not exist.

SUMMARY AND CONCLUSIONS

This parking evaluation collected data regarding current parking activity at Plainsboro Plaza on a typical Friday and Saturday. The Friday observations were made during the 12:00 to 5:30 PM period; while the Saturday observations were made during the 11:00 AM to 2:30 PM period; both of which encompass the typical peak periods of shopping activity. It is recognized that at the time of the parking occupancy study the shopping center was operating at approximately 84.5 percent of full occupancy.

From the observed data, we calculated the observed parking ratio for the center which indicated that the Friday ratio was 1.96 spaces per 1000 square feet and Saturday was 1.88 spaces per 1000 square feet. The ITE Parking Generation Manual, 5th Edition indicates that the Friday average peak parking ratio calculates to be 2.61 spaces per 1000 square feet and the Saturday average peak parking ratio calculates to be 2.96 spaces per 1000 square feet. We calculated the parking occupancy of a fully leased and operating center using the higher of the parking ratios for each studied day applied to the currently unoccupied space. Based upon these data, we calculate the peak parking usage on a Friday to be 479 spaces and on a Saturday 471 spaces without the proposed bank.

The construction and occupancy of the proposed 3,478 square foot bank with a single drive-up ATM lane will generate an additional parking demand of 13 spaces on a Friday and 11 spaces on a Saturday based upon ITE parking data. We note that the peak Saturday demand for the bank would not coincide with the peak of the shopping center as the bank would likely be closed or soon to close at the peak shopping hour on Saturday (1:00 PM). Regardless, we have added this bank parking demand to the calculated peak of the shopping center.

We have distributed the overall parking demand increase as a result of the full occupancy of the center to the appropriate parking sectors we have defined on site. This distribution of parking assumes that there will be an increase in usage of the rear parking area by employees of the currently vacant spaces, as currently occurs within the center. As noted, the construction of the bank pad will result in the net loss of 63 parking spaces in Area 2 and the loss of an additional eight (8) land banked spaces.

Based upon this analysis, the construction of the bank will not have a negative impact on the overall parking demand or utilization at the shopping center based on its calculated displacement of parking spaces, its calculated average peak parking demand and the abundance of parking at the existing center. With the proposed bank and full occupancy of the existing shopping center there will still be 429 parking spaces available, at a peak parking utilization of 53.4 percent, during the Friday peak period.

On a Saturday with the proposed bank and full occupancy of the shopping center there will be 439 spaces available, at a peak parking utilization of 52.3 percent for the Saturday peak hour. **There will continue to be more than sufficient available parking on-site at full occupancy of the shopping center and with the proposed bank.**

To provide a further sensitivity analysis, we have also examined the calculated parking demands using the 85th percentile parking data from the ITE Parking Generation Manual, 5th Edition. For a fully occupied shopping center plus the bank, the 85th percentile parking demand is at 91 to 92 percent of the capacity of the existing parking supply including the 38 landbanked parking spaces. The 85th percentile parking demand results in values double of what was observed during our November 2022 parking counts. Further, given the mix of tenants in this center including the day care, office/medical space and restaurants, there will be less peaking of the parking demand and in our professional opinion, the 85th percentile parking demands far exceed what is likely to occur.

In our professional opinion, the calculated parking demand at full occupancy with the proposed bank will continue to be more than adequately served by the existing parking supply within the center without the landbanked parking spaces. We conclude that the proposed bank is an appropriate use of the property from a parking perspective and will not negatively impact available parking at this center.

The foregoing is a true representation of my findings.

Eric L. Keller, P.E., P.P., LEED AP
Professional Engineer License No. 32054

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ENGINEERING REPORT

Plainsboro Plaza - Chase Bank Stand-alone Pad
Block 1602, Lots 5 and 7
Block 1508, Lot 7
Plainsboro Township
Middlesex County, New Jersey

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VNHA #PLPOL23001
September 5, 2013
Revised October 12, 2023

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I. INTRODUCTION

Plainsboro Plaza Owner, LLC (Onyx) is proposing the construction of a 3,478 square foot standalone building pad (Chase Bank) with a drive-up ATM lane within a portion of the existing parking lot in Plainsboro Plaza behind the CVS building. In addition to the building pad, the site improvements include modifications to the surrounding parking lot, drive circulation, addition of walks, and landscape islands. The project improvements are situated on Block 1602, Lot 5, in the Township of Plainsboro, County of Middlesex, New Jersey. The site is bounded by the CVS Building to the east, the shops at Plainsboro Plaza to the north and west, and the PNC building to the south.

The construction of this Project will yield a net decrease of approximately 0.07 acre in impervious area. Currently, the site's stormwater management is mitigated by an existing wet pond located between the existing shopping center and Scudders Mill Road. The wet pond was designed to provide both peak rate reductions of stormwater runoff as well as providing water quality treatment. Under proposed site conditions, there will be a reduction in impervious surfacer along with an increase in landscape areas. The improvements will increase the time of concentration as well as reduce the runoff directed to the wet pond.

II. STORMWATER MANAGEMENT

A. LAND USE/LAND COVER ANALYSIS

This section of the report demonstrates the ability of the Project's stormwater management system to mitigate the increase in runoff anticipated from both phases of the proposed development. Compliance with design assumptions will be verified upon build-out of the site.

EXISTING PROJECT SITE DESCRIPTION AND METHODOLOGY

As previously discussed, stormwater management for the site under existing conditions is provided within an existing wet pond. The basin was originally designed and approved in the report entitled, "Storm Drainage, Soil Erosion and Sediment Control, and Stormwater Detention Calculations," for Plainsboro Center for the Wiltshier Group," prepared by Van Note-Harvey Associates, P.C. (VNHA), dated April 10, 1985, revised August 26, 2007. Supplemental reports were later prepared by VNHA at the time of additional site improvements, entitled "Engineering Report for Plainsboro Plaza Shopping Center," dated March 1, 2000, last revised October 4, 2000, "Detention Basin Water Quality Analysis for Plainsboro Plaza Shopping Center," dated October 5, 2000, last revised November 15, 2000, and "Engineering Report Plainsboro Plaza prepared for AO Plainsboro LLC", dated October 22, 2013, last revised June 4, 2014..

According to the "Soil Survey Geographic Database" (SSURGO) for Middlesex County, New Jersey, the project site soils consists of Sassafras sandy loam, 2 to 5% slopes (classified as Hydrologic Soil Group [HSG] Type B Soil), Sassafras loam, 0 to 2% slopes (HSG Type B soil), Sassafras loam, 2 to 5% slopes (HSG Type B Soil), Woodstown sandy loam, 0 to 2 percent slopes (HSG Type C soil), and Woodstown loam, 0 to 2 percent slopes (HSG Type C soil).

PROPOSED PROJECT SITE DESCRIPTION AND METHODOLOGY

The proposed Project improvements include a new 3,437 square foot Chase Bank with an ATM drive-up lane, removal of existing parking areas, dumpster enclosure, walks, and modified parking and circulation areas. The proposed site improvements will result in a disturbance area of 1.1 acres with a decrease in impervious of 3,139 square feet. Table 1 below provides a summary of the current and proposed site impervious coverage.

Table 1: Impervious Site Coverage

	Square Feet	Acres
Existing Site Impervious Area	42,625	0.98
Proposed Site Impervious Area	39,486	0.91
Net Decrease in Impervious Area	3,139	0.07

B. STORMWATER QUANTITY

The hydrologic characteristics for the design of the stormwater management system are based upon the 2-, 10-, and 100-year frequency storm events. The calculations have been developed in conformance with the requirements of the Township of Plainsboro, Middlesex County, Delaware and Raritan Canal Commission (DRCC), and the NJDEP State Stormwater Management Rules (N.J.A.C. 7:8).

The requirements for peak rate reduction take effect if a development disturbs 1 acre or more or has a net increase in impervious surface of 0.25 acres or more. As stated above the project has a net decrease in impervious surface. As the site has had previous improvements occur at the site since 1980 (DRCC) and 2009 (NJDEP), stormwater quantity needs to be addressed.

The project proposes a net reduction in the impervious surface by 0.07acres. As the project is located over an existing paved parking lot, the impervious surface reduction is related to the removal of vehicular pavement. As the project proposes a decrease in impervious coverage, there is an increase in landscape area, the time of concentration will increase slightly. The post-construction runoff hydrographs do not exceed the pre-construction runoff hydrographs for the same storm events. Therefore, the water quantity standards have been met. Refer the Appendix C for unit hydrographs and routings

C. STORMWATER QUALITY

The runoff quality standards at N.J.A.C. 7:8-5.5 and the Township's stormwater ordinance apply if there is a net increase in impervious surface of 0.25 acres or more. As indicated in section II-A, above, the proposed project will yield a net decrease in impervious surface; however, the runoff quality standards do apply for the project as improvements have occurred at the site since 1980 and reconstructed vehicular pavement areas are proposed.

Based on the parking lot reconstruction project at the Plainsboro Plaza site in 2014, the "Engineering Report Plainsboro Plaza prepared for AO Plainsboro LLC", dated October 22, 2013, last revised June 4, 2014, it was determined the existing wet pond provides a TSS removal of 82.5%.

The existing area around the project consists of 0.98 acres of vehicular pavement and 0.17 acres of landscape areas. With the proposed project, the vehicular pavement will be reduced to 0.76 acres, the landscape area increased to 0.24 acres. The remaining area will consist of 0.15 acres of building and sidewalks. With a vehicular pavement area reduction of 22%, an increase in the landscape area and time of concentration, a reduction in the flows, and the existing wet pond providing a TSS removal of 82.5%, the water quality standards have been met.

D. GROUNDWATER RECHARGE

The groundwater recharge standards at N.J.A.C. 7:8-5.5 applies for any project that disturbs at least one acre of land or increases impervious surface by 0.25 acres. As previously indicated above, the site will yield a net decrease in impervious surface; however, the runoff quality standards do apply for the project as improvements have occurred at the site since 1980.

In accordance with NJDEP Stormwater Management Rules (N.J.A.C. 7:8) and the Best Management Practices Manual, compliance with this groundwater recharge requirement must be verified through a hydrologic and hydraulic analysis of the site in its existing and proposed condition. Compliance is

determined utilizing the New Jersey Groundwater Recharge Spreadsheet (NJGSR-32). Inputting the existing and proposed conditions into NJGSR-32 spreadsheet shows that the project meets the recharge requirements by reducing the impervious surface; therefore, the project complies with the recharge requirement.

Refer to the Appendix D for a copy of the NJGSR-32 spreadsheet computations.

E. NON-STRUCTURAL STORMWATER MANAGEMENT STRATEGIES

In accordance with N.J.A.C. 7:8-5.2(a) and the Township's stormwater ordinance 85-28.1D (5b), the design of any development that disturbs at least one acre of land or increases impervious surface by 0.25 acres must incorporate non-structural stormwater management strategies. Even though this project proposes a net decrease in impervious area, non-structural stormwater management strategies are required to meet the DRCC requirements.

To accomplish a better site design and further mitigate the impacts of stormwater runoff, provisions have been made in the Project's design to incorporate a combination of non-structural, LIDs. These LIDs are listed as follows:

- Reduction in vehicular impervious surface;
- Replace vehicular pavement with landscape areas;
- Low-maintenance landscaping, where practical;

To assist in determining that the non-structural stormwater management strategies have been incorporated into the site design "to the maximum extent practical," the New Jersey Department of Environmental Protection has developed the New Jersey Non-structural Stormwater Management Strategies Point System (NSPS) spreadsheet. The NSPS is a tool that quantifies the level of non-structural strategies utilized in the design of a site. Refer to Appendix E for a copy of the NSPS, demonstrating that sufficient use of non-structural strategies has been incorporated into the design of this site.

F. SOIL EROSION AND SEDIMENT CONTROL

All soil erosion and sediment control measures are shown graphically on the associated project site plans, including tree protection, inlet protection, and the project site limit of disturbance. All soil erosion control measures will be implemented in accordance with the current Standards for Soil Erosion and Sediment Control of New Jersey.

G. PROJECT SITE SOIL TYPES

1. SacB Sassafras sandy loam, 2 to 5% slopes; Type B Soil.
2. SafA, Sassafras loam, 0 to 2 percent slopes, Type B Soil.
3. SafB, Sassafras loam, 2 to 5 percent slopes, Type B Soil.
4. WoeA, Woodstown sandy loam, 0 to 2 percent slopes, Type C Soil.
5. WogA, Woodstown loam, 0 to 2 percent slopes, Type C soil
6. HumAt, Humaquepts, 0 to 3 percent slopes, Type A/D soil

III. REVIEW AGENCIES

1. Plainsboro Township Planning Board, Preliminary/Final Site Plan approval.
2. Middlesex County Planning Board, Site Plan approval.
3. Delaware and Raritan Canal Commission, certificate of approval.
4. Freehold Soil Erosion and Sediment Control Plan, SESC Plan Certification.

IV. UTILITY SERVICES

Electric, gas, sanitary sewer, CATV, telephone, and water mains are available within the Plainsboro Plaza site, Schalks Crossing Road, and Plainsboro Road. The utility purveyors are indicated below:

- Electric and Gas: Public Service Electric and Gas Company (PSE&G)
- Water: New Jersey American Water (NJAW)
- Sanitary Sewer: VEOLOA Water Princeton Meadows WWTP
- CATV: Comcast
- Telephone: Verizon Communications

Electric and Gas

The proposed building will require new electric and gas services. Existing mains for both gas and electric are found within the right-of-way of Schalks Crossing Road.

CATV/Telephone

CATV/Telephone service will be provided to the new building from existing communication systems within the right-of-way of Schalks Crossing Road.

Water Demand

NJAW has a distribution system within the Plainsboro Plaza development (8"), Schalks Crossing Road (8"), as well as Plainsboro Road (8"). Based on a pre-application meeting with NJAW, a 6-inch water main extension is proposed to tap off the existing water main located within the Plainsboro Plaza development. The main will extend within the outer Plainsboro Plaza site circulation drive in close proximity to the proposed building with a 1 ¼" domestic and 4" fire services coming from the new main. Table 1 of NJAC 7:10-12.6 does not list banks as a specific type of establishment. The closest type of establishment would be a "Store, office building" with a demand of 0.125 gallons per square foot of building. Utilizing this rate, the domestic water demand for the proposed bank is 435 GPD (3,478sf x 0.0125gal/sf).

As the increase in domestic demand for the new Chase Bank will be less than 6,000 GPD, a Bureau of Safe Drinking Water permit will not be required.

Sanitary Sewer Demand

An existing sanitary sewer collection system within the Plainsboro Plaza development is located at the along the rear service drive. Based on a preliminary review with Veolia, the sanitary sewer lateral for the bank will tie into the lateral from the CVS building located near the Schalks Crossing Road R.O.W. Due to elevation restrictions, the flow from the bank will require the installation of a lift station, which will utilize a 2" force main to direct the flow to the existing CVS lateral. NJAC 14.A-23.2, does not list banks as a specific type of establishment. The closest type of establishment would be a "Stores and shopping centers" with a demand of 0.100 gallons per square foot of building. Utilizing this rate, the domestic water demand for the proposed bank is 438 GPD (3,478sf x 0.0100gal/sf).

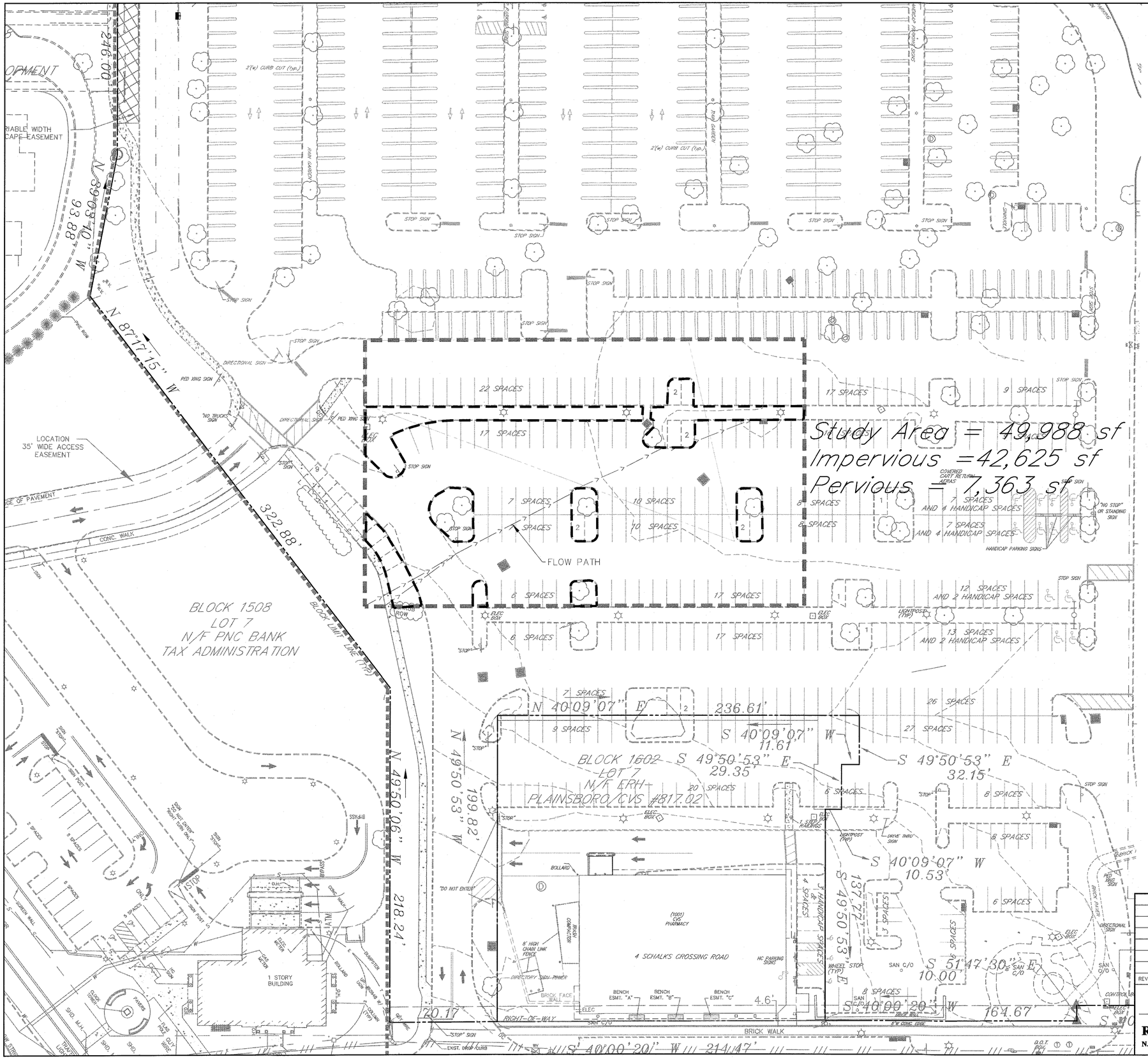
As the increase in sanitary sewer demand for the new Chase Bank will be less than 8,000 GPD, a NJDEP Treatment Works permit will not be required.

