TECHNICAL REPORT

AMENDED STORMWATER MANAGEMENT REPORT

HOLTEC OFFICE BUILDING
BLOCK 514, LOT 3.01
CITY OF CAMDEN
CAMDEN COUNTY, NEW JERSEY

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EXHIBITS

APPENDICIES

1.0 INTRODUCTION

Pennoni Associates, Inc., has been retained by USA Architects to provide preliminary/final design for a proposed two-story office building, parking area expansion at the Main Office building, stormwater conveyance facilities, landscaping and lighting in the City of Camden, Camden County, New Jersey.

2.0 PROJECT DESCRIPTION

The proposed two-story office building project is bounded by Broadway to the south and west and Holtec Boulevard to the north, and the proposed parking expansion is bounded by the Main Office building to the southwest and the Delaware River to the north in Camden, New Jersey. The property can be found on the United States Geological Survey (USGS) 7.5- minute topographic quadrangle for Camden, New Jersey. A copy of the USGS map is provided as Figure 1. The property consists of Blocks 511, 512, 514 and 515 (Figure 2). The "site" is defined as the tax map property boundaries. The site is the location of a vacant lots and right of way areas that have been abandoned.

PRE-DEVELOPED CONDITIONS (PROPOSED OFFICE BUILDING)

The site is part of the Holtec Technology Center (HTC) project located along Broadway and Holtec Boulevard. The water quality structures and downstream stormwater conveyance piping to the Delaware River was constructed in 2016. The piping is sized for build out of the project site. The existing water quality structures are designed to treat 4.32 acres of regulated impervious surface from the project site (reference Appendix C, Stormwater Management Report, Holtec Technology Center, prepared by T&M Associates, last revised May 1, 2015). Two of the three existing MTD's are classified as green-infrastructure BMP's. The project site discharges to a tidal flood hazard area along the Delaware River.

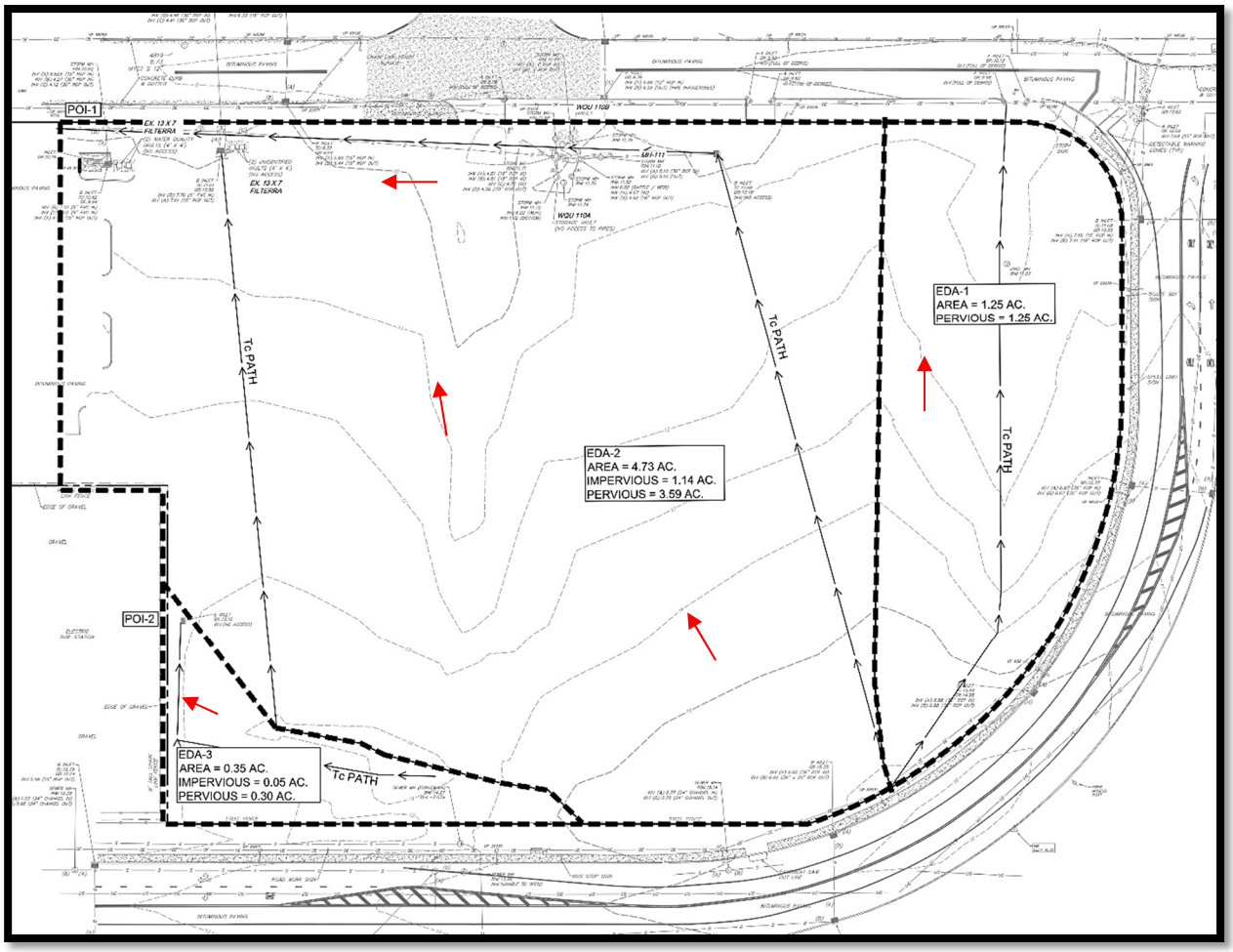
For existing condition runoff calculations, the site is analyzed as three (3) drainage sub-areas Existing Drainage Area 1 (EDA-1) thru Existing Drainage Area 3 (EDA-3), which drain to two (2) "points of interest" (POI) POI-1 and POI-2 (See Dwg. CS-9001, Appendix D).

Existing drainage area 1 (EDA-1) and existing drainage area 2 (EDA-2) consists of the existing dirt storage/parking area, paved parking area and grassed open space area. The stormwater runoff drains in a westerly direction to existing onsite stormwater conveyance system and to an existing stormwater conveyance system located within Broadway (POI-1). The existing stormwater system extends through the Holtec site and discharges directly to the Delaware River.

Existing drainage area 3 (EDA-2) consists of existing dirt and grass storage area along the southeasterly corner of the site. The stormwater runoff drains offsite in a southerly direction towards an inlet located onsite (POI-2

A schematic diagram indicating the flow patterns is provided below. The Pre-Developed Drainage Area Plan (CS9001) can be found in Appendix D.

PRE-DEVELOPED DRAINAGE AREA MAP (PROPOSED OFFICE BUILDING)



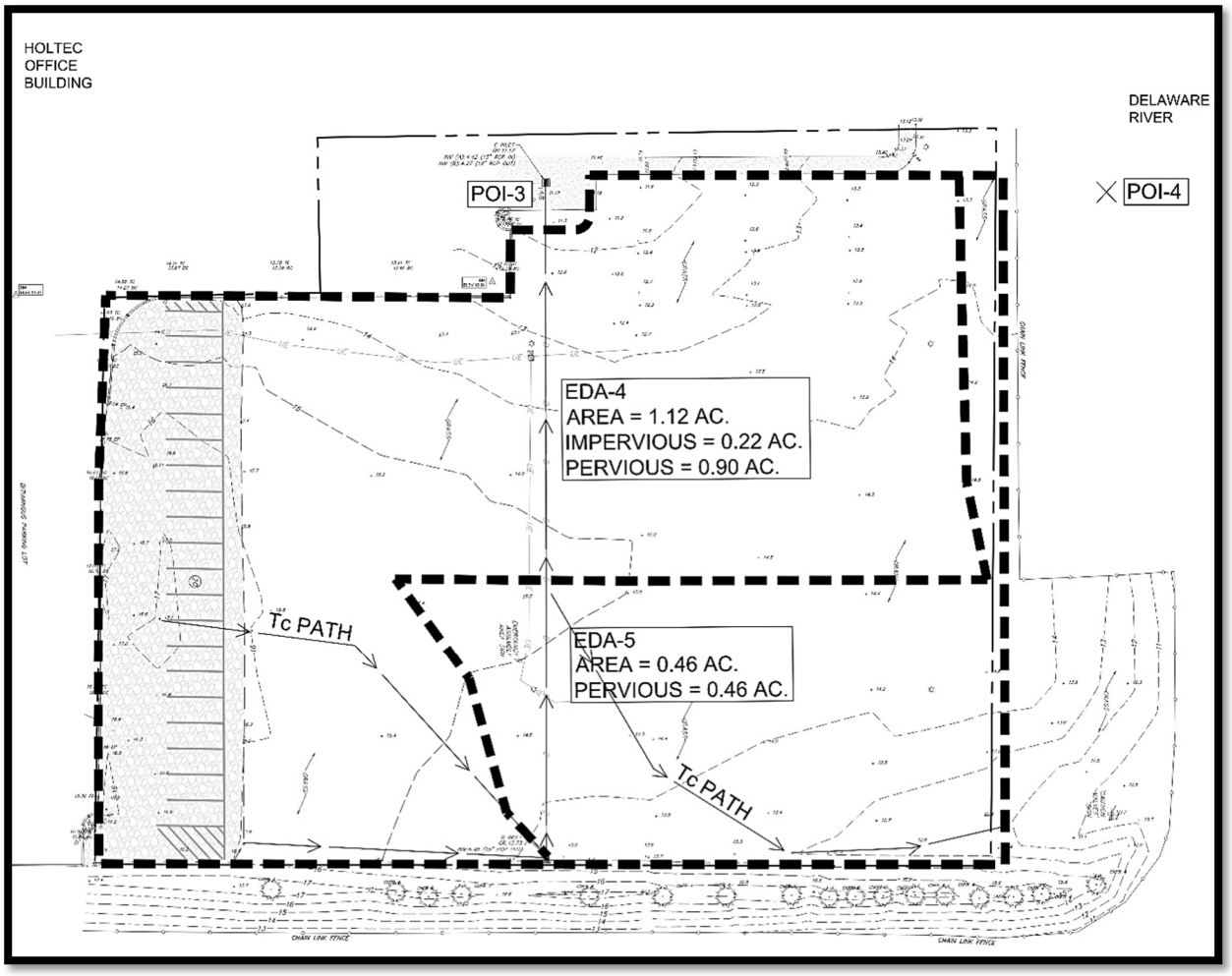
PRE-DEVELOPED CONDITIONS (PARKING EXPANSION)

Existing drainage area 4 (EDA-4) consists of existing grass area located in a northeasterly direction from Holtec's main office building. The stormwater runoff drains in a westerly direction towards an existing water quality inlet located onsite (POI-3). The existing stormwater system extends through Holtec's site and discharges directly to the Delaware River.

Existing drainage area 5 (EDA-5) consists of existing dirt and grass areas along the northeasterly corner of the main office building site. The stormwater runoff drains in a northwesterly direction to the Delaware River POI-4).

A schematic diagram indicating the flow patterns is provided below. The Pre-Developed Drainage Area Plan (CS9001A) can be found in Appendix D.

PRE-DEVELOPED DRAINAGE AREA MAP (PARKING EXPANSION)



POST DEVELOPED CONDITIONS (PROPOSED OFFICE BUILDING)

The project construction consists of a proposed office building, paved parking areas, stormwater collection, stormwater management, landscaping and lighting. The project is proposing 4.34 acres +/- (total) of impervious surface. Regulated impervious surface requiring TSS removal is approximately 3.36 acres.

The proposed watershed areas for the Office Building analysis are divided into seven (7) sub areas, proposed drainage area 1 thru proposed drainage area 7 (PDA-1 thru PDA-7) and offsite 5 impervious and pervious areas (Offsite 5) (See Dwg. CS9002). For this report the post-developed calculations were analyzed to two (2) "points of interest" (POI) POI-1 and POI-2 (Appendix A).

Proposed drainage area 1 (PDA-1) consists of runoff from the easterly parking area and open space area. The runoff flows to a proposed bioretention basin #1. The basin discharges to stormwater collection system within the site to the existing green-infrastructure (GI) MTD. The existing GI MTD discharges to an existing stormwater conveyance system which extends along the westerly side of the site (POI-1) and discharges to the Delaware River.

Proposed drainage area 2 (PDA-2) consists of proposed building and parking areas located on the southernly and westerly sides of the site. The stormwater runoff is collected by a proposed stormwater system within the site to the existing green-infrastructure (GI) MTD. The existing GI MTD discharges to an existing stormwater conveyance system which extends along the westerly side of the site (POI-1) and discharges to the Delaware River.

Proposed drainage area 3 (PDA-3) consists of proposed building and parking areas located on the northernly and westerly sides of the site. The stormwater runoff is collected by a proposed stormwater system within the site to the existing green-infrastructure (GI) MTD. The existing GI MTD discharges to an existing stormwater conveyance system which extends along the westerly side of the site and discharges to the Delaware River.

Proposed drainage area 4 (PDA-4) consists of existing dirt parking/storage area located on the southernly side of the site. A parking area is proposed, and the stormwater runoff drains in a westerly direction and is collected by an existing green-infrastructure (GI) MTD. The existing GI MTD discharges to an existing stormwater conveyance system which extends along the westerly side of the site and discharges to the Delaware River.

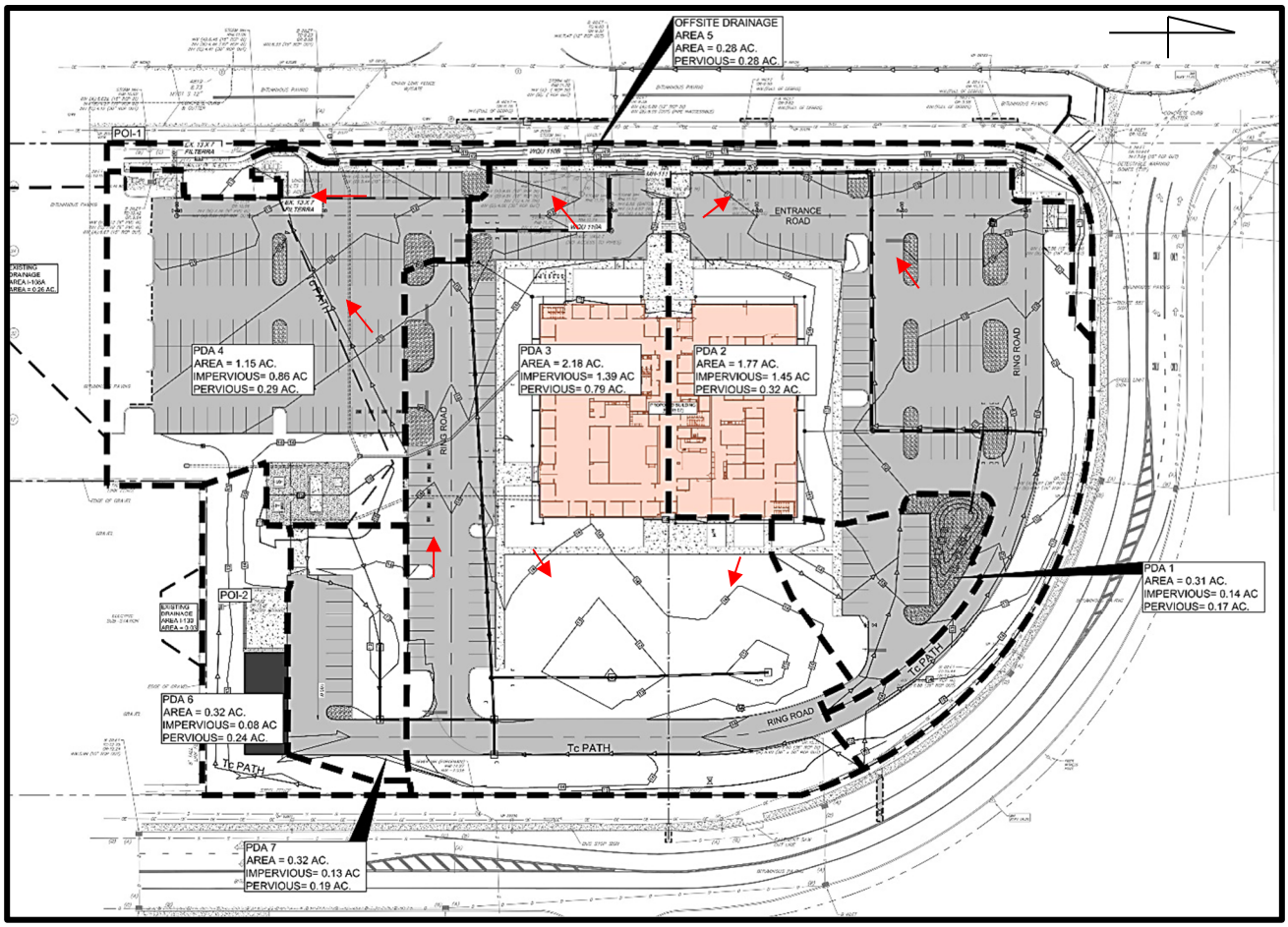
Proposed drainage area 5 (PDA-5) consists of grass area located on the westerly side of the site. The stormwater runoff drains in a westerly direction and is collected by an existing stormwater conveyance system, which extends to Holtec Boulevard and discharges to the Delaware River.

Proposed drainage area 6 (PDA-6) consists of a proposed pole barn located on the southernly side of the site. The stormwater runoff drains in a southernly direction and is collected by an existing stormwater conveyance system, which extends to Holtec Boulevard and discharges to the Delaware River.

Proposed drainage area 7 (PDA-7) consists of a proposed parking area for the pole barn and is located on the southernly side of the site. The stormwater runoff drains in a northernly direction and is collected by the proposed stormwater conveyance system, which extends through the site to Holtec Boulevard and discharges to the Delaware River.

A schematic diagram indicating the flow patterns is provided below. The Post-Developed Drainage Area Plan (CS9002) can be found in Appendix D.

POST-DEVELOPED DRAINAGE AREA MAP (PROPOSED OFFICE BUILDING)



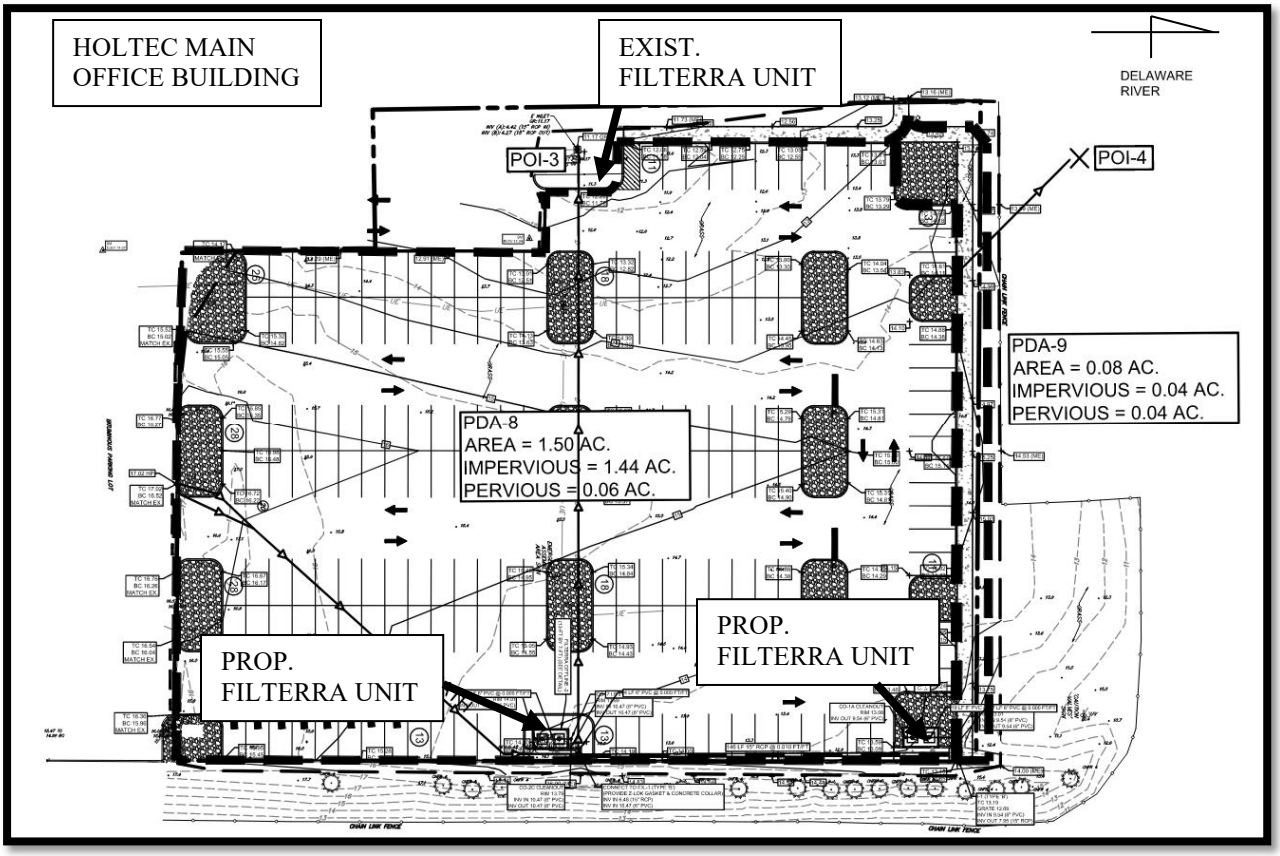
POST-DEVELOPED CONDITIONS (PARKING EXPANSION)

Proposed drainage area 8 (PDA-8) consists of a proposed parking area located in a northeasterly direction from Holtec's main office building. The stormwater runoff drains in a northeasterly direction towards two (2) proposed Filterra water quality inlets and in a westerly direction towards two (2) existing Filterra water quality inlets located onsite (POI-3). The proposed stormwater collection system will connect into the existing stormwater system constructed under the previous HTC project that extends through Holtec's site and discharges directly to the Delaware River.

Proposed drainage area 9 (PDA-9) consists of proposed sidewalk and grass area along the northeasterly corner of the main office building site. The stormwater runoff drains in a northwesterly direction to the Delaware River (POI-4).

A schematic diagram indicating the flow patterns is provided below. The Post-Developed Drainage Area Plan (CS9002A) can be found in Appendix D.

POST-DEVELOPED DRAINAGE AREA MAP (PARKING EXPANSION)



3.0 SOIL DATA

The site soils consist of Urban land (Ur), 0 to 5 percent slopes as depicted on the United States Department of Agriculture, (USDA) Web Soil Survey of Camden County, New Jersey (Figure 3). Urban land has not been assigned a hydrologic soil group; therefore Type "D" soils have been utilized.

