Project Narrative and Stormwater Management Report

For the Proposed

Itri Commons

An 8-Unit Residential Development

at

1455 Park Avenue
AP 12-2, Lots 269, 2822 & 2823
Cranston, Rhode Island

Prepared for:
Mr. Daniel Balkun
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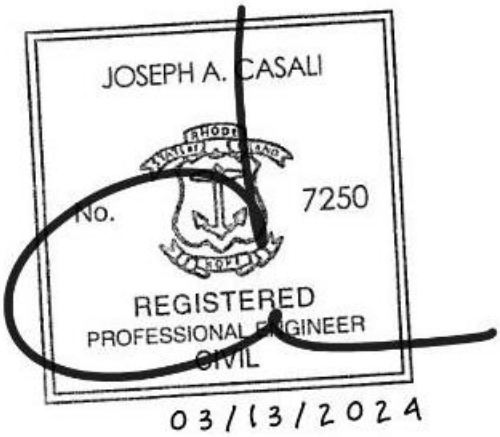

Submission Date:
March 2024

Submitted by:

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TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

On behalf of Mr. Daniel Balkun, Joe Casali Engineering, Inc. (JCE) has prepared the following Project Narrative to identify existing and proposed site conditions related to the design and construction of a new 8-unit residential complex, entitled "Itri Commons" located at 1455 Park Avenue in Cranston, Rhode Island, specifically Cranston's Tax Assessor's Plat Map (AP) 11-2, Lots 269, 2822 & 2823.

The three (3) existing parcels will be merged into one (1) contiguous parcel via an administrative subdivision. The site currently contains a mixed-use structure that contains two apartments and an office. Under proposed conditions, the existing mixed-use structure is to remain and be rehabbed to contain two (2) separate dwelling units. A six-unit multi-family residential structure is proposed adjacent to the existing residential structure. Associated site improvements include new parking areas, new landscaped areas, utility connections and improvements, and stormwater management.

2 SITE LOCATION AND PHYSICAL DESCRIPTION

According to a Class I Property Line Survey and Class III Topographic Survey performed by Ocean State Planners of Cranston, RI, the total area of AP 11-2, Lots 269, 2822 & 2823 is approximately 23,871 square feet (0.55 acres). The subject parcels consist of a two-family dwelling with associated parking. The project site is bound by a residential dwelling to the north, commercial properties to the east and west, and Park Avenue to the south, as shown below in Figure 1 – Locus Map.