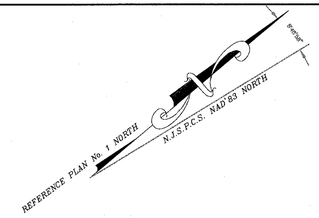
I. REFERENCES

1. Blick, S.A., F. Kelly, and J.J. Skupien. April 2004. New Jersey Stormwater Best Management Practices Manual. New Jersey Department of Environmental Protection, Division of Watershed Management. Trenton, New Jersey.
2. New Jersey Department of Agriculture. November 2000. Standards for Soil Erosion and Sediment Control in New Jersey. State Soil Conservation Committee. Trenton, New Jersey.
3. Plainsboro Township, Code of the Township of Plainsboro.
4. United States Department of Agriculture, Natural Resource Conservation Service. May 24, 1999. Soil Survey Geographic (SSURGO) Database for Middlesex County, New Jersey. United States Department of Agriculture, Natural Resource Conservation Service. Fort Worth, Texas.
5. Ferguson, Bruce K., 2005. Porous Pavements. Boca Raton, Florida.

APPENDIX A
IMPERVIOUS/DRAINAGE AREA MAPS

APPENDIX B
WEB SOIL SURVEY REPORT





EXISTING LEGEND

- LIGHT STANDARD
- SANITARY MANHOLE
- HANDICAP PARKING SPACE
- FENCE
- SIGN
- OUT-FLOW STRUCTURE
- F.E.S.
- STORM MANHOLE
- FIRE HYDRANT
- "B" INLET
- HEADWALL
- CURB DEPRESSION
- INLET
- TRANSFORMER
- "A" INLET
- GAS VALVE
- WATER VALVE
- CURB
- PARKING STRIPE
- 80 CONTOUR

PROPOSED LEGEND

- PAVEMENT MARKING
- CONCRETE PATH/ SIDEWALK
- PAVEMENT MILLING
- EDGE OF PAVEMENT
- CURB
- FLUSH CURB
- PARKING STRIPE (HAIRPIN)
- HANDICAP SYMBOL
- (10) PARKING COUNT
- TRAFFIC SIGN

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 feet

REV.	DESCRIPTION	DATE	DFT.BY	CKD.BY

06/06/23
DATE OF SIGN.

RALPH A. PETRELLA
N.J. PROFESSIONAL ENGINEER LIC. NO. GE 46160

van note-harvey associates, inc.
consulting engineers, planners & land surveyors
103 College Road East • Princeton, NJ 08540 • 609-987-2323
211 Bayberry Drive • Cape May Court House, NJ 08210 • 609-465-2600
www.vannoteharvey.com **Certificate of Authorization** No. 24GA28271300
van note-harvey associates - Since 1894 -

EXISTING IMPERVIOUS MAP – STANDALONE BUILDING PAD–CHASE BANK
OF
PLAINSBORO PLAZA CENTER UPGRADES
PREPARED FOR
PLAINSBORO PLAZA OWNER, LLC
SITUATED IN
PLAINSBORO TOWNSHIP — MIDDLESEX CO., N.J.
SCALE 1"= 60' — FEBRUARY 14, 2023

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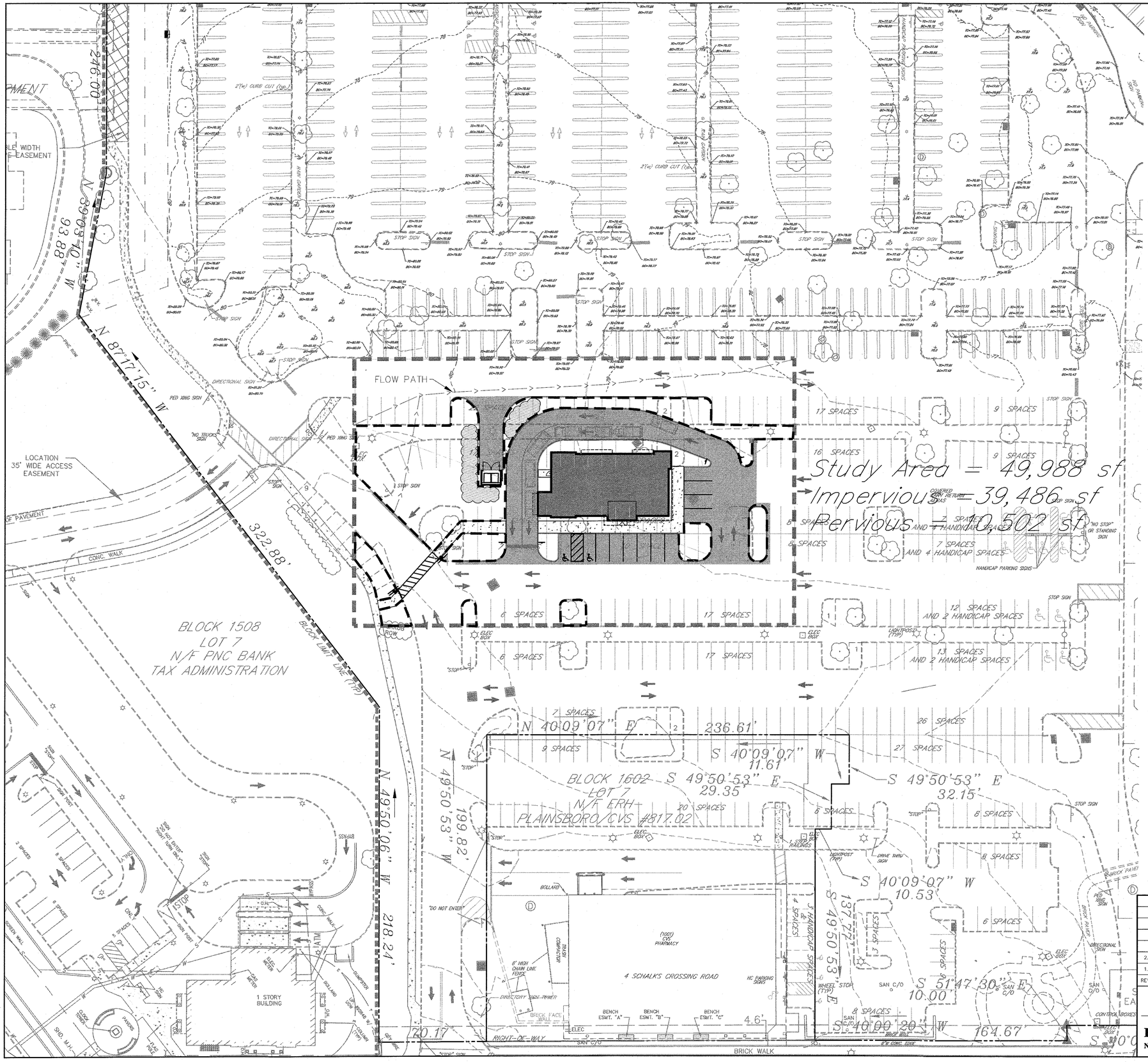

EXISTING LEGEND

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- HANDICAP PARKING SPACE
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- PAVEMENT MILLING
- EDGE OF PAVEMENT
- CURB
- FLUSH CURB
- PARKING STRIPE (HAIRPIN)
- HANDICAP SYMBOL
- (10) PARKING COUNT
- TRAFFIC SIGN

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 feet

REV.	DESCRIPTION	DATE	DFT.BY	CKD.BY
2.	REVISED PER COMMENTS	4/11/23	WDV	RAP
1.	REVISED PER TOWNSHIP COMMENTS	3/24/23	WDV	RAP

02/14/23
DATE OF SIGN.

RALPH A. PETRELLA
N.J. PROFESSIONAL ENGINEER LIC. NO. GE 46160

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- Since 1894 -

CONCEPTUAL LAYOUT – STANDALONE BUILDING
PAD-CHASE BANK WITH DRIVE THRU LANES
OF
PLAINSBORO PLAZA CENTER UPGRADES
PREPARED FOR
PLAINSBORO PLAZA OWNER, LLC
SITUATED IN
PLAINSBORO TOWNSHIP MIDDLESEX CO., N.J.
SCALE 1"= 30' FEBRUARY 14, 2023

DRAWN BY DATE	WDV	FIELD BK	ORDER No.	FILE No.	SHEET No.
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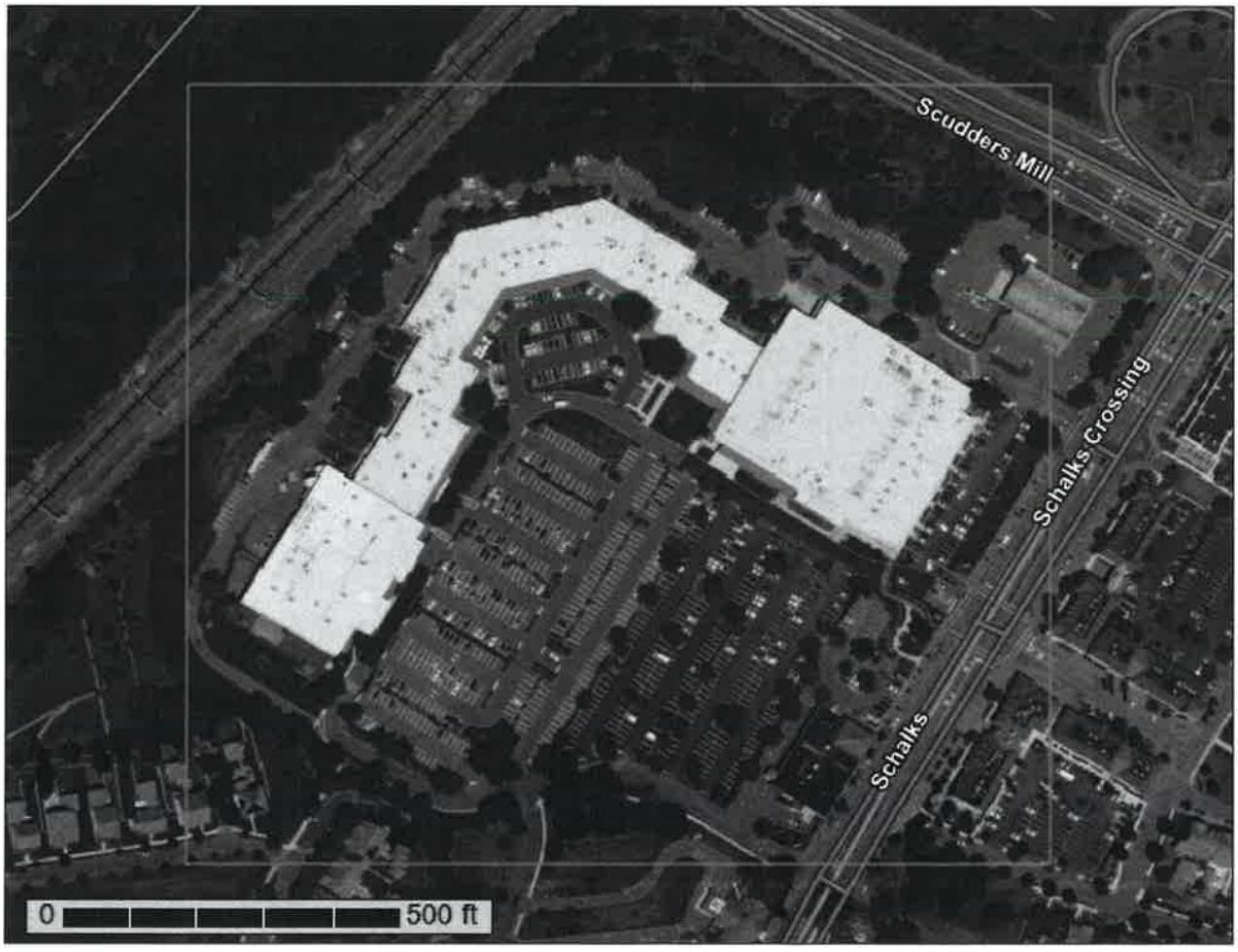
United States Department of Agriculture

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 Middlesex County, New Jersey



June 30, 2023

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.

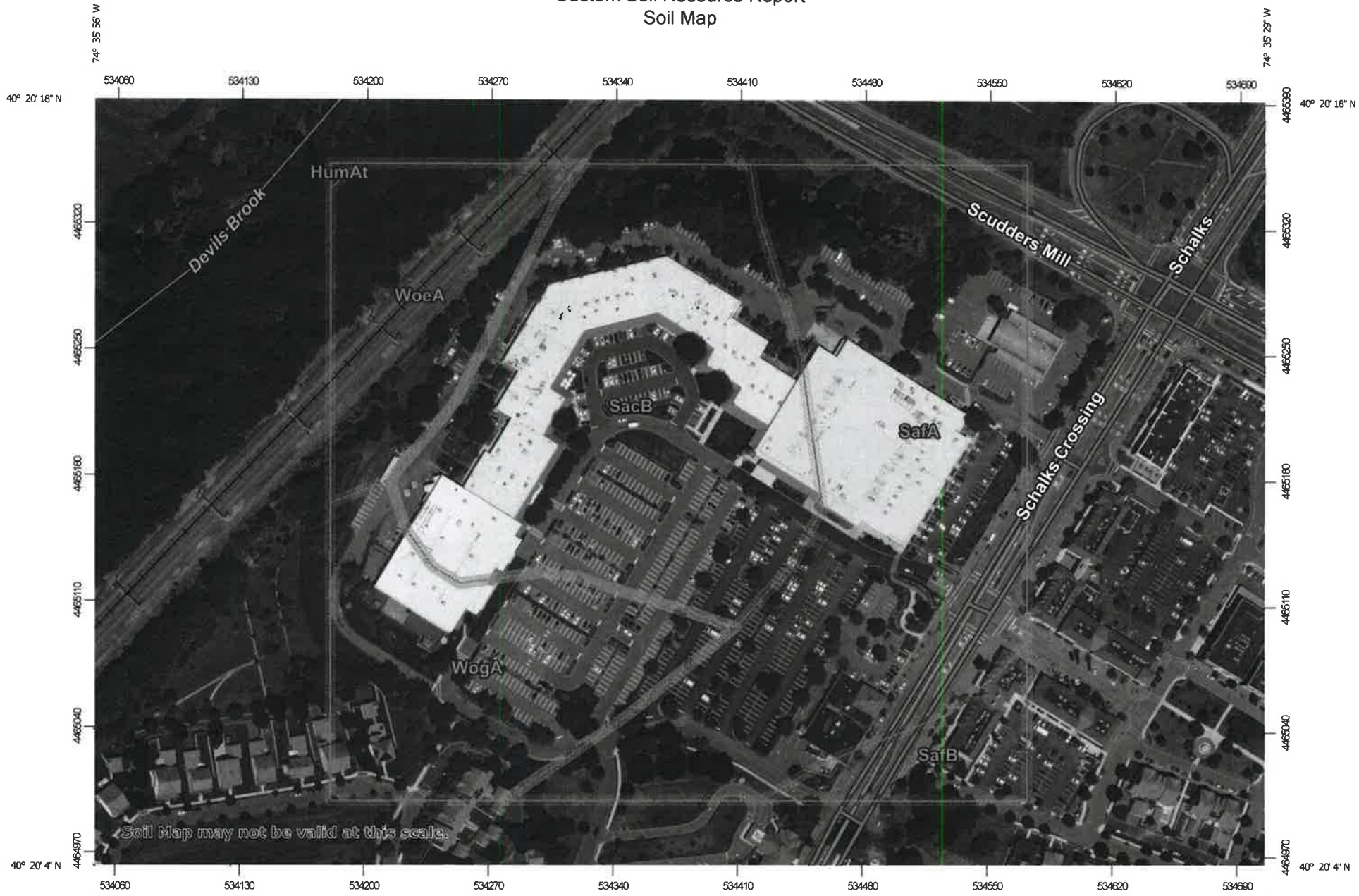
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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: 1:3,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

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 1:24,000.