4.0 WATERSHED DATA

Based on a review of FEMA Flood Insurance Rate Maps, and NJ GeoWeb, we have made the following determinations near the project limits:

According to the National Flood Insurance Program's Effective Flood Insurance Rate Map FEMA Panel #34007C0036F, revised 8/17/2016, the proposed site is located within the FEMA flood hazard area X (Figure 4).

5.0 DESIGN CRITERIA

In accordance with the New Jersey Department of Environmental Protection (NJDEP) Stormwater Management Rules at N.J.A.C. 7:8, a Major Development is defined as a development which disturbs one or more acres of land and/or increases impervious coverage by one-quarter of an acre or more.

GREEN INFRASTRUCTURE:

To satisfy the groundwater recharge, runoff quality and runoff quantity the project design must utilize green infrastructure BMP's (GI BMP) as identified in Table 5-1 at N.J.A.C. 7:8-5.2 (f) or an alternative stormwater management measure approved in accordance with N.J.A.C. 7:8-5.2(g). The following green infrastructure BMP's from Table 5-1 at N.J.A.C. 7:8-5.2 (b) have been incorporated into the project design:

1. Green Infrastructure Stormwater MTD's – Two (2) green infrastructure BMP's in the form of Filterra bioretention systems are provided as part of the project design. As required by N.J.A.C. 7:8-5.3 (b), the small-scale green infrastructure BMP is subject to a maximum contributory drainage area of 2.5 acres.

Office Building -
The existing green infrastructure MTD's (3 - Filterra units) will have contributory drainage areas of 0.75 acres and 0.37 acres. The existing GI MTD's were designed for a maximum contributory drainage area of 1.0 acre and 0.50 acres, respectively.

Parking Expansion -
The impervious area is treated by two (2) existing green infrastructure MTD's (Filterra Units) is 0.75 acres (0.65 acres proposed + 0.10 acres existing). Two (2) proposed GI MTD's (Filterra Units) will treat 0.30 acres and 0.47 acres of impervious area (reference Appendix C). The proposed green infrastructure BMP complies with N.J.A.C. 7:8-5.3 (b).

GROUNDWATER RECHARGE:

Pursuant to the N.J.A.C. 7:8-5.4 (b) groundwater recharge requirements apply if there is either a 0.25 acre increase in impervious area or one acre of disturbance. The project disturbs more than one acre and increases motor vehicle surfaces by more than 0.25 acres. Therefore, one of the following requirements shall be met to satisfy the standards for groundwater recharge: (1) 100 percent of the site's average annual pre-developed groundwater recharge volume shall be maintained after development; (2) 100 percent of the difference between the site's pre- and post-developed 2-year runoff volumes shall be infiltrated.

According to the New Jersey State Development and Redevelopment Plan, the site is within a designated Urban Center. Groundwater recharge is not required within an "Urban Redevelopment Area" pursuant to N.J.A.C. 7:8-5.4(b)2 (Appendix C, Reference Data). Therefore, groundwater recharge was not evaluated for this project.

RUNOFF QUANTITY:

Post-construction runoff hydrographs for the 2, 10 and 100-year has not been analyzed as part of the stormwater management design. Pursuant to N.J.A.C. 7:8-5.6(b) 4. In tidal flood hazard areas, stormwater runoff quantity analysis, in accordance with (b)1, 2, and 3 above, is required unless the design engineer demonstrates through hydrologic and hydraulic analysis that the increased volume, change in timing, or increased rate of the stormwater runoff, or any combination of the three will not result in additional flood damage below the point of discharge of the major development. No analysis is required if the stormwater is discharged directly into any ocean, bay, inlet, or the reach of any watercourse between its confluence with an ocean, bay, or inlet and downstream of the first water control structure.

In accordance with N.J.A.C. 7:8-5.6(b)4, no analysis is required if the stormwater is discharged directly into any ocean, bay, inlet, or the reach of any watercourse between its confluence with an ocean, bay, or inlet and downstream of the first water control structure. The project site discharges directly to the tidal flood hazard area of the Delaware River. Therefore, any runoff from the site will not increase flood damages downstream. The site is part of the Holtec Technology Center project. The water quality structures and downstream stormwater conveyance systems to the Delaware River were constructed in 2016 and were sized for build out of the project site. The proposed office building site increases grass areas thereby reducing runoff from 25-year storm event (reference Appendix B).

RUNOFF QUALITY:

Pursuant to N.J.A.C. 7:8-5.2 (f), the green infrastructure BMP's can be utilized to satisfy the requirements of N.J.A.C. 7:8-5.5 for stormwater runoff quality. Stormwater Management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm by 80 percent of the anticipated load from the developed site. The increase in motor vehicle surface, must be treated for 80% TSS reductions.

The water quality standards will apply as the net increase of motor vehicle surface is 3.36 acres which exceeds the maximum net increase of 0.25 acres.

The site currently contains both green infrastructure MTD's and non-green infrastructure MTD's.

Office Building-

The existing green infrastructure MTD's (2 - Filterra units) provide 80% TSS removal for proposed impervious area of 0.87 acres. The units were designed to treat 1.5 acres of impervious area.

Existing non-green infrastructure MTD's (2 - Vortechs units) provide 50% TSS removal for proposed impervious area of 3.19 acres. The units were designed to treat 3.64 acres of impervious.

The non-green manufactured treatment devices installed in 2016 provide 50% TSS removal for redeveloped sites. The site has been redeveloped and previously contained multi-family homes, paved roadways and buildings. The proposed site will utilize the existing green and non-green MTD's. Maintenance to the existing MTD's will be included as part of the proposed development.

Parking Expansion-

Under the HTC design, the existing green infrastructure MTD (2 - Filterra unit) provides 80% TSS removal for of 0.85 acres of impervious area. Under proposed conditions, the existing GI MTD will treat 0.65 acres of impervious area.

The proposed green infrastructure MTD's (2 - Filterra units) provide 80% TSS removal for proposed impervious areas of 0.28 acres and 0.45 acres. The units were originally designed to treat 0.43 acres and 0.45 acres, respectively of impervious area.

6.0 TECHNIQUES OF ANALYSIS

The water quality (WQ) design storm is 1.25 inches of rainfall in 2-hours. In accordance with N.J.A.C. 7:8-5.5, Table 5-4, a one-minute water quality design storm rainfall distribution was utilized for the calculations. Bentley's Pondpack Connect Edition was used to perform the calculations.

The developed area is made up of Urban Land, Type D soils. Therefore, CNs of 80 for lawn in good condition, 84 for lawn/landscaped areas in fair condition, 98 for impervious areas have been utilized in the calculations. The impervious areas were calculated as separate subareas to generate hydrographs without weighted CNs as outlined in the BMP manual chapter 5.

Pre- and post-developed times of concentration (TC) are determined using the hydraulically longest flow path. Curve numbers (CN) for the drainage areas for the pre- and post-developed condition are based on the hydrologic soil group and land use.

Using the drainage areas, the TCs and CNs as input data, *Pond Pack Connect Edition,* a hydrologic/hydraulic software program by Bentley, was utilized to generate the runoff volume and rate.

7.0 STORM SEWER DESIGN

Storm sewer design consists of Type "B" inlets, manholes, and RCP and HDPE storm pipes. All proposed conveyance systems have been sized to accommodate the 25-year storm event (Appendix B). Rainfall intensities are based on NOAA data for City of Camden, NJ (Appendix C). The infrastructure is depicted on sheet CS9003, Inlet Drainage Area Plan (Appendix D).

8.0 SOIL EROSION AND SEDIMENT CONTROL

The project will comply with the minimum design and performance standards for erosion control established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq. and implementing rules. Anticipated BMP's to be included in the Soil Erosion and Sediment Control Plan will include, structural and non-structural soil erosion BMP's to be implemented during construction, including: minimizing the area of disturbance, placement of silt fencing around the limit of disturbance, temporary soil stockpiles surrounded with silt fencing, temporary vegetative cover standards, inlet filter covers over all existing stormwater inlets, and an anti-tracking stabilized construction entrance (see Dwg. CS8001). The project will be submitted to the Camden County Conservation District for certification of a Soil Erosion and Sediment Control Plan prior to commencement of construction.

9.0 CONCLUSION

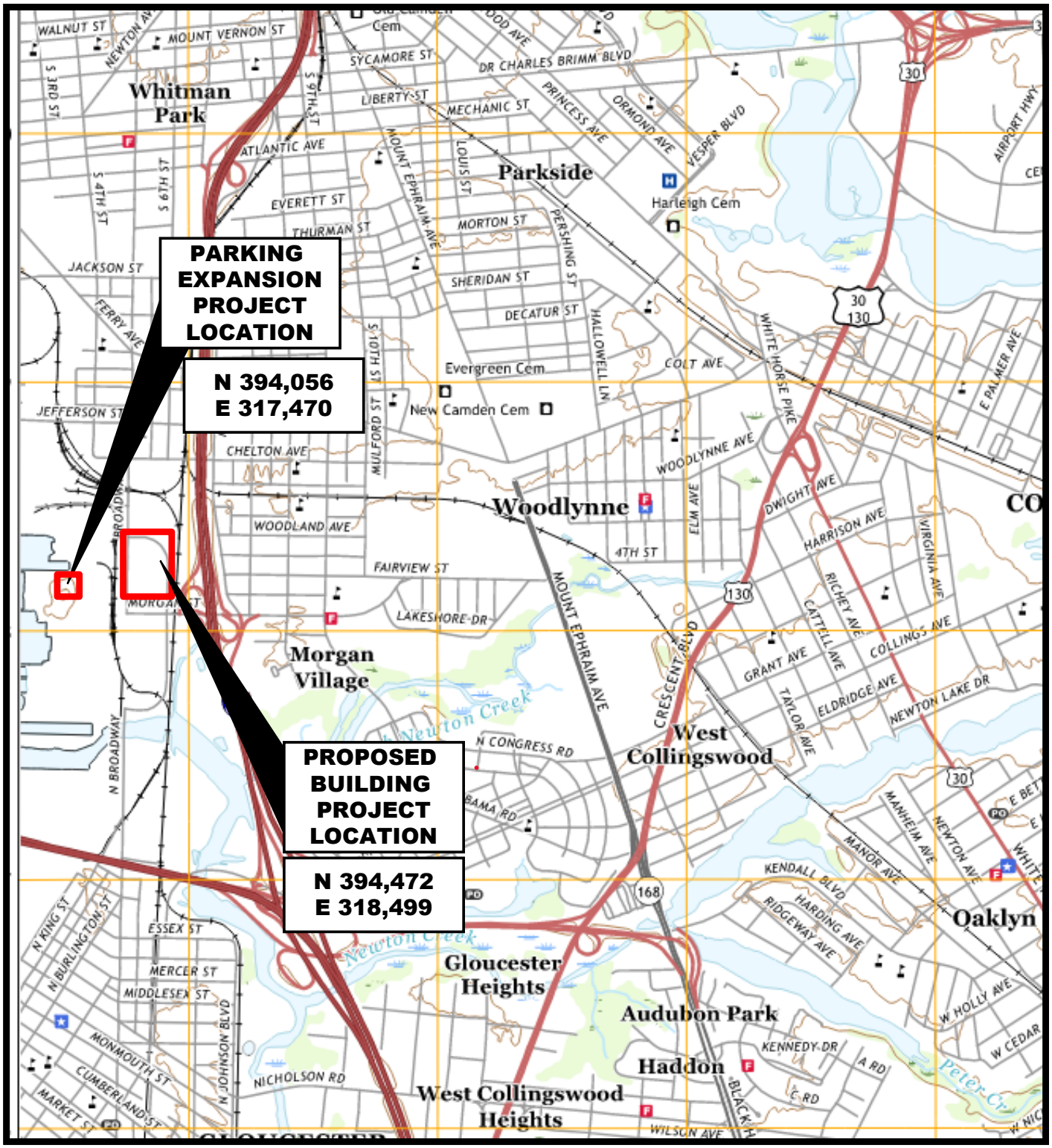
The site is part of the overall Holtec Technology Center site located along Broadway and Holtec Boulevard. The proposed stormwater conveyance system connects to an existing stormwater system located within Broadway. The existing stormwater system discharges directly to the Delaware River. A summary of the stormwater management design is as follows:

- N.J.A.C. 7:8-5.6(b)4, no analysis is required if the stormwater is discharged directly into any ocean, bay, inlet, or the reach of any watercourse between its confluence with an ocean, bay, or inlet and downstream of the first water control structure. The project site discharges directly to the tidal flood hazard area of the Delaware River. Therefore, any runoff from the site will not increase flood damages downstream.

- The project is located within an Urban Redevelopment Area, and therefore, pursuant to N.J.A.C. 7:8-5.4(b)2 the groundwater recharge requirement does not apply.

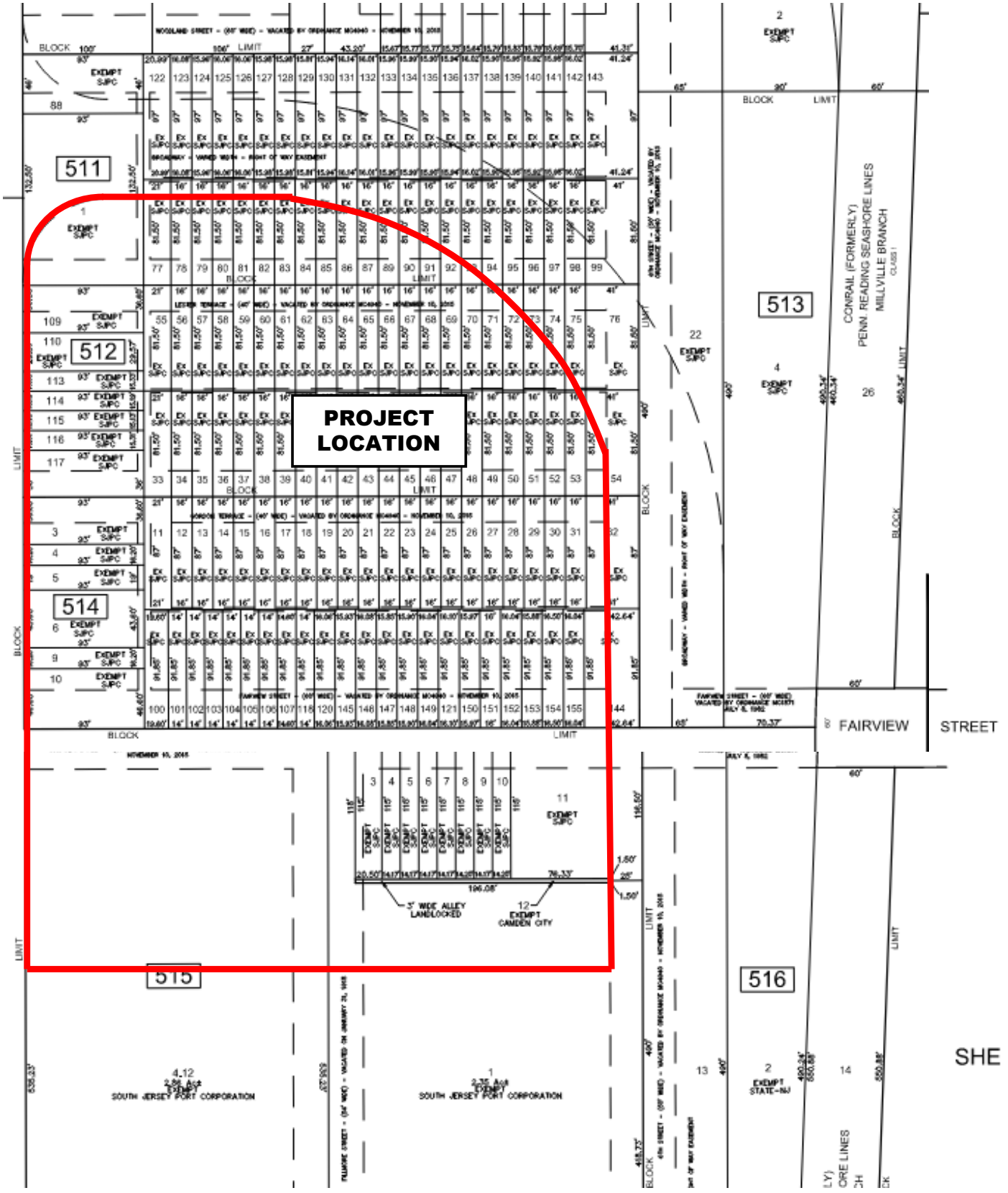
- The required TSS removal rate under the 2015 site plan approval was 50%. The existing non-green MTD's were designed to provide 50% TSS removal and have sufficient capacity to treat the proposed project. The green infrastructure MTD's were designed to provide 80% TSS removal and have sufficient capacity to treat the proposed project.

Exhibits



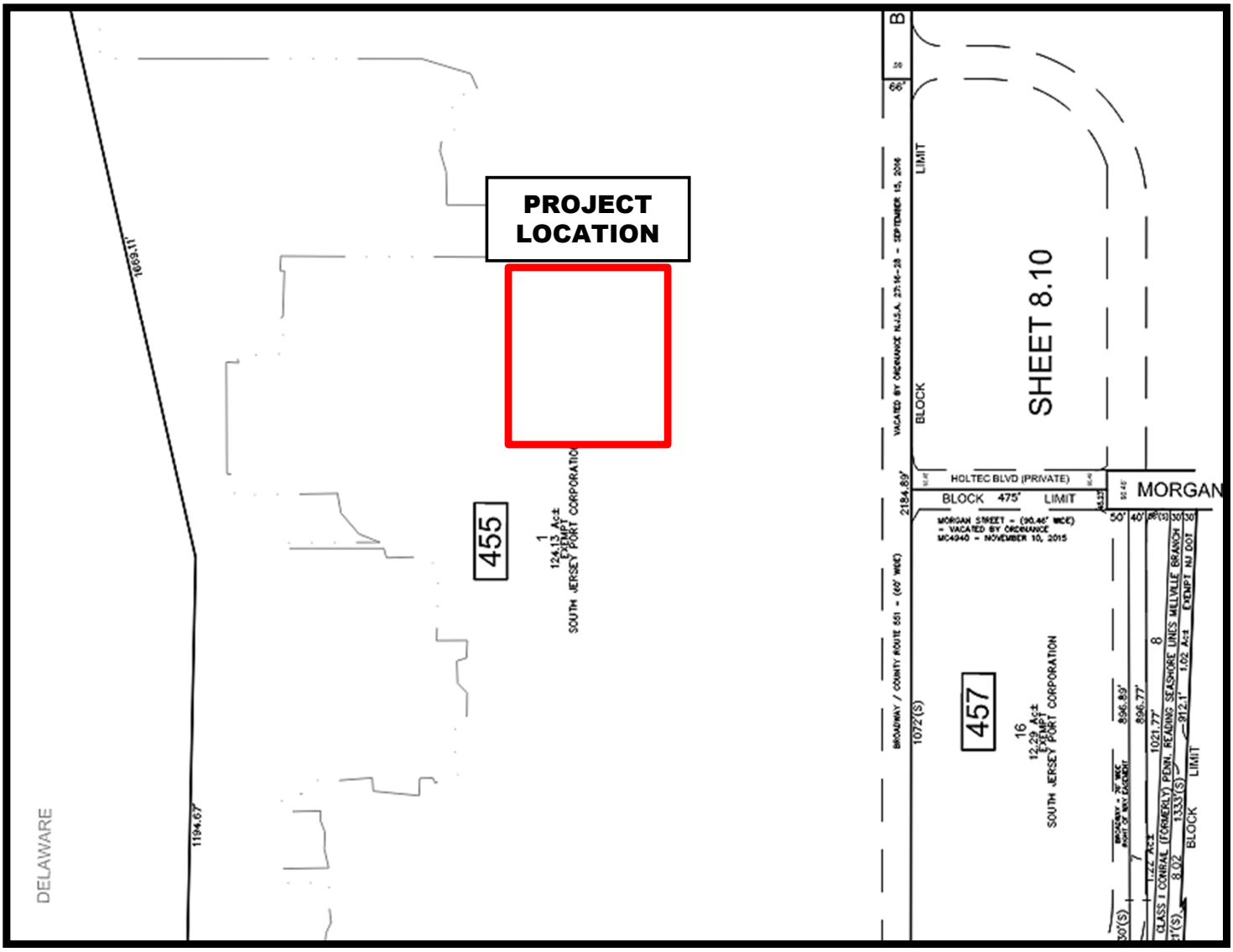
USGS 7.5 Min. Camden Quadrangle, Camden County, New Jersey

Pennoni PENNONI ASSOCIATES INC. 2 AQUARIUM DRIVE, SUITE 320 CAMDEN, NEW JERSEY 08103	HOLTEC OFFICE BUILDING BLOCKS 511,512,514 & 515 CITY OF CAMDEN, CAMDEN COUNTY NEW JERSEY	
Job No. USATX22001	Scale: 1"=2,000'	Figure 1 –USGS Map



City of Camden Tax Map Plate 8.09 and Plate 8.10

Pennoni	PENNONI ASSOCIATES INC. 2 AQUARIUM DRIVE, SUITE 320 CAMDEN, NEW JERSEY 08103	HOLTEC OFFICE BUILDING BLOCKS 511,512,514 & 515 CITY OF CAMDEN, CAMDEN COUNTY NEW JERSEY
Job No. USATX22001	Scale: NTS	Figure 2 –Tax Map



City of Camden Tax Map Plate 8.12

Pennoni PENNONI ASSOCIATES INC. 2 AQUARIUM DRIVE, SUITE 320 CAMDEN, NEW JERSEY 08103		HOLTEC PARKING EXPANSION BLOCK 455, LOT 1 CITY OF CAMDEN, CAMDEN COUNTY NEW JERSEY
Job No. USATX22001	Scale: NTS	Figure 2A –Tax Map