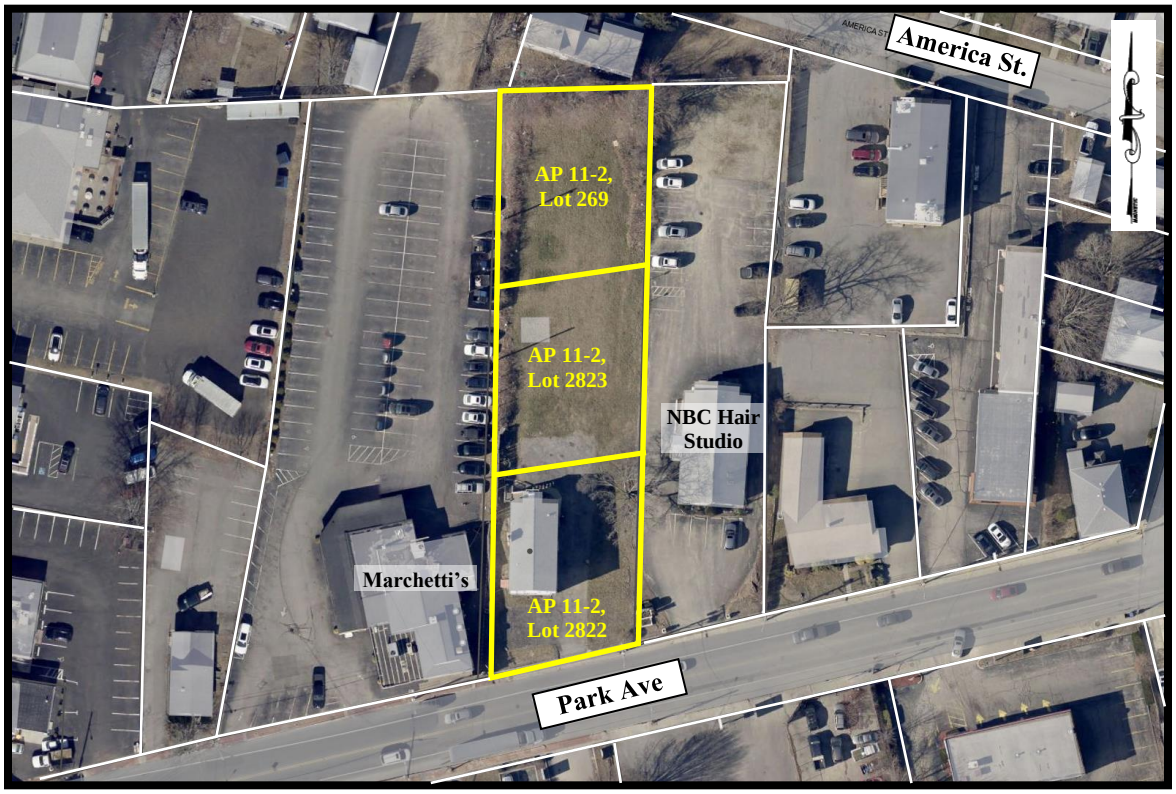

Figure 1 - Locus Map

NOT TO SCALE

2.1 Soil Classification

According to *Web Soil Survey (WSS)* operated by the US Department of Agriculture Natural Resources Conservation Service (NRCS), produced by the National Cooperative Soil Survey, the soils on-site consist entirely of Merrimac-Urban land complex, 0 to 8% slopes (MU). MU soils generally consist of loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from

granite, schist, and gneiss. MU soils are somewhat excessively drained and have a very low runoff class. These soils belong to hydrologic soil group A.

Figure 2 - Soils Map

NOT TO SCALE

JCE observed and documented the excavation of five (5) soil evaluation test pits for use in stormwater management design (TH-1 through TH-5) in January 2024. The depth of the test pits ranged from 84-inches to 96-inches below the ground surface. The seasonal high groundwater table (SHGWT) and a limiting layer were not encountered for any of the soil evaluation test pits performed. Infiltration rates were determined to be good (Hydrologic Soil Group 'A'). The completed soil evaluation test pit logs and test pit location plan are included in Appendix A.

2.2 Natural Resource Inventory

According to the Rhode Island Department of Environmental Management (RIDEM) Environmental Resource Map there are no wetlands on or adjacent to the subject parcels. The site is located within the Pocasset River Watershed (RIDEM Inventory

#010900040608). Stormwater runoff from the subject parcel sheet flows in southerly direction towards Park Avenue (RI Route 12). Stormwater runoff from the site is collected via existing catch basins within Park Avenue's City Drainage System.

The project site is predominantly within RIDEM's Groundwater Classification Zone GB, which is defined as "groundwater which may not be suitable for drinking water use without treatment due to known or presumed degradation." The parcel is not located in a historic planning district, land conservation area, natural heritage area, or a wellhead protection area.

2.3 Flood Zone Classification

The site is located on the Flood Insurance Rate Map for the City of Cranston, Rhode Island, Map Number 44007C0312H, effective date October 2, 2015. Based on this FEMA Flood Insurance Rate Map, the subject property and all adjacent properties, are identified as lying within FEMA Flood Zone X - areas determined to be outside the 0.2% annual-chance flood elevation. An excerpt from the FEMA FIRM (FIRMette) is included below:

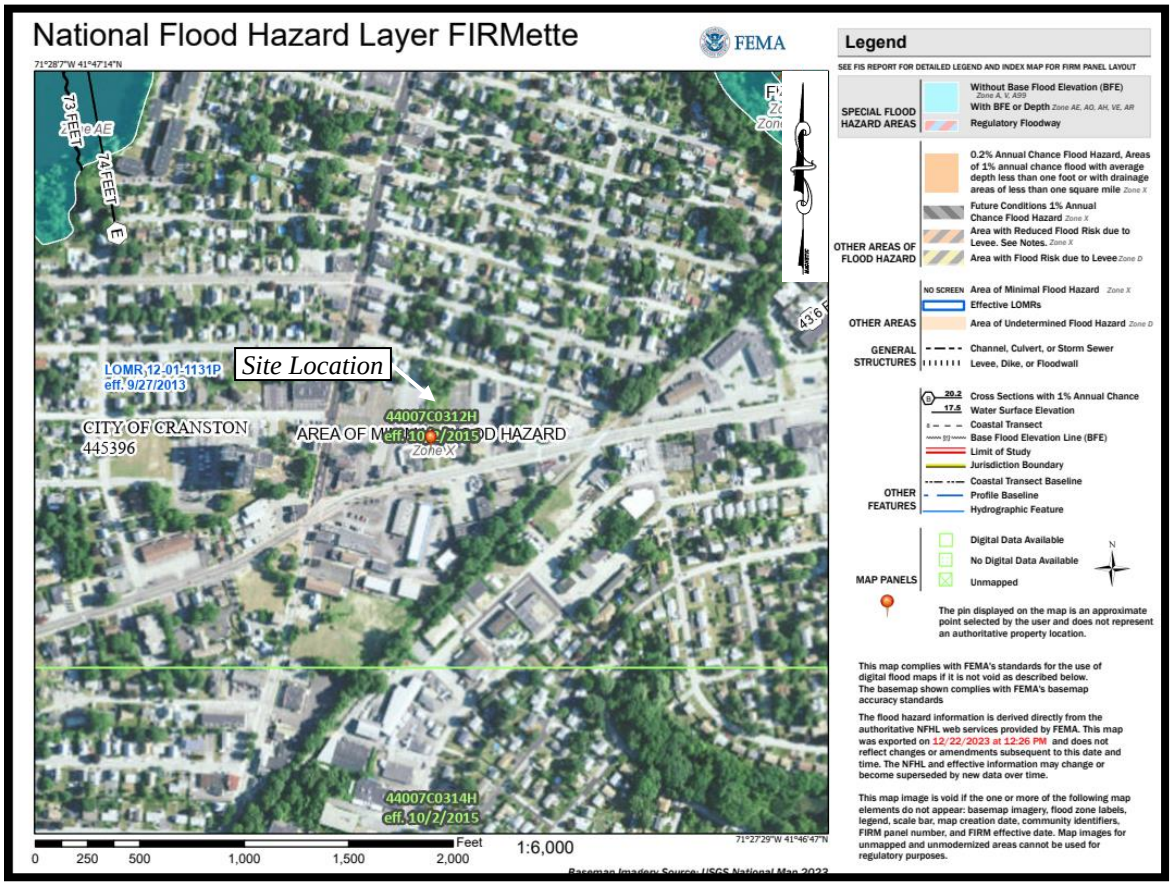

Figure 3 - Flood Map

NOT TO SCALE

2.4 Zoning

According to the City of Cranston Zoning Maps, the site is currently zoned as Commercial C-2. This district is intended primarily for neighborhood businesses. Properties to the north of the subject parcels are zoned Residential A-6, while properties to the south are zoned Commercial C-5 (Heavy business, industry) and properties to the east and west are also within the C-2 district. The following are the dimensional requirements for current zoning classification for the C-2 District:

Requirement	C-2 Zone
Minimum Lot Area	6,000 sq. ft.
Minimum Lot Width and Frontage	60 feet
Minimum Front Yard	25 feet
Minimum Rear Yard	20 feet
Minimum Side Yard	8 feet
Maximum Lot Coverage	60%
Maximum Building Height	30 feet

The existing two-family dwelling is allowed by-right. The proposed multi-family dwelling use is also allowed by-right.