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: Middlesex County, New Jersey
Survey Area Data: Version 18, Aug 30, 2022

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

Date(s) aerial images were photographed: Jun 4, 2022—Jul 22, 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
HumAt	Humaquepts, 0 to 3 percent slopes, frequently flooded	0.0	0.1%
SacB	Sassafras sandy loam, 2 to 5 percent slopes, Northern Coastal Plain	10.6	30.9%
SafA	Sassafras loam, 0 to 2 percent slopes	12.6	36.5%
SafB	Sassafras loam, 2 to 5 percent slopes	1.4	4.2%
WoeA	Woodstown sandy loam, 0 to 2 percent slopes, Northern Coastal Plain	4.0	11.7%
WogA	Woodstown loam, 0 to 2 percent slopes, Northern Coastal Plain	5.8	16.8%
Totals for Area of Interest		**34.4**	**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.

Middlesex County, New Jersey

HumAt—Humaquepts, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 1hv19
Elevation: 0 to 300 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Not prime farmland

Map Unit Composition

Humaquepts, frequently flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Humaquepts, Frequently Flooded

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

A - 0 to 18 inches: loam
C - 18 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: FrequentNone
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Manahawkin, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Mullica, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains, depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Atsion

Percent of map unit: 5 percent
Landform: Flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

SacB—Sassafras sandy loam, 2 to 5 percent slopes, Northern Coastal Plain

Map Unit Setting

National map unit symbol: 2thxd
Elevation: 0 to 470 feet
Mean annual precipitation: 41 to 49 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 190 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sassafras and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sassafras

Setting

Landform: Flats, fluviomarine terraces
Landform position (three-dimensional): Riser, rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits

Typical profile

Ap - 0 to 12 inches: sandy loam
Bt1 - 12 to 18 inches: sandy loam
Bt2 - 18 to 28 inches: sandy clay loam
BC - 28 to 40 inches: loamy sand
C1 - 40 to 58 inches: sand
C2 - 58 to 80 inches: sand

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Fallsington, drained

Percent of map unit: 4 percent
Landform: Flats, depressions, swales
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Woodstown

Percent of map unit: 4 percent
Landform: Depressions, flats, fluviomarine terraces, broad interstream divides
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Downer

Percent of map unit: 4 percent
Landform: Flats, knolls, fluviomarine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, riser, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Hydric soil rating: No

Ingleside

Percent of map unit: 4 percent
Landform: Flats
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Aura

Percent of map unit: 4 percent

Landform: Low hills, fluviomarine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope, riser
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

SafA—Sassafras loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2thxp
Elevation: 0 to 470 feet
Mean annual precipitation: 41 to 49 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 190 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sassafras and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sassafras

Setting

Landform: Flats, fluviomarine terraces
Landform position (three-dimensional): Riser, rise
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Loamy fluviomarine deposits

Typical profile

Ap - 0 to 12 inches: loam
Bt1 - 12 to 18 inches: sandy loam
Bt2 - 18 to 28 inches: sandy clay loam
BC - 28 to 40 inches: loamy sand
C1 - 40 to 58 inches: sand
C2 - 58 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Ingleside

Percent of map unit: 4 percent
Landform: Flats, fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Riser, rise
Down-slope shape: Linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Downer

Percent of map unit: 4 percent
Landform: Knolls, fluviomarine terraces, flats
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, riser, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Hydric soil rating: No

Aura

Percent of map unit: 4 percent
Landform: Low hills, fluviomarine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope, riser
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Fallsington, drained

Percent of map unit: 4 percent
Landform: Flats, depressions, swales, broad interstream divides
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Woodstown

Percent of map unit: 4 percent
Landform: Flats, depressions, broad interstream divides, fluviomarine terraces
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

SafB—Sassafras loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2thxh
Elevation: 0 to 530 feet
Mean annual precipitation: 41 to 49 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 190 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sassafras and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sassafras

Setting

Landform: Fluviomarine terraces, flats
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser, rise
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Loamy fluviomarine deposits

Typical profile

Ap - 0 to 12 inches: loam
Bt1 - 12 to 18 inches: sandy loam
Bt2 - 18 to 28 inches: sandy clay loam
BC - 28 to 40 inches: loamy sand
C1 - 40 to 58 inches: sand
C2 - 58 to 80 inches: sand

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Ingleside

Percent of map unit: 4 percent
Landform: Fluviomarine terraces, flats
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser, rise
Down-slope shape: Linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Woodstown

Percent of map unit: 4 percent
Landform: Depressions, broad interstream divides, flats, fluviomarine terraces
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Fallsington, drained

Percent of map unit: 4 percent
Landform: Broad interstream divides, flats, depressions, swales
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Downer

Percent of map unit: 4 percent
Landform: Knolls, flats, fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve, riser, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Hydric soil rating: No

Aura

Percent of map unit: 4 percent
Landform: Low hills, fluviomarine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope, riser
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

WoeA—Woodstown sandy loam, 0 to 2 percent slopes, Northern Coastal Plain

Map Unit Setting

National map unit symbol: 2thvw
Elevation: 0 to 280 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodstown and similar soils: 81 percent
Minor components: 19 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodstown

Setting

Landform: Fluviomarine terraces, depressions, broad interstream divides, flats
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Loamy fluviomarine deposits

Typical profile

Ap - 0 to 7 inches: sandy loam
E - 7 to 11 inches: sandy loam
Bt - 11 to 29 inches: sandy loam
BCg - 29 to 45 inches: fine sandy loam
Cg - 45 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 20 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Hammonton

Percent of map unit: 7 percent
Landform: Flats, broad interstream divides
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Fallsington

Percent of map unit: 7 percent
Landform: Drainageways, depressions, swales, flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Hambrook

Percent of map unit: 5 percent
Landform: Fluviomarine terraces, flats
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

WogA—Woodstown loam, 0 to 2 percent slopes, Northern Coastal Plain

Map Unit Setting

National map unit symbol: 2thx3
Elevation: 0 to 470 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 190 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodstown and similar soils: 81 percent
Minor components: 19 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodstown

Setting

Landform: Fluviomarine terraces, depressions, broad interstream divides, flats
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Tread, dip, talf

Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Loamy fluviomarine deposits

Typical profile

Ap - 0 to 7 inches: loam
E - 7 to 11 inches: sandy loam
Bt - 11 to 29 inches: sandy loam
BCg - 29 to 45 inches: fine sandy loam
Cg - 45 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 20 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Fallsington

Percent of map unit: 7 percent
Landform: Drainageways, swales, flats, depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Hammonton

Percent of map unit: 7 percent
Landform: Flats, broad interstream divides
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hambrook

Percent of map unit: 5 percent
Landform: Fluviomarine terraces, flats
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

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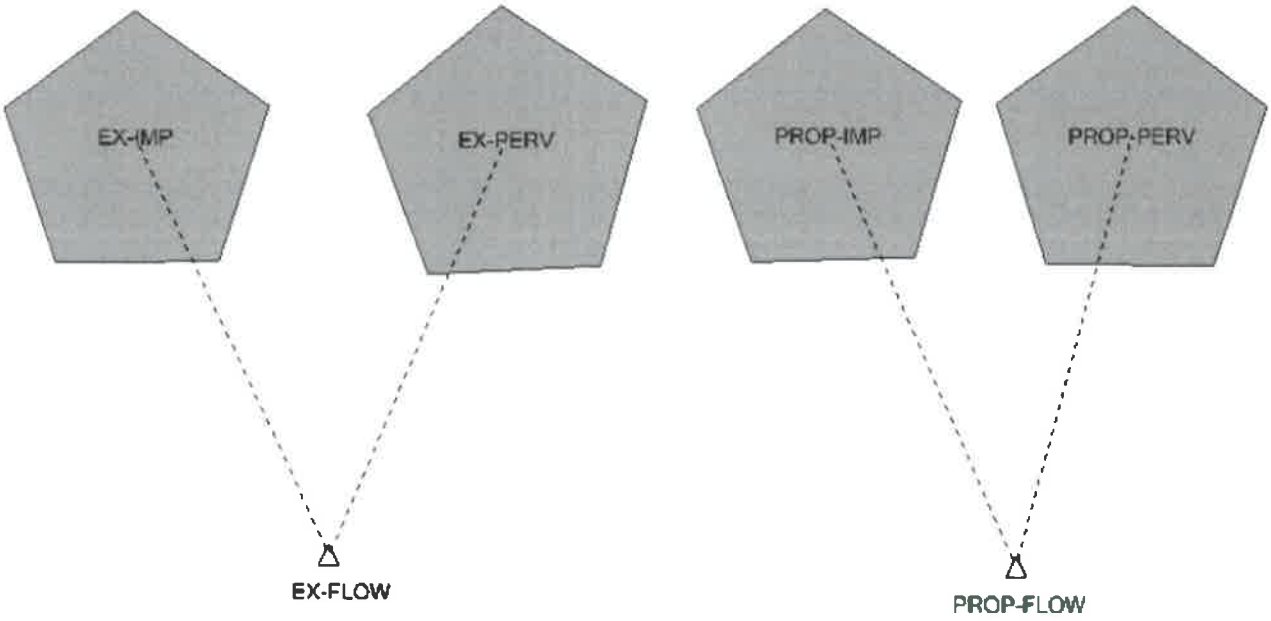
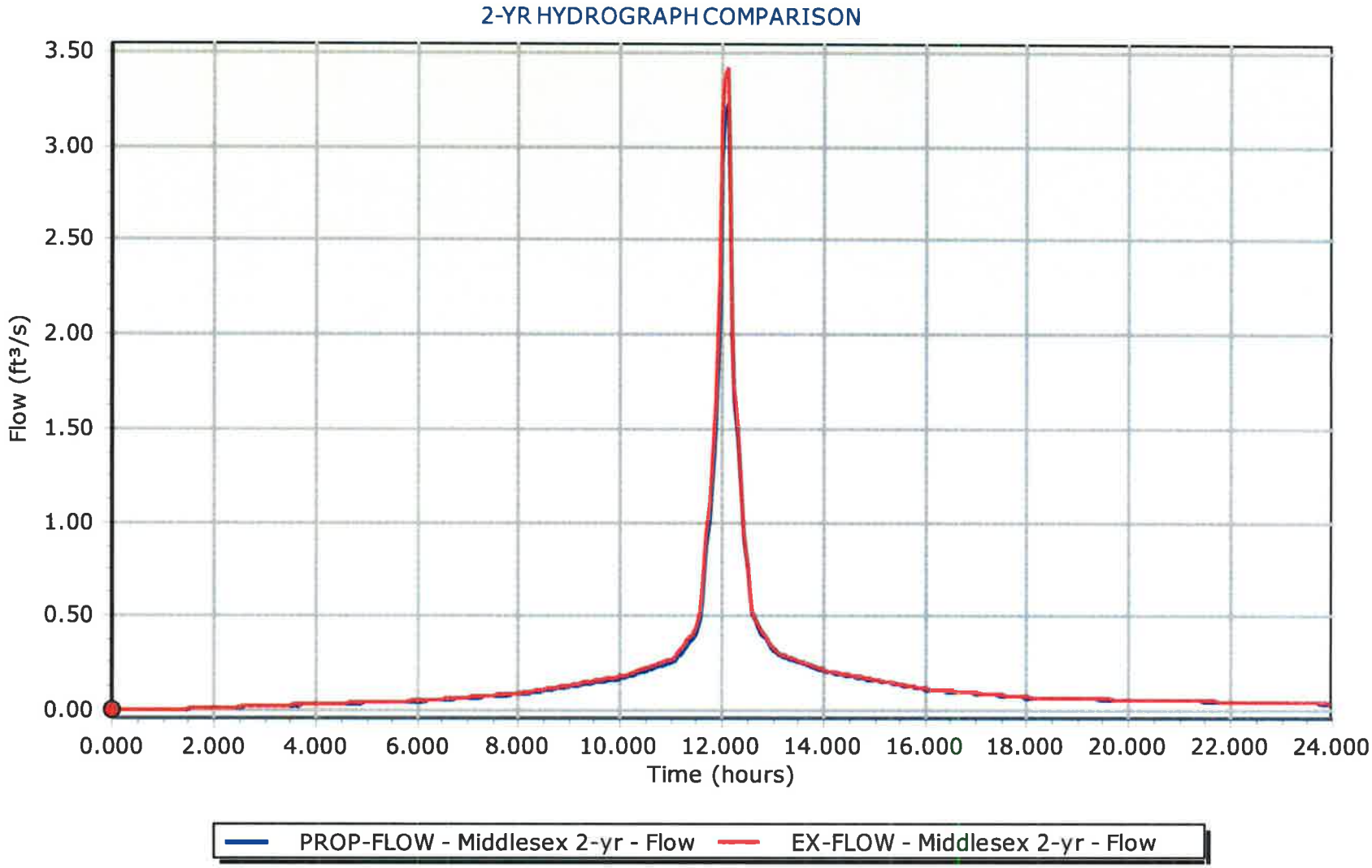
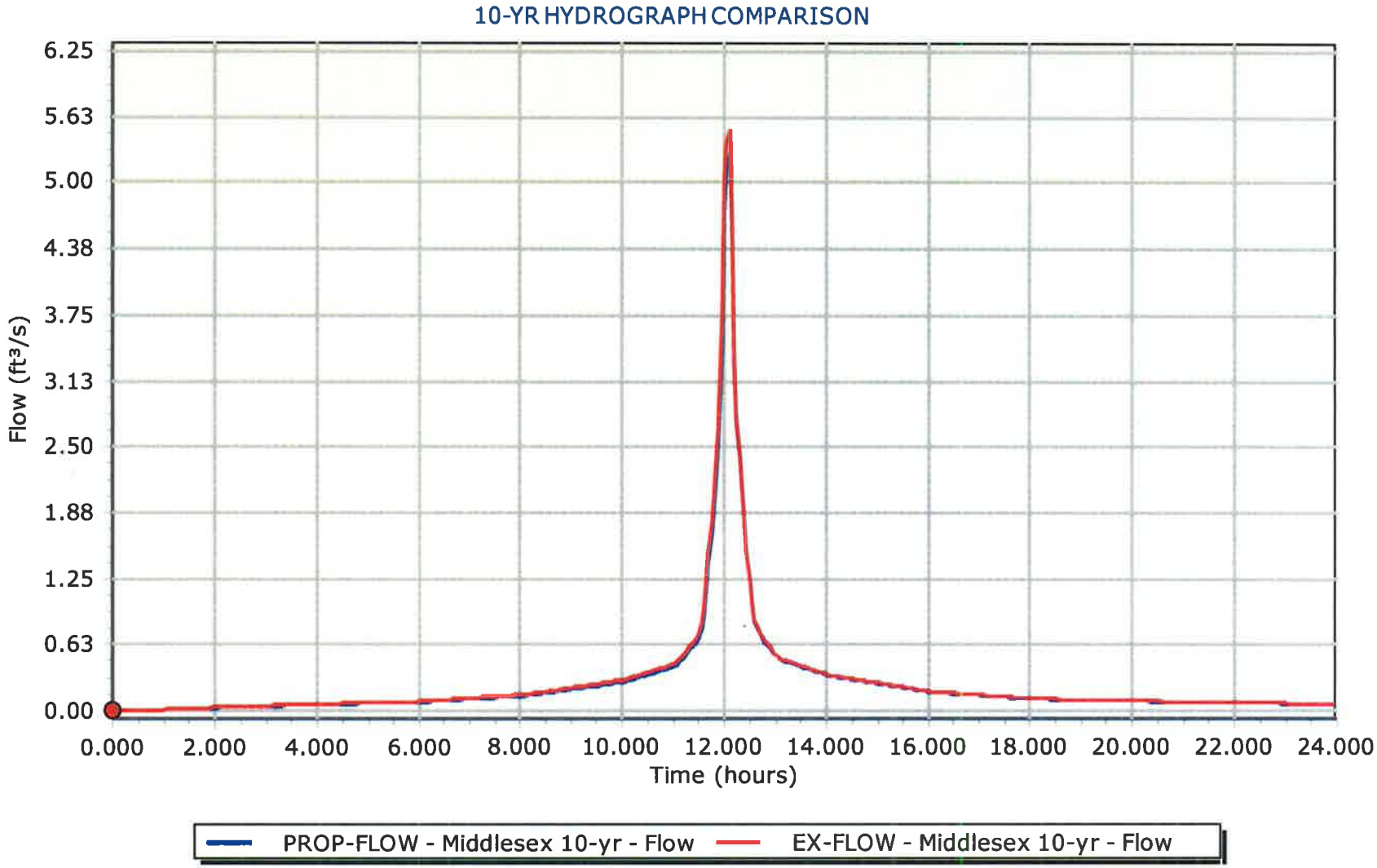
APPENDIX C
HYDROLOGIC ROUTINGS