Map Unit Symbol	Map Unit Name
UR	Urban land

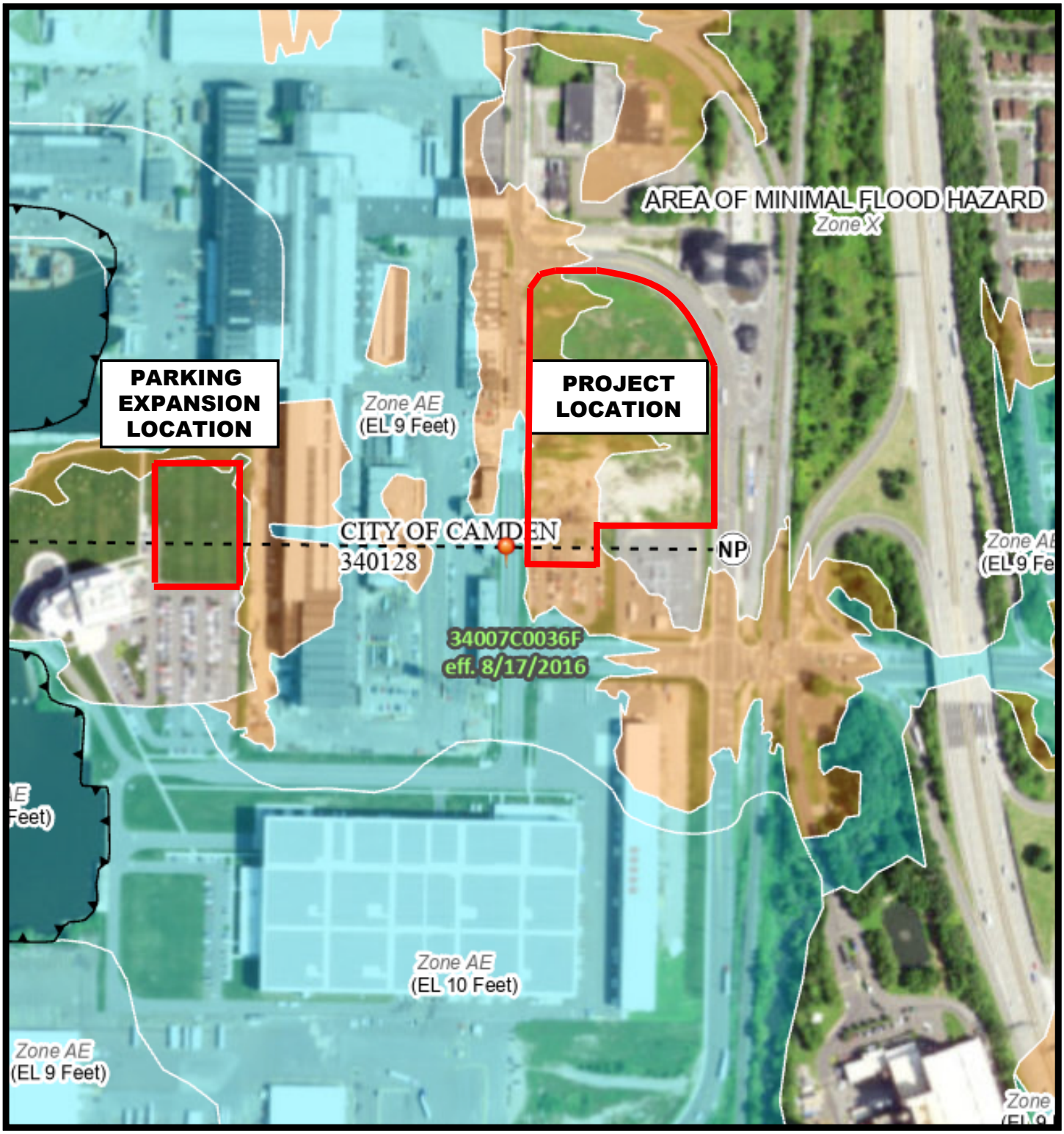
NRCS WebSoil Survey, Camden County, NJ

Pennoni PENNONI ASSOCIATES INC. 2 AQUARIUM DRIVE, SUITE 320 CAMDEN, NEW JERSEY 08103		HOLTEC OFFICE BUILDING BLOCKS 511,512,514 & 515 CITY OF CAMDEN, CAMDEN COUNTY NEW JERSEY
Job No. USATX22001	Scale: NTS	Figure 3 –Soils Map

Map Unit Symbol	Map Unit Name
UR	Urban land

NRCS WebSoil Survey, Camden County, NJ

Pennoni	PENNONI ASSOCIATES INC. 2 AQUARIUM DRIVE, SUITE 320 CAMDEN, NEW JERSEY 08103	HOLTEC PARKING EXPANSION BLOCK 455, LOT 1 CITY OF CAMDEN, CAMDEN COUNTY NEW JERSEY
Job No. USATX22001	Scale: NTS	Figure 3A –Soils Map

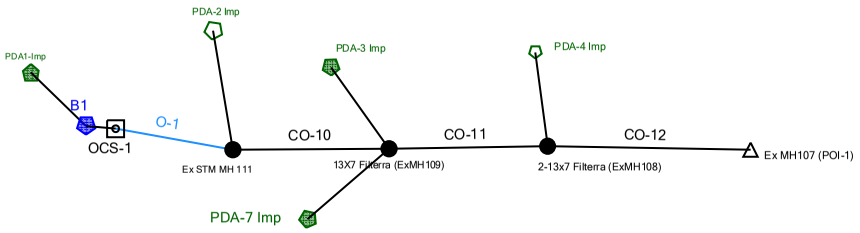


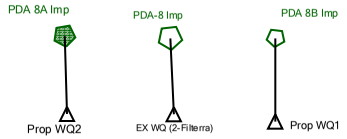
FEMA Map 34007C0036F, Effective 8/17/2016

Pennoni	PENNONI ASSOCIATES INC. 2 AQUARIUM DRIVE, SUITE 320 CAMDEN, NEW JERSEY 08103	HOLTEC OFFICE BUILDING BLOCKS 511,512,514 & 515 CITY OF CAMDEN, CAMDEN COUNTY NEW JERSEY
Job No. USATX22001	Scale: NTS	Figure 4 –FEMA Map

Appendix A

Scenario: base





PROPOSED OFFICE BUILDING

PROPOSED PARKING
EXPANSION (MAIN OFFICE)

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WQ

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
PDA 8A Imp	base	1	1,766.00	1.100	1.20
PDA 8B Imp	base	1	1,014.00	1.100	0.69
PDA-2 Imp	base	1	5,446.00	1.100	3.23
PDA-3 Imp	base	1	5,222.00	1.100	3.54
PDA-4 Imp	base	1	3,231.00	1.100	2.19
PDA-7 Imp	base	1	488.00	1.100	0.33
PDA-8 Imp	base	1	2,630.00	1.100	1.78
PDA1-Imp	base	1	526.00	1.100	0.36

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
13X7 Filterra (ExMH109)	base	1	11,682.00	1.100	7.43
2-13x7 Filterra (ExMH108)	base	1	14,913.00	1.100	9.62
EX WQ (2-Filterra)	base	1	2,630.00	1.100	1.78
Ex MH107 (POI-1)	base	1	14,913.00	1.100	9.62
Ex STM MH 111	base	1	5,972.00	1.100	3.56
Prop WQ1	base	1	1,014.00	1.100	0.69
Prop WQ2	base	1	1,766.00	1.100	1.20

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
B1 (IN)	base	1	526.00	1.100	0.36	(N/A)	(N/A)
B1 (OUT)	base	1	526.00	1.100	0.34	8.71	6.00

Subsection: Time of Concentration Calculations
Label: PDA 8A Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.011
Slope	0.019 ft/ft
2 Year 24 Hour Depth	3.40 in
Average Velocity	1.39 ft/s
Segment Time of Concentration	0.020 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	129.00 ft
Is Paved?	True
Slope	0.010 ft/ft
Average Velocity	2.03 ft/s
Segment Time of Concentration	0.018 hours

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

Subsection: Time of Concentration Calculations
Label: PDA 8A Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

==== 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: PDA 8B Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.011
Slope	0.020 ft/ft
2 Year 24 Hour Depth	3.40 in
Average Velocity	1.42 ft/s
Segment Time of Concentration	0.020 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	92.00 ft
Is Paved?	True
Slope	0.013 ft/ft
Average Velocity	2.32 ft/s
Segment Time of Concentration	0.011 hours

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

Subsection: Time of Concentration Calculations
Label: PDA 8B Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

==== 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: PDA1-Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.011
Slope	0.015 ft/ft
2 Year 24 Hour Depth	3.40 in
Average Velocity	1.26 ft/s
Segment Time of Concentration	0.022 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	65.00 ft
Is Paved?	True
Slope	0.016 ft/ft
Average Velocity	2.57 ft/s
Segment Time of Concentration	0.007 hours

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

Subsection: Time of Concentration Calculations
Label: PDA1-Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

==== 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: PDA-2 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	36.00 ft
Manning's n	0.150
Slope	0.036 ft/ft
2 Year 24 Hour Depth	3.40 in
Average Velocity	0.18 ft/s
Segment Time of Concentration	0.055 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	237.00 ft
Is Paved?	True
Slope	0.014 ft/ft
Average Velocity	2.41 ft/s
Segment Time of Concentration	0.027 hours

Segment #3: TR-55 Channel Flow	
Flow Area	1.8 ft²
Hydraulic Length	411.00 ft
Manning's n	0.015
Slope	0.005 ft/ft
Wetted Perimeter	4.70 ft
Average Velocity	3.70 ft/s
Segment Time of Concentration	0.031 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.113 hours

Subsection: Time of Concentration Calculations
Label: PDA-2 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

==== 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

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:
Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Subsection: Time of Concentration Calculations
Label: PDA-3 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.011
Slope	0.008 ft/ft
2 Year 24 Hour Depth	3.40 in
Average Velocity	0.96 ft/s
Segment Time of Concentration	0.029 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	119.00 ft
Is Paved?	True
Slope	0.008 ft/ft
Average Velocity	1.76 ft/s
Segment Time of Concentration	0.019 hours

Segment #3: TR-55 Channel Flow	
Flow Area	1.2 ft²
Hydraulic Length	53.00 ft
Manning's n	0.015
Slope	0.005 ft/ft
Wetted Perimeter	3.90 ft
Average Velocity	3.20 ft/s
Segment Time of Concentration	0.005 hours

Segment #4: TR-55 Channel Flow	
Flow Area	1.8 ft²
Hydraulic Length	287.00 ft
Manning's n	0.015
Slope	0.005 ft/ft
Wetted Perimeter	4.70 ft
Average Velocity	3.70 ft/s
Segment Time of Concentration	0.022 hours

Segment #5: TR-55 Channel Flow	
Flow Area	3.1 ft²
Hydraulic Length	119.00 ft
Manning's n	0.015

Subsection: Time of Concentration Calculations
Label: PDA-3 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Segment #5: TR-55 Channel Flow	
Slope	0.005 ft/ft
Wetted Perimeter	6.30 ft
Average Velocity	4.38 ft/s
Segment Time of Concentration	0.008 hours

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

Subsection: Time of Concentration Calculations
Label: PDA-3 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

==== 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

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:
Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Subsection: Time of Concentration Calculations
Label: PDA-4 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.011
Slope	0.010 ft/ft
2 Year 24 Hour Depth	3.40 in
Average Velocity	1.07 ft/s
Segment Time of Concentration	0.026 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	265.00 ft
Is Paved?	True
Slope	0.010 ft/ft
Average Velocity	2.03 ft/s
Segment Time of Concentration	0.036 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: PDA-7 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	68.00 ft
Manning's n	0.011
Slope	0.027 ft/ft
2 Year 24 Hour Depth	3.40 in
Average Velocity	1.48 ft/s
Segment Time of Concentration	0.013 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	47.00 ft
Is Paved?	False
Slope	0.018 ft/ft
Average Velocity	2.16 ft/s
Segment Time of Concentration	0.006 hours

Segment #3: TR-55 Channel Flow	
Flow Area	1.2 ft²
Hydraulic Length	158.00 ft
Manning's n	0.015
Slope	0.005 ft/ft
Wetted Perimeter	3.90 ft
Average Velocity	3.20 ft/s
Segment Time of Concentration	0.014 hours

Segment #4: TR-55 Channel Flow	
Flow Area	1.8 ft²
Hydraulic Length	287.00 ft
Manning's n	0.015
Slope	0.005 ft/ft
Wetted Perimeter	4.70 ft
Average Velocity	3.70 ft/s
Segment Time of Concentration	0.022 hours

Segment #5: TR-55 Channel Flow	
Flow Area	3.1 ft²
Hydraulic Length	119.00 ft
Manning's n	0.015

Subsection: Time of Concentration Calculations
Label: PDA-7 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Segment #5: TR-55 Channel Flow	
Slope	0.005 ft/ft
Wetted Perimeter	6.30 ft
Average Velocity	4.38 ft/s
Segment Time of Concentration	0.008 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

==== SCS TR-55 Sheet Flow

Tc =	(0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))
Where:	Tc= Time of concentration, hours n= Manning's n Lf= Flow length, feet P= 2yr, 24hr Rain depth, inches Sf= Slope, %

Subsection: Time of Concentration Calculations
Label: PDA-8 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.011
Slope	0.020 ft/ft
2 Year 24 Hour Depth	3.40 in
Average Velocity	1.42 ft/s
Segment Time of Concentration	0.020 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	92.00 ft
Is Paved?	True
Slope	0.013 ft/ft
Average Velocity	2.29 ft/s
Segment Time of Concentration	0.011 hours

Segment #3: TR-55 Channel Flow	
Flow Area	1.2 ft²
Hydraulic Length	235.00 ft
Manning's n	0.015
Slope	0.009 ft/ft
Wetted Perimeter	3.90 ft
Average Velocity	4.29 ft/s
Segment Time of Concentration	0.015 hours

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

Subsection: Time of Concentration Calculations
Label: PDA-8 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

==== 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

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:
Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Subsection: Unit Hydrograph Summary
Label: PDA 8A Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Storm Event	Gauged Event (1.3 in)
Return Event	1 years
Duration	120.000 hours
Depth	1.25 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.470 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	1.100 hours
Flow (Peak, Computed)	1.20 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	1.100 hours
Flow (Peak Interpolated Output)	1.20 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.470 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.03 in
Runoff Volume (Pervious)	1,765.08 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,766.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	284.057
K Factor	0.440

Subsection: Unit Hydrograph Summary
Label: PDA 8A Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	3.544
Unit peak, qp	3.73 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.489 hours
Total unit time, Tb	0.544 hours

Subsection: Unit Hydrograph Summary
Label: PDA 8B Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Storm Event	Gauged Event (1.3 in)
Return Event	1 years
Duration	120.000 hours
Depth	1.25 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.270 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	1.100 hours
Flow (Peak, Computed)	0.69 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	1.100 hours
Flow (Peak Interpolated Output)	0.69 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.270 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.03 in
Runoff Volume (Pervious)	1,013.98 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,014.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	284.057
K Factor	0.440

Subsection: Unit Hydrograph Summary
Label: PDA 8B Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	3.544
Unit peak, qp	2.14 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.489 hours
Total unit time, Tb	0.544 hours

Subsection: Unit Hydrograph Summary
Label: PDA1-Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Storm Event	Gauged Event (1.3 in)
Return Event	1 years
Duration	120.000 hours
Depth	1.25 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.140 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	1.100 hours
Flow (Peak, Computed)	0.36 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	1.100 hours
Flow (Peak Interpolated Output)	0.36 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.140 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.03 in
Runoff Volume (Pervious)	525.77 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	526.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	284.057
K Factor	0.440

Subsection: Unit Hydrograph Summary
Label: PDA1-Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	3.544
Unit peak, qp	1.11 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.489 hours
Total unit time, Tb	0.544 hours

Subsection: Unit Hydrograph Summary
Label: PDA-2 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Storm Event	Gauged Event (1.3 in)
Return Event	1 years
Duration	120.000 hours
Depth	1.25 in
Time of Concentration (Composite)	0.113 hours
Area (User Defined)	1.450 acres

Computational Time Increment	0.015 hours
Time to Peak (Computed)	1.120 hours
Flow (Peak, Computed)	3.27 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	1.100 hours
Flow (Peak Interpolated Output)	3.23 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	1.450 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.03 in
Runoff Volume (Pervious)	5,445.47 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	5,446.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.113 hours
Computational Time Increment	0.015 hours
Unit Hydrograph Shape Factor	284.057
K Factor	0.440

Subsection: Unit Hydrograph Summary
Label: PDA-2 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	3.544
Unit peak, qp	8.44 ft^3/s
Unit peak time, Tp	0.076 hours
Unit receding limb, Tr	0.666 hours
Total unit time, Tb	0.741 hours

Subsection: Unit Hydrograph Summary
Label: PDA-3 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Storm Event	Gauged Event (1.3 in)
Return Event	1 years
Duration	120.000 hours
Depth	1.25 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.390 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	1.100 hours
Flow (Peak, Computed)	3.54 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	1.100 hours
Flow (Peak Interpolated Output)	3.54 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	1.390 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.03 in
Runoff Volume (Pervious)	5,220.14 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	5,222.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	284.057
K Factor	0.440

Subsection: Unit Hydrograph Summary
Label: PDA-3 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	3.544
Unit peak, qp	11.03 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.489 hours
Total unit time, Tb	0.544 hours

Subsection: Unit Hydrograph Summary
Label: PDA-4 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Storm Event	Gauged Event (1.3 in)
Return Event	1 years
Duration	120.000 hours
Depth	1.25 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.860 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	1.100 hours
Flow (Peak, Computed)	2.19 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	1.100 hours
Flow (Peak Interpolated Output)	2.19 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.860 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.03 in
Runoff Volume (Pervious)	3,229.73 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3,231.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	284.057
K Factor	0.440

Subsection: Unit Hydrograph Summary
Label: PDA-4 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	3.544
Unit peak, qp	6.82 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.489 hours
Total unit time, Tb	0.544 hours

Subsection: Unit Hydrograph Summary
Label: PDA-7 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Storm Event	Gauged Event (1.3 in)
Return Event	1 years
Duration	120.000 hours
Depth	1.25 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.130 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	1.100 hours
Flow (Peak, Computed)	0.33 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	1.100 hours
Flow (Peak Interpolated Output)	0.33 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.130 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.03 in
Runoff Volume (Pervious)	488.21 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	488.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	284.057
K Factor	0.440

Subsection: Unit Hydrograph Summary
Label: PDA-7 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	3.544
Unit peak, qp	1.03 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.489 hours
Total unit time, Tb	0.544 hours

Subsection: Unit Hydrograph Summary
Label: PDA-8 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

Storm Event	Gauged Event (1.3 in)
Return Event	1 years
Duration	120.000 hours
Depth	1.25 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.700 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	1.100 hours
Flow (Peak, Computed)	1.78 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	1.100 hours
Flow (Peak Interpolated Output)	1.78 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.700 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.03 in
Runoff Volume (Pervious)	2,628.85 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,630.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	284.057
K Factor	0.440

Subsection: Unit Hydrograph Summary
Label: PDA-8 Imp
Scenario: base

Return Event: 1 years
Storm Event: Gauged Event (1.3 in)

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	3.544
Unit peak, qp	5.55 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.489 hours
Total unit time, Tb	0.544 hours

REFERENCE ONLY

DELAWARE RIVER

NEWTOWN CREEK

I-676

N.J.S.P.C.S.

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
301	30,769	0.84	0.99	6,262	0.12	0.65	0.96	0.95	3.200	2.92
301A	18,571	0.43	0.99	2,713	0.06	0.65	0.49	0.95	3.200	1.49
301B	19,602	0.45	0.99	2,529	0.05	0.65	0.50	0.96	3.200	1.54
302A.x2	30,241	0.69	0.99	6,795	0.16	0.65	0.85	0.93	3.200	2.52
302A	20,178	0.46	0.99	1,602	0.04	0.65	0.50	0.96	3.200	1.54
302B	18,766	0.45	0.99	2,332	0.05	0.65	0.50	0.96	3.200	1.54
303	14,315	0.33	0.99	1,353	0.03	0.65	0.36	0.96	3.200	1.11
304	13,360	0.31	0.99	1,780	0.04	0.65	0.35	0.95	3.200	1.09
							4.61	0.95		15.72
							3.66			

9. 13x7 Filtera Units- Office Parking Area

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
107A	10,323	0.24	0.99	652	0.01	0.65	0.25	0.98	3.200	0.78
107B	20,470	0.47	0.99	1,310	0.03	0.65	0.50	0.97	3.200	1.55
108A.x2	41,770	0.96	0.99	1,760	0.04	0.65	1.00	0.98	3.200	3.14
108A	20,048	0.46	0.99	1,732	0.04	0.65	0.50	0.96	3.200	1.54
							2.25	0.97		7.01
							2.13			

8. 13x7 Filtera Units - NE Parking Area

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
111A	7,653	0.18	0.99	11,957	0.27	0.65	0.45	0.79	3.200	1.14
111B	14,113	0.32	0.99	0	0.00	0.65	0.32	0.99	3.200	1.01
112	43,331	0.99	0.99	10,779	0.25	0.65	1.24	0.92	3.200	3.65
113	33,600	0.78	0.99	8,395	0.19	0.65	0.97	0.92	3.200	2.86
114	9,683	0.22	0.99	5,229	0.12	0.65	0.34	0.97	3.200	0.95
115	16,769	0.38	0.99	4,560	0.10	0.65	0.48	0.92	3.200	1.35
116	7,497	0.17	0.99	3,635	0.08	0.65	0.25	0.88	3.200	0.70
117	4,384	0.10	0.99	3,635	0.08	0.65	0.18	0.64	3.200	0.49
118	22,402	0.52	0.99	4,171	0.10	0.65	0.62	0.94	3.200	1.66
							4.83	0.90		13.86
							3.64			

WQU-110 A & B Vortechs 11000, x2

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
201	30,769	0.84	0.99	6,262	0.12	0.65	0.96	0.95	3.200	2.92
201A	18,571	0.43	0.99	2,713	0.06	0.65	0.49	0.95	3.200	1.49
201B	19,602	0.45	0.99	2,529	0.05	0.65	0.50	0.96	3.200	1.54
202.x2	30,241	0.69	0.99	6,795	0.16	0.65	0.85	0.93	3.200	2.52
202A	20,178	0.46	0.99	1,602	0.04	0.65	0.50	0.96	3.200	1.54
202B	18,766	0.45	0.99	2,332	0.05	0.65	0.50	0.96	3.200	1.54
203	14,315	0.33	0.99	1,353	0.03	0.65	0.36	0.96	3.200	1.11
204	13,360	0.31	0.99	1,780	0.04	0.65	0.35	0.95	3.200	1.09
							4.61	0.95		15.72
							3.66			

9. 13x7 Filtera Units- Office Parking Area

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
207A	10,323	0.24	0.99	652	0.01	0.65	0.25	0.98	3.200	0.78
207B	20,470	0.47	0.99	1,310	0.03	0.65	0.50	0.97	3.200	1.55
208A.x2	41,770	0.96	0.99	1,760	0.04	0.65	1.00	0.98	3.200	3.14
208A	20,048	0.46	0.99	1,732	0.04	0.65	0.50	0.96	3.200	1.54
							2.25	0.97		7.01
							2.13			