2.5 Easements

Based on the Class I Property Line Survey and Class III Topographic Survey performed by Ocean State Planners, Inc. of Cranston, RI, there are no known easements located on the subject parcels.

2.6 Utilities

Water: There is an existing 12-inch cement lined ductile iron water main located within Park Avenue. The existing two-family dwelling is serviced by a 5/8-inch lead service. There is an existing hydrant located approximately 240 feet east of the project site, on the same side of the street.

Sewer: There is an existing 24-inch (corrugated pipe) sewer main located within Park Avenue. The existing two-family dwelling has an existing 6-inch sewer service.

Gas: A 12-inch CL LP gas main exists within Park Avenue. The existing dwelling has an existing gas service.

Electric/Communications: Electric and communication services are provided to the existing dwelling via overhead lines located along the north side of the existing roadway.

3 PROPOSED SCOPE OF WORK

3.1 General

The proposed project has been designed in general accordance with the current City of Cranston's Land Development and Subdivision Regulations. The three (3) existing parcels will be merged into one (1) contiguous parcel via an administrative subdivision. Under proposed conditions, the existing mixed-use structure is to remain and be rehabbed to contain two (2) separate dwelling units. A six-unit multi-family residential structure is proposed adjacent to the existing residential structure. It should be noted that per the City of Cranston's Zoning Ordinance, the maximum density of the project site is five (5) dwelling units. The current proposal of eight (8) condominium units is more than allowed, therefore, the applicant respectfully requests a variance from this standard.

The new multi-family, two-story residential structure has a building footprint of 4,410 square feet. Each unit will contain two bedrooms and a one (1) car garage. The existing two-family dwelling will remain as two (2) units. These structures will be accessed via a 20-foot-wide driveway off Park Avenue.

Per the City of Cranston's Zoning Ordinance Chapter 17.64, a minimum of two (2) parking spaces are required per dwelling unit for residential structures or groups of structures within three (3) or more dwelling units. The 8-unit residential development requires 16 off-street parking spaces. 16 parking spaces are proposed, which includes a single-car garage provided for the six (6) new dwelling units. Two (2) parking spaces are proposed adjacent to the existing dwelling. The remaining eight (8) parking spaces are provided near the rear of the site. This parking area has been designed to be utilized as a fire truck and ambulance turnaround area. Other site improvements include stormwater management, utility connections, an on-site dumpster area.

3.2 Utilities

Water: There is an existing 12-inch cement lined water main located within Park Avenue. A new 2-inch type 'K' copper domestic water service is proposed to connect to the existing residential structure. A meter and backflow preventor will be contained within the basement of the existing structure. A 2-inch PE domestic water service will be provided to the new residential structure from the existing residential structure. The water service design will require review and approval by the Providence Water Supply Board.

Sewer: There is an existing 24-inch (corrugated pipe) sewer main located within Park Avenue. A new 6-inch sewer service is proposed for the new residential structure. The sewer design will require review and approval by Veolia Water.

Gas/Electric/Communications: Gas services, electric services and communication services will be provided to the new condominium units by RI Energy.

3.3 Drainage

There is no existing stormwater management system in place. Generally, stormwater appears to sheet flows across the subject parcels, southerly towards Park Avenue, and into the city-owned closed drainage system. The proposed development will require stormwater infrastructure, as detailed in the *Rhode Island Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)* to attenuate peak stormwater runoff rates for the 1-, 2-, 10-, 25-, and 100-year storm events, reduce volume and increase the water quality of the stormwater leaving the site. The stormwater design will be in accordance with all City and State standards and consist of a closed drainage system for conveyance, and an underground infiltration system (UIC) for water quality and storage. Excess treated stormwater water runoff will sheet flow to the existing catch basins Park Avenue. Review of the proposed stormwater management system design will be required by the Rhode Island Department of Environmental Management.