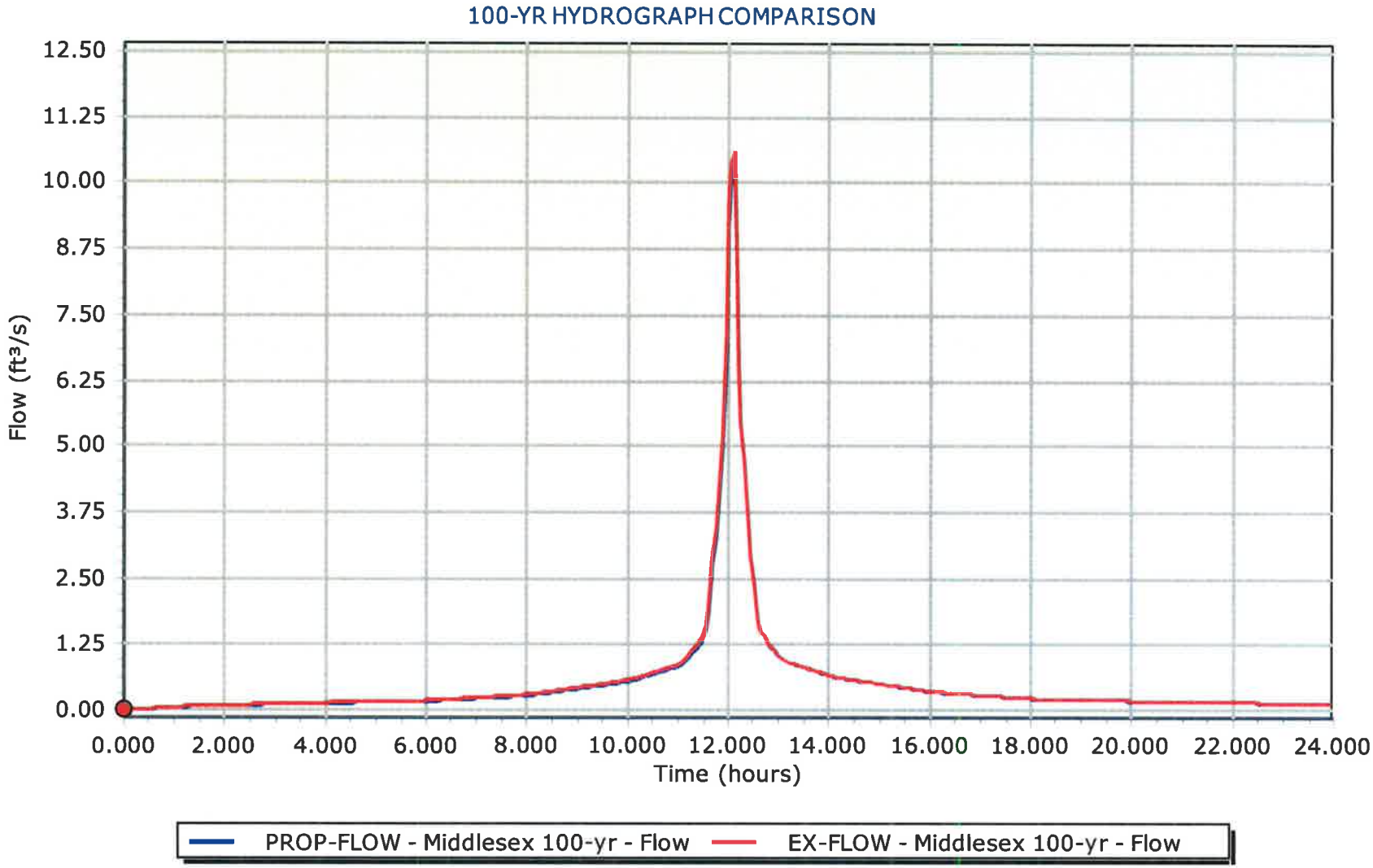

EX-IMP
EX-PERV
PROP-IMP
PROP-PERV
EX-FLOW
PROP-FLOW



Post construction hydrograph does not exceed pre construction hydrograph at any time.



Post construction hydrograph does not exceed pre construction hydrograph at any time.



Post construction hydrograph does not exceed pre construction hydrograph at any time.

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Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
EX-IMP	Middlesex 2-yr	2	0.306	12.100	3.27
EX-IMP	Middlesex 10-yr	10	0.487	12.100	5.11
EX-IMP	Middlesex 100-yr	100	0.917	12.100	9.49
EX-PERV	Middlesex 2-yr	2	0.015	12.150	0.16
EX-PERV	Middlesex 10-yr	10	0.037	12.150	0.42
EX-PERV	Middlesex 100-yr	100	0.099	12.150	1.12
PROP-IMP	Middlesex 2-yr	2	0.285	12.100	3.04
PROP-IMP	Middlesex 10-yr	10	0.452	12.100	4.75
PROP-IMP	Middlesex 100-yr	100	0.852	12.100	8.81
PROP-PERV	Middlesex 2-yr	2	0.020	12.150	0.21
PROP-PERV	Middlesex 10-yr	10	0.050	12.150	0.56
PROP-PERV	Middlesex 100-yr	100	0.137	12.150	1.55

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
EX-FLOW	Middlesex 2-yr	2	0.322	12.100	3.42
EX-FLOW	Middlesex 10-yr	10	0.523	12.100	5.51
EX-FLOW	Middlesex 100-yr	100	1.016	12.100	10.59
PROP-FLOW	Middlesex 2-yr	2	0.305	12.100	3.23
PROP-FLOW	Middlesex 10-yr	10	0.502	12.100	5.28
PROP-FLOW	Middlesex 100-yr	100	0.989	12.100	10.32

Subsection: Time-Depth Curve
Label: MIDDLESEX:1,2,10,100
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Time-Depth Curve: TypeIII 24hr	
Label	TypeIII 24hr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	2 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.2	0.2	0.2
4.500	0.2	0.2	0.2	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.3
5.500	0.3	0.3	0.3	0.3	0.3
6.000	0.3	0.3	0.3	0.3	0.3
6.500	0.3	0.3	0.3	0.3	0.4
7.000	0.4	0.4	0.4	0.4	0.4
7.500	0.4	0.4	0.4	0.4	0.4
8.000	0.5	0.5	0.5	0.5	0.5
8.500	0.5	0.5	0.5	0.6	0.6
9.000	0.6	0.6	0.6	0.6	0.6
9.500	0.7	0.7	0.7	0.7	0.7
10.000	0.8	0.8	0.8	0.8	0.8
10.500	0.9	0.9	0.9	0.9	1.0
11.000	1.0	1.0	1.1	1.1	1.1
11.500	1.2	1.3	1.4	1.5	1.7
12.000	2.0	2.3	2.5	2.6	2.7
12.500	2.8	2.8	2.9	2.9	3.0
13.000	3.0	3.0	3.0	3.1	3.1
13.500	3.1	3.2	3.2	3.2	3.2
14.000	3.2	3.3	3.3	3.3	3.3
14.500	3.3	3.3	3.4	3.4	3.4
15.000	3.4	3.4	3.4	3.5	3.5
15.500	3.5	3.5	3.5	3.5	3.5
16.000	3.5	3.5	3.6	3.6	3.6
16.500	3.6	3.6	3.6	3.6	3.6
17.000	3.6	3.6	3.6	3.7	3.7

Subsection: Time-Depth Curve
Label: MIDDLESEX:1,2,10,100
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	3.7	3.7	3.7	3.7	3.7
18.000	3.7	3.7	3.7	3.7	3.7
18.500	3.7	3.7	3.7	3.8	3.8
19.000	3.8	3.8	3.8	3.8	3.8
19.500	3.8	3.8	3.8	3.8	3.8
20.000	3.8	3.8	3.8	3.8	3.8
20.500	3.8	3.8	3.9	3.9	3.9
21.000	3.9	3.9	3.9	3.9	3.9
21.500	3.9	3.9	3.9	3.9	3.9
22.000	3.9	3.9	3.9	3.9	3.9
22.500	3.9	3.9	3.9	3.9	3.9
23.000	4.0	4.0	4.0	4.0	4.0
23.500	4.0	4.0	4.0	4.0	4.0
24.000	4.0	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: TypeIII 24hr	
Label	TypeIII 24hr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.3	0.3
4.000	0.3	0.3	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.3	0.3
5.000	0.4	0.4	0.4	0.4	0.4
5.500	0.4	0.4	0.4	0.4	0.4
6.000	0.4	0.5	0.5	0.5	0.5
6.500	0.5	0.5	0.5	0.5	0.5
7.000	0.6	0.6	0.6	0.6	0.6
7.500	0.6	0.6	0.7	0.7	0.7
8.000	0.7	0.7	0.7	0.8	0.8
8.500	0.8	0.8	0.8	0.9	0.9
9.000	0.9	0.9	1.0	1.0	1.0
9.500	1.0	1.1	1.1	1.1	1.1
10.000	1.2	1.2	1.2	1.3	1.3
10.500	1.3	1.4	1.4	1.5	1.5
11.000	1.5	1.6	1.7	1.7	1.8
11.500	1.8	1.9	2.1	2.3	2.6
12.000	3.1	3.6	3.9	4.1	4.3
12.500	4.4	4.4	4.5	4.5	4.6
13.000	4.6	4.7	4.7	4.8	4.8
13.500	4.9	4.9	4.9	5.0	5.0
14.000	5.0	5.1	5.1	5.1	5.1
14.500	5.2	5.2	5.2	5.2	5.3
15.000	5.3	5.3	5.3	5.4	5.4
15.500	5.4	5.4	5.4	5.5	5.5
16.000	5.5	5.5	5.5	5.5	5.6
16.500	5.6	5.6	5.6	5.6	5.6
17.000	5.6	5.7	5.7	5.7	5.7

Subsection: Time-Depth Curve
Label: MIDDLESEX:1,2,10,100
Scenario: Middlesex 10-yr

Return Event: 10 years
Storm Event: TypeIII 24hr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	5.7	5.7	5.7	5.7	5.7
18.000	5.8	5.8	5.8	5.8	5.8
18.500	5.8	5.8	5.8	5.8	5.8
19.000	5.8	5.9	5.9	5.9	5.9
19.500	5.9	5.9	5.9	5.9	5.9
20.000	5.9	5.9	5.9	6.0	6.0
20.500	6.0	6.0	6.0	6.0	6.0
21.000	6.0	6.0	6.0	6.0	6.0
21.500	6.0	6.1	6.1	6.1	6.1
22.000	6.1	6.1	6.1	6.1	6.1
22.500	6.1	6.1	6.1	6.1	6.1
23.000	6.1	6.1	6.2	6.2	6.2
23.500	6.2	6.2	6.2	6.2	6.2
24.000	6.2	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: TypeIII 24hr	
Label	TypeIII 24hr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.1	0.1	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.2
1.500	0.2	0.2	0.2	0.2	0.2
2.000	0.2	0.2	0.3	0.3	0.3
2.500	0.3	0.3	0.3	0.3	0.3
3.000	0.4	0.4	0.4	0.4	0.4
3.500	0.4	0.4	0.4	0.5	0.5
4.000	0.5	0.5	0.5	0.5	0.6
4.500	0.6	0.6	0.6	0.6	0.6
5.000	0.7	0.7	0.7	0.7	0.7
5.500	0.7	0.8	0.8	0.8	0.8
6.000	0.8	0.8	0.9	0.9	0.9
6.500	0.9	0.9	1.0	1.0	1.0
7.000	1.0	1.1	1.1	1.1	1.1
7.500	1.2	1.2	1.2	1.3	1.3
8.000	1.3	1.3	1.4	1.4	1.4
8.500	1.5	1.5	1.6	1.6	1.6
9.000	1.7	1.7	1.8	1.8	1.9
9.500	1.9	2.0	2.0	2.1	2.1
10.000	2.2	2.2	2.3	2.4	2.4
10.500	2.5	2.6	2.6	2.7	2.8
11.000	2.9	3.0	3.1	3.2	3.3
11.500	3.4	3.6	3.9	4.3	4.8
12.000	5.7	6.7	7.2	7.6	7.9
12.500	8.1	8.2	8.3	8.4	8.5
13.000	8.6	8.7	8.8	8.8	8.9
13.500	9.0	9.1	9.1	9.2	9.3
14.000	9.3	9.4	9.4	9.5	9.5
14.500	9.6	9.6	9.7	9.7	9.8
15.000	9.8	9.8	9.9	9.9	10.0
15.500	10.0	10.0	10.1	10.1	10.1
16.000	10.2	10.2	10.2	10.3	10.3
16.500	10.3	10.3	10.4	10.4	10.4
17.000	10.4	10.5	10.5	10.5	10.5

Subsection: Time-Depth Curve
Label: MIDDLESEX:1,2,10,100
Scenario: Middlesex 100-yr

Return Event: 100 years
Storm Event: TypeIII 24hr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	10.6	10.6	10.6	10.6	10.6
18.000	10.7	10.7	10.7	10.7	10.7
18.500	10.7	10.8	10.8	10.8	10.8
19.000	10.8	10.8	10.9	10.9	10.9
19.500	10.9	10.9	10.9	11.0	11.0
20.000	11.0	11.0	11.0	11.0	11.0
20.500	11.1	11.1	11.1	11.1	11.1
21.000	11.1	11.1	11.2	11.2	11.2
21.500	11.2	11.2	11.2	11.2	11.2
22.000	11.3	11.3	11.3	11.3	11.3
22.500	11.3	11.3	11.3	11.4	11.4
23.000	11.4	11.4	11.4	11.4	11.4
23.500	11.4	11.4	11.5	11.5	11.5
24.000	11.5	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time of Concentration Calculations
Label: EX-IMP
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	83.00 ft
Manning's n	0.011
Slope	0.015 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	1.20 ft/s
Segment Time of Concentration	0.019 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	180.20 ft
Is Paved?	True
Slope	0.010 ft/ft
Average Velocity	2.03 ft/s
Segment Time of Concentration	0.025 hours

Segment #3: TR-55 Sheet Flow	
Hydraulic Length	17.00 ft
Manning's n	0.150
Slope	0.100 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.23 ft/s
Segment Time of Concentration	0.020 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.083 hours

==== SCS Channel Flow

Tc = R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc = Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

Subsection: Time of Concentration Calculations
Label: EX-PERV
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	65.00 ft
Manning's n	0.150
Slope	0.018 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.15 ft/s
Segment Time of Concentration	0.119 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	190.20 ft
Is Paved?	True
Slope	0.010 ft/ft
Average Velocity	2.03 ft/s
Segment Time of Concentration	0.026 hours

Segment #3: TR-55 Sheet Flow	
Hydraulic Length	5.00 ft
Manning's n	0.011
Slope	0.010 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.58 ft/s
Segment Time of Concentration	0.002 hours

Segment #4: TR-55 Sheet Flow	
Hydraulic Length	30.00 ft
Manning's n	0.011
Slope	0.010 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.83 ft/s
Segment Time of Concentration	0.010 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.157 hours

==== SCS Channel Flow

Tc = R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc = Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

Subsection: Time of Concentration Calculations
Label: PROP-IMP
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.011
Slope	0.012 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	1.14 ft/s
Segment Time of Concentration	0.024 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	191.00 ft
Is Paved?	True
Slope	0.009 ft/ft
Average Velocity	1.93 ft/s
Segment Time of Concentration	0.028 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.083 hours

==== SCS Channel Flow

Tc =

R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:

R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:

V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

Subsection: Time of Concentration Calculations
Label: PROP-PERV
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	60.00 ft
Manning's n	0.150
Slope	0.010 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.12 ft/s
Segment Time of Concentration	0.141 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	223.00 ft
Is Paved?	True
Slope	0.095 ft/ft
Average Velocity	6.27 ft/s
Segment Time of Concentration	0.010 hours

Segment #3: TR-55 Sheet Flow	
Hydraulic Length	40.00 ft
Manning's n	0.011
Slope	0.010 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.88 ft/s
Segment Time of Concentration	0.013 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.163 hours

==== SCS Channel Flow

Tc =

R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:

R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:

V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

Subsection: Runoff CN-Area
Label: EX-IMP
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	0.610	0.0	0.0	98.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.370	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.980	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
Label: EX-PERV
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.110	0.0	0.0	61.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.060	0.0	0.0	74.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.170	(N/A)	(N/A)	65.588

Subsection: Runoff CN-Area
Label: PROP-IMP
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	0.910	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.910	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
Label: PROP-PERV
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.160	0.0	0.0	61.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.080	0.0	0.0	74.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.240	(N/A)	(N/A)	65.333

Unit Hydrograph Method (Computational Notes)
Definition of Terms

At	Total area (acres): At = Ai+Ap
Ai	Impervious area (acres)
Ap	Pervious area (acres)
CNi	Runoff curve number for impervious area
CNp	Runoff curve number for pervious area
fLoss	f loss constant infiltration (depth/time)
gKs	Saturated Hydraulic Conductivity (depth/time)
Md	Volumetric Moisture Deficit
Psi	Capillary Suction (length)
hK	Horton Infiltration Decay Rate (time^-1)
fo	Initial Infiltration Rate (depth/time)
fc	Ultimate(capacity)Infiltration Rate (depth/time)
Ia	Initial Abstraction (length)
dt	Computational increment (duration of unit excess rainfall) Default dt is smallest value of 0.1333Tc, rtm, and th (Smallest dt is then adjusted to match up with Tp)
UDdt	User specified override computational main time increment (only used if UDdt is => .1333Tc)
D(t)	Point on distribution curve (fraction of P) for time step t
K	2 / (1 + (Tr/Tp)): default K = 0.75: (for Tr/Tp = 1.67)
Ks	Hydrograph shape factor = Unit Conversions * K: = ((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K Default Ks = 645.333 * 0.75 = 484
Lag	Lag time from center of excess runoff (dt) to Tp: Lag = 0.6Tc
P	Total precipitation depth, inches
Pa(t)	Accumulated rainfall at time step t
Pi(t)	Incremental rainfall at time step t
qp	Peak discharge (cfs) for 1in. runoff, for 1hr, for 1 sq.mi. = (Ks * A * Q) / Tp (where Q = 1in. runoff, A=sq.mi.)
Qu(t)	Unit hydrograph ordinate (cfs) at time step t
Q(t)	Final hydrograph ordinate (cfs) at time step t
Rai(t)	Accumulated runoff (inches) at time step t for impervious area
Rap(t)	Accumulated runoff (inches) at time step t for pervious area
Rii(t)	Incremental runoff (inches) at time step t for impervious area
Rip(t)	Incremental runoff (inches) at time step t for pervious area
R(t)	Incremental weighted total runoff (inches)
Rtm	Time increment for rainfall table
Si	S for impervious area: Si = (1000/CNi) - 10
Sp	S for pervious area: Sp = (1000/CNp) - 10
t	Time step (row) number
Tc	Time of concentration
Tb	Time (hrs) of entire unit hydrograph: Tb = Tp + Tr
Tp	Time (hrs) to peak of a unit hydrograph: Tp = (dt/2) + Lag
Tr	Time (hrs) of receding limb of unit hydrograph: Tr = ratio of Tp

Subsection: Unit Hydrograph Equations

Unit Hydrograph Method
Computational Notes
Precipitation

Column (1)	Time for time step t
Column (2)	D(t) = Point on distribution curve for time step t
Column (3)	Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4)	Pa(t) = D(t) x P: Col.(2) x P

Pervious Area Runoff (using SCS Runoff CN Method)

Column (5)	Rap(t) = Accumulated pervious runoff for time step t
	If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
	If (Pa(t) is > 0.2Sp) then use:
	
	Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6)	Rip(t) = Incremental pervious runoff for time step t Rip(t) = Rap(t) - Rap(t-1) Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

Impervious Area Runoff

Column (7 & 8)...	Did not specify to use impervious areas.