8. 13x7 Filtera Units - NE Parking Area

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
211A	7,653	0.18	0.99	11,957	0.27	0.65	0.45	0.79	3.200	1.14
211B	14,113	0.32	0.99	0	0.00	0.65	0.32	0.99	3.200	1.01
212	43,331	0.99	0.99	10,779	0.25	0.65	1.24	0.92	3.200	3.65
213	33,600	0.78	0.99	8,395	0.19	0.65	0.97	0.92	3.200	2.86
214	9,683	0.22	0.99	5,229	0.12	0.65	0.34	0.97	3.200	0.95
215	16,769	0.38	0.99	4,560	0.10	0.65	0.48	0.92	3.200	1.35
216	7,497	0.17	0.99	3,635	0.08	0.65	0.25	0.88	3.200	0.70
217	4,384	0.10	0.99	3,635	0.08	0.65	0.18	0.64	3.200	0.49
218	22,402	0.52	0.99	4,171	0.10	0.65	0.62	0.94	3.200	1.66
							4.83	0.90		13.86
							3.64			

WQU-110 A & B Vortechs 11000, x2

HOLTEC TECHNOLOGY CENTER, LLC

HOLTEC TECHNOLOGY CENTER
BLOCK 457 - LOT 16, P/O BLOCK 455 - LOT 1
BLOCKS 511, 512, 514 AND 515

CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

INLET DRAINAGE AREA EXHIBIT

DESIGNED BY	KRH	PROJECT NO.	HLTC000010
CHECKED BY	KRH	DATE	2/17/2015
DRAWN BY	EBL	SCALE	1"=100'
DRAWING			

SHEET 1 OF 1

T&M ASSOCIATES
A306 NORTH CHURCH STREET
MOORESTOWN, NJ 08057
TEL 856-722-4700
FAX 856-722-0170

NO.	DATE	BY	REVISIONS

REFERENCE ONLY

David J. Fleming, P.E.
Vice President

LICENSED PROFESSIONAL ENGINEER
STATE OF NJ LICENSE NO. 24GE03321600

5/15/2015

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www.tandmassociates.com

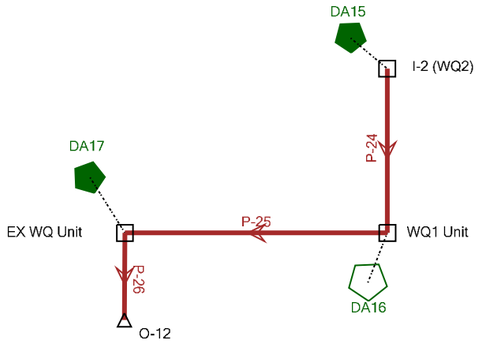
11 Tindall Road
Middletown, NJ 07748

Corporate Headquarters

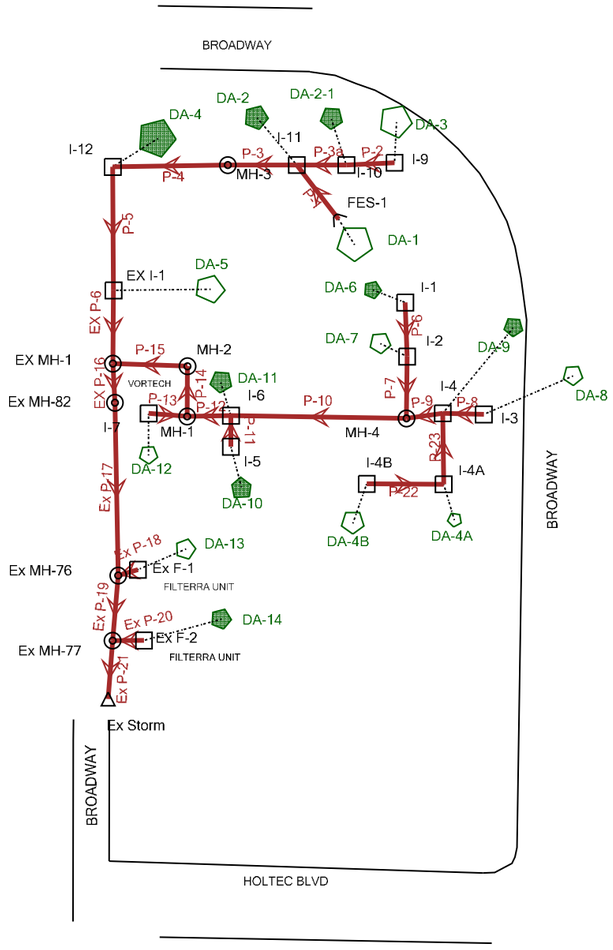
YOUR GOALS. OUR MISSION.

Appendix B

Scenario: 25 year



PROPOSED PARKING
EXPANSION (MAIN OFFICE)



PROPOSED OFFICE BUILDING

Conduit FlexTable: Combined Pipe/Node Report

Label	Start Node	Stop Node	Upstream Inlet Area (acres)	System Flow Time (min)	System Intensity (in/h)	Length (Unified) (ft)	Slope (Calc) (ft/ft)	Dia. (in)	Conduit Description	Material	Manning's n	Flow (cfs)	Capacity (Full Flow) (cfs)	V (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Cover (Start) (ft)	Cover (Stop) (ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
EX P-6	EX I-1	EX MH-1	0.130	6.67	7.0	74.0	0.0020	30.0	Circle - 30.0 in	Concrete	0.013	11.50	18.47	3.97	5.25	5.10	2.44	6.17	10.19	13.77	6.95	6.88
EX P-16	EX MH-1	Ex MH-82	(N/A)	11.23	5.6	9.7	0.0103	30.0	Circle - 30.0 in	Concrete	0.013	20.68	41.70	8.48	5.10	5.00	6.17	6.25	13.77	13.75	6.88	6.92
Ex P-17	Ex MH-82	Ex MH-76	(N/A)	11.25	5.6	213.0	0.0028	30.0	Circle - 30.0 in	Concrete	0.013	20.67	21.59	5.01	5.00	4.41	6.25	4.15	13.75	11.06	6.92	6.18
Ex P-18	Ex F-1	Ex MH-76	0.370	5.00	7.6	10.0	0.1150	15.0	Circle - 15.0 in	Concrete	0.013	2.42	21.91	11.75	7.61	6.46	1.70	3.35	10.56	11.06	8.23	6.79
Ex P-19	Ex MH-76	Ex MH-77	(N/A)	11.95	5.4	74.0	0.0039	30.0	Circle - 30.0 in	Concrete	0.013	21.93	25.68	5.88	4.41	4.12	4.15	4.00	11.06	10.62	6.18	5.87
Ex P-20	Ex F-2	Ex MH-77	0.750	5.00	7.6	21.0	0.0024	15.0	Circle - 15.0 in	Concrete	0.013	4.91	3.15	4.00	6.67	6.62	2.02	2.75	9.94	10.62	7.78	7.52
Ex P-21	Ex MH-77	Ex Storm	(N/A)	12.16	5.4	190.0	0.0054	30.0	Circle - 30.0 in	Concrete	0.013	25.25	30.05	6.86	4.12	3.10	4.00	4.40	10.62	10.00	5.87	4.81
P-1	FES-1	I-11	0.300	5.00	7.6	55.0	0.0105	15.0	Circle - 15.0 in	Concrete	0.015	1.62	5.75	4.02	8.39	7.81	1.86	1.66	11.50	10.72	8.89	8.43
P-2	I-9	I-10	0.400	5.00	7.6	24.0	0.0050	15.0	Circle - 15.0 in	Concrete	0.015	2.16	3.96	3.29	8.02	7.90	1.49	1.58	10.76	10.73	8.67	8.49
P-3	I-11	MH-3	0.710	5.23	7.6	77.0	0.0040	24.0	Circle - 24.0 in	Concrete	0.015	9.85	12.44	4.39	7.06	6.75	1.66	3.07	10.72	11.82	8.43	8.17
P-3a	I-10	I-11	0.250	5.12	7.6	17.0	0.0053	18.0	Circle - 18.0 in	Concrete	0.015	3.67	6.62	3.85	7.65	7.56	1.58	1.66	10.73	10.72	8.48	8.43
P-4	MH-3	I-12	(N/A)	5.52	7.4	178.0	0.0035	24.0	Circle - 24.0 in	Concrete	0.015	9.71	11.57	4.13	6.75	6.13	3.07	3.38	11.82	11.51	8.17	7.63
P-5	I-12	EX I-1	0.260	6.24	7.2	109.0	0.0035	24.0	Circle - 24.0 in	Concrete	0.015	11.06	11.58	4.19	6.13	5.75	3.38	2.44	11.51	10.19	7.63	6.95
P-6	I-1	I-2	0.280	5.00	7.6	108.0	0.0050	15.0	Circle - 15.0 in	Concrete	0.015	1.72	3.96	3.12	9.41	8.87	1.75	1.75	12.41	11.87	10.62	10.52
P-7	I-2	MH-4	0.340	5.58	7.4	83.0	0.0049	15.0	Circle - 15.0 in	Concrete	0.013	3.71	4.54	3.03	8.87	8.46	1.75	3.69	11.87	13.40	10.52	10.24
P-8	I-3	I-4	0.440	5.00	7.6	24.0	0.0050	15.0	Circle - 15.0 in	Concrete	0.015	2.88	3.96	2.35	8.73	8.61	2.83	2.95	12.81	12.81	10.53	10.47
P-9	I-4	MH-4	0.320	9.50	6.0	29.0	0.0021	15.0	Circle - 15.0 in	Concrete	0.015	4.91	2.55	4.00	8.61	8.55	2.95	3.60	12.81	13.40	10.47	10.24
P-10	MH-4	I-6	(N/A)	9.63	5.9	287.0	0.0047	18.0	Circle - 18.0 in	Concrete	0.015	7.84	6.22	4.44	8.21	6.87	3.69	4.19	13.40	12.56	10.24	7.96
P-11	I-5	I-6	0.090	5.00	7.6	24.0	0.0050	15.0	Circle - 15.0 in	Concrete	0.015	0.66	3.96	2.39	7.24	7.12	3.94	4.19	12.43	12.56	7.75	7.74
P-12	I-6	MH-1	0.460	10.70	5.7	22.0	0.0050	24.0	Circle - 24.0 in	Concrete	0.015	10.35	13.86	4.84	6.37	6.26	4.19	4.42	12.56	12.68	7.74	7.67
P-13	I-7	MH-1	0.270	5.00	7.6	22.0	-0.0877	15.0	Circle - 15.0 in	Concrete	0.015	1.87	16.58	1.52	7.12	9.05	3.69	2.38	12.06	12.68	9.80	9.59
P-14	MH-1	MH-2	(N/A)	10.78	5.7	97.0	0.0049	24.0	Circle - 24.0 in	Concrete	0.015	11.71	13.79	4.93	6.26	5.78	4.42	5.86	12.68	13.64	7.67	7.01
P-15	MH-2	EX MH-1	(N/A)	11.11	5.6	36.0	0.0050	30.0	Circle - 30.0 in	Concrete	0.015	11.59	25.13	5.02	5.28	5.10	5.86	6.17	13.64	13.77	6.90	6.88
P-22	I-4B	I-4A	0.140	5.00	7.6	50.0	0.0050	15.0	Circle - 15.0 in	Concrete	0.015	0.32	3.96	0.26	9.25	9.00	1.97	3.30	12.47	13.55	10.50	10.50
P-23	I-4A	I-4	0.150	8.16	6.5	79.0	0.0049	15.0	Circle - 15.0 in	Concrete	0.015	1.20	3.93	0.98	9.00	8.61	3.30	2.95	13.55	12.81	10.50	10.47
P-24	I-2 (WQ2)	WQ1 Unit	0.530	5.00	7.6	146.0	0.0101	15.0	Circle - 15.0 in	Concrete	0.015	3.67	5.62	4.88	7.95	6.48	3.49	6.15	12.69	13.88	8.72	7.61
P-25	WQ1 Unit	EX WQ Unit	0.300	5.50	7.5	234.0	0.0088	15.0	Circle - 15.0 in	Concrete	0.015	5.61	5.25	4.80	6.48	4.42	6.15	5.50	13.88	11.17	7.61	5.52
P-26	EX WQ Unit	O-12	0.770	6.31	7.2	179.0	0.0113	18.0	Circle - 18.0 in	Concrete	0.013	10.66	11.16	7.19	4.27	2.25	5.40	7.25	11.17	11.00	5.52	3.42

NOTE: EXISTING PIPE CONDUITS DESIGNED IN 2015 WITH A MANNING'S N=0.013

USATX22001

25-YEAR STORM RUNOFF CALCULATIONS
HOLTEC OFFICE BUILDING
CITY OF CAMDEN, CAMDEN CO., NJ

August 20, 2024

Inlet Area	Impervious Area (SF)	Impervious Area (AC)	Pervious Area (SF)	Pervious Area (AC)	c	Total Area (SF)	Total Area (AC)	Q (cfs)
Approved Design*	231739	5.32	45302	1.04	0.945	277041	6.36	39.67
Proposed Site	176418	4.05	99317	2.28	0.891	275735	6.33	37.22

* Holtec Technology Center project 2016
Impervious Area Runoff Coefficient = .99
Pervious Area Runoff Coefficient = .65
Antecedent=1.1

Q = ciA

i= 6.6 in/hr 10 min 25yr storm

c= (Impervious Area x .99 + Pervious Area x .65 x 1.1)/Total Area

A= Total Area

Land Use	Description	Hydrologic Soils Group			
		A	B	C	D
Cultivated Land	without conservation treatment	0.49	0.67	0.81	0.88
	with conservation treatment	0.27	0.43	0.67	0.67
Pasture or Range Land	poor condition	0.38	0.63	0.78	0.84
Meadow	good condition	---	0.25	0.51	0.65
	good condition	---	---	0.41	0.61
Wood or Forest Land	thin stand, poor cover, no mulch	---	0.34	0.59	0.70
	good cover	---	---	0.45	0.59
Open Spaces, Lawns, Parks, Golf Courses, Cemeteries					
Good Condition	grass cover on 75% or more	---	0.25	0.51	0.65
Fair Condition	grass cover on 50% to 75%	---	0.45	0.63	0.74
Commercial and Business Area	85% impervious	0.84	0.90	0.93	0.96
Industrial Districts	72% impervious	0.67	0.81	0.88	0.92
Residential	average % impervious				
Average Lot Size (acres)					
1/8	65	0.59	0.76	0.86	0.90
1/4	38	0.29	0.55	0.70	0.80
1/3	30	---	0.49	0.67	0.78
1/2	25	---	0.45	0.65	0.76
1	20	---	0.41	0.63	0.74
Paved Areas	parking lots, roofs, driveways, etc.	0.99	0.99	0.99	0.99
Streets and Roads	paved with curbs & storm sewers	0.99	0.99	0.99	0.99
	gravel	0.57	0.76	0.84	0.88
	dirt	0.49	0.69	0.80	0.84

USATX22001

25-YEAR STORM RUNOFF CALCULATIONS
HOLTEC PARKING EXPANSION
CITY OF CAMDEN, CAMDEN CO., NJ

August 20, 2024

Inlet Area	Impervious Area (SF)	Impervious Area (AC)	Pervious Area (SF)	Pervious Area (AC)	c	Total Area (SF)	Total Area (AC)	Q (cfs)
Approved Design*	74872	1.72	10304	0.236	0.294	85176	6.36	12.34
Proposed Site	63237	1.45	6736	0.15	0.958	69973	1.61	10.18

* Holtec Technology Center project 2016
Impervious Area Runoff Coefficient = .99
Pervious Area Runoff Coefficient = .65
Antecedent=1.1

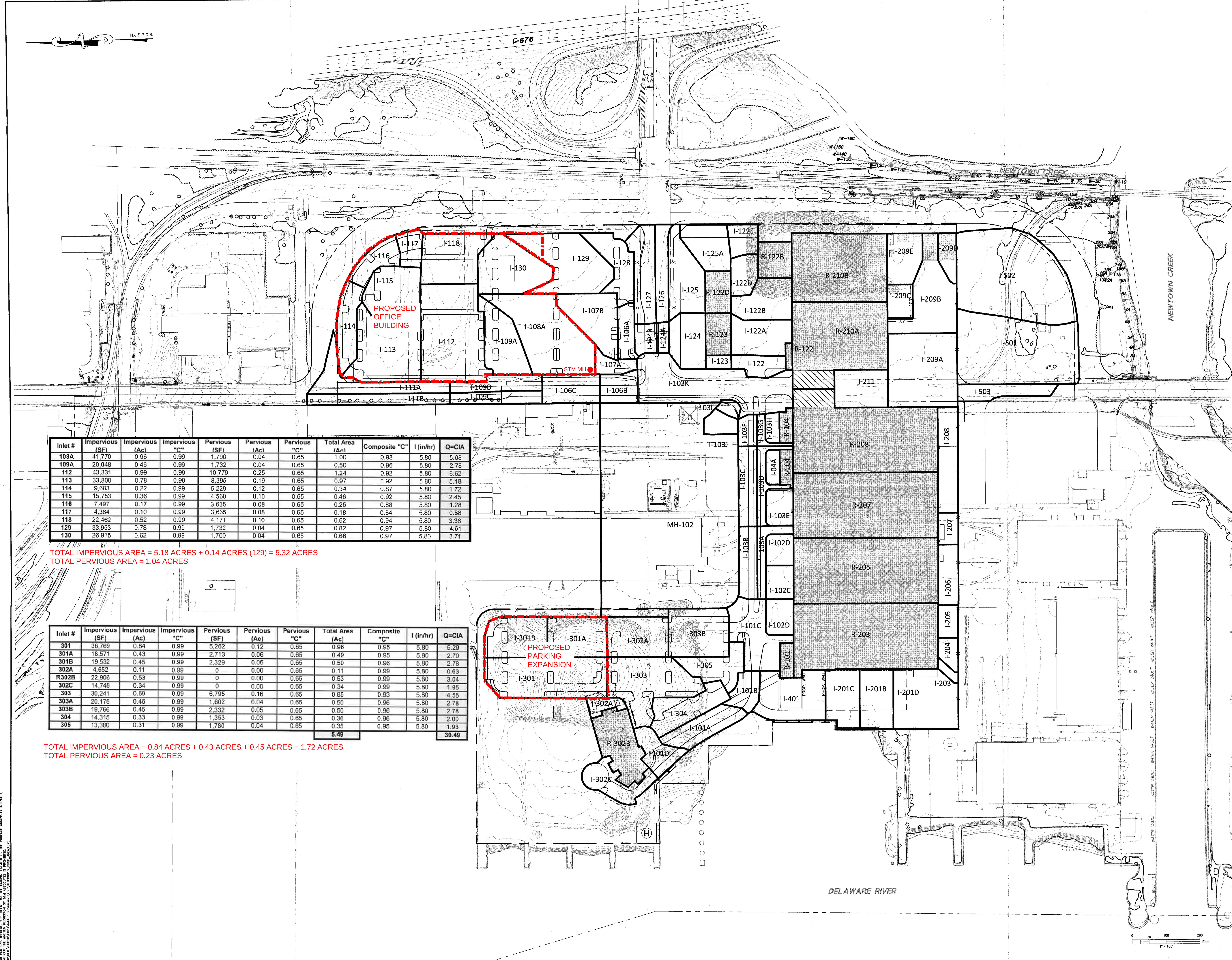
Q = ciA

i= 6.6 in/hr 10 min 25yr storm

c= (Impervious Area x .99 + Pervious Area x .65 x 1.1)/Total Area

A= Total Area

Land Use	Description	Hydrologic Soils Group A	B	C	D
Cultivated Land	without conservation treatment	0.49	0.67	0.81	0.88
	with conservation treatment	0.27	0.43	0.67	0.67
Pasture or Range Land	poor condition	0.38	0.63	0.78	0.84
Meadow	good condition	---	0.25	0.51	0.65
	good condition	---	---	0.41	0.61
Wood or Forest Land	thin stand, poor cover, no mulch	---	0.34	0.59	0.70
	good cover	---	---	0.45	0.59
Open Spaces, Lawns, Parks, Golf Courses, Cemeteries					
Good Condition	grass cover on 75% or more	---	0.25	0.51	0.65
Fair Condition	grass cover on 50% to 75%	---	0.45	0.63	0.74
Commercial and Business Area	85% impervious	0.84	0.90	0.93	0.96
Industrial Districts	72% impervious	0.67	0.81	0.88	0.92
Residential	average % impervious				
Average Lot Size (acres)					
1/8	65	0.59	0.76	0.86	0.90
1/4	38	0.29	0.55	0.70	0.80
1/3	30	---	0.49	0.67	0.78
1/2	25	---	0.45	0.65	0.76
1	20	---	0.41	0.63	0.74
Paved Areas	parking lots, roofs, driveways, etc.	0.99	0.99	0.99	0.99
Streets and Roads	paved with curbs & storm	0.99	0.99	0.99	0.99
	sewers	0.57	0.76	0.84	0.88
	gravel	0.49	0.69	0.80	0.84
	dirt				



Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
108A	41,770	0.96	0.99	1,790	0.04	0.65	1.00	0.98	5.80	5.68
109A	20,048	0.46	0.99	1,732	0.04	0.65	0.50	0.96	5.80	2.78
112	43,331	0.99	0.99	10,779	0.25	0.65	1.24	0.92	5.80	6.62
113	33,800	0.78	0.99	8,395	0.19	0.65	0.97	0.92	5.80	5.18
114	9,683	0.22	0.99	5,229	0.12	0.65	0.34	0.87	5.80	1.72
115	15,753	0.36	0.99	4,560	0.10	0.65	0.46	0.92	5.80	2.45
116	7,497	0.17	0.99	3,635	0.08	0.65	0.25	0.88	5.80	1.28
117	4,384	0.10	0.99	3,635	0.08	0.65	0.18	0.84	5.80	0.88
118	22,462	0.52	0.99	4,171	0.10	0.65	0.62	0.94	5.80	3.38
129	33,953	0.78	0.99	1,732	0.04	0.65	0.82	0.97	5.80	4.61
130	26,915	0.62	0.99	1,700	0.04	0.65	0.66	0.97	5.80	3.71