4 PERMIT REQUIREMENTS

4.1 City of Cranston Permit Requirements

4.1.1 City Plan Commission

According to the City of Cranston's Land Development Regulations, the proposed development is considered a Minor Land Development Project with zoning relief that shall be reviewed under Unified Development Review (UDR). The project requires relief from the minimum lot area. The permitting schedule is as follows, and consists of abutter notification, public meetings, and City Plan Commission approval:

1. Preliminary Plan (City Plan Commission and UDR)
2. Final Plan (Administrative Office)

4.1.2 Veolia Water

The proposed sewer improvements will require review and approval from Veolia Water and the City of Cranston Department of Public Works.

4.1.3 Providence Water Supply Board

The proposed domestic water improvements will require review and approval from the Providence Water Supply Board.

4.1.4 Building Permit / Fire Department

A Building Permit will be required from the City of Cranston Building Official for construction of the proposed residential units. The proposed project's layout will require review and approval from the Cranston Fire Department.

4.2 State of Rhode Island Permit Requirements

4.2.1 Rhode Island Department of Environmental Management (RIDEM)

The proposed stormwater management system will require a Construction Stormwater Application (CSA) from the Rhode Island Department of Environmental Management (RIDEM) Office of Water Resources. to discharge stormwater from the proposed drainage infrastructure below grade.

4.2.2 Rhode Island Department of Transportation (RIDOT)

The proposed development will require a Physical Alteration Permit (PAP) from the Rhode Island Department of Transportation (RIDOT) for the proposed site improvements within a State Highway Right of Way, specifically Route 12 (Park Avenue) for the proposed entrance to the residential development.

5 STORMWATER MANAGEMENT PLAN

The proposed development is subject to the requirements of the Rhode Island Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)), a recodification of the regulatory portions of the Stormwater Manual implemented by both the Rhode Island Department of Environmental Management (RIDEM) and the Rhode Island Coastal Resources Management Council (CRMC). There is no existing stormwater management system in place. Generally, stormwater appears to sheet flows across the subject parcels, southerly towards Park Avenue, and into the city-owned closed drainage system.

The proposed development will require stormwater infrastructure, as detailed in the *Rhode Island Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)* to attenuate peak stormwater runoff rates for the 1-, 2-, 10-, 25-, and 100-year storm events, reduce volume and increase the water quality of the stormwater leaving the site. The stormwater design will be in accordance with all City and State standards and consist of a closed drainage system for conveyance, and an underground infiltration system (UIC) for water quality and storage. Excess treated stormwater water runoff will sheet flow to the existing catch basins Park Avenue.

5.1 Standard 1: LID Planning and Design Strategies

Low Impact Development (LID) site planning and design strategies must be used to the maximum extent practicable.

Standard Met

LID practices of two (2) underground infiltration chamber systems and maintenance planning have been included in the site stormwater management design. Proposed drainage patterns will closely mimic those of existing conditions, including reduction of pre-development peak runoff rates and volumes. Infiltration of stormwater generated by proposed improvements will be accomplished using underground infiltration chamber systems.

5.2 Standard 2: Groundwater Recharge

Stormwater must be recharged within the same sub-watershed to maintain base flow at pre-development recharge levels to the maximum extent practicable.

Standard Met

Groundwater recharge will be provided on site through the underground infiltration chamber systems. All calculations were completed in accordance with Section 8.8 of the Stormwater Rules using the following formula:

$Re_v = (1") (F) (I) / 12$

Based on the results of the soil evaluation test pits, a recharge factor of 0.60 was used, associated with Hydrologic Soil Group A.

Table 1: Recharge Requirements

Subwatershed	**2A & 2B**	**2C**
Treatment System	UIC #1	UIC #2
Impervious Area (SF)	8,589	5,277
Recharge factor (in)	0.60	0.60
Required Recharge Volume (CF)	429	264
Provided Recharge Volume (CF)	2,584	896
Recharge Requirement Met?	Yes	Yes

Notes: 1. Refer to Proposed Watershed Map located in Appendix D for BMP locations.
2. Based on Routing Analysis of WQ_V, the entire volume is infiltrated.
3. Recharge Volumes are calculated as the Static Storage Volume.

5.3 Standard 3: Water Quality

The stormwater runoff from the site must be treated prior to discharge.