Incremental Weighted Runoff

Column (9)	R(t) = (Ap/At) x Rip(t) + (Ai/At) x Rii(t) R(t) = (Ap/At) x Col.(6) + (Ai/At) x Col.(8)

SCS Unit Hydrograph Method

Column (10)	Q(t) is computed with the SCS unit hydrograph method using R(t) and Qu(t).

Subsection: Unit Hydrograph (Hydrograph Table)
Label: EX-IMP
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Storm Event	TypeIII 24hr
Return Event	2 years
Duration	24.000 hours
Depth	4.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.980 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1.150	0.00	0.00	0.00	0.00	0.00
1.400	0.00	0.01	0.01	0.01	0.01
1.650	0.01	0.01	0.01	0.01	0.01
1.900	0.01	0.01	0.01	0.01	0.01
2.150	0.01	0.01	0.01	0.01	0.01
2.400	0.02	0.02	0.02	0.02	0.02
2.650	0.02	0.02	0.02	0.02	0.02
2.900	0.02	0.02	0.02	0.02	0.02
3.150	0.02	0.02	0.02	0.02	0.03
3.400	0.03	0.03	0.03	0.03	0.03
3.650	0.03	0.03	0.03	0.03	0.03
3.900	0.03	0.03	0.03	0.03	0.03
4.150	0.03	0.03	0.03	0.03	0.03
4.400	0.04	0.04	0.04	0.04	0.04
4.650	0.04	0.04	0.04	0.04	0.04
4.900	0.04	0.04	0.04	0.04	0.04
5.150	0.04	0.04	0.04	0.04	0.04
5.400	0.04	0.04	0.05	0.05	0.05
5.650	0.05	0.05	0.05	0.05	0.05
5.900	0.05	0.05	0.05	0.05	0.05
6.150	0.05	0.05	0.05	0.05	0.06
6.400	0.06	0.06	0.06	0.06	0.06
6.650	0.06	0.06	0.06	0.06	0.07
6.900	0.07	0.07	0.07	0.07	0.07
7.150	0.07	0.07	0.07	0.08	0.08
7.400	0.08	0.08	0.08	0.08	0.08
7.650	0.08	0.08	0.08	0.09	0.09
7.900	0.09	0.09	0.09	0.09	0.09
8.150	0.10	0.10	0.10	0.10	0.10
8.400	0.11	0.11	0.11	0.11	0.12
8.650	0.12	0.12	0.12	0.12	0.13
8.900	0.13	0.13	0.13	0.14	0.14
9.150	0.14	0.14	0.15	0.15	0.15
9.400	0.15	0.15	0.16	0.16	0.16

Subsection: Unit Hydrograph (Hydrograph Table)
Label: EX-IMP
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.650	0.16	0.17	0.17	0.17	0.17
9.900	0.18	0.18	0.18	0.18	0.19
10.150	0.19	0.20	0.20	0.21	0.21
10.400	0.22	0.22	0.22	0.23	0.23
10.650	0.24	0.24	0.25	0.25	0.26
10.900	0.26	0.27	0.27	0.28	0.29
11.150	0.31	0.33	0.34	0.36	0.38
11.400	0.40	0.42	0.43	0.51	0.60
11.650	0.75	0.92	1.09	1.26	1.43
11.900	1.61	2.25	3.03	3.23	3.27
12.150	2.68	1.92	1.60	1.39	1.21
12.400	1.04	0.87	0.69	0.58	0.48
12.650	0.44	0.42	0.40	0.38	0.36
12.900	0.35	0.33	0.31	0.30	0.29
13.150	0.28	0.27	0.27	0.26	0.26
13.400	0.26	0.25	0.25	0.24	0.24
13.650	0.23	0.23	0.22	0.22	0.21
13.900	0.21	0.20	0.20	0.19	0.19
14.150	0.19	0.19	0.18	0.18	0.18
14.400	0.18	0.18	0.17	0.17	0.17
14.650	0.17	0.16	0.16	0.16	0.16
14.900	0.15	0.15	0.15	0.15	0.15
15.150	0.14	0.14	0.14	0.14	0.13
15.400	0.13	0.13	0.13	0.13	0.12
15.650	0.12	0.12	0.12	0.11	0.11
15.900	0.11	0.11	0.11	0.10	0.10
16.150	0.10	0.10	0.10	0.10	0.10
16.400	0.10	0.09	0.09	0.09	0.09
16.650	0.09	0.09	0.09	0.09	0.09
16.900	0.09	0.08	0.08	0.08	0.08
17.150	0.08	0.08	0.08	0.08	0.08
17.400	0.08	0.07	0.07	0.07	0.07
17.650	0.07	0.07	0.07	0.07	0.07
17.900	0.07	0.07	0.06	0.06	0.06
18.150	0.06	0.06	0.06	0.06	0.06
18.400	0.06	0.06	0.06	0.06	0.06
18.650	0.06	0.06	0.06	0.06	0.06
18.900	0.06	0.06	0.06	0.06	0.06
19.150	0.06	0.06	0.06	0.06	0.06
19.400	0.06	0.05	0.05	0.05	0.05
19.650	0.05	0.05	0.05	0.05	0.05
19.900	0.05	0.05	0.05	0.05	0.05
20.150	0.05	0.05	0.05	0.05	0.05

Subsection: Unit Hydrograph (Hydrograph Table)
Label: EX-IMP
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
20.400	0.05	0.05	0.05	0.05	0.05
20.650	0.05	0.05	0.05	0.05	0.05
20.900	0.05	0.05	0.05	0.05	0.05
21.150	0.05	0.05	0.05	0.05	0.05
21.400	0.05	0.04	0.04	0.04	0.04
21.650	0.04	0.04	0.04	0.04	0.04
21.900	0.04	0.04	0.04	0.04	0.04
22.150	0.04	0.04	0.04	0.04	0.04
22.400	0.04	0.04	0.04	0.04	0.04
22.650	0.04	0.04	0.04	0.04	0.04
22.900	0.04	0.04	0.04	0.04	0.04
23.150	0.04	0.04	0.04	0.04	0.04
23.400	0.04	0.04	0.04	0.04	0.04
23.650	0.04	0.04	0.03	0.03	0.03
23.900	0.03	0.03	0.03	(N/A)	(N/A)

Storm Event	TypeIII 24hr
Return Event	10 years
Duration	24.000 hours
Depth	6.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.980 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.700	0.00	0.00	0.00	0.00	0.01
0.950	0.01	0.01	0.01	0.01	0.01
1.200	0.01	0.02	0.02	0.02	0.02
1.450	0.02	0.02	0.02	0.02	0.02
1.700	0.02	0.03	0.03	0.03	0.03
1.950	0.03	0.03	0.03	0.03	0.03
2.200	0.03	0.03	0.03	0.04	0.04
2.450	0.04	0.04	0.04	0.04	0.04
2.700	0.04	0.04	0.04	0.04	0.04
2.950	0.05	0.05	0.05	0.05	0.05
3.200	0.05	0.05	0.05	0.05	0.05
3.450	0.05	0.05	0.05	0.05	0.06
3.700	0.06	0.06	0.06	0.06	0.06
3.950	0.06	0.06	0.06	0.06	0.06
4.200	0.06	0.06	0.06	0.07	0.07
4.450	0.07	0.07	0.07	0.07	0.07
4.700	0.07	0.07	0.07	0.07	0.07
4.950	0.07	0.07	0.07	0.08	0.08
5.200	0.08	0.08	0.08	0.08	0.08
5.450	0.08	0.08	0.08	0.08	0.08
5.700	0.08	0.08	0.08	0.08	0.09
5.950	0.09	0.09	0.09	0.09	0.09
6.200	0.09	0.09	0.09	0.10	0.10
6.450	0.10	0.10	0.10	0.10	0.11
6.700	0.11	0.11	0.11	0.11	0.11
6.950	0.11	0.12	0.12	0.12	0.12
7.200	0.12	0.12	0.13	0.13	0.13
7.450	0.13	0.13	0.13	0.14	0.14
7.700	0.14	0.14	0.14	0.14	0.15
7.950	0.15	0.15	0.15	0.15	0.16
8.200	0.16	0.16	0.17	0.17	0.17
8.450	0.18	0.18	0.18	0.19	0.19
8.700	0.20	0.20	0.20	0.21	0.21
8.950	0.21	0.22	0.22	0.22	0.23

Subsection: Unit Hydrograph (Hydrograph Table)
Label: EX-IMP
Scenario: Middlesex 10-yr

Return Event: 10 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.200	0.23	0.23	0.24	0.24	0.25
9.450	0.25	0.25	0.26	0.26	0.26
9.700	0.27	0.27	0.27	0.28	0.28
9.950	0.28	0.29	0.29	0.30	0.31
10.200	0.31	0.32	0.33	0.33	0.34
10.450	0.35	0.36	0.36	0.37	0.38
10.700	0.39	0.39	0.40	0.41	0.42
10.950	0.42	0.43	0.45	0.46	0.49
11.200	0.52	0.54	0.57	0.60	0.63
11.450	0.66	0.68	0.80	0.94	1.18
11.700	1.44	1.71	1.98	2.24	2.51
11.950	3.53	4.74	5.04	5.11	4.18
12.200	2.99	2.49	2.17	1.89	1.62
12.450	1.35	1.08	0.90	0.75	0.69
12.700	0.65	0.62	0.60	0.57	0.54
12.950	0.51	0.48	0.46	0.44	0.43
13.200	0.43	0.42	0.41	0.40	0.40
13.450	0.39	0.38	0.38	0.37	0.36
13.700	0.35	0.35	0.34	0.33	0.32
13.950	0.32	0.31	0.30	0.30	0.29
14.200	0.29	0.29	0.28	0.28	0.28
14.450	0.27	0.27	0.27	0.26	0.26
14.700	0.26	0.25	0.25	0.24	0.24
14.950	0.24	0.23	0.23	0.23	0.22
15.200	0.22	0.22	0.21	0.21	0.21
15.450	0.20	0.20	0.20	0.19	0.19
15.700	0.18	0.18	0.18	0.17	0.17
15.950	0.17	0.16	0.16	0.16	0.16
16.200	0.15	0.15	0.15	0.15	0.15
16.450	0.15	0.15	0.14	0.14	0.14
16.700	0.14	0.14	0.14	0.14	0.13
16.950	0.13	0.13	0.13	0.13	0.13
17.200	0.12	0.12	0.12	0.12	0.12
17.450	0.12	0.12	0.11	0.11	0.11
17.700	0.11	0.11	0.11	0.10	0.10
17.950	0.10	0.10	0.10	0.10	0.10
18.200	0.10	0.10	0.10	0.10	0.09
18.450	0.09	0.09	0.09	0.09	0.09
18.700	0.09	0.09	0.09	0.09	0.09
18.950	0.09	0.09	0.09	0.09	0.09
19.200	0.09	0.09	0.09	0.09	0.09
19.450	0.09	0.08	0.08	0.08	0.08
19.700	0.08	0.08	0.08	0.08	0.08

Subsection: Unit Hydrograph (Hydrograph Table)
Label: EX-IMP
Scenario: Middlesex 10-yr

Return Event: 10 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
19.950	0.08	0.08	0.08	0.08	0.08
20.200	0.08	0.08	0.08	0.08	0.08
20.450	0.08	0.08	0.08	0.08	0.08
20.700	0.07	0.07	0.07	0.07	0.07
20.950	0.07	0.07	0.07	0.07	0.07
21.200	0.07	0.07	0.07	0.07	0.07
21.450	0.07	0.07	0.07	0.07	0.07
21.700	0.07	0.07	0.07	0.07	0.07
21.950	0.07	0.07	0.07	0.07	0.07
22.200	0.06	0.06	0.06	0.06	0.06
22.450	0.06	0.06	0.06	0.06	0.06
22.700	0.06	0.06	0.06	0.06	0.06
22.950	0.06	0.06	0.06	0.06	0.06
23.200	0.06	0.06	0.06	0.06	0.06
23.450	0.06	0.06	0.06	0.06	0.05
23.700	0.05	0.05	0.05	0.05	0.05
23.950	0.05	0.05	(N/A)	(N/A)	(N/A)

Storm Event	TypeIII 24hr
Return Event	100 years
Duration	24.000 hours
Depth	11.5 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.980 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.400	0.00	0.00	0.01	0.01	0.02
0.650	0.02	0.03	0.03	0.04	0.04
0.900	0.04	0.05	0.05	0.05	0.05
1.150	0.06	0.06	0.06	0.06	0.06
1.400	0.07	0.07	0.07	0.07	0.07
1.650	0.07	0.08	0.08	0.08	0.08
1.900	0.08	0.08	0.08	0.08	0.08
2.150	0.09	0.09	0.09	0.09	0.09
2.400	0.09	0.09	0.10	0.10	0.10
2.650	0.10	0.10	0.10	0.10	0.10
2.900	0.11	0.11	0.11	0.11	0.11
3.150	0.11	0.11	0.11	0.12	0.12
3.400	0.12	0.12	0.12	0.12	0.12
3.650	0.12	0.13	0.13	0.13	0.13
3.900	0.13	0.13	0.13	0.13	0.13
4.150	0.14	0.14	0.14	0.14	0.14
4.400	0.14	0.14	0.14	0.14	0.14
4.650	0.15	0.15	0.15	0.15	0.15
4.900	0.15	0.15	0.15	0.15	0.16
5.150	0.16	0.16	0.16	0.16	0.16
5.400	0.16	0.16	0.16	0.16	0.16
5.650	0.17	0.17	0.17	0.17	0.17
5.900	0.17	0.17	0.17	0.17	0.18
6.150	0.18	0.18	0.18	0.19	0.19
6.400	0.19	0.20	0.20	0.20	0.20
6.650	0.21	0.21	0.21	0.22	0.22
6.900	0.22	0.22	0.23	0.23	0.23
7.150	0.24	0.24	0.24	0.25	0.25
7.400	0.25	0.25	0.26	0.26	0.26
7.650	0.27	0.27	0.27	0.27	0.28
7.900	0.28	0.28	0.29	0.29	0.29
8.150	0.30	0.31	0.31	0.32	0.33
8.400	0.33	0.34	0.35	0.35	0.36
8.650	0.37	0.37	0.38	0.39	0.39

Subsection: Unit Hydrograph (Hydrograph Table)
Label: EX-IMP
Scenario: Middlesex 100-yr

Return Event: 100 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
8.900	0.40	0.40	0.41	0.42	0.42
9.150	0.43	0.44	0.44	0.45	0.46
9.400	0.46	0.47	0.48	0.48	0.49
9.650	0.50	0.50	0.51	0.52	0.52
9.900	0.53	0.54	0.54	0.55	0.56
10.150	0.57	0.59	0.60	0.62	0.63
10.400	0.64	0.66	0.67	0.68	0.70
10.650	0.71	0.72	0.74	0.75	0.77
10.900	0.78	0.79	0.81	0.83	0.87
11.150	0.91	0.96	1.02	1.07	1.12
11.400	1.17	1.22	1.28	1.50	1.76
11.650	2.20	2.69	3.18	3.68	4.18
11.900	4.68	6.55	8.80	9.36	9.49
12.150	7.76	5.55	4.63	4.03	3.51
12.400	3.00	2.51	2.01	1.68	1.39
12.650	1.28	1.21	1.16	1.10	1.05
12.900	1.00	0.95	0.90	0.86	0.82
13.150	0.81	0.79	0.78	0.76	0.75
13.400	0.74	0.72	0.71	0.70	0.68
13.650	0.67	0.66	0.64	0.63	0.61
13.900	0.60	0.59	0.57	0.56	0.55
14.150	0.54	0.54	0.53	0.52	0.52
14.400	0.51	0.51	0.50	0.49	0.49
14.650	0.48	0.47	0.47	0.46	0.45
14.900	0.45	0.44	0.43	0.43	0.42
15.150	0.41	0.41	0.40	0.39	0.39
15.400	0.38	0.38	0.37	0.36	0.36
15.650	0.35	0.34	0.34	0.33	0.32
15.900	0.32	0.31	0.30	0.30	0.29
16.150	0.29	0.29	0.28	0.28	0.28
16.400	0.28	0.27	0.27	0.27	0.26
16.650	0.26	0.26	0.26	0.25	0.25
16.900	0.25	0.24	0.24	0.24	0.24
17.150	0.23	0.23	0.23	0.23	0.22
17.400	0.22	0.22	0.21	0.21	0.21
17.650	0.20	0.20	0.20	0.20	0.19
17.900	0.19	0.19	0.18	0.18	0.18
18.150	0.18	0.18	0.18	0.18	0.18
18.400	0.18	0.17	0.17	0.17	0.17
18.650	0.17	0.17	0.17	0.17	0.17
18.900	0.17	0.17	0.17	0.16	0.16
19.150	0.16	0.16	0.16	0.16	0.16
19.400	0.16	0.16	0.16	0.16	0.16