TOTAL IMPERVIOUS AREA = 5.18 ACRES + 0.14 ACRES (129) = 5.32 ACRES
TOTAL PERVIOUS AREA = 1.04 ACRES

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
301	36,769	0.84	0.99	5,262	0.12	0.65	0.96	0.95	5.80	5.29
301A	18,571	0.43	0.99	2,713	0.06	0.65	0.49	0.95	5.80	2.70
301B	19,532	0.45	0.99	2,329	0.05	0.65	0.50	0.96	5.80	2.78
302A	4,652	0.11	0.99	0	0.00	0.65	0.11	0.99	5.80	0.63
R302B	22,906	0.53	0.99	0	0.00	0.65	0.53	0.99	5.80	3.04
302C	14,748	0.34	0.99	0	0.00	0.65	0.34	0.99	5.80	1.95
303	30,241	0.69	0.99	6,795	0.16	0.65	0.85	0.93	5.80	4.58
303A	20,178	0.46	0.99	1,602	0.04	0.65	0.50	0.96	5.80	2.78
303B	19,766	0.45	0.99	2,332	0.05	0.65	0.50	0.96	5.80	2.78
304	14,315	0.33	0.99	1,353	0.03	0.65	0.36	0.96	5.80	2.00
305	13,380	0.31	0.99	1,780	0.04	0.65	0.35	0.95	5.80	1.93
							5.49			30.49

TOTAL IMPERVIOUS AREA = 0.84 ACRES + 0.43 ACRES + 0.45 ACRES = 1.72 ACRES
TOTAL PERVIOUS AREA = 0.23 ACRES

YOUR GOALS. OUR MISSION.
Corporate Headquarters
11 Tindall Road
Middletown, NJ 07748
www.tandmassociates.com
Offices Located In: Delaware, Indiana, Kentucky, Massachusetts, Michigan, New Jersey, Ohio and Pennsylvania
NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS CERTIFICATE OF AUTHORIZATION 24GA27987500

REFERENCE ONLY

HOLTEC TECHNOLOGY CENTER, LLC
HOLTEC TECHNOLOGY CENTER
BLOCK 457 - LOT 16, P/O BLOCK 455 - LOT 1
BLOCKS 511, 512, 514 AND 515
CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

INLET DRAINAGE AREA EXHIBIT

DESIGNED BY	KRH	PROJECT NO.	HLTC00010
CHECKED BY	ERL	DATE	2/17/2015
DRAWN BY	KRH	SCALE	1" = 100'
DRAWING			

SHEET 1 OF 1

Appendix C

PREPARED FOR:

Holtec Technology Center, LLC
One Holtec Drive
Marlton, NJ 08053

PREPARED BY:

T&M Associates
1256 N. Church Street
Moorestown, NJ 08057
856.722.6700

STORMWATER MANAGEMENT REPORT

HOLTEC TECHNOLOGY CENTER
BLOCK 457-LOT 16, p/o BLOCK 455-LOT 1,
BLOCKS 511, 512, 514 & 515
CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

T&M PROJECT NO. HLTC-00010
February 17, 2015
Revised May 1, 2015

Erik R. Littlehales, P.E.
NJ License No. 24GE04312700

David J. Fleming, P.E.,
NJ License No. 24GE3321600

Holtec Technology Center Drainage Report
Manufactured Treatment Device Flow Summary

HLTC-00010

Revised 5/1/2015

WQU-101 Vortechs 7000

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
101A	9,770	0.22	0.99	6,110	0.14	0.65	0.36	0.86	3.200	0.99
101B	5,579	0.13	0.99	3,089	0.07	0.65	0.20	0.87	3.200	0.56
101C	14,321	0.33	0.99	10,386	0.24	0.65	0.57	0.85	3.200	1.55
101D	10,565	0.24	0.99	1,080	0.02	0.65	0.26	0.98	3.200	0.80
		0.92					1.39	0.89		3.90

WQU-103 Vortechs 16000

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
103A	5,662	0.13	0.99	2,036	0.05	0.65	0.18	0.9	3.200	0.52
103B	3,468	0.08	0.99	8,342	0.19	0.65	0.27	0.75	3.200	0.65
103C	3,935	0.09	0.99	9,230	0.21	0.65	0.30	0.75	3.200	0.72
103D	5,935	0.14	0.99	2,170	0.05	0.65	0.19	0.9	3.200	0.55
103E	0	0.00	0.99	8,895	0.20	0.65	0.20	0.65	3.200	0.42
103F	1,668	0.04	0.99	3,360	0.08	0.65	0.12	0.76	3.200	0.29
103G	2,532	0.06	0.99	1,097	0.03	0.65	0.09	0.88	3.200	0.25
103H	0	0.00	0.99	3,668	0.08	0.65	0.08	0.65	3.200	0.17
103I	2,743	0.06	0.99	0	0.00	0.65	0.06	0.99	3.200	0.19
103J	6,026	0.14	0.99	0	0.00	0.65	0.14	0.99	3.200	0.44
103K	35,793	0.82	0.99	17,704	0.41	0.65	1.23	0.88	3.200	3.46
		1.56					2.80	0.83		7.66

5, 13x7 Filterra Units - NE Parking Area

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
107A	10,323	0.24	0.99	652	0.01	0.65	0.25	0.98	3.200	0.78
107B	20,470	0.47	0.99	1,310	0.03	0.65	0.50	0.97	3.200	1.55
108A, x2	41,770	0.96	0.99	1,700	0.04	0.65	1.00	0.98	3.200	3.14
109A	20,048	0.46	0.99	1,732	0.04	0.65	0.50	0.96	3.200	1.54
		2.13					2.25	0.97		7.01

EXISTING GI MTD

WQU-110 A & B Vortechs 11000, x2

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
111A	7,693	0.18	0.99	11,957	0.27	0.65	0.45	0.79	3.200	1.14
111B	14,113	0.32	0.99	0	0.00	0.65	0.32	0.99	3.200	1.01
112	43,331	0.99	0.99	10,779	0.25	0.65	1.24	0.92	3.200	3.65
113	33,800	0.78	0.99	8,395	0.19	0.65	0.97	0.92	3.200	2.86
114	9,683	0.22	0.99	5,229	0.12	0.65	0.34	0.87	3.200	0.95
115	15,753	0.36	0.99	4,560	0.10	0.65	0.46	0.92	3.200	1.35
116	7,497	0.17	0.99	3,635	0.08	0.65	0.25	0.88	3.200	0.70
117	4,384	0.10	0.99	3,635	0.08	0.65	0.18	0.84	3.200	0.49
118	22,462	0.52	0.99	4,171	0.10	0.65	0.62	0.94	3.200	1.86
		3.64					4.83	0.90		13.86

EXISTING MTD

WQU-121 Vortechs 16000, x2

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
122	7,800	0.18	0.99	992	0.02	0.65	0.20	0.96	3.200	0.61
122A	18,690	0.43	0.99	0	0.00	0.65	0.43	0.99	3.200	1.36
122B	18,559	0.43	0.99	0	0.00	0.65	0.43	0.99	3.200	1.36
122D	8,981	0.21	0.99	0	0.00	0.65	0.21	0.99	3.200	0.67
122E	4,533	0.10	0.99	3,531	0.08	0.65	0.18	0.84	3.200	0.48
123	3,000	0.07	0.99	0	0.00	0.65	0.07	0.99	3.200	0.22
124	12,466	0.29	0.99	4,426	0.10	0.65	0.39	0.9	3.200	1.12
124A	3,268	0.08	0.99	0	0.00	0.65	0.08	0.99	3.200	0.25
124B	3,234	0.07	0.99	2,717	0.06	0.65	0.13	0.83	3.200	0.35
125	19,033	0.30	0.99	9,319	0.21	0.65	0.51	0.85	3.200	1.39
125A	11,147	0.26	0.99	5,593	0.13	0.65	0.39	0.88	3.200	1.10
126	11,400	0.26	0.99	0	0.00	0.65	0.26	0.99	3.200	0.82
127	12,499	0.29	0.99	7,414	0.17	0.65	0.46	0.86	3.200	1.27
128	14,995	0.34	0.99	1,710	0.04	0.65	0.38	0.95	3.200	1.16
129	33,953	0.78	0.99	1,732	0.04	0.65	0.82	0.97	3.200	2.55
130	26,915	0.62	0.99	1,700	0.04	0.65	0.66	0.97	3.200	2.05
		4.71					5.00	0.93		16.76

WQU-201 Vortechs 9000

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
201B	17,931	0.41	0.99	0	0.00	0.65	0.41	0.99	3.200	1.30
201C	17,208	0.40	0.99	0	0.00	0.65	0.40	0.99	3.200	1.27
201D	33,010	0.76	0.99	0	0.00	0.65	0.76	0.99	3.200	2.41
		1.57					1.57	0.99		4.97

WQU-209 Vortechs 16000

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
209A	44,945	1.03	0.99	0	0.00	0.65	1.03	0.99	3.200	3.26
209B	31,800	0.73	0.99	0	0.00	0.65	0.73	0.99	3.200	2.31
209C	7,500	0.17	0.99	0	0.00	0.65	0.17	0.99	3.200	0.54
209D	6,850	0.16	0.99	0	0.00	0.65	0.16	0.99	3.200	0.51
209E	14,832	0.34	0.99	0	0.00	0.65	0.34	0.99	3.200	1.08
		2.43					2.43	0.99		7.70

9, 13x7 Filterra Units- Office Parking Area

Inlet #	Impervious (SF)	Impervious (Ac)	Impervious "C"	Pervious (SF)	Pervious (Ac)	Pervious "C"	Total Area (Ac)	Composite "C"	I (in/hr)	Q=CIA
301	36,769	0.84	0.99	5,262	0.12	0.65	0.96	0.95	3.200	2.92
301A	18,571	0.43	0.99	2,713	0.06	0.65	0.49	0.95	3.200	1.49
301B	19,632	0.45	0.99	2,329	0.05	0.65	0.50	0.96	3.200	1.54
303, x2	30,241	0.69	0.99	6,795	0.16	0.65	0.85	0.93	3.200	2.53
303A	20,178	0.46	0.99	1,602	0.04	0.65	0.50	0.96	3.200	1.54
303B	19,766	0.45	0.99	2,332	0.05	0.65	0.50	0.96	3.200	1.54
304	14,315	0.33	0.99	1,353	0.03	0.65	0.36	0.96	3.200	1.11
305	13,380	0.31	0.99	1,780	0.04	0.65	0.35	0.95	3.200	1.06
		3.96					4.51	0.95		13.73

CONTECH ENGINEERED SOLUTIONS

Sizing Summary

Holtec Technology Center, LLC
Camden, NJ

Information provided by Engineer (T&M Associates):

- Total contributing area = 4.91 acres
- WQ Flowrate = 13.86 cfs
- Contributing Inlets = 111A through 118
- Presiding agency = NJDEP

Sizing Summary:

The CONTECH Engineered Solutions Vortechs® stormwater treatment system is a hydrodynamic separator designed to enhance gravitational separation of floating and settleable materials from stormwater flows. Stormwater flows enter the unit tangentially to the grit chamber, which promotes a gentle swirling motion. As stormwater circles within the grit chamber, pollutants migrate toward the center of the unit where velocities are the lowest. The majority of settleable solids are left behind as stormwater exits the swirl chamber. Stormwater flows then are directed below a floatables baffle wall, where buoyant debris and hydrocarbons are removed. The Vortechs system is NJCAT verified and as a result has received an interim certification from the NJDEP for 50% TSS removal.

For this project the Vortechs system was designed to treat the 2004 NJDEP water quality design storm – a two-hour, variable distribution storm, with a rainfall depth of 1.25" inches. The engineer of record modeled the water quality design storm runoff, and the peak water quality flow rate was determined to be 13.86 cfs.

Water Quality Design Storm Peak Runoff Rate (cfs)	Two Vortechs Model VX 11000 In Parallel Water Quality Treatment Flow Rate (cfs)
13.86	14.00

Maintenance:

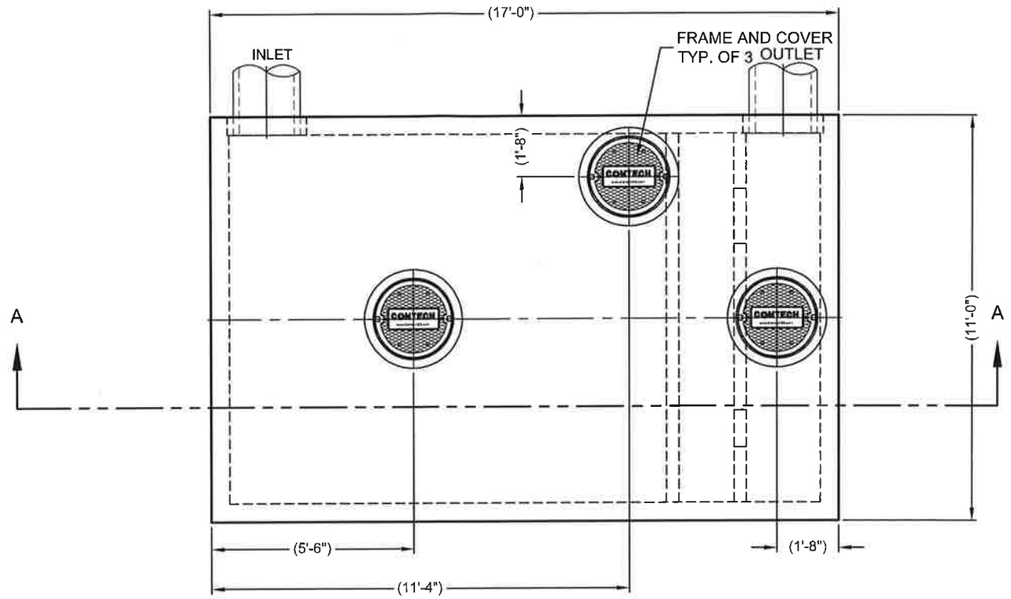
Like any stormwater best management practice, the Vortechs system requires regular inspection and maintenance to ensure optimal performance. Maintenance frequency will be driven by site conditions. Quarterly visual inspections are recommended, at which time the accumulation of pollutants can be determined. On average, the Vortechs system requires annual removal of accumulated pollutants.

Thank you for the opportunity to present this information to you and your client.

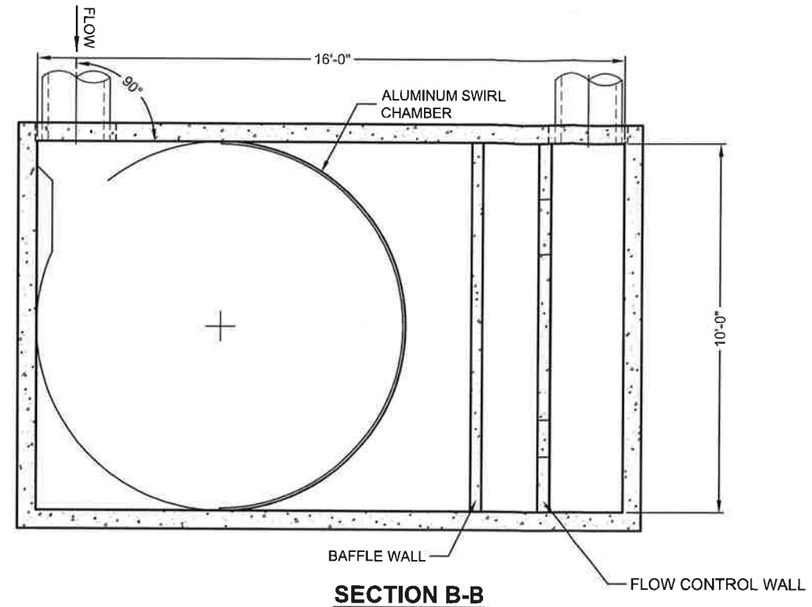
Sincerely,

Andrew Brown, E.I.T.
Stormwater Design Engineer

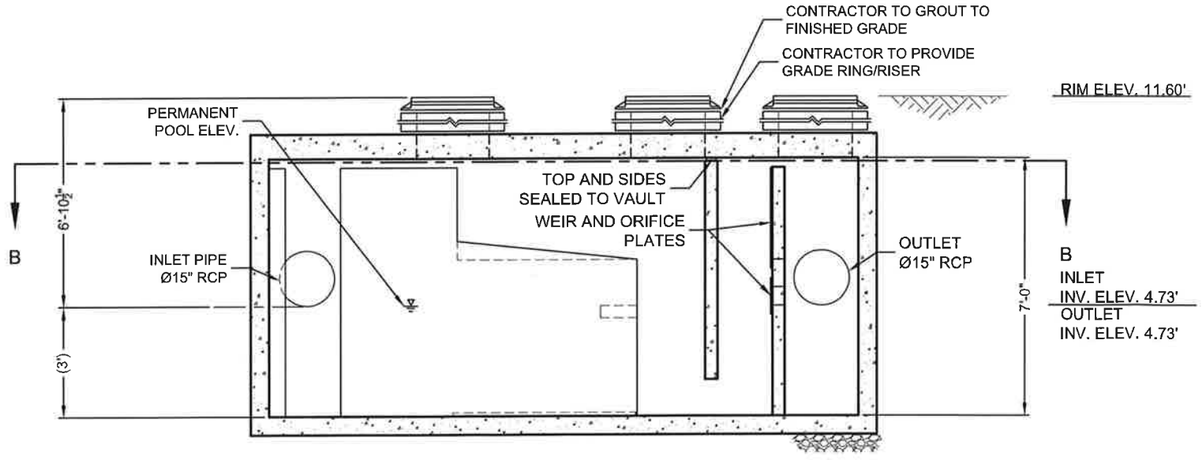
605 Global Way, Suite 113, Linthicum, MD 21090
Toll-free: 866.740.3318 Fax: 866.376.8511



PLAN VIEW



SECTION B-B



SECTION A-A

- BYPASS STRUCTURE INFORMATION -

BYPASS STRUCTURE = 6.0' DIA.
BYPASS WEIR CREST LENGTH = 6.0'
BYPASS WEIR CREST ELEVATION = 7.02'

- NOT SUPPLIED BY CONTECH ENGINEERED SOLUTIONS LLC -

MATERIALS LIST - PROVIDED BY CONTECH

COUNT	DESCRIPTION	INSTALLED BY
1	ALUMINUM SWIRL CHAMBER	CONTECH
1	ALUMINUM WEIR PLATE	CONTECH
1	ALUMINUM ORIFICE PLATE	CONTECH
1	SWIRL CHAMBER SEALANT	CONTECH
1	SEALANT FOR JOINTS	CONTRACTOR
3	Ø24" x 4" FRAME AND COVER	CONTRACTOR

SITE DESIGN DATA

WATER QUALITY FLOW RATE	6.93 cfs
PEAK FLOW RATE	OFFLINE
RETURN PERIOD OF PEAK FLOW	N/A

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED VAULT DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. VORTECHS WATER QUALITY VAULT SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET AASHTO M306 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM
6. ACTUAL GROUNDWATER ELEVATION.
7. WATER SURFACE ELEVATION IN THE VORTECHS SYSTEM IS EXPECTED TO BE AT OR BELOW TOP OF FLOW CONTROL WALL DURING THE DESIGN STORM.
8. GROUND WATER ELEVATION ASSUMED AT INLET PIPE INVERT.

INSTALLATION NOTES

1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE VORTECHS VAULT (LIFTING CLUTCHES PROVIDED).
3. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL VAULT JOINTS AND ASSEMBLE VAULT.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
5. CONTRACTOR TO PROVIDE ANY EXTERNAL BYPASS VAULTS REQUIRED FOR OFFLINE LAYOUT (UNLESS OTHERWISE SPECIFIED.
6. CONTRACTOR TO PROVIDE AND INSTALL MANHOLE RISERS, GRADE RINGS OR BLOCK REQUIRED BETWEEN THE TOP OF THE VORTECHS SYSTEM AND THE BASE OF THE MANHOLE FRAMES. TOP SLAB OPENING DIAMETER MAY BE DIFFERENT FROM THOSE SHOWN.

STRUCTURE WEIGHT

APPROXIMATE HEAVIEST PICK = 56,000 LBS.

Vortechs®

THIS PRODUCT MAY BE PROTECTED BY THE FOLLOWING U.S. PATENT: 5,759,415; RELATED FOREIGN PATENTS.