Standard Met

Because the site is not considered a redevelopment, 100% treatment for the water quality volume has been achieved. Existing impervious areas being directed to the site do not require treatment. Calculations are provided in Appendix F. Treatment for the water quality volume will be met using two (2) underground infiltration chamber systems (UIC). These systems have been sized to capture and treat the required water quality volume prior to discharge. Pre-treatment is provided via an isolator row within each UIC. Calculations were completed in accordance with Section 8.9 of the Stormwater Rules using the following formula:

$WQ_v = (1") (I) /12$ in/ft

Tables 2 and 3 below provide sizing calculations for the Water Quality Volume (WQ_V) of the pretreatment area and the treatment area, respectively.

Table 2: Pretreatment Requirements

Subwatershed	**2B**	**2C**
Treatment System	Isolator Row	Isolator Row
Impervious Area (SF)	4,189	5,277
Water Quality Factor (in)	1.00	1.00
Required Water Quality Volume (CF)	349	440
Required Static Storage Volume for Pretreatment (CF) (25% of WQv)	87	110
Provided Static Storage Volume for Pretreatment (CF) (25% of WQv)	346	708
Pretreatment Requirement Met?	Yes	Yes

Table 3: Treatment Requirements

Subwatershed	**2A & 2B**	**2C**
Treatment Type	UIC #1	UIC #2
Impervious Area (sf)	8,589	5,277
Water Quality Factor (in)	1.00	1.00
Required Water Quality Volume (CF)	716	440
Required Static Volume for Treatment (CF) (100% for UIC)	716	440
Provided Static Storage Volume for Treatment (CF)	896	2,584
Treatment Requirement Met	Yes	Yes

Notes:

1. Isolator row added to infiltration chambers for pretreatment.
2. The rooftop area is exempt from pretreatment requirements.
3. Static Storage Volume (UIC) = Volume of chambers & volume of voids in stone below outlet

4. As shown in the water quality calculations, Appendix F, the UIC fully contains and infiltrates the water quality design storm event.

As shown in Tables 1 through 3 above, the site's proposed stormwater management system exceeds the requirements for groundwater recharge volume, water quality pre-treatment volume and water quality treatment volume. This is in accordance with all Stormwater Rules and City of Cranston's Standards, and ultimately eliminates or reduces any instances of untreated stormwater from entering the city-owned drainage system.

5.4 Standard 4: Conveyance and Natural Channel Protection

This standard is designed to prevent erosive flow within natural channels and drainage ways.

Standard Met

The proposed improvements have been designed to accommodate stormwater conveyance up to and including the 100-year design storm event while maintaining peak stormwater flow rates at or below existing conditions. The underground chamber systems have been designed to hold up to and including the 25-year design storm event. For larger storm events (100-year design storm and larger) the system may become inundated with excess stormwater preventing additional stormwater from entering the system until treated stormwater can infiltrate and thus allow more capacity. When the systems are inundated, excess stormwater runoff (well beyond the required water quality volume) will be conveyed to the city-owned drainage system within Park Avenue at rates and volumes lower than those of which exist under exiting conditions.

5.5 Standard 5: Overbank Flood Protection

Downstream overbank flood protection must be provided by attenuating the post-development peak discharge rate to the pre-development levels for the 1–, 10-, and 100-year, Type III design storm events.

Standard Met

HydroCAD calculations for the proposed site, included in Appendix C & E, show that post-development peak stormwater discharge rates are less than the pre-development peak stormwater discharge rates for the 1-, 2-, 10-, 25- and 100-year storm events. In addition, the total stormwater volume discharged to the Design Points is less than the pre-development conditions. See Section 6.4 and Appendices C & E for supporting calculations.

5.6 Standard 6: Redevelopment and Infill Projects

For redevelopment sites with 40% or more existing impervious surface coverage and infill sites, only Standards 2, 3, and 7-11 must be addressed.

Standard Not Applicable
The subject site does not qualify as a redevelopment project.