Subsection: Unit Hydrograph (Hydrograph Table)
Label: EX-IMP
Scenario: Middlesex 100-yr

Return Event: 100 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
19.650	0.15	0.15	0.15	0.15	0.15
19.900	0.15	0.15	0.15	0.15	0.15
20.150	0.15	0.15	0.15	0.14	0.14
20.400	0.14	0.14	0.14	0.14	0.14
20.650	0.14	0.14	0.14	0.14	0.14
20.900	0.14	0.14	0.14	0.14	0.13
21.150	0.13	0.13	0.13	0.13	0.13
21.400	0.13	0.13	0.13	0.13	0.13
21.650	0.13	0.13	0.13	0.13	0.13
21.900	0.12	0.12	0.12	0.12	0.12
22.150	0.12	0.12	0.12	0.12	0.12
22.400	0.12	0.12	0.12	0.12	0.12
22.650	0.11	0.11	0.11	0.11	0.11
22.900	0.11	0.11	0.11	0.11	0.11
23.150	0.11	0.11	0.11	0.11	0.11
23.400	0.11	0.10	0.10	0.10	0.10
23.650	0.10	0.10	0.10	0.10	0.10
23.900	0.10	0.10	0.10	(N/A)	(N/A)

Storm Event	TypeIII 24hr
Return Event	2 years
Duration	24.000 hours
Depth	4.0 in
Time of Concentration (Composite)	0.157 hours
Area (User Defined)	0.170 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.300	0.00	0.00	0.00	0.00	0.00
11.550	0.00	0.01	0.01	0.01	0.02
11.800	0.02	0.03	0.04	0.05	0.08
12.050	0.12	0.15	0.16	0.15	0.13
12.300	0.11	0.10	0.09	0.08	0.07
12.550	0.06	0.05	0.04	0.04	0.03
12.800	0.03	0.03	0.03	0.03	0.03
13.050	0.03	0.02	0.02	0.02	0.02
13.300	0.02	0.02	0.02	0.02	0.02
13.550	0.02	0.02	0.02	0.02	0.02
13.800	0.02	0.02	0.02	0.02	0.02
14.050	0.02	0.02	0.02	0.02	0.02
14.300	0.02	0.02	0.02	0.02	0.02
14.550	0.02	0.02	0.02	0.02	0.01
14.800	0.01	0.01	0.01	0.01	0.01
15.050	0.01	0.01	0.01	0.01	0.01
15.300	0.01	0.01	0.01	0.01	0.01
15.550	0.01	0.01	0.01	0.01	0.01
15.800	0.01	0.01	0.01	0.01	0.01
16.050	0.01	0.01	0.01	0.01	0.01
16.300	0.01	0.01	0.01	0.01	0.01
16.550	0.01	0.01	0.01	0.01	0.01
16.800	0.01	0.01	0.01	0.01	0.01
17.050	0.01	0.01	0.01	0.01	0.01
17.300	0.01	0.01	0.01	0.01	0.01
17.550	0.01	0.01	0.01	0.01	0.01
17.800	0.01	0.01	0.01	0.01	0.01
18.050	0.01	0.01	0.01	0.01	0.01
18.300	0.01	0.01	0.01	0.01	0.01
18.550	0.01	0.01	0.01	0.01	0.01
18.800	0.01	0.01	0.01	0.01	0.01
19.050	0.01	0.01	0.01	0.01	0.01
19.300	0.01	0.01	0.01	0.01	0.01
19.550	0.01	0.01	0.01	0.01	0.01

Subsection: Unit Hydrograph (Hydrograph Table)
Label: EX-PERV
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
19.800	0.01	0.01	0.01	0.01	0.01
20.050	0.01	0.01	0.01	0.01	0.01
20.300	0.01	0.01	0.01	0.01	0.00
20.550	0.00	0.00	0.00	0.00	0.00
20.800	0.00	0.00	0.00	0.00	0.00
21.050	0.00	0.00	0.00	0.00	0.00
21.300	0.00	0.00	0.00	0.00	0.00
21.550	0.00	0.00	0.00	0.00	0.00
21.800	0.00	0.00	0.00	0.00	0.00
22.050	0.00	0.00	0.00	0.00	0.00
22.300	0.00	0.00	0.00	0.00	0.00
22.550	0.00	0.00	0.00	0.00	0.00
22.800	0.00	0.00	0.00	0.00	0.00
23.050	0.00	0.00	0.00	0.00	0.00
23.300	0.00	0.00	0.00	0.00	0.00
23.550	0.00	0.00	0.00	0.00	0.00
23.800	0.00	0.00	0.00	0.00	0.00

Subsection: Unit Hydrograph (Hydrograph Table)
Label: EX-PERV
Scenario: Middlesex 10-yr

Return Event: 10 years
Storm Event: TypeIII 24hr

Storm Event	TypeIII 24hr
Return Event	10 years
Duration	24.000 hours
Depth	6.2 in
Time of Concentration (Composite)	0.157 hours
Area (User Defined)	0.170 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.800	0.00	0.00	0.00	0.00	0.00
10.050	0.00	0.00	0.00	0.00	0.00
10.300	0.00	0.00	0.00	0.01	0.01
10.550	0.01	0.01	0.01	0.01	0.01
10.800	0.01	0.01	0.01	0.01	0.01
11.050	0.01	0.01	0.01	0.02	0.02
11.300	0.02	0.02	0.02	0.02	0.03
11.550	0.03	0.04	0.04	0.06	0.07
11.800	0.09	0.11	0.14	0.18	0.26
12.050	0.34	0.40	0.42	0.37	0.31
12.300	0.27	0.23	0.20	0.18	0.15
12.550	0.13	0.10	0.09	0.08	0.08
12.800	0.07	0.07	0.06	0.06	0.06
13.050	0.06	0.05	0.05	0.05	0.05
13.300	0.05	0.05	0.05	0.05	0.05
13.550	0.04	0.04	0.04	0.04	0.04
13.800	0.04	0.04	0.04	0.04	0.04
14.050	0.04	0.04	0.04	0.04	0.03
14.300	0.03	0.03	0.03	0.03	0.03
14.550	0.03	0.03	0.03	0.03	0.03
14.800	0.03	0.03	0.03	0.03	0.03
15.050	0.03	0.03	0.03	0.03	0.03
15.300	0.03	0.03	0.03	0.03	0.02
15.550	0.02	0.02	0.02	0.02	0.02
15.800	0.02	0.02	0.02	0.02	0.02
16.050	0.02	0.02	0.02	0.02	0.02
16.300	0.02	0.02	0.02	0.02	0.02
16.550	0.02	0.02	0.02	0.02	0.02
16.800	0.02	0.02	0.02	0.02	0.02
17.050	0.02	0.02	0.02	0.02	0.02
17.300	0.02	0.02	0.02	0.01	0.01
17.550	0.01	0.01	0.01	0.01	0.01
17.800	0.01	0.01	0.01	0.01	0.01
18.050	0.01	0.01	0.01	0.01	0.01

Subsection: Unit Hydrograph (Hydrograph Table)
Label: EX-PERV
Scenario: Middlesex 10-yr

Return Event: 10 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
18.300	0.01	0.01	0.01	0.01	0.01
18.550	0.01	0.01	0.01	0.01	0.01
18.800	0.01	0.01	0.01	0.01	0.01
19.050	0.01	0.01	0.01	0.01	0.01
19.300	0.01	0.01	0.01	0.01	0.01
19.550	0.01	0.01	0.01	0.01	0.01
19.800	0.01	0.01	0.01	0.01	0.01
20.050	0.01	0.01	0.01	0.01	0.01
20.300	0.01	0.01	0.01	0.01	0.01
20.550	0.01	0.01	0.01	0.01	0.01
20.800	0.01	0.01	0.01	0.01	0.01
21.050	0.01	0.01	0.01	0.01	0.01
21.300	0.01	0.01	0.01	0.01	0.01
21.550	0.01	0.01	0.01	0.01	0.01
21.800	0.01	0.01	0.01	0.01	0.01
22.050	0.01	0.01	0.01	0.01	0.01
22.300	0.01	0.01	0.01	0.01	0.01
22.550	0.01	0.01	0.01	0.01	0.01
22.800	0.01	0.01	0.01	0.01	0.01
23.050	0.01	0.01	0.01	0.01	0.01
23.300	0.01	0.01	0.01	0.01	0.01
23.550	0.01	0.01	0.01	0.01	0.01
23.800	0.01	0.01	0.01	0.01	0.01

Storm Event	TypeIII 24hr
Return Event	100 years
Duration	24.000 hours
Depth	11.5 in
Time of Concentration (Composite)	0.157 hours
Area (User Defined)	0.170 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
7.300	0.00	0.00	0.00	0.00	0.00
7.550	0.00	0.00	0.00	0.00	0.00
7.800	0.00	0.00	0.00	0.00	0.00
8.050	0.00	0.00	0.01	0.01	0.01
8.300	0.01	0.01	0.01	0.01	0.01
8.550	0.01	0.01	0.01	0.01	0.01
8.800	0.01	0.01	0.01	0.01	0.01
9.050	0.01	0.02	0.02	0.02	0.02
9.300	0.02	0.02	0.02	0.02	0.02
9.550	0.02	0.02	0.02	0.02	0.03
9.800	0.03	0.03	0.03	0.03	0.03
10.050	0.03	0.03	0.03	0.03	0.04
10.300	0.04	0.04	0.04	0.04	0.04
10.550	0.04	0.05	0.05	0.05	0.05
10.800	0.05	0.06	0.06	0.06	0.06
11.050	0.06	0.07	0.07	0.07	0.08
11.300	0.08	0.09	0.10	0.10	0.11
11.550	0.12	0.14	0.17	0.21	0.26
11.800	0.32	0.38	0.44	0.55	0.77
12.050	0.98	1.11	1.12	0.98	0.80
12.300	0.68	0.59	0.51	0.44	0.37
12.550	0.30	0.25	0.22	0.19	0.18
12.800	0.17	0.16	0.15	0.15	0.14
13.050	0.13	0.13	0.12	0.12	0.12
13.300	0.11	0.11	0.11	0.11	0.11
13.550	0.10	0.10	0.10	0.10	0.10
13.800	0.09	0.09	0.09	0.09	0.09
14.050	0.09	0.08	0.08	0.08	0.08
14.300	0.08	0.08	0.08	0.08	0.08
14.550	0.07	0.07	0.07	0.07	0.07
14.800	0.07	0.07	0.07	0.07	0.07
15.050	0.07	0.06	0.06	0.06	0.06
15.300	0.06	0.06	0.06	0.06	0.06
15.550	0.06	0.05	0.05	0.05	0.05

Subsection: Unit Hydrograph (Hydrograph Table)
Label: EX-PERV
Scenario: Middlesex 100-yr

Return Event: 100 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
15.800	0.05	0.05	0.05	0.05	0.05
16.050	0.05	0.05	0.04	0.04	0.04
16.300	0.04	0.04	0.04	0.04	0.04
16.550	0.04	0.04	0.04	0.04	0.04
16.800	0.04	0.04	0.04	0.04	0.04
17.050	0.04	0.04	0.04	0.04	0.04
17.300	0.03	0.03	0.03	0.03	0.03
17.550	0.03	0.03	0.03	0.03	0.03
17.800	0.03	0.03	0.03	0.03	0.03
18.050	0.03	0.03	0.03	0.03	0.03
18.300	0.03	0.03	0.03	0.03	0.03
18.550	0.03	0.03	0.03	0.03	0.03
18.800	0.03	0.03	0.03	0.03	0.03
19.050	0.03	0.03	0.03	0.02	0.02
19.300	0.02	0.02	0.02	0.02	0.02
19.550	0.02	0.02	0.02	0.02	0.02
19.800	0.02	0.02	0.02	0.02	0.02
20.050	0.02	0.02	0.02	0.02	0.02
20.300	0.02	0.02	0.02	0.02	0.02
20.550	0.02	0.02	0.02	0.02	0.02
20.800	0.02	0.02	0.02	0.02	0.02
21.050	0.02	0.02	0.02	0.02	0.02
21.300	0.02	0.02	0.02	0.02	0.02
21.550	0.02	0.02	0.02	0.02	0.02
21.800	0.02	0.02	0.02	0.02	0.02
22.050	0.02	0.02	0.02	0.02	0.02
22.300	0.02	0.02	0.02	0.02	0.02
22.550	0.02	0.02	0.02	0.02	0.02
22.800	0.02	0.02	0.02	0.02	0.02
23.050	0.02	0.02	0.02	0.02	0.02
23.300	0.02	0.02	0.02	0.02	0.02
23.550	0.02	0.02	0.02	0.02	0.02
23.800	0.02	0.02	0.02	0.02	0.02

Storm Event	TypeIII 24hr
Return Event	2 years
Duration	24.000 hours
Depth	4.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.910 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1.150	0.00	0.00	0.00	0.00	0.00
1.400	0.00	0.00	0.01	0.01	0.01
1.650	0.01	0.01	0.01	0.01	0.01
1.900	0.01	0.01	0.01	0.01	0.01
2.150	0.01	0.01	0.01	0.01	0.01
2.400	0.01	0.01	0.02	0.02	0.02
2.650	0.02	0.02	0.02	0.02	0.02
2.900	0.02	0.02	0.02	0.02	0.02
3.150	0.02	0.02	0.02	0.02	0.02
3.400	0.02	0.02	0.02	0.03	0.03
3.650	0.03	0.03	0.03	0.03	0.03
3.900	0.03	0.03	0.03	0.03	0.03
4.150	0.03	0.03	0.03	0.03	0.03
4.400	0.03	0.03	0.03	0.03	0.03
4.650	0.04	0.04	0.04	0.04	0.04
4.900	0.04	0.04	0.04	0.04	0.04
5.150	0.04	0.04	0.04	0.04	0.04
5.400	0.04	0.04	0.04	0.04	0.04
5.650	0.04	0.04	0.04	0.04	0.04
5.900	0.05	0.05	0.05	0.05	0.05
6.150	0.05	0.05	0.05	0.05	0.05
6.400	0.05	0.05	0.05	0.06	0.06
6.650	0.06	0.06	0.06	0.06	0.06
6.900	0.06	0.06	0.06	0.06	0.07
7.150	0.07	0.07	0.07	0.07	0.07
7.400	0.07	0.07	0.07	0.07	0.08
7.650	0.08	0.08	0.08	0.08	0.08
7.900	0.08	0.08	0.08	0.08	0.09
8.150	0.09	0.09	0.09	0.09	0.10
8.400	0.10	0.10	0.10	0.10	0.11
8.650	0.11	0.11	0.11	0.12	0.12
8.900	0.12	0.12	0.12	0.13	0.13
9.150	0.13	0.13	0.13	0.14	0.14
9.400	0.14	0.14	0.15	0.15	0.15

Subsection: Unit Hydrograph (Hydrograph Table)
Label: PROP-IMP
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.650	0.15	0.15	0.16	0.16	0.16
9.900	0.16	0.17	0.17	0.17	0.17
10.150	0.18	0.18	0.19	0.19	0.20
10.400	0.20	0.20	0.21	0.21	0.22
10.650	0.22	0.23	0.23	0.24	0.24
10.900	0.24	0.25	0.25	0.26	0.27
11.150	0.29	0.30	0.32	0.34	0.35
11.400	0.37	0.39	0.40	0.47	0.56
11.650	0.70	0.85	1.01	1.17	1.33
11.900	1.49	2.09	2.81	2.99	3.04
12.150	2.49	1.78	1.49	1.29	1.13
12.400	0.96	0.81	0.64	0.54	0.45
12.650	0.41	0.39	0.37	0.36	0.34
12.900	0.32	0.31	0.29	0.28	0.27
13.150	0.26	0.25	0.25	0.25	0.24
13.400	0.24	0.23	0.23	0.22	0.22
13.650	0.22	0.21	0.21	0.20	0.20
13.900	0.19	0.19	0.18	0.18	0.18
14.150	0.18	0.17	0.17	0.17	0.17
14.400	0.16	0.16	0.16	0.16	0.16
14.650	0.15	0.15	0.15	0.15	0.15
14.900	0.14	0.14	0.14	0.14	0.14
15.150	0.13	0.13	0.13	0.13	0.12
15.400	0.12	0.12	0.12	0.12	0.11
15.650	0.11	0.11	0.11	0.11	0.10
15.900	0.10	0.10	0.10	0.10	0.09
16.150	0.09	0.09	0.09	0.09	0.09
16.400	0.09	0.09	0.09	0.09	0.09
16.650	0.08	0.08	0.08	0.08	0.08
16.900	0.08	0.08	0.08	0.08	0.08
17.150	0.08	0.07	0.07	0.07	0.07
17.400	0.07	0.07	0.07	0.07	0.07
17.650	0.07	0.07	0.06	0.06	0.06
17.900	0.06	0.06	0.06	0.06	0.06
18.150	0.06	0.06	0.06	0.06	0.06
18.400	0.06	0.06	0.06	0.06	0.06
18.650	0.06	0.05	0.05	0.05	0.05
18.900	0.05	0.05	0.05	0.05	0.05
19.150	0.05	0.05	0.05	0.05	0.05
19.400	0.05	0.05	0.05	0.05	0.05
19.650	0.05	0.05	0.05	0.05	0.05
19.900	0.05	0.05	0.05	0.05	0.05
20.150	0.05	0.05	0.05	0.05	0.05