CONTECH **PROPOSAL** DRAWING

CIL
LS/LS

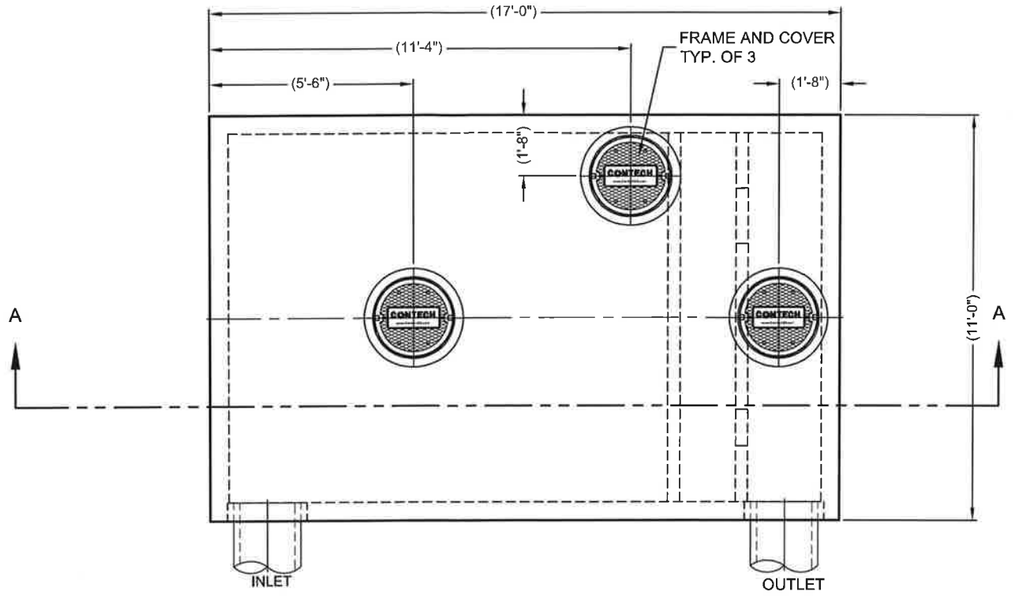
MARK	DATE	REVISION DESCRIPTION	BY
1	2/29/15	UPDATED SITE DESIGNATION AND ELEV.	TAB

Vortechs 11000 - 517619-240
Holtec Technology Center, LLC
Camden, NJ
SITE DESIGNATION: WQU-110A

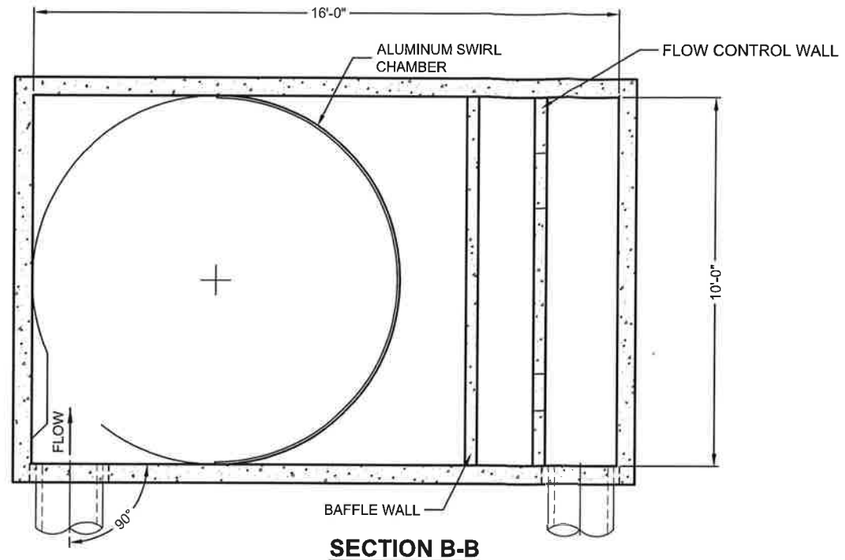
CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9026 Corporate Circle Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

Vortechs®

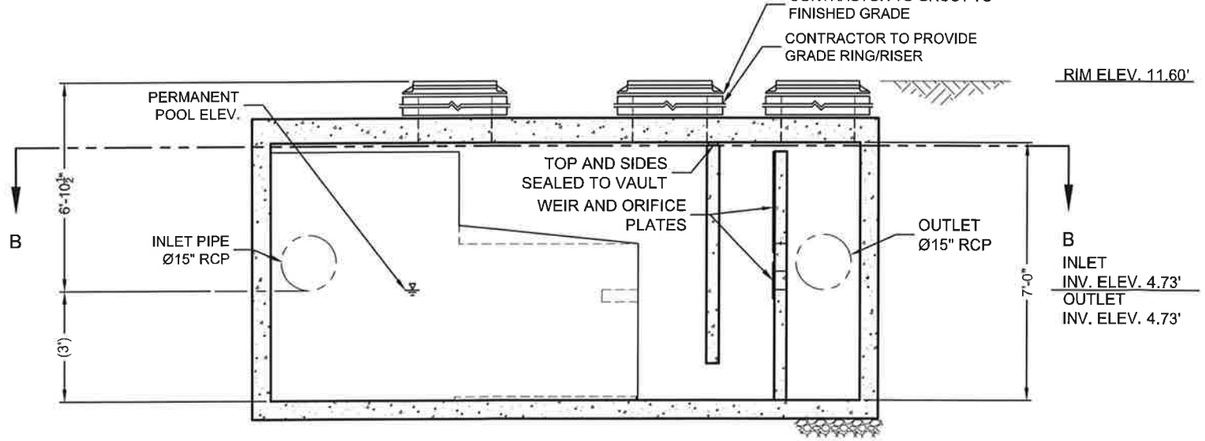
DATE: 4/16/15
DESIGNED: #### | DRAWN: TAB
CHECKED: | APPROVED:
PROJECT NUMBER: 517619
SHEET: 1 OF #



PLAN VIEW



SECTION B-B



SECTION A-A

- BYPASS STRUCTURE INFORMATION -

BYPASS STRUCTURE = 6.0' DIA.
BYPASS WEIR CREST LENGTH = 6.0'
BYPASS WEIR CREST ELEVATION = 7.02'

- NOT SUPPLIED BY CONTECH ENGINEERED SOLUTIONS LLC -

MATERIALS LIST - PROVIDED BY CONTECH

COUNT	DESCRIPTION	INSTALLED BY
1	ALUMINUM SWIRL CHAMBER	CONTECH
1	ALUMINUM WEIR PLATE	CONTECH
1	ALUMINUM ORIFICE PLATE	CONTECH
1	SWIRL CHAMBER SEALANT	CONTECH
1	SEALANT FOR JOINTS	CONTRACTOR
3	Ø24" x 4" FRAME AND COVER	CONTRACTOR

SITE DESIGN DATA

WATER QUALITY FLOW RATE	6.93 cfs
PEAK FLOW RATE	OFFLINE
RETURN PERIOD OF PEAK FLOW	N/A

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED VAULT DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. VORTECHS WATER QUALITY VAULT SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET AASHTO M306 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM
6. ACTUAL GROUNDWATER ELEVATION.
7. WATER SURFACE ELEVATION IN THE VORTECHS SYSTEM IS EXPECTED TO BE AT OR BELOW TOP OF FLOW CONTROL WALL DURING THE DESIGN STORM.
8. GROUND WATER ELEVATION ASSUMED AT INLET PIPE INVERT.

INSTALLATION NOTES

1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE VORTECHS VAULT (LIFTING CLUTCHES PROVIDED).
3. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL VAULT JOINTS AND ASSEMBLE VAULT.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
5. CONTRACTOR TO PROVIDE ANY EXTERNAL BYPASS VAULTS REQUIRED FOR OFFLINE LAYOUT (UNLESS OTHERWISE SPECIFIED.
6. CONTRACTOR TO PROVIDE AND INSTALL MANHOLE RISERS, GRADE RINGS OR BLOCK REQUIRED BETWEEN THE TOP OF THE VORTECHS SYSTEM AND THE BASE OF THE MANHOLE FRAMES. TOP SLAB OPENING DIAMETER MAY BE DIFFERENT FROM THOSE SHOWN.

STRUCTURE WEIGHT

APPROXIMATE HEAVIEST PICK = 56,000 LBS.

Vortechs®

CONTECH
PROPOSAL
DRAWING

GIL
RS/RS

MARK	DATE	REVISION DESCRIPTION	TAB	BY
1	4/29/15	UPDATE SITE DESIGNATION AND ELEV.		

Vortechs 11000 - 517619-250
Holtec Technology Center, LLC
Camden, NJ
SITE DESIGNATION: WQU-110B

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

Vortechs®

DATE: 4/16/15
DESIGNED: #### | DRAWN: TAB
CHECKED: | APPROVED:
PROJECT NUMBER: 517619
SHEET: 1 OF #

VORTECHS SYSTEM® FLOW CALCULATIONS
HOLTEC TECHNOLOGY CENTER
CAMDEN, NJ
MODEL NAME VORTECHS 11000
SITE DESIGNATION WQU-110A

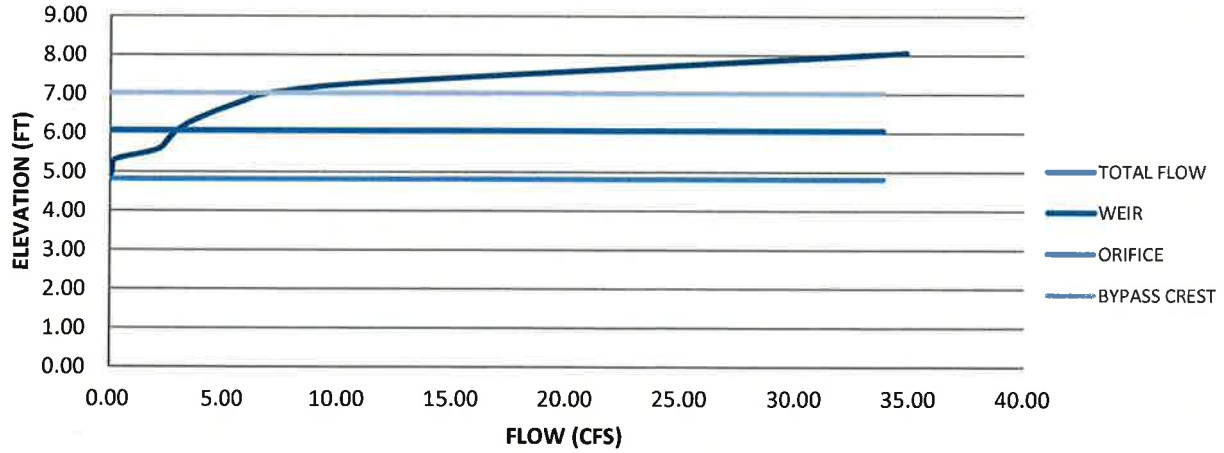
CONTECH ENGINEERED SOLUTIONS

Vortechs Orifice	Vortechs Weir	Bypass Weir
Cd = 0.56	Cd = 3.37	Cd = 3.3
A (ft^2) = 0.65	Weir Crest Length (ft) = 0.92	Crest Length (ft) = 6
Crest Elevation (ft) = 4.81	Crest Elevation (ft) = 6.06	Crest Elev. (ft) = 7.02

Head (ft)	Elevation (ft)	Orifice Flow (cfs)	Weir Flow (cfs)	Bypass Flow (cfs)	Total Flow (cfs)
0.00	4.81	0.00	0.00	0.00	0.00
0.25	5.06	0.08	0.00	0.00	0.08
0.50	5.31	0.23	0.00	0.00	0.23
0.75	5.56	2.05	0.00	0.00	2.05
1.00	5.81	2.51	0.00	0.00	2.51
1.25	6.06	2.90	0.00	0.00	2.90
1.50	6.31	3.24	0.39	0.00	3.63
1.75	6.56	3.55	1.10	0.00	4.65
2.00	6.81	3.84	2.01	0.00	5.85
2.21	7.02	4.06	2.90	0.00	6.96
2.46	7.27	4.31	4.11	2.48	10.89
3.25	8.06	5.02	8.76	21.06	34.85
2.20	7.01	4.05	2.88	0.00	6.93
2.71	8.07	4.78	8.80	21.27	34.85

Calculated by: TAB | 4/16/15

VORTECHS STAGE DISCHARGE CURVE



VORTECHS SYSTEM® FLOW CALCULATIONS
HOLTEC TECHNOLOGY CENTER
CAMDEN, NJ
MODEL NAME VORTECHS 11000
SITE DESIGNATION WQU-110B

CONTECH ENGINEERED SOLUTIONS

Vortechs Orifice
Cd = 0.56
A (ft^2) = 0.65
Crest Elevation (ft) = 4.81

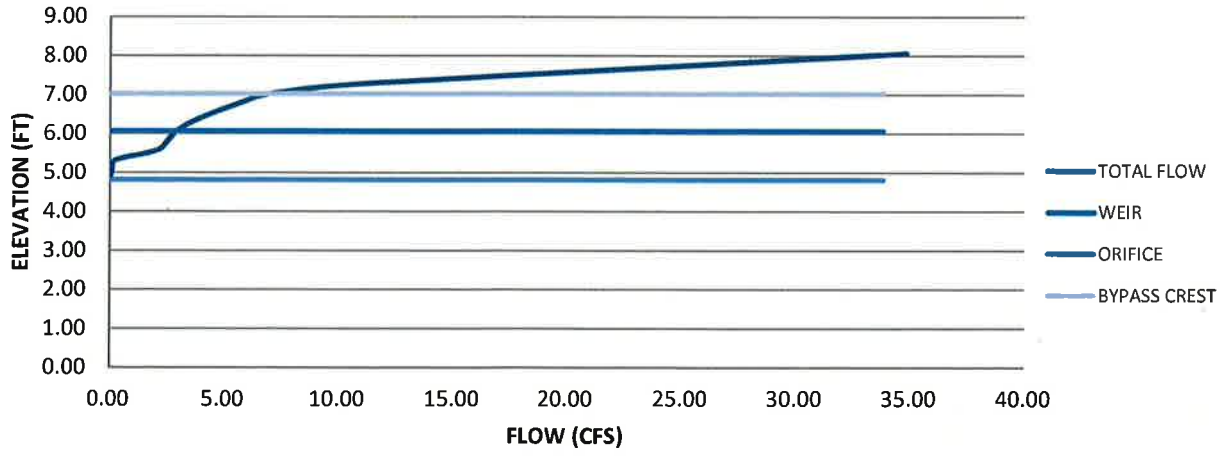
Vortechs Weir
Cd = 3.37
Weir Crest Length (ft) = 0.92
Crest Elevation (ft) = 6.06

Bypass Weir
Cd = 3.3
Crest Length (ft) = 6
Crest Elev. (ft) = 7.02

Head (ft)	Elevation (ft)	Orifice Flow (cfs)	Weir Flow (cfs)	Bypass Flow (cfs)	Total Flow (cfs)
0.00	4.81	0.00	0.00	0.00	0.00
0.25	5.06	0.08	0.00	0.00	0.08
0.50	5.31	0.23	0.00	0.00	0.23
0.75	5.56	2.05	0.00	0.00	2.05
1.00	5.81	2.51	0.00	0.00	2.51
1.25	6.06	2.90	0.00	0.00	2.90
1.50	6.31	3.24	0.39	0.00	3.63
1.75	6.56	3.55	1.10	0.00	4.65
2.00	6.81	3.84	2.01	0.00	5.85
2.21	7.02	4.06	2.90	0.00	6.96
2.46	7.27	4.31	4.11	2.48	10.89
3.25	8.06	5.02	8.76	21.06	34.85
2.20	7.01	4.05	2.88	0.00	6.93
2.71	8.07	4.78	8.80	21.27	34.85

Calculated by: TAB | 4/16/15

VORTECHS STAGE DISCHARGE CURVE



EXISTING WQ UNITS 110

Sizing Summary

Holtec Technology Center, LLC

Camden, NJ

Information provided by Engineer (T&M Associates):

- Total contributing area = 4.91 acres
- WQ Flowrate = 13.86 cfs
- Contributing Inlets = 111A through 118
- Presiding agency = NJDEP

Sizing Summary:

The CONTECH Engineered Solutions Vortechs® stormwater treatment system is a hydrodynamic separator designed to enhance gravitational separation of floating and settleable materials from stormwater flows. Stormwater flows enter the unit tangentially to the grit chamber, which promotes a gentle swirling motion. As stormwater circles within the grit chamber, pollutants migrate toward the center of the unit where velocities are the lowest. The majority of settleable solids are left behind as stormwater exits the swirl chamber. Stormwater flows then are directed below a floatables baffle wall, where buoyant debris and hydrocarbons are removed. The Vortechs system is NJCAT verified and as a result has received an interim certification from the NJDEP for 50% TSS removal.

For this project the Vortechs system was designed to treat the 2004 NJDEP water quality design storm – a two-hour, variable distribution storm, with a rainfall depth of 1.25" inches. The engineer of record modeled the water quality design storm runoff, and the peak water quality flow rate was determined to be 13.86 cfs.

Water Quality Design Storm Peak Runoff Rate (cfs)	Two Vortechs Model VX 11000 In Parallel Water Quality Treatment Flow Rate (cfs)
13.86	14.00

Maintenance:

Like any stormwater best management practice, the Vortechs system requires regular inspection and maintenance to ensure optimal performance. Maintenance frequency will be driven by site conditions. Quarterly visual inspections are recommended, at which time the accumulation of pollutants can be determined. On average, the Vortechs system requires annual removal of accumulated pollutants.

Thank you for the opportunity to present this information to you and your client.

Sincerely,

Andrew Brown, E.I.T.
Stormwater Design Engineer

605 Global Way, Suite 113, Linthicum, MD 21090
Toll-free: 866.740.3318 Fax: 866.376.8511

filterra
Bioretention Systems

Table 1: Filterra® Quick Sizing Table (New Jersey)

Available Filterra® Box Sizes (feet)	Recommended Commercial Contributing Drainage Area (acres) where C = 0.85	Outlet Pipe
4x4	up to 0.10	4" SDR-35 PVC
4x6 or 6x4	0.10 to 0.15	4" SDR-35 PVC
4x8 or 8x4	0.16 to 0.21	4" SDR-35 PVC
6x6	0.22 to 0.23	4" SDR-35 PVC
6x8 or 8x6	0.24 to 0.31	4" SDR-35 PVC
6x10 or 10x6	0.32 to 0.39	6" SDR-35 PVC
6x12 or 12x6	0.40 to 0.46	6" SDR-35 PVC
7x13 or 13x7	0.47 to 0.59	6" SDR-35 PVC

Notes:

1. All boxes are a standard 3.5 feet depth (INV to TC)
2. A standard SDR-35 PVC pipe coupling is cast into the wall for easy connection to discharge drain.
3. Dimensions shown are internal. Please add 1' to each external dimensions (using 6" walls).
4. For Commerical Developments a minimum (runoff coefficient) C factor of 0.85 is required. For Residential Developments, use of C factors less than 0.5 require individual site review by Filterra.
5. Please ask for sizing tables for other target treatment goals.
6. This sizing table is valid for NJ following NJDEP Water Quality Design Storm Event of 1.25" in 2 hours using the Modified Rational Method to match peak flow with FT capacity as allowed by NJDEP.
7. Filterra infiltration rate 140"/hour.
8. Standard Filterra design (0.5' headspace, 2.5' filter depth)
9. NCRS TR-55 to capture routed volume in FT headspace as allowed by NJDEP.9

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
Mail Code 401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

May 19, 2015

Derek M. Berg
CONTECH Engineered Solutions, LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Lab Certification for the
Filterra Bioretention System
By CONTECH Engineered Solutions, LLC

TSS Removal Rate: 80%

Dear Mr. Berg:

This certification letter is being written to update the Filterra Bioretention System lab certification to reflect an ownership change from Filterra Bioretention System, A Division of Americast, Inc. to Contech Engineered Solutions, LLC.

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Filterra® Bioretention Systems has requested a Laboratory Certification for the Filterra Bioretention System.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the Filterra Bioretention System by Contech Engineered Solutions, LLC at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix.

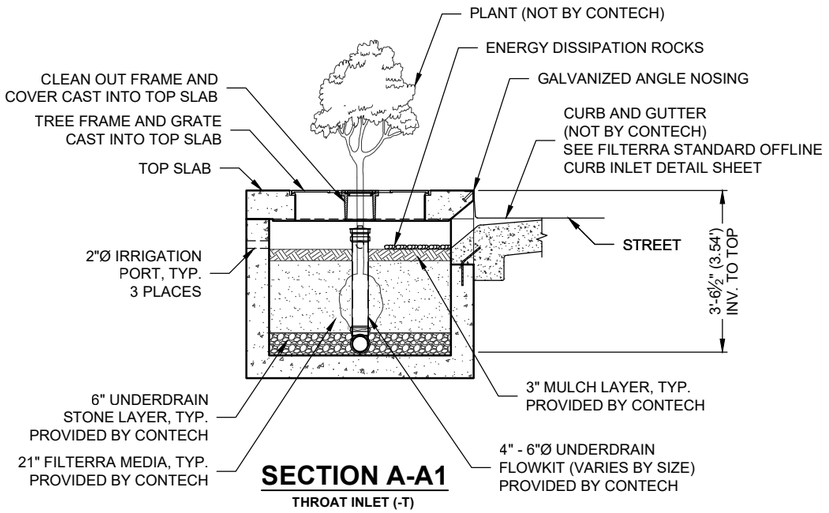
Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance of the New Jersey Stormwater Best Management Manual.

If you have any questions regarding the above information, please contact Titus Magnanao, of my office at (609) 633-7021.

Sincerely,

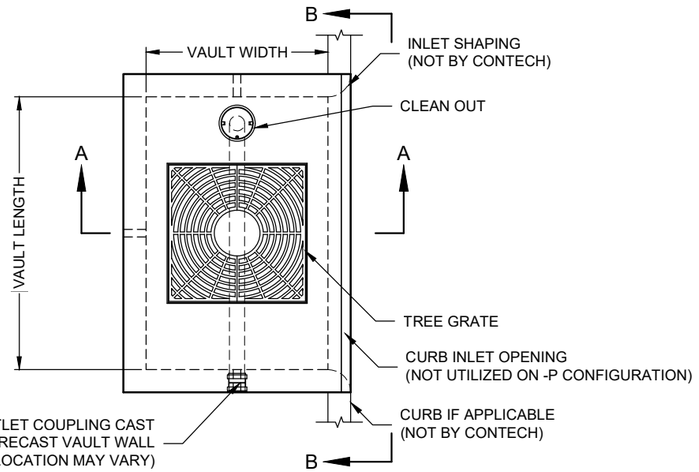
James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

C: Chron File
Richard Magee, NJCAT
Madhu Guru, DLUR
Elizabeth Dragon, BNPC
Lisa Schaefer, BNPC
Titus Magnanao, BNPC
Ravi Patraju, NJDEP

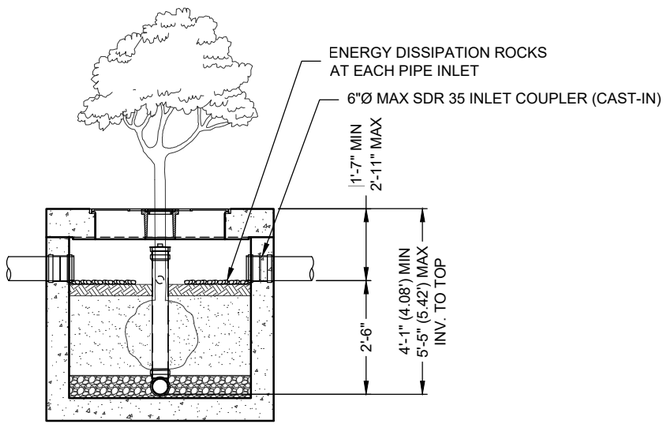


SECTION A-A1

THROAT INLET (-T)

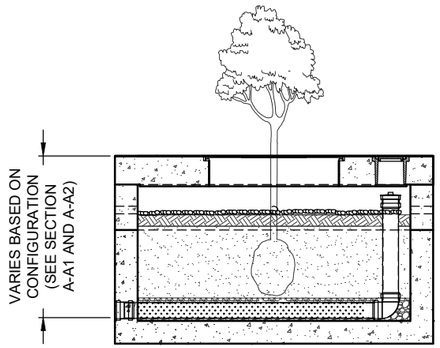


PLAN VIEW

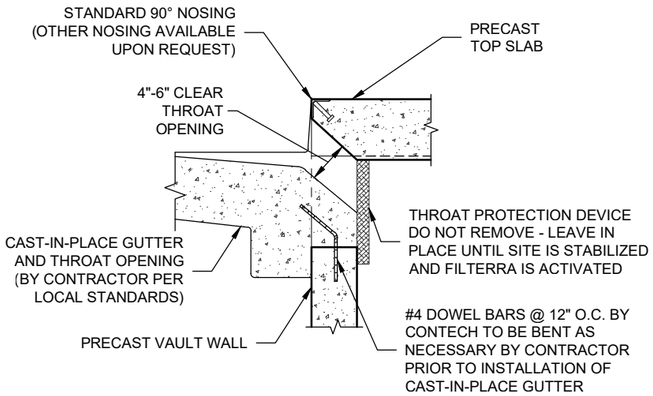


SECTION A-A2

PIPE INLET (-P)



SECTION B-B



STANDARD CURB INLET DETAIL

FT CONFIGURATION

(OPTIONS: THROAT INLET "-T", PIPE INLET "-P")