5.7 Standard 7: Pollution Prevention

All development sites require the use of source control and pollution prevention measures to minimize the impact that the land use may have on stormwater runoff quality.

Standard Met
Soil erosion and pollution control measures including a crushed stone construction access and a compost sock are proposed during construction. A Soil Erosion and Sediment Control Plan (SESCP), has been prepared in accordance with the manual and has been submitted under separate cover. A long-term Operation and Maintenance Plan (O&M) has been prepared in accordance with the Manual and will be provided under separate cover.

5.8 Standard 8: Land Uses with Higher Potential Pollutant Loads

Stormwater discharges from land uses with higher potential pollutant loads (LUHPPLs) require the use of specific source control and pollution prevention measures and the specific stormwater BMPs approved for such use.

A stormwater LUHPPL is defined by the following land uses and activities:

1. Areas within an industrial site (as defined in RIPDES Rule 31(b)(15)) that are the location of activities subject to the RIPDES Multi-Sector General Permit (except where a No Exposure Certification for Exclusion from RIPDES Stormwater Permitting has been executed);
2. Auto fueling facilities (i.e., gas stations);
3. Exterior vehicle service, maintenance and equipment cleaning areas;
4. Road salt storage and loading areas (if exposed to rainfall); and
5. Outdoor storage and loading/unloading of hazardous substances.

Standard Not Applicable
The subject site does not meet the definition of a LUHPPL, as it does not maintain or require a RIPDES Multi-Sector General Permit.

5.9 Standard 9: Illicit Discharges

All illicit discharges to stormwater management systems are prohibited, including discharges from OWTS, and sub-drains and French drains near OWTSs that do not meet the State's OWTS Rules.

Standard Met

There are no known existing illicit discharges at the site nor are any proposed as part of this project.

5.10 Standard 10: Construction and Erosion Sedimentation Control

Erosion and sedimentation control (ESC) practices must be utilized during the construction phase as well as during any land disturbing activities.

Standard Met

Soil Erosion and Sediment Control Practices have been employed to avoid and minimize impacts to abutting properties and the State ROW. Detailed notes have been included in the plans to ensure effective implementation of erosion and sedimentation controls, which include a compost sock around the perimeter of the site and a crushed stone construction access at the entrance to the site. The soil erosion and sedimentation control measures will be installed prior to the initiation of construction activities and maintained throughout construction. Once established, these measures will be monitored daily until construction activities are complete. The silt fence line will serve as the strict limits of disturbance for the project. No alterations, including vegetative clearing or surface disturbance, will occur beyond this line. The limits of clearing, grading, and disturbance will be kept to a minimum within the proposed area of construction. All areas outside of these limits, as depicted on the project site plans, will remain undisturbed, in a completely natural condition.

5.11 Standard 11: Stormwater Management System Operation and Maintenance

The stormwater management system, including all structural stormwater controls and conveyances, must have an Operation and Maintenance Plan to ensure that it continues to function as designed.

Standard Met

A long-term Stormwater Operation and Maintenance Plan has been prepared for the development in accordance with the Manual and is provided under separate cover.

6 DRAINAGE ANALYSIS

6.1 Methodology

The comparative pre- versus post-development hydrologic analysis was performed using the Soil Conservation Service, Technical Release 20 and 55 (TR-20 and TR-55) methodology. The 1-, 2-, 10-, 25-, and 100-year storm events were modeled for a 24-hour, Type III storm utilizing HydroCAD version 10.20. As shown in the following sections, the proposed stormwater management system has been designed to attenuate peak stormwater runoff rates and reduce stormwater volumes leaving the site for the 1-, 2-, 10-, 25- and 100-year design storm events. HydroCAD modeling reports for the existing and proposed conditions can be found in Appendices C and E, respectively.

6.2 Existing Conditions

The existing site consists of two (2) watersheds discharging to two (2) design points, which can be seen on the Existing Condition Watershed Map, included in Appendix B.