Subsection: Unit Hydrograph (Hydrograph Table)
Label: PROP-IMP
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
20.400	0.05	0.05	0.05	0.05	0.05
20.650	0.05	0.04	0.04	0.04	0.04
20.900	0.04	0.04	0.04	0.04	0.04
21.150	0.04	0.04	0.04	0.04	0.04
21.400	0.04	0.04	0.04	0.04	0.04
21.650	0.04	0.04	0.04	0.04	0.04
21.900	0.04	0.04	0.04	0.04	0.04
22.150	0.04	0.04	0.04	0.04	0.04
22.400	0.04	0.04	0.04	0.04	0.04
22.650	0.04	0.04	0.04	0.04	0.04
22.900	0.04	0.04	0.04	0.04	0.03
23.150	0.03	0.03	0.03	0.03	0.03
23.400	0.03	0.03	0.03	0.03	0.03
23.650	0.03	0.03	0.03	0.03	0.03
23.900	0.03	0.03	0.03	(N/A)	(N/A)

Storm Event	TypeIII 24hr
Return Event	10 years
Duration	24.000 hours
Depth	6.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.910 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.700	0.00	0.00	0.00	0.00	0.01
0.950	0.01	0.01	0.01	0.01	0.01
1.200	0.01	0.01	0.02	0.02	0.02
1.450	0.02	0.02	0.02	0.02	0.02
1.700	0.02	0.02	0.02	0.03	0.03
1.950	0.03	0.03	0.03	0.03	0.03
2.200	0.03	0.03	0.03	0.03	0.03
2.450	0.03	0.04	0.04	0.04	0.04
2.700	0.04	0.04	0.04	0.04	0.04
2.950	0.04	0.04	0.04	0.04	0.04
3.200	0.05	0.05	0.05	0.05	0.05
3.450	0.05	0.05	0.05	0.05	0.05
3.700	0.05	0.05	0.05	0.05	0.06
3.950	0.06	0.06	0.06	0.06	0.06
4.200	0.06	0.06	0.06	0.06	0.06
4.450	0.06	0.06	0.06	0.06	0.06
4.700	0.07	0.07	0.07	0.07	0.07
4.950	0.07	0.07	0.07	0.07	0.07
5.200	0.07	0.07	0.07	0.07	0.07
5.450	0.07	0.07	0.08	0.08	0.08
5.700	0.08	0.08	0.08	0.08	0.08
5.950	0.08	0.08	0.08	0.08	0.08
6.200	0.08	0.09	0.09	0.09	0.09
6.450	0.09	0.09	0.09	0.10	0.10
6.700	0.10	0.10	0.10	0.10	0.11
6.950	0.11	0.11	0.11	0.11	0.11
7.200	0.11	0.12	0.12	0.12	0.12
7.450	0.12	0.12	0.12	0.13	0.13
7.700	0.13	0.13	0.13	0.13	0.14
7.950	0.14	0.14	0.14	0.14	0.15
8.200	0.15	0.15	0.16	0.16	0.16
8.450	0.16	0.17	0.17	0.17	0.18
8.700	0.18	0.18	0.19	0.19	0.19
8.950	0.20	0.20	0.20	0.21	0.21

Subsection: Unit Hydrograph (Hydrograph Table)
Label: PROP-IMP
Scenario: Middlesex 10-yr

Return Event: 10 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.200	0.21	0.22	0.22	0.22	0.23
9.450	0.23	0.23	0.24	0.24	0.24
9.700	0.25	0.25	0.25	0.26	0.26
9.950	0.26	0.27	0.27	0.28	0.28
10.200	0.29	0.30	0.30	0.31	0.32
10.450	0.32	0.33	0.34	0.35	0.35
10.700	0.36	0.37	0.37	0.38	0.39
10.950	0.39	0.40	0.41	0.43	0.45
11.200	0.48	0.51	0.53	0.56	0.58
11.450	0.61	0.64	0.74	0.88	1.10
11.700	1.34	1.59	1.84	2.08	2.34
11.950	3.27	4.40	4.68	4.75	3.88
12.200	2.78	2.32	2.02	1.76	1.50
12.450	1.26	1.00	0.84	0.69	0.64
12.700	0.61	0.58	0.55	0.53	0.50
12.950	0.48	0.45	0.43	0.41	0.40
13.200	0.40	0.39	0.38	0.38	0.37
13.450	0.36	0.36	0.35	0.34	0.34
13.700	0.33	0.32	0.31	0.31	0.30
13.950	0.29	0.29	0.28	0.28	0.27
14.200	0.27	0.27	0.26	0.26	0.26
14.450	0.25	0.25	0.25	0.24	0.24
14.700	0.24	0.23	0.23	0.23	0.22
14.950	0.22	0.22	0.21	0.21	0.21
15.200	0.20	0.20	0.20	0.19	0.19
15.450	0.19	0.18	0.18	0.18	0.17
15.700	0.17	0.17	0.17	0.16	0.16
15.950	0.16	0.15	0.15	0.15	0.15
16.200	0.14	0.14	0.14	0.14	0.14
16.450	0.14	0.14	0.13	0.13	0.13
16.700	0.13	0.13	0.13	0.13	0.12
16.950	0.12	0.12	0.12	0.12	0.12
17.200	0.12	0.11	0.11	0.11	0.11
17.450	0.11	0.11	0.11	0.10	0.10
17.700	0.10	0.10	0.10	0.10	0.10
17.950	0.09	0.09	0.09	0.09	0.09
18.200	0.09	0.09	0.09	0.09	0.09
18.450	0.09	0.09	0.09	0.09	0.09
18.700	0.09	0.09	0.08	0.08	0.08
18.950	0.08	0.08	0.08	0.08	0.08
19.200	0.08	0.08	0.08	0.08	0.08
19.450	0.08	0.08	0.08	0.08	0.08
19.700	0.08	0.08	0.08	0.08	0.08

Subsection: Unit Hydrograph (Hydrograph Table)
Label: PROP-IMP
Scenario: Middlesex 10-yr

Return Event: 10 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
19.950	0.07	0.07	0.07	0.07	0.07
20.200	0.07	0.07	0.07	0.07	0.07
20.450	0.07	0.07	0.07	0.07	0.07
20.700	0.07	0.07	0.07	0.07	0.07
20.950	0.07	0.07	0.07	0.07	0.07
21.200	0.07	0.07	0.07	0.07	0.07
21.450	0.06	0.06	0.06	0.06	0.06
21.700	0.06	0.06	0.06	0.06	0.06
21.950	0.06	0.06	0.06	0.06	0.06
22.200	0.06	0.06	0.06	0.06	0.06
22.450	0.06	0.06	0.06	0.06	0.06
22.700	0.06	0.06	0.06	0.06	0.06
22.950	0.06	0.06	0.05	0.05	0.05
23.200	0.05	0.05	0.05	0.05	0.05
23.450	0.05	0.05	0.05	0.05	0.05
23.700	0.05	0.05	0.05	0.05	0.05
23.950	0.05	0.05	(N/A)	(N/A)	(N/A)

Storm Event	TypeIII 24hr
Return Event	100 years
Duration	24.000 hours
Depth	11.5 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.910 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.400	0.00	0.00	0.01	0.01	0.02
0.650	0.02	0.03	0.03	0.03	0.04
0.900	0.04	0.04	0.05	0.05	0.05
1.150	0.05	0.05	0.06	0.06	0.06
1.400	0.06	0.06	0.06	0.07	0.07
1.650	0.07	0.07	0.07	0.07	0.07
1.900	0.07	0.07	0.08	0.08	0.08
2.150	0.08	0.08	0.08	0.08	0.08
2.400	0.09	0.09	0.09	0.09	0.09
2.650	0.09	0.09	0.09	0.10	0.10
2.900	0.10	0.10	0.10	0.10	0.10
3.150	0.10	0.11	0.11	0.11	0.11
3.400	0.11	0.11	0.11	0.11	0.11
3.650	0.12	0.12	0.12	0.12	0.12
3.900	0.12	0.12	0.12	0.12	0.12
4.150	0.13	0.13	0.13	0.13	0.13
4.400	0.13	0.13	0.13	0.13	0.13
4.650	0.14	0.14	0.14	0.14	0.14
4.900	0.14	0.14	0.14	0.14	0.14
5.150	0.14	0.15	0.15	0.15	0.15
5.400	0.15	0.15	0.15	0.15	0.15
5.650	0.15	0.15	0.16	0.16	0.16
5.900	0.16	0.16	0.16	0.16	0.16
6.150	0.17	0.17	0.17	0.17	0.18
6.400	0.18	0.18	0.18	0.19	0.19
6.650	0.19	0.20	0.20	0.20	0.20
6.900	0.21	0.21	0.21	0.21	0.22
7.150	0.22	0.22	0.22	0.23	0.23
7.400	0.23	0.24	0.24	0.24	0.24
7.650	0.25	0.25	0.25	0.25	0.26
7.900	0.26	0.26	0.26	0.27	0.27
8.150	0.28	0.28	0.29	0.30	0.30
8.400	0.31	0.32	0.32	0.33	0.33
8.650	0.34	0.35	0.35	0.36	0.36

Subsection: Unit Hydrograph (Hydrograph Table)
Label: PROP-IMP
Scenario: Middlesex 100-yr

Return Event: 100 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
8.900	0.37	0.38	0.38	0.39	0.39
9.150	0.40	0.41	0.41	0.42	0.42
9.400	0.43	0.44	0.44	0.45	0.46
9.650	0.46	0.47	0.47	0.48	0.49
9.900	0.49	0.50	0.50	0.51	0.52
10.150	0.53	0.55	0.56	0.57	0.58
10.400	0.60	0.61	0.62	0.63	0.65
10.650	0.66	0.67	0.69	0.70	0.71
10.900	0.72	0.74	0.75	0.77	0.80
11.150	0.85	0.90	0.94	0.99	1.04
11.400	1.09	1.14	1.19	1.39	1.63
11.650	2.04	2.49	2.95	3.42	3.88
11.900	4.34	6.09	8.17	8.69	8.81
12.150	7.21	5.15	4.30	3.74	3.26
12.400	2.79	2.33	1.86	1.56	1.29
12.650	1.19	1.13	1.07	1.03	0.98
12.900	0.93	0.88	0.83	0.80	0.77
13.150	0.75	0.73	0.72	0.71	0.70
13.400	0.68	0.67	0.66	0.65	0.63
13.650	0.62	0.61	0.60	0.58	0.57
13.900	0.56	0.55	0.53	0.52	0.51
14.150	0.51	0.50	0.49	0.49	0.48
14.400	0.48	0.47	0.46	0.46	0.45
14.650	0.45	0.44	0.43	0.43	0.42
14.900	0.41	0.41	0.40	0.40	0.39
15.150	0.38	0.38	0.37	0.37	0.36
15.400	0.35	0.35	0.34	0.34	0.33
15.650	0.32	0.32	0.31	0.31	0.30
15.900	0.29	0.29	0.28	0.28	0.27
16.150	0.27	0.27	0.26	0.26	0.26
16.400	0.26	0.25	0.25	0.25	0.25
16.650	0.24	0.24	0.24	0.23	0.23
16.900	0.23	0.23	0.22	0.22	0.22
17.150	0.22	0.21	0.21	0.21	0.21
17.400	0.20	0.20	0.20	0.20	0.19
17.650	0.19	0.19	0.19	0.18	0.18
17.900	0.18	0.17	0.17	0.17	0.17
18.150	0.17	0.17	0.17	0.16	0.16
18.400	0.16	0.16	0.16	0.16	0.16
18.650	0.16	0.16	0.16	0.16	0.16
18.900	0.16	0.15	0.15	0.15	0.15
19.150	0.15	0.15	0.15	0.15	0.15
19.400	0.15	0.15	0.15	0.14	0.14

Subsection: Unit Hydrograph (Hydrograph Table)
Label: PROP-IMP
Scenario: Middlesex 100-yr

Return Event: 100 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
19.650	0.14	0.14	0.14	0.14	0.14
19.900	0.14	0.14	0.14	0.14	0.14
20.150	0.14	0.14	0.14	0.13	0.13
20.400	0.13	0.13	0.13	0.13	0.13
20.650	0.13	0.13	0.13	0.13	0.13
20.900	0.13	0.13	0.13	0.13	0.12
21.150	0.12	0.12	0.12	0.12	0.12
21.400	0.12	0.12	0.12	0.12	0.12
21.650	0.12	0.12	0.12	0.12	0.12
21.900	0.12	0.11	0.11	0.11	0.11
22.150	0.11	0.11	0.11	0.11	0.11
22.400	0.11	0.11	0.11	0.11	0.11
22.650	0.11	0.11	0.10	0.10	0.10
22.900	0.10	0.10	0.10	0.10	0.10
23.150	0.10	0.10	0.10	0.10	0.10
23.400	0.10	0.10	0.10	0.10	0.09
23.650	0.09	0.09	0.09	0.09	0.09
23.900	0.09	0.09	0.09	(N/A)	(N/A)

Subsection: Unit Hydrograph (Hydrograph Table)
Label: PROP-PERV
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Storm Event	TypeIII 24hr
Return Event	2 years
Duration	24.000 hours
Depth	4.0 in
Time of Concentration (Composite)	0.163 hours
Area (User Defined)	0.240 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.400	0.00	0.00	0.00	0.00	0.00
11.650	0.01	0.01	0.02	0.02	0.03
11.900	0.05	0.07	0.10	0.15	0.19
12.150	0.21	0.20	0.17	0.15	0.14
12.400	0.12	0.11	0.09	0.08	0.06
12.650	0.06	0.05	0.05	0.04	0.04
12.900	0.04	0.04	0.04	0.04	0.03
13.150	0.03	0.03	0.03	0.03	0.03
13.400	0.03	0.03	0.03	0.03	0.03
13.650	0.03	0.03	0.03	0.03	0.03
13.900	0.03	0.02	0.02	0.02	0.02
14.150	0.02	0.02	0.02	0.02	0.02
14.400	0.02	0.02	0.02	0.02	0.02
14.650	0.02	0.02	0.02	0.02	0.02
14.900	0.02	0.02	0.02	0.02	0.02
15.150	0.02	0.02	0.02	0.02	0.02
15.400	0.02	0.02	0.02	0.02	0.02
15.650	0.02	0.02	0.02	0.02	0.01
15.900	0.01	0.01	0.01	0.01	0.01
16.150	0.01	0.01	0.01	0.01	0.01
16.400	0.01	0.01	0.01	0.01	0.01
16.650	0.01	0.01	0.01	0.01	0.01
16.900	0.01	0.01	0.01	0.01	0.01
17.150	0.01	0.01	0.01	0.01	0.01
17.400	0.01	0.01	0.01	0.01	0.01
17.650	0.01	0.01	0.01	0.01	0.01
17.900	0.01	0.01	0.01	0.01	0.01
18.150	0.01	0.01	0.01	0.01	0.01
18.400	0.01	0.01	0.01	0.01	0.01
18.650	0.01	0.01	0.01	0.01	0.01
18.900	0.01	0.01	0.01	0.01	0.01
19.150	0.01	0.01	0.01	0.01	0.01
19.400	0.01	0.01	0.01	0.01	0.01
19.650	0.01	0.01	0.01	0.01	0.01

Subsection: Unit Hydrograph (Hydrograph Table)
Label: PROP-PERV
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
19.900	0.01	0.01	0.01	0.01	0.01
20.150	0.01	0.01	0.01	0.01	0.01
20.400	0.01	0.01	0.01	0.01	0.01
20.650	0.01	0.01	0.01	0.01	0.01
20.900	0.01	0.01	0.01	0.01	0.01
21.150	0.01	0.01	0.01	0.01	0.01
21.400	0.01	0.01	0.01	0.01	0.01
21.650	0.01	0.01	0.01	0.01	0.01
21.900	0.01	0.01	0.01	0.01	0.01
22.150	0.01	0.01	0.01	0.01	0.01
22.400	0.01	0.01	0.01	0.01	0.01
22.650	0.01	0.01	0.01	0.01	0.01
22.900	0.01	0.01	0.01	0.01	0.01
23.150	0.01	0.01	0.01	0.01	0.01
23.400	0.01	0.01	0.01	0.01	0.01
23.650	0.01	0.01	0.00	0.00	0.00
23.900	0.00	0.00	0.00	(N/A)	(N/A)