VAULT SIZE (L x W)	MEDIA AREA (SF)	LONG SIDE INLET DESIG. / PART NO.	SHORT SIDE INLET DESIG. / PART NO.	AVAILABILITY	OUTLET PIPE DIA	MIN. NO. OF INLET PIPES (-P ONLY)
4 x 4	16	FT0404	FT0404	ALL	4" SDR 35	1
6 x 4	24	FT0604	FT0406	ALL	4" SDR 35	1
8 x 4	32	FT0804	FT0408	ALL (EXCEPT DE,MD,NJ,PA,VA,WV)	4" SDR 35	1
7.83 x 4.5	35	FT078045	FT045078	DE,MD,NJ,PA,VA.WV ONLY	4" SDR 35	1
6 x 6	36	FT0606	FT0606	ALL (EXCEPT CA, TX)	4" SDR 35	1
8 x 6	48	FT0806	FT0608	ALL	4" SDR 35	1
10 x 6	60	FT1006	FT0610	ALL (EXCEPT CA, TX)	6" SDR 35	2
8 x 8	64	FT0808	FT0808	CA, TX ONLY	6" SDR 35	2
12 x 6	72	FT1206	FT0612	ALL (EXCEPT TX)	6" SDR 35	2
10 x 8	80	FT1008	FT0810	CA, TX ONLY	6" SDR 35	2
13 x 7	91	FT1307	FT0713	ALL (EXCEPT CA, TX)	6" SDR 35	2
12 x 8	96	FT1208	FT0812	CA, TX ONLY	6" SDR 35	2
14 x 8	112	FT1408†	N/A	ALL	6" SDR 35	3
16 x 8	128	FT1608†	N/A	ALL (EXCEPT OR,WA)	6" SDR 35	3
15 x 9	135	FT1509†	N/A	OR,WA ONLY	6" SDR 35	3
18 x 8	144	FT1808†	N/A	CALL CONTECH	6" SDR 35	3
20 x 8	160	FT2008†	N/A	CALL CONTECH	6" SDR 35	4
22 x 8	176	FT2208†	N/A	CALL CONTECH	6" SDR 35	4

†UTILIZES (2) CURB OPENINGS WITH MIN 6" SPACING

INTERNAL PIPE CONFIGURATION MAY VARY DEPENDING ON VAULT SIZE

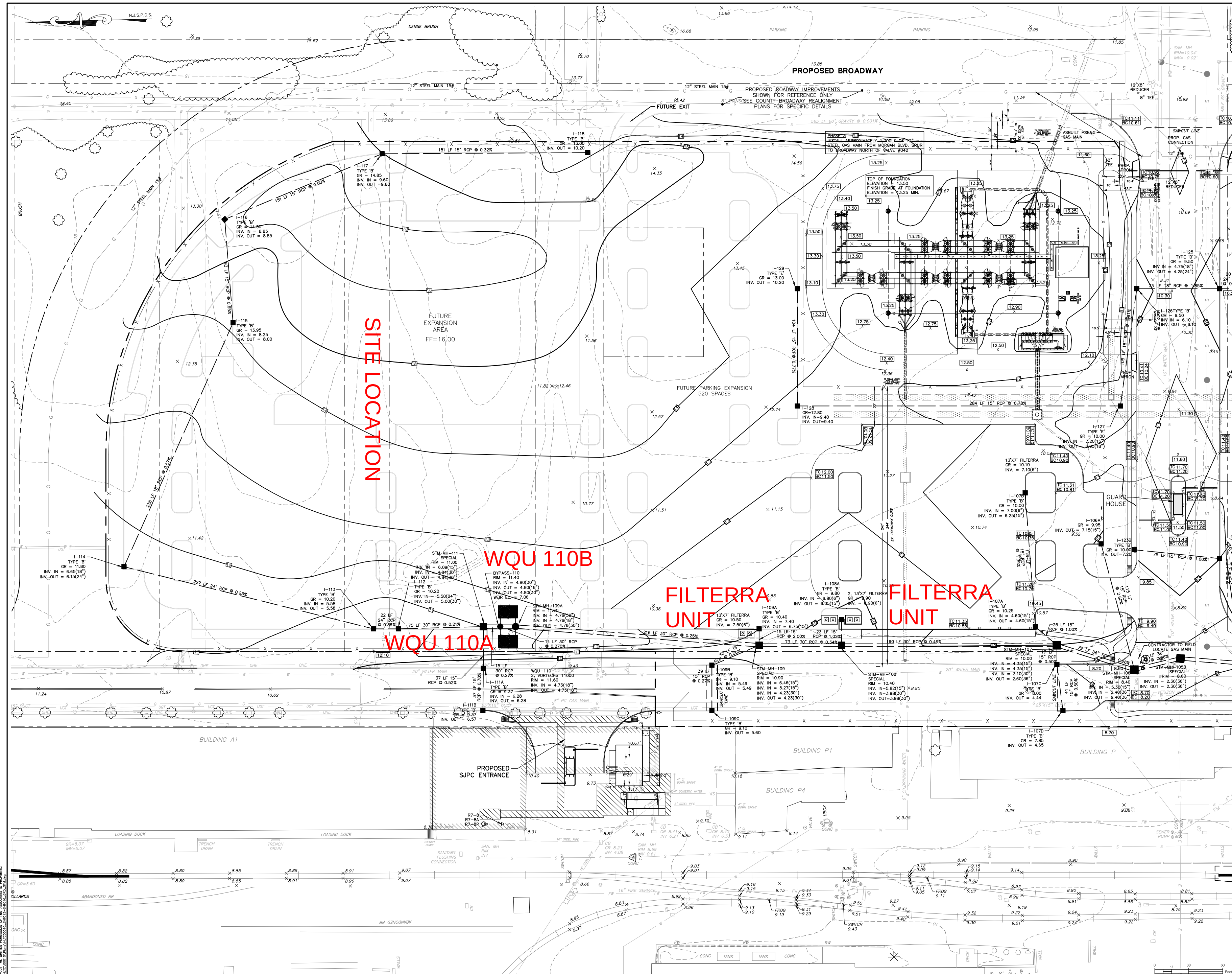
filterra®

FOR PATENT INFORMATION, GO TO www.ContechES.com/IP

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9100 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

FILTERRA OFFLINE (FT) CONFIGURATION DETAIL

PROPOSED WQ UNITS



YOUR GOALS. OUR MISSION.
Corporate Headquarters
11 Tindall Road
Middletown, NJ 07748
www.tandmassociates.com
Offices Located in:
Delaware, Indiana, Kentucky, Massachusetts, Michigan, New Jersey, Ohio and Pennsylvania
NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
CERTIFICATE OF AUTHORIZATION 24GA27987500

David J. Fleming, P.E.
Vice President
9/15/2016
LICENSED PROFESSIONAL ENGINEER
STATE OF NJ LICENSE No. 24GE03321600

NO.	DATE	REVISIONS	BY
11	9/15/16	FINAL CONSTRUCTION PLANS	KRH
10	7/29/16	GENERAL REVISIONS	KRH
9	7/7/16	REVISED PER CONTRACTOR'S COMMENTS	FWD
8	3/8/16	REVISED PER OWNER & CONTRACTOR'S COMMENTS	FWD
7	1/7/16	REVISED PER CONTRACTOR & ARCHITECT'S COMMENTS	JMH
6	10/2/15	REVISED PER OWNER'S COMMENTS	FWD
5	8/11/15	REVISED PER NJDEP SUBMISSION	KRH
4	7/29/15	REVISED STORMWATER TREATMENT DEVICES	FWD
3	7/15/15	REVISED PER OWNER'S COMMENTS	FWD
2	6/9/15	REVISED PER CITY ENGINEER'S COMMENTS	FWD
1	6/1/15	REVISED PER OWNER'S COMMENTS	FWD

HOLTEC TECHNOLOGY CENTER, LLC

HOLTEC TECHNOLOGY CENTER
BLOCK 457 - LOT 16, P/O BLOCK 455 - LOT 1
BLOCKS 511, 512, 514 AND 515
CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

GRADING & STORMWATER PLAN 4

DESIGNED BY	ERL	PROJECT NO.	HLTC00010
CHECKED BY	ERL	DATE	2/17/2015
DRAWN BY	FWD	SCALE	1" =30'
DRAWING			

SHEET 16 of 54

NOAA Atlas 14, Volume 2, Version 3
Location name: Camden, New Jersey, USA*
Latitude: 39.9146°, Longitude: -75.1189°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.18** (3.83-4.55)	**4.98** (4.56-5.42)	**5.87** (5.36-6.40)	**6.50** (5.94-7.09)	**7.27** (6.61-7.93)	**7.81** (7.06-8.54)	**8.34** (7.51-9.16)	**8.82** (7.88-9.72)	**9.40** (8.30-10.4)	**9.83** (8.60-11.0)
10-min	**3.34** (3.06-3.64)	**3.98** (3.65-4.34)	**4.70** (4.30-5.12)	**5.20** (4.75-5.67)	**5.80** (5.27-6.32)	**6.22** (5.62-6.80)	**6.63** (5.96-7.27)	**6.99** (6.25-7.70)	**7.43** (6.56-8.24)	**7.74** (6.78-8.63)
15-min	**2.78** (2.55-3.03)	**3.34** (3.06-3.64)	**3.96** (3.62-4.32)	**4.38** (4.00-4.78)	**4.90** (4.45-5.34)	**5.25** (4.74-5.74)	**5.59** (5.03-6.12)	**5.88** (5.25-6.48)	**6.24** (5.51-6.91)	**6.48** (5.67-7.22)
30-min	**1.90** (1.75-2.08)	**2.30** (2.11-2.51)	**2.81** (2.57-3.07)	**3.17** (2.90-3.47)	**3.63** (3.30-3.96)	**3.95** (3.57-4.32)	**4.28** (3.85-4.69)	**4.58** (4.09-5.04)	**4.96** (4.38-5.50)	**5.25** (4.59-5.85)
60-min	**1.19** (1.09-1.30)	**1.45** (1.33-1.58)	**1.80** (1.65-1.97)	**2.07** (1.89-2.26)	**2.42** (2.19-2.64)	**2.68** (2.42-2.93)	**2.95** (2.65-3.23)	**3.21** (2.87-3.54)	**3.56** (3.14-3.94)	**3.83** (3.35-4.27)
2-hr	**0.716** (0.652-0.784)	**0.870** (0.794-0.953)	**1.09** (0.994-1.20)	**1.26** (1.14-1.38)	**1.48** (1.34-1.63)	**1.66** (1.49-1.82)	**1.84** (1.64-2.02)	**2.02** (1.78-2.23)	**2.26** (1.98-2.52)	**2.45** (2.12-2.74)
3-hr	**0.521** (0.476-0.572)	**0.633** (0.578-0.695)	**0.796** (0.724-0.873)	**0.921** (0.836-1.01)	**1.09** (0.984-1.20)	**1.23** (1.10-1.35)	**1.37** (1.22-1.51)	**1.51** (1.33-1.67)	**1.71** (1.48-1.90)	**1.86** (1.60-2.08)
6-hr	**0.326** (0.298-0.358)	**0.394** (0.360-0.434)	**0.493** (0.449-0.543)	**0.573** (0.520-0.630)	**0.687** (0.618-0.756)	**0.780** (0.696-0.859)	**0.879** (0.777-0.971)	**0.983** (0.858-1.09)	**1.13** (0.969-1.26)	**1.25** (1.06-1.41)
12-hr	**0.196** (0.180-0.217)	**0.237** (0.217-0.262)	**0.299** (0.272-0.330)	**0.350** (0.318-0.386)	**0.427** (0.383-0.470)	**0.491** (0.436-0.542)	**0.562** (0.492-0.622)	**0.639** (0.551-0.711)	**0.753** (0.634-0.843)	**0.849** (0.701-0.957)
24-hr	**0.113** (0.104-0.122)	**0.136** (0.126-0.148)	**0.173** (0.160-0.188)	**0.204** (0.188-0.221)	**0.250** (0.229-0.270)	**0.289** (0.263-0.312)	**0.332** (0.300-0.357)	**0.379** (0.340-0.408)	**0.450** (0.398-0.483)	**0.509** (0.445-0.547)
2-day	**0.065** (0.059-0.070)	**0.078** (0.072-0.085)	**0.100** (0.092-0.108)	**0.117** (0.108-0.127)	**0.143** (0.130-0.155)	**0.165** (0.150-0.179)	**0.189** (0.170-0.204)	**0.214** (0.192-0.232)	**0.252** (0.223-0.273)	**0.284** (0.248-0.307)
3-day	**0.046** (0.042-0.050)	**0.055** (0.051-0.060)	**0.070** (0.064-0.076)	**0.082** (0.075-0.089)	**0.100** (0.091-0.108)	**0.115** (0.104-0.124)	**0.131** (0.118-0.141)	**0.148** (0.133-0.160)	**0.174** (0.154-0.188)	**0.195** (0.171-0.211)
4-day	**0.036** (0.033-0.039)	**0.043** (0.040-0.047)	**0.055** (0.051-0.060)	**0.064** (0.059-0.070)	**0.078** (0.071-0.084)	**0.089** (0.081-0.097)	**0.102** (0.092-0.110)	**0.115** (0.103-0.124)	**0.134** (0.120-0.145)	**0.150** (0.133-0.163)
7-day	**0.024** (0.022-0.026)	**0.029** (0.027-0.031)	**0.036** (0.033-0.039)	**0.042** (0.039-0.045)	**0.050** (0.046-0.054)	**0.057** (0.053-0.062)	**0.065** (0.059-0.070)	**0.073** (0.066-0.079)	**0.085** (0.076-0.092)	**0.095** (0.084-0.103)
10-day	**0.019** (0.018-0.020)	**0.023** (0.021-0.024)	**0.028** (0.026-0.030)	**0.032** (0.030-0.034)	**0.038** (0.035-0.041)	**0.043** (0.040-0.046)	**0.048** (0.044-0.051)	**0.053** (0.049-0.057)	**0.061** (0.055-0.066)	**0.068** (0.061-0.073)
20-day	**0.013** (0.012-0.014)	**0.015** (0.014-0.016)	**0.018** (0.017-0.019)	**0.021** (0.019-0.022)	**0.024** (0.022-0.025)	**0.027** (0.025-0.028)	**0.029** (0.027-0.031)	**0.032** (0.030-0.034)	**0.035** (0.033-0.038)	**0.038** (0.035-0.041)
30-day	**0.011** (0.010-0.011)	**0.013** (0.012-0.013)	**0.015** (0.014-0.016)	**0.016** (0.016-0.017)	**0.019** (0.018-0.020)	**0.020** (0.019-0.022)	**0.022** (0.021-0.023)	**0.024** (0.022-0.025)	**0.026** (0.024-0.028)	**0.028** (0.026-0.030)
45-day	**0.009** (0.009-0.009)	**0.011** (0.010-0.011)	**0.012** (0.012-0.013)	**0.014** (0.013-0.014)	**0.015** (0.014-0.016)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.019** (0.017-0.020)	**0.020** (0.019-0.021)	**0.021** (0.020-0.022)
60-day	**0.008** (0.008-0.009)	**0.009** (0.009-0.010)	**0.011** (0.010-0.011)	**0.012** (0.011-0.013)	**0.013** (0.013-0.014)	**0.014** (0.013-0.015)	**0.015** (0.014-0.016)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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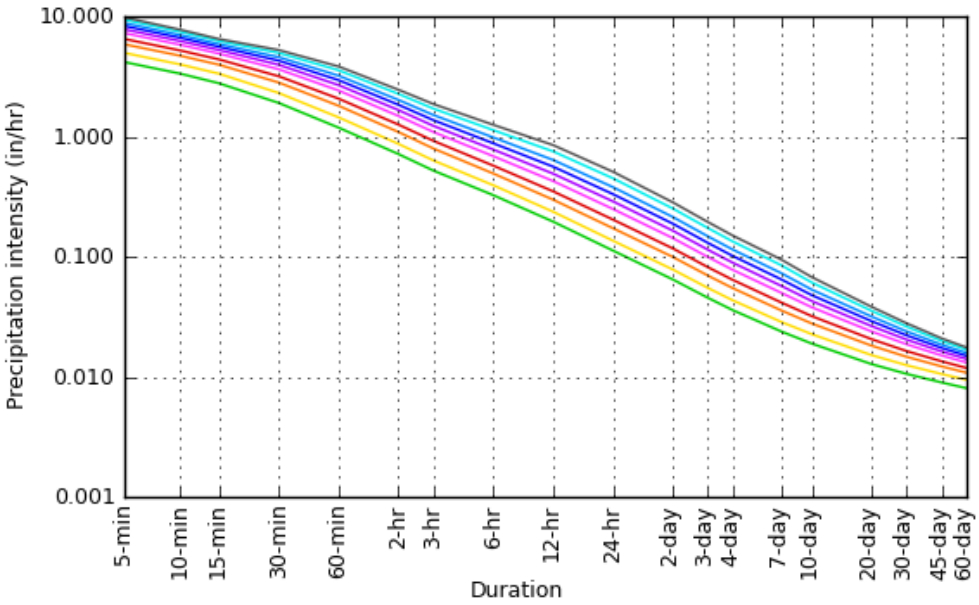
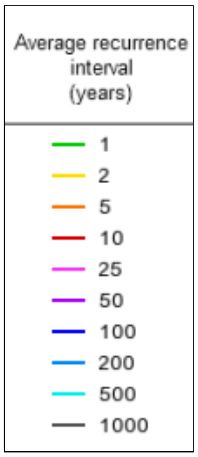
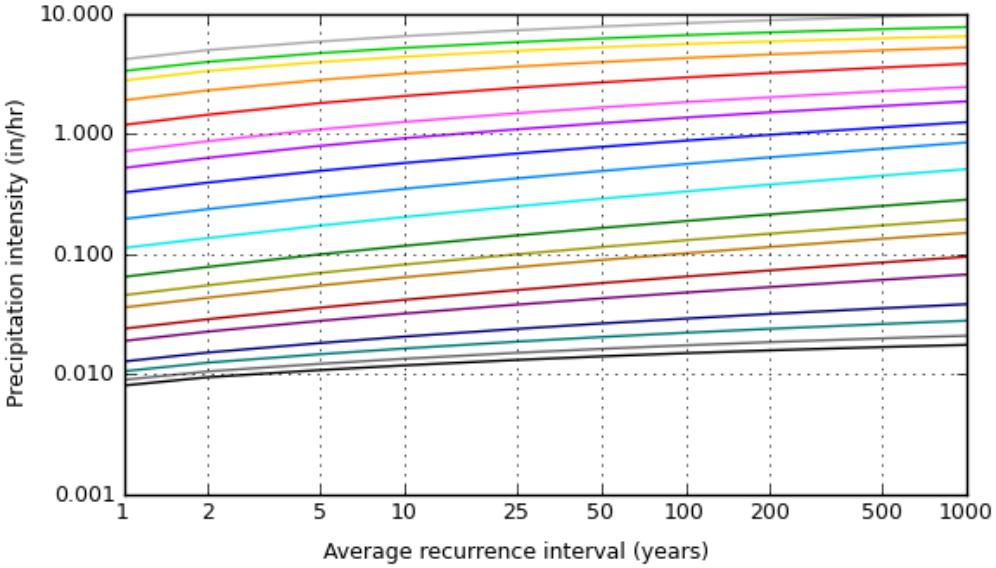
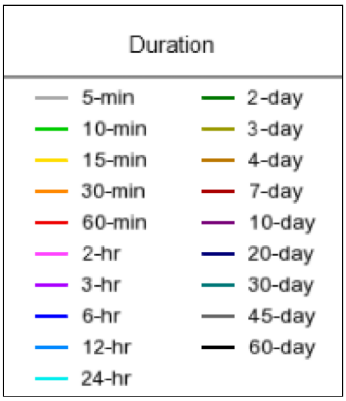
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 39.9146°, Longitude: -75.1189°









NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Thu Apr 20 19:16:39 2023

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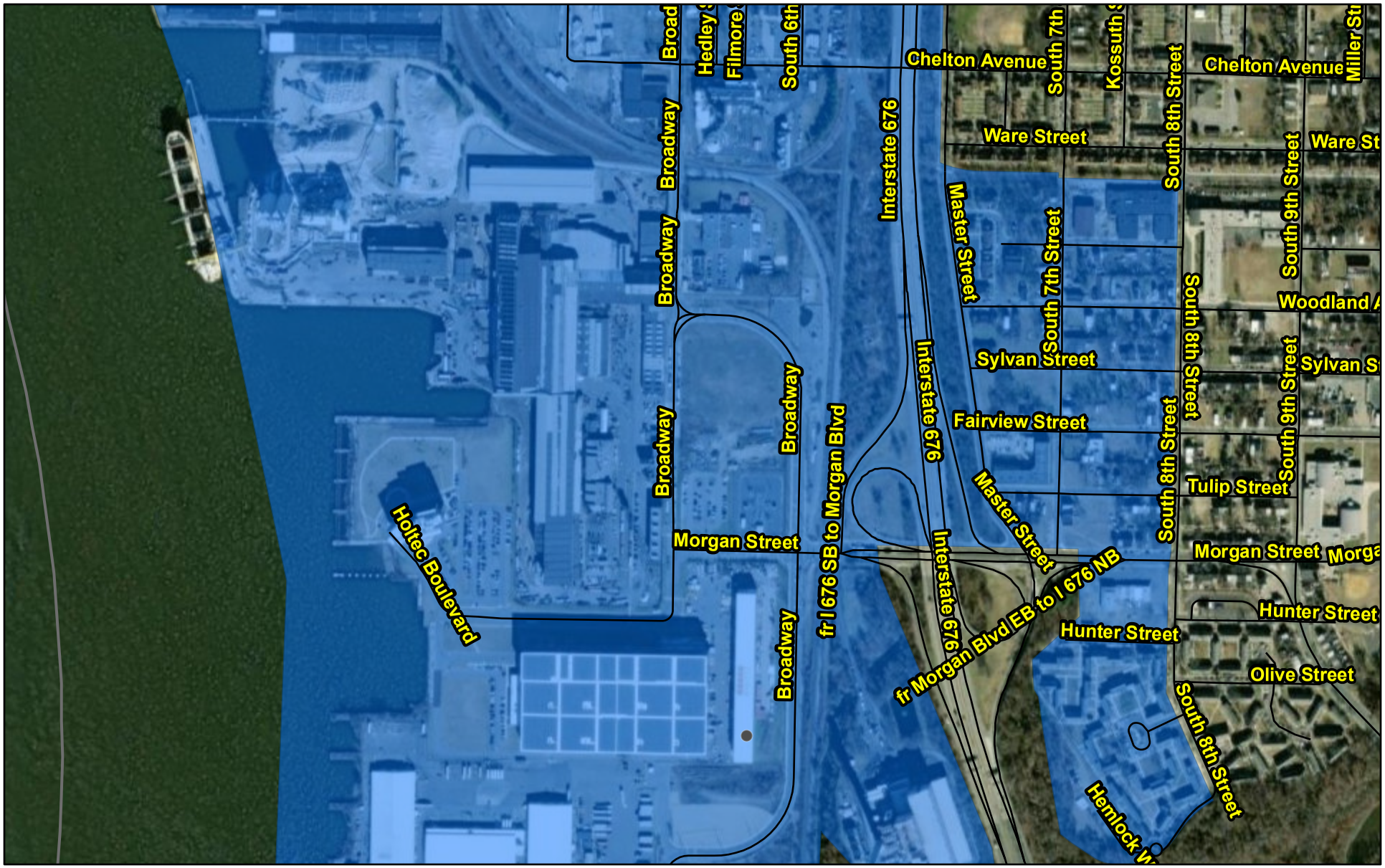
Maps & aerials

Small scale terrain

URBAN AREA



8/21/2024, 2:51:36 PM

County Boundaries

Urban Enterprise Zones

Road Centerlines of NJ

1:9,028

0 0.05 0.1 0.2 mi

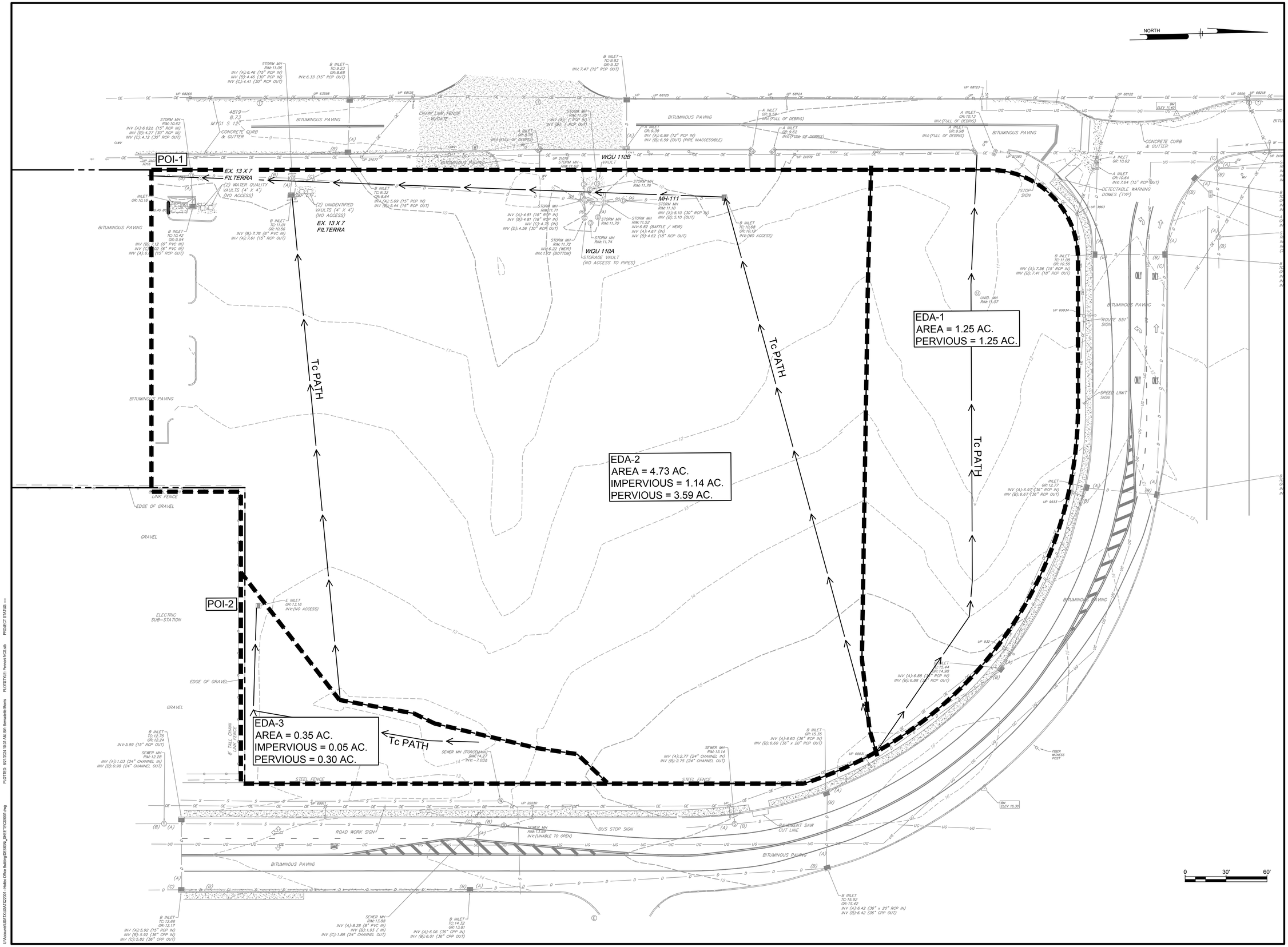
0 0.07 0.15 0.3 km

Maxar

New Jersey Department of Environmental Protection

NJDEP | NJ Department of Community Affairs, Local Planning Services

Appendix D



PENNONI ASSOCIATES INC.
2 Aquarium Drive, Suite 320
Camden, NJ 08103
T 856.669.8600
NJ. COA NO. GA28033300

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

NJ CERTIFICATE OF AUTHORIZATION NO. GA28033300

JOSEPH RADAY
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. GE043768

08/21/24

AMENDED HOLTEC OFFICE BUILDING & MAIN OFFICE PARKING EXPANSION

2360 SOUTH BROADWAY, BLOCKS 511, 512, 514 & 515
CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

PRE-DEVELOPED DRAINAGE AREA PLAN

HOLTEC INTERNATIONAL INC
1 HOLTEC BOULEVARD
CAMDEN, NEW JERSEY 08104

NO.	DATE	REVISIONS	BY

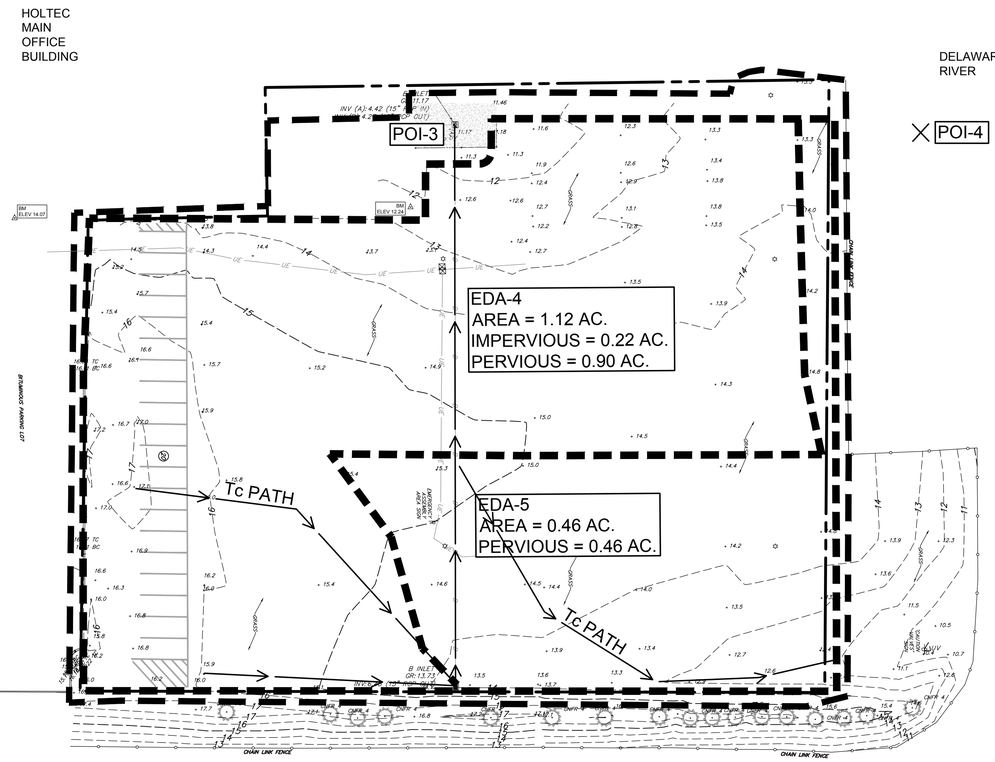
PROJECT	USATX22001
DATE	AUGUST 23, 2024
DRAWING SCALE	1"=30'
DRAWN BY	BM / BF
APPROVED BY	JJR

CS9001

SHEET 1 OF 6

U:\Accounts\USATX\USATX22001 - Holtec Office Building\[DESIGN]_SHEETS\CS9001.dwg PLOTSTYLE: Pennoni MCS.stb PLOTTED: 8/21/2024 10:31 AM BY: Bernadette Morris PROJECT STATUS: —

NORTH



0 30' 60'

PENNONI ASSOCIATES INC.
2 Aquarium Drive, Suite 320
Camden, NJ 08103
T 856.669.8000
NJ. COA NO. GA28033300

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JOSEPH RADAY
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. GE043768

08/23/24

AMENDED HOLTEC OFFICE BUILDING & MAIN OFFICE PARKING EXPANSION

2360 SOUTH BROADWAY, BLOCKS 511, 512, 514 & 515
CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

PRE-DEVELOPED DRAINAGE AREA PLAN

HOLTEC INTERNATIONAL INC
1 HOLTEC BOULEVARD
CAMDEN, NEW JERSEY 08104

NO.	DATE	REVISIONS	BY

PROJECT	USATX22001
DATE	AUGUST 23, 2024
DRAWING SCALE	1"=30'
DRAWN BY	BM / BF
APPROVED BY	JJR

CS9001A

SHEET 2 OF 6

U:\Accounts\USATX\USATX22001 - Holtec Office Building\[DESIGN]_SHEETS\CS9001.dwg PLOTTED: 8/22/2024 9:01 AM, BY: Bernadette Morris PLOTSTYLE: Pennoni MCS.stb PROJECT STATUS: —

OFFSITE DRAINAGE
AREA 5
AREA = 0.28 AC.
PERVIOUS= 0.28 AC.

POI-1

POI-2

EXISTING
DRAINAGE
AREA I-108A
AREA = 0.26 AC.

EXISTING
DRAINAGE
AREA I-130
AREA = 0.03

PDA 1
AREA = 0.31 AC.
IMPERVIOUS= 0.14 AC
PERVIOUS= 0.17 AC.

PDA 2
AREA = 1.77 AC.
IMPERVIOUS= 1.45 AC
PERVIOUS= 0.32 AC.

PDA 3
AREA = 2.18 AC.
IMPERVIOUS= 1.39 AC
PERVIOUS= 0.79 AC.

PDA 4
AREA = 1.15 AC.
IMPERVIOUS= 0.86 AC
PERVIOUS= 0.29 AC.

PDA 6
AREA = 0.32 AC.
IMPERVIOUS= 0.08 AC
PERVIOUS= 0.24 AC.

PDA 7
AREA = 0.32 AC.
IMPERVIOUS= 0.13 AC
PERVIOUS= 0.19 AC.

TOTAL IMPERVIOUS AREA = 4.31 ACRES
(INCLUDES EXISTING I-108A, I-129 AND I-130)
TOTAL PERVIOUS AREA = 2.28 ACRES

DRAINAGE LEGEND:
- PROPOSED STORM PIPE
- PROPOSED STORM STRUCTURE
- PROPOSED STORM CLEANOUT

0 30' 60'

PROPOSED BUILDING
(FF=15.07)

ENTRANCE ROAD

RING ROAD

Tc PATH

WQU 110B

WQU 110A

MH-111

EX. 13 X 7 FILTERRA

EX. 13 X 7 FILTERRA

NORTH

PENNONI ASSOCIATES INC.
2 Aquarium Drive, Suite 320
Camden, NJ 08103
T 856.669.5100
NJ. COA NO. GA28033300

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

NJ CERTIFICATE OF AUTHORIZATION NO. GA28033300

JOSEPH RADAY
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. GE043768

08/21/24

AMENDED HOLTEC OFFICE BUILDING & MAIN OFFICE PARKING EXPANSION
2360 SOUTH BROADWAY, BLOCKS 511, 512, 514 & 515
CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

POST-DEVELOPED DRAINAGE AREA PLAN

HOLTEC INTERNATIONAL INC
1 HOLTEC BOULEVARD
CAMDEN, NEW JERSEY 08104

NO.	DATE	REVISIONS	BY

PROJECT	USATX22001
DATE	AUGUST 23, 2024
DRAWING SCALE	1"=30'
DRAWN BY	BM / BF
APPROVED BY	JJR

CS9002

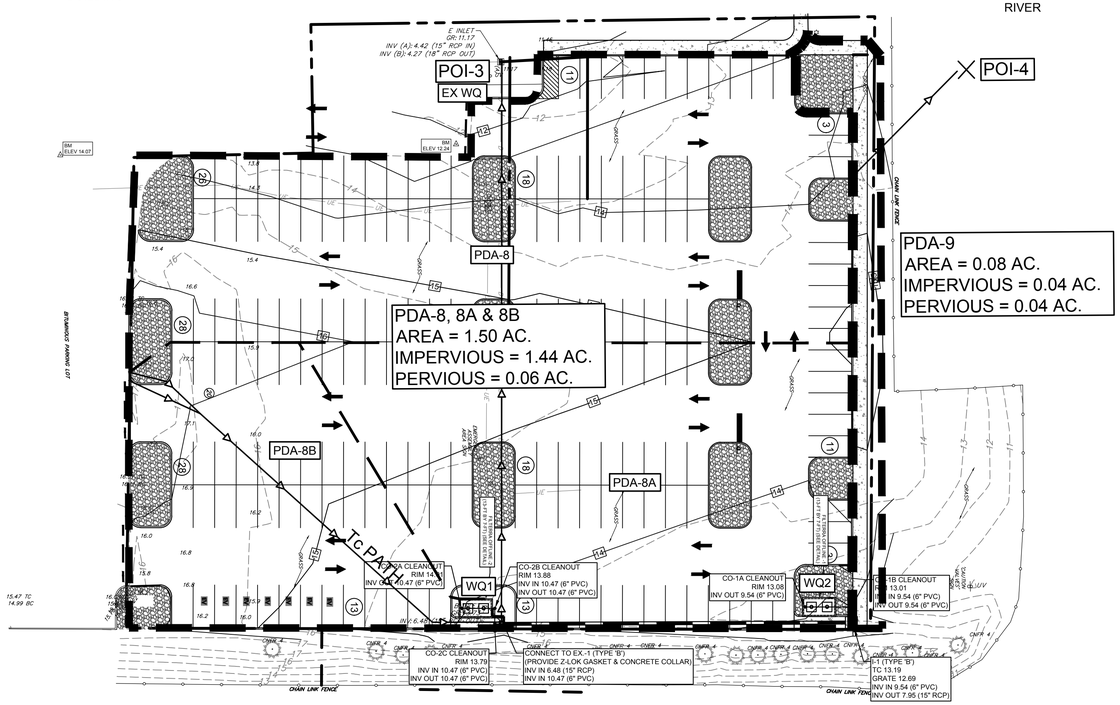
SHEET 3 OF 6

U:\Accounts\USATX\USATX22001 - Holtec Office Building\DESIGN_SHEETS\CS9002.dwg PLOTTED: 8/21/2024 2:42 PM, BY: Bernadette Morris PLOTSTYLE: Pennoni WCS.stb PROJECT STATUS: —

HOLTEC
MAIN
OFFICE
BUILDING

DELAWARE
RIVER

NORTH



DRAINAGE LEGEND:

- PROPOSED STORM PIPE
- PROPOSED STORM STRUCTURE
- PROPOSED STORM CLEANOUT

0 30' 60'

PENNONI ASSOCIATES INC.
2 Aquarium Drive, Suite 320
Camden, NJ 08103
T 856.669.8600
NJ. CA NO. GA28033300

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

NJ CERTIFICATE OF AUTHORIZATION NO. GA28033300

JOSEPH RADAY
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. GE043768

08/23/24

AMENDED HOLTEC OFFICE BUILDING & MAIN OFFICE PARKING EXPANSION

2360 SOUTH BROADWAY, BLOCKS 511, 512, 514 & 515
CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

POST-DEVELOPED DRAINAGE AREA PLAN

HOLTEC INTERNATIONAL INC
1 HOLTEC BOULEVARD
CAMDEN, NEW JERSEY 08104

NO.	DATE	REVISIONS	BY

PROJECT	USATX22001
DATE	AUGUST 23, 2024
DRAWING SCALE	1"=30'
DRAWN BY	BM / BF
APPROVED BY	JJR

CS9002A

SHEET 4 OF 6

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NORTH

POI-1

POI-2

DA1

DA2

DA2-1

DA3

DA4

DA5

DA6

DA7

DA8

DA9

DA10

DA11

DA12

DA13

DA14

DA-4A

DA-4B

EX. 13 X 7 FILTERRA

EX. 13 X 7 FILTERRA

WQU 110B

WQU 110A

MH-111

STM. MH-2 RIM 13.64

STM. MH-4 (48" DIA.) RIM 13.40

STM. MH-3 (48" DIA.)

14.34 HP

13.19 LP

12.27 LP

PROPOSED BUILDING (FF=15.07)

PROPOSED BUILDING (FF=14.40)

EXISTING PARKING LOT [103 SPACES]

I-1 (TYPE 'B') GRATE 12.41

I-2 (TYPE 'B') GRATE 11.87

I-3 (TYPE 'B') GRATE 12.95

I-4 (TYPE 'B') GRATE 13.10

I-5 (TYPE 'B') GRATE 12.60

I-6 (TYPE 'B') GRATE 12.61

I-7 (TYPE 'B') GRATE 12.43

I-8 (TYPE 'B') GRATE 12.30

I-9 (TYPE 'B') GRATE 10.93

I-10 (TYPE 'B') GRATE 10.90

I-11 (TYPE 'B') GRATE 11.40

I-12 (TYPE 'B') GRATE 10.62

Tc PATH

Tc PATH

Tc PATH

Tc PATH

DRAINAGE LEGEND:

PROPOSED STORM PIPE

PROPOSED STORM STRUCTURE

PROPOSED STORM CLEANOUT

0 30' 60'

PENNONI ASSOCIATES INC.
2 Aquarium Drive, Suite 320
Camden, NJ 08103
T 856.669.5100
NJ. COA NO. GA28033300

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

NJ CERTIFICATE OF AUTHORIZATION NO. GA28033300

JOSEPH RADAY
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. GE043768

08/23/24

AMENDED HOLTEC OFFICE BUILDING & MAIN OFFICE PARKING EXPANSION
2360 SOUTH BROADWAY, BLOCKS 511, 512, 514 & 515
CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

INLET DRAINAGE AREA PLAN

HOLTEC INTERNATIONAL INC
1 HOLTEC BOULEVARD
CAMDEN, NEW JERSEY 08104

BY	REVISIONS	NO.	DATE

PROJECT	USATX22001
DATE	AUGUST 23, 2024
DRAWING SCALE	1"=30'
DRAWN BY	BM / BF
APPROVED BY	JJR

CS9003

SHEET 5 OF 6

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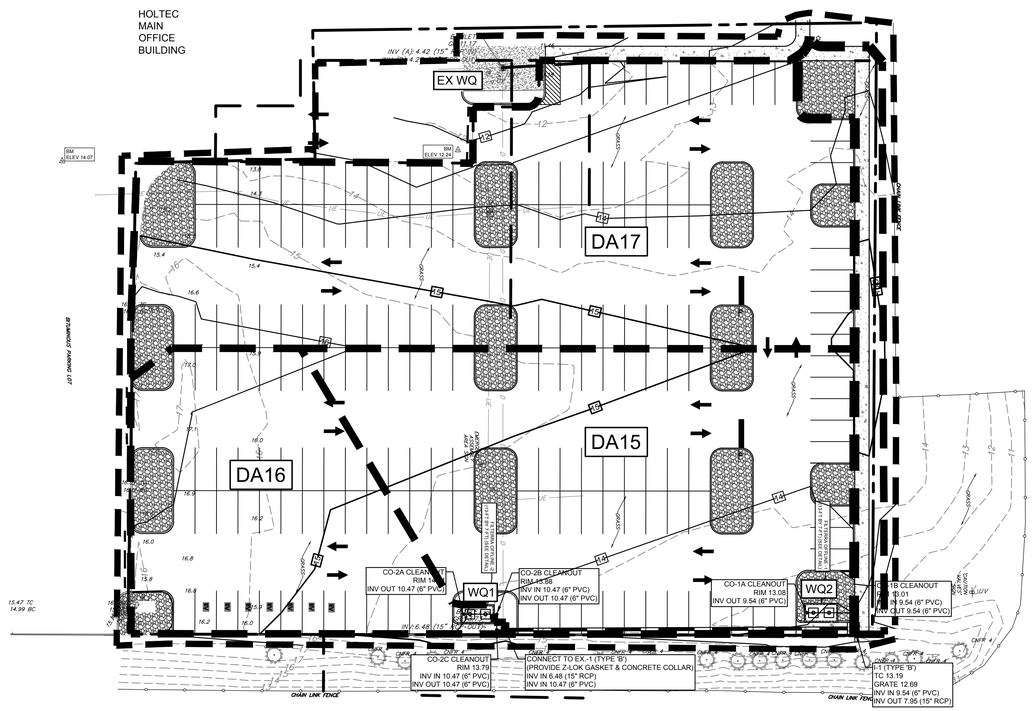

NORTH

DRAINAGE LEGEND:

- PROPOSED STORM PIPE
- PROPOSED STORM STRUCTURE
- PROPOSED STORM CLEANOUT

0 30' 60'

AMENDED HOLTEC OFFICE BUILDING & MAIN OFFICE PARKING EXPANSION

2360 SOUTH BROADWAY, BLOCKS 511, 512, 514 & 515
CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY

INLET DRAINAGE AREA PLAN

HOLTEC INTERNATIONAL INC
1 HOLTEC BOULEVARD
CAMDEN, NEW JERSEY 08104

NO.	DATE	REVISIONS	BY

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PROJECT	USATX22001
DATE	AUGUST 23, 2024
DRAWING SCALE	1"=30'
DRAWN BY	BM / BF
APPROVED BY	JJR

CS9003A

SHEET 6 OF 6

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NJ CERTIFICATE OF AUTHORIZATION NO. GA28033300

JOSEPH RADAY
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. GE043768

08/23/24

Pennoni

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NJ. CA NO. GA28033300