Storm Event	TypeIII 24hr
Return Event	10 years
Duration	24.000 hours
Depth	6.2 in
Time of Concentration (Composite)	0.163 hours
Area (User Defined)	0.240 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.900	0.00	0.00	0.00	0.00	0.00
10.150	0.00	0.00	0.00	0.00	0.00
10.400	0.01	0.01	0.01	0.01	0.01
10.650	0.01	0.01	0.01	0.01	0.01
10.900	0.01	0.01	0.01	0.02	0.02
11.150	0.02	0.02	0.02	0.02	0.03
11.400	0.03	0.03	0.03	0.04	0.05
11.650	0.06	0.07	0.09	0.12	0.15
11.900	0.18	0.23	0.34	0.45	0.53
12.150	0.56	0.51	0.43	0.37	0.32
12.400	0.28	0.25	0.21	0.17	0.15
12.650	0.13	0.11	0.10	0.10	0.09
12.900	0.09	0.08	0.08	0.08	0.07
13.150	0.07	0.07	0.07	0.07	0.07
13.400	0.06	0.06	0.06	0.06	0.06
13.650	0.06	0.06	0.06	0.06	0.06
13.900	0.05	0.05	0.05	0.05	0.05
14.150	0.05	0.05	0.05	0.05	0.05
14.400	0.05	0.05	0.05	0.04	0.04
14.650	0.04	0.04	0.04	0.04	0.04
14.900	0.04	0.04	0.04	0.04	0.04
15.150	0.04	0.04	0.04	0.04	0.04
15.400	0.04	0.04	0.03	0.03	0.03
15.650	0.03	0.03	0.03	0.03	0.03
15.900	0.03	0.03	0.03	0.03	0.03
16.150	0.03	0.03	0.03	0.03	0.03
16.400	0.03	0.03	0.03	0.03	0.02
16.650	0.02	0.02	0.02	0.02	0.02
16.900	0.02	0.02	0.02	0.02	0.02
17.150	0.02	0.02	0.02	0.02	0.02
17.400	0.02	0.02	0.02	0.02	0.02
17.650	0.02	0.02	0.02	0.02	0.02
17.900	0.02	0.02	0.02	0.02	0.02
18.150	0.02	0.02	0.02	0.02	0.02

Subsection: Unit Hydrograph (Hydrograph Table)
Label: PROP-PERV
Scenario: Middlesex 10-yr

Return Event: 10 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
18.400	0.02	0.02	0.02	0.02	0.02
18.650	0.02	0.02	0.02	0.02	0.02
18.900	0.02	0.02	0.02	0.02	0.02
19.150	0.02	0.02	0.02	0.02	0.02
19.400	0.02	0.02	0.02	0.01	0.01
19.650	0.01	0.01	0.01	0.01	0.01
19.900	0.01	0.01	0.01	0.01	0.01
20.150	0.01	0.01	0.01	0.01	0.01
20.400	0.01	0.01	0.01	0.01	0.01
20.650	0.01	0.01	0.01	0.01	0.01
20.900	0.01	0.01	0.01	0.01	0.01
21.150	0.01	0.01	0.01	0.01	0.01
21.400	0.01	0.01	0.01	0.01	0.01
21.650	0.01	0.01	0.01	0.01	0.01
21.900	0.01	0.01	0.01	0.01	0.01
22.150	0.01	0.01	0.01	0.01	0.01
22.400	0.01	0.01	0.01	0.01	0.01
22.650	0.01	0.01	0.01	0.01	0.01
22.900	0.01	0.01	0.01	0.01	0.01
23.150	0.01	0.01	0.01	0.01	0.01
23.400	0.01	0.01	0.01	0.01	0.01
23.650	0.01	0.01	0.01	0.01	0.01
23.900	0.01	0.01	0.01	(N/A)	(N/A)

Subsection: Unit Hydrograph (Hydrograph Table)
Label: PROP-PERV
Scenario: Middlesex 100-yr

Return Event: 100 years
Storm Event: TypeIII 24hr

Storm Event	TypeIII 24hr
Return Event	100 years
Duration	24.000 hours
Depth	11.5 in
Time of Concentration (Composite)	0.163 hours
Area (User Defined)	0.240 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
7.450	0.00	0.00	0.00	0.00	0.00
7.700	0.00	0.00	0.00	0.00	0.00
7.950	0.00	0.00	0.01	0.01	0.01
8.200	0.01	0.01	0.01	0.01	0.01
8.450	0.01	0.01	0.01	0.01	0.01
8.700	0.01	0.01	0.01	0.02	0.02
8.950	0.02	0.02	0.02	0.02	0.02
9.200	0.02	0.02	0.02	0.02	0.02
9.450	0.03	0.03	0.03	0.03	0.03
9.700	0.03	0.03	0.03	0.04	0.04
9.950	0.04	0.04	0.04	0.04	0.04
10.200	0.04	0.05	0.05	0.05	0.05
10.450	0.05	0.06	0.06	0.06	0.06
10.700	0.07	0.07	0.07	0.07	0.08
10.950	0.08	0.08	0.08	0.09	0.09
11.200	0.10	0.11	0.11	0.12	0.13
11.450	0.14	0.15	0.16	0.19	0.23
11.700	0.28	0.35	0.43	0.51	0.60
11.950	0.75	1.03	1.32	1.51	1.55
12.200	1.37	1.13	0.96	0.83	0.72
12.450	0.62	0.52	0.43	0.36	0.31
12.700	0.27	0.25	0.24	0.23	0.21
12.950	0.20	0.19	0.18	0.18	0.17
13.200	0.17	0.16	0.16	0.16	0.15
13.450	0.15	0.15	0.15	0.14	0.14
13.700	0.14	0.14	0.13	0.13	0.13
13.950	0.12	0.12	0.12	0.12	0.12
14.200	0.11	0.11	0.11	0.11	0.11
14.450	0.11	0.11	0.10	0.10	0.10
14.700	0.10	0.10	0.10	0.10	0.10
14.950	0.09	0.09	0.09	0.09	0.09
15.200	0.09	0.09	0.08	0.08	0.08
15.450	0.08	0.08	0.08	0.08	0.08
15.700	0.07	0.07	0.07	0.07	0.07

Subsection: Unit Hydrograph (Hydrograph Table)
Label: PROP-PERV
Scenario: Middlesex 100-yr

Return Event: 100 years
Storm Event: TypeIII 24hr

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
15.950	0.07	0.07	0.06	0.06	0.06
16.200	0.06	0.06	0.06	0.06	0.06
16.450	0.06	0.06	0.06	0.06	0.06
16.700	0.06	0.06	0.05	0.05	0.05
16.950	0.05	0.05	0.05	0.05	0.05
17.200	0.05	0.05	0.05	0.05	0.05
17.450	0.05	0.05	0.05	0.04	0.04
17.700	0.04	0.04	0.04	0.04	0.04
17.950	0.04	0.04	0.04	0.04	0.04
18.200	0.04	0.04	0.04	0.04	0.04
18.450	0.04	0.04	0.04	0.04	0.04
18.700	0.04	0.04	0.04	0.04	0.04
18.950	0.04	0.04	0.04	0.04	0.04
19.200	0.03	0.03	0.03	0.03	0.03
19.450	0.03	0.03	0.03	0.03	0.03
19.700	0.03	0.03	0.03	0.03	0.03
19.950	0.03	0.03	0.03	0.03	0.03
20.200	0.03	0.03	0.03	0.03	0.03
20.450	0.03	0.03	0.03	0.03	0.03
20.700	0.03	0.03	0.03	0.03	0.03
20.950	0.03	0.03	0.03	0.03	0.03
21.200	0.03	0.03	0.03	0.03	0.03
21.450	0.03	0.03	0.03	0.03	0.03
21.700	0.03	0.03	0.03	0.03	0.03
21.950	0.03	0.03	0.03	0.03	0.03
22.200	0.03	0.03	0.03	0.03	0.03
22.450	0.03	0.03	0.03	0.03	0.02
22.700	0.02	0.02	0.02	0.02	0.02
22.950	0.02	0.02	0.02	0.02	0.02
23.200	0.02	0.02	0.02	0.02	0.02
23.450	0.02	0.02	0.02	0.02	0.02
23.700	0.02	0.02	0.02	0.02	0.02
23.950	0.02	0.02	(N/A)	(N/A)	(N/A)

Subsection: Addition Summary
Label: EX-FLOW
Scenario: Middlesex 2-yr

Return Event: 2 years
Storm Event: TypeIII 24hr

Summary for Hydrograph Addition at 'EX-FLOW'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	EX-IMP
<Catchment to Outflow Node>	EX-PERV

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	EX-IMP	0.306	12.100	3.27
Flow (From)	EX-PERV	0.015	12.150	0.16
Flow (In)	EX-FLOW	0.322	12.100	3.42

Summary for Hydrograph Addition at 'EX-FLOW'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	EX-IMP
<Catchment to Outflow Node>	EX-PERV

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	EX-IMP	0.487	12.100	5.11
Flow (From)	EX-PERV	0.037	12.150	0.42
Flow (In)	EX-FLOW	0.523	12.100	5.51

Subsection: Addition Summary
Label: EX-FLOW
Scenario: Middlesex 100-yr

Return Event: 100 years
Storm Event: TypeIII 24hr

Summary for Hydrograph Addition at 'EX-FLOW'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	EX-IMP
<Catchment to Outflow Node>	EX-PERV

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	EX-IMP	0.917	12.100	9.49
Flow (From)	EX-PERV	0.099	12.150	1.12
Flow (In)	EX-FLOW	1.016	12.100	10.59

Summary for Hydrograph Addition at 'PROP-FLOW'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	PROP-IMP
<Catchment to Outflow Node>	PROP-PERV

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	PROP-IMP	0.285	12.100	3.04
Flow (From)	PROP-PERV	0.020	12.150	0.21
Flow (In)	PROP-FLOW	0.305	12.100	3.23

Subsection: Addition Summary
Label: PROP-FLOW
Scenario: Middlesex 10-yr

Return Event: 10 years
Storm Event: TypeIII 24hr

Summary for Hydrograph Addition at 'PROP-FLOW'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	PROP-IMP
<Catchment to Outflow Node>	PROP-PERV

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	PROP-IMP	0.452	12.100	4.75
Flow (From)	PROP-PERV	0.050	12.150	0.56
Flow (In)	PROP-FLOW	0.502	12.100	5.28

Subsection: Addition Summary
Label: PROP-FLOW
Scenario: Middlesex 100-yr

Return Event: 100 years
Storm Event: TypeIII 24hr

Summary for Hydrograph Addition at 'PROP-FLOW'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	PROP-IMP
<Catchment to Outflow Node>	PROP-PERV

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	PROP-IMP	0.852	12.100	8.81
Flow (From)	PROP-PERV	0.137	12.150	1.55
Flow (In)	PROP-FLOW	0.989	12.100	10.32

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APPENDIX D
NEW JERSEY GROUNDWATER RECHARGE SPREADSHEET (NJGRS)

New Jersey Groundwater Recharge Spreadsheet
Version 2.0
November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Project Name:	Chase Bank
Description:	43986-410-21
Analysis Date:	10/12/23

Select Township ↓	Average Annual P (in)	Climatic Factor
MIDDLESEX CO., PLAINSBORO TWP	44.9	1.43

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.98	Impervious areas	Readington	0.0	-
2	0.11	Open space	Sassafras	13.2	5,276
3	0.06	Open space	Woodstown	11.3	2,460
4					
5					
6					
7					
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.2			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				1.9	7,736

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.91	Impervious areas	Readington	0.0	-
2	0.16	Open space	Sassafras	13.2	7,675
3	0.08	Open space	Woodstown	11.3	3,280
4					
5					
6					
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.2			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				2.6	10,955

Annual Recharge Requirements Calculation ↓		Total Impervious Area (sq ft)
% of Pre-Developed Annual Recharge to Preserve =	100%	39,640
Post-Development Annual Recharge Deficit=	-3,218	(cubic feet)

Recharge Efficiency Parameters Calculations (area averages)

RWC=	#N/A	(in)	DRWC=	#N/A	(in)
ERWC =	#N/A	(in)	EDRWC=	#N/A	(in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

APPENDIX E
NON-STRUCTURAL POINT SYSTEM SPREADSHEET

NJDEP Nonstructural Strategies Points System (NSPS)

Version: January 31, 2006

Note: Input Values in Yellow Cells Only

Project:	Chase Bank
Date:	October 12, 2023
User:	KMW
Notes:	

Step 1 - Provide Basic Major Development Site Information

A. Specify Total Area in Acres of Development Site Described in Steps 2 and 3 = 1.2 **Acres**

B. Specify by Percent the Various Planning Areas Located within the Development Site:

State Plan Planning Area:	PA-1	PA-2	PA-3	PA-4	PA-4B	PA-5	Total % Area
Percent of Each Planning Area within Site:		100.0%					100.0%

Note: See User's Guide for Equivalent Zones within Designated Centers and the NJ Meadowlands, Pinelands, and Highlands Districts

Step 2 - Describe Existing or Pre-Developed Site Conditions

A. Specify Existing Land Use/Land Cover Descriptions and Areas:

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals	Points
		HSG A	HSG B	HSG C	HSG D		
1	Wetlands and Undisturbed Stream Buffers					0.0	0
2	Lawn and Open Space		0.1	0.1		0.2	44
3	Brush and Shrub					0.0	0
4	Meadow, Pasture, Grassland, or Range					0.0	0
5	Row Crop					0.0	0
6	Small Grain and Legumes					0.0	0
7	Woods - Indigenous					0.0	0
8	Woods - Planted					0.0	0
9	Woods and Grass Combination					0.0	0
10	Ponds, Lakes, and Other Open Water					0.0	0
11	Gravel and Dirt					0.0	0
12	Porous and Permeable Paving					0.0	0
13	Directly Connected Impervious		0.6	0.4		1.0	0
14	Unconnected Impervious with Small D/S Pervious					0.0	0
15	Unconnected Impervious with Large D/S Pervious					0.0	0
	HSG Subtotals (Acres):	0.0	0.7	0.4	0.0	**Total Area:**	1.2
	HSG Subtotals (%):	0.0%	62.6%	37.4%	0.0%	**Total % Area:**	100.0%

Points Subtotal: 44

Total Existing Site Points: 44

Step 3 - Describe Proposed or Post-Developed Site Conditions

A. Specify Proposed Land Use/Land Cover Descriptions and Areas:

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals	Points
		HSG A	HSG B	HSG C	HSG D		
1	Wetlands and Undisturbed Stream Buffers					0.0	0
2	Lawn and Open Space		0.2	0.1		0.2	62
3	Brush and Shrub					0.0	0
4	Meadow, Pasture, Grassland, or Range					0.0	0
5	Row Crop					0.0	0
6	Small Grain and Legumes					0.0	0
7	Woods - Indigenous					0.0	0
8	Woods - Planted					0.0	0
9	Woods and Grass Combination					0.0	0
10	Ponds, Lakes, and Other Open Water					0.0	0
11	Gravel and Dirt					0.0	0
12	Porous and Permeable Paving					0.0	0
13	Directly Connected Impervious		0.6	0.4		0.9	0
14	Unconnected Impervious with Small D/S Pervious					0.0	0
15	Unconnected Impervious with Large D/S Pervious					0.0	0
	HSG Subtotals (Acres):	0.0	0.7	0.4	0.0	**Total Area:**	1.2
	HSG Subtotals (%):	0.0%	62.6%	37.4%	0.0%	**Total % Area:**	100.0%

Points Subtotal: 62

B. Compare Proposed Impervious Coverage with Maximum Allowable Impervious Coverage:

Total Directly Connected Impervious Coverage =	79%	% of Site
Total Unconnected Impervious Coverage with Small D/S Pervious =	0%	% of Site
Total Unconnected Impervious Coverage with Large D/S Pervious =	0%	% of Site
Total Site Impervious Coverage =	79%	% of Site
Effective Site Impervious Coverage =	79%	% of Site
Specify Source of Maximum Allowable Impervious Coverage:	None	(None or Table)

Points Subtotal: 0

C. Compare Proposed Site Disturbance with Maximum Allowable Site Disturbance:

Total Proposed Site Disturbance =		% of Site
Maximum Allowable Site Disturbance by Municipal Ordinance =		% of Site

Points Subtotal: 0

D. Describe Proposed Runoff Conveyance System:

Total Length of Runoff Conveyance System =	0	Feet
Length of Vegetated Runoff Conveyance System =	0	Feet
% of Total Runoff Conveyance System That is Vegetated =	0%	

Points Subtotal: 0

E. Residential Lot Clustering:

Percent of Total Site Area that will be Clustered =		% of Site
Minimum Standard Lot Size as Per Zoning (Note: 1/2 Acre or Greater) =		Acres
Maximum Proposed Cluster Lot Size (Note:1/4 Acre or Less) =		Acres
Percent of Clustered Portion of Site to be Preserved as Vegetated Open Space =		% of Clustered Site Portion

Points Subtotal: 0

F. Will the Following be Utilized to Minimize Soil Compaction?

Proposed Lawn Areas will be Graded with Lightweight Construction Equipment:	No	(Yes or No)
Percent of Proposed Lawn Areas to be Graded with Such Equipment:	0%	% of Lawn Areas

Points Subtotal: 0

G. Are Any of the Following Stormwater Management Standards Met Using Only Nonstructural Strategies and Measures?

Groundwater Recharge Standards (NJAC 7:8-5.4-a-2):	No	(Yes or No)
Stormwater Runoff Quality Standards (NJAC 7:8-5.5):	No	(Yes or No)
Stormwater Runoff Quantity Standards (NJAC 7:8-5.4-a-3):	No	(Yes or No)

Points Subtotal: 0

Note: If the Answers to All Three Questions at G Above are "Yes", Adequate Nonstructural Measures have been Utilized.

Total Proposed Site Points: 62

Ratio of Proposed to Existing Site Points: 142%

Required Site Points Ratio: 80%

Nonstructural Point System Results: Proposed Nonstructural Measures are Adequate