Design Point 1 – Existing Catch Basin

Watershed 1 consists of 11,244 sq. ft. of area, consisting primarily of grassed areas with a portion of existing paved parking lot associated with the abutting property to the west. This subwatershed has been assigned a Time of Concentration (T_c) of 7.2 minutes and a Composite Runoff Number (CN) of 49. Ultimately, stormwater from this subwatershed area is conveyed via overland flow towards an existing catch basin located within the existing parking lot on the abutting property to the east (Design Point 1).

Design Point 2 – Park Avenue Drainage System

Subwatershed 2 consists of 18,527 sq. ft. of area, consisting mostly of grassed areas and contains the existing dwelling and associated driveway area. This subwatershed has been assigned a minimum Tc of 10.2 minutes and a CN of 62. Ultimately, stormwater from this subwatershed area is conveyed via overland flow to the city drainage system located within Park Avenue, south of the subject property (Design Point 2).

6.3 Proposed Conditions

The applicant is proposing to construct an eight (8) unit residential development with a new 20-foot-wide shared driveway, utility improvements, landscaping improvements, and stormwater management. In general, the proposed drainage patterns mimic existing conditions, discharging to the same design points as under existing conditions. The rear of the site has been designed to convey stormwater runoff associated with new impervious areas away the existing catch basin on the abutting property to the east (NBC Hair Studio). Water quality and volume control are achieved by means of infiltration practices and detention practices. The Proposed Watershed Map is included in Appendix D.

Design Point 1 – Existing Catch Basin

Watershed 1 consists of 1,392 sq. ft. of area, consisting entirely of grassed areas. This subwatershed has been assigned a minimum Time of Concentration (T_c) of 6.0 minutes and a Composite Runoff Number (CN) of 39. Ultimately, stormwater from this subwatershed area is conveyed via overland flow towards an existing catch basin located within the existing parking lot on the abutting property to the east, mimicking existing conditions (Design Point 1).

Design Point 2 – Park Avenue Drainage System

Subwatershed 2A consists of 4,400 sq. ft. of area, consisting of the proposed residential rooftop. This subwatershed has been assigned a minimum Tc of 6.0 minutes and a CN of 98. Stormwater from this subwatershed area is conveyed via roof drains directly to Underground Infiltration Chamber System #1 for water quality and groundwater recharge. When the system is full for the 100-year storm event or larger, excess stormwater runoff sheet flows in a southerly direction towards Park Avenue. Excess stormwater runoff will likely bypass the site's second catch basin associated with UIC #2 and discharge to the city-owned drainage system within Park Avenue (Design Point 2).

Subwatershed 2B consists of 8,481 sq. ft. of area, consisting mostly of new impervious areas associated with the new parking area at the rear of the site. Accordingly, this subwatershed has been assigned a minimum Tc of 6.0 minutes and a CN of 81. Stormwater from this subwatershed area sheet flows to a proposed catch basin that conveys stormwater to the isolator row associated with UIC #1 for pretreatment and the remaining rows for water quality and groundwater recharge. Excess stormwater runoff will likely bypass the site's second catch basin associated with UIC #2 and discharge to the city-owned drainage system within Park Avenue (Design Point 2).

Subwatershed 2C consists of 8,786 sq. ft. of area, consisting primarily of new impervious areas associated with the remaining portion of the new driveway and the small parking area servicing the existing structure. This subwatershed has been assigned a Tc of 7.2 minutes and a CN of 79. Stormwater from this subwatershed area sheet flows in a southerly direction towards the proposed catch basin near the entrance to the site. The catch basin routes stormwater runoff to the isolator row associated with UIC #2 for pretreatment and the remaining row for water quality and groundwater recharge. Excess stormwater runoff will likely bypass the site's second catch basin associated with UIC #2 and discharge to the city-owned drainage system within Park Avenue (Design Point 2).

Subwatershed 2D consists of 6,712 sq. ft. of area, consisting primarily of grassed/landscaped areas. This subwatershed has been assigned a Tc of 7.8 minutes and a

CN of 61. Ultimately, stormwater from this subwatershed area is conveyed via overland flow to the existing drainage system within Park Avenue, mimicking existing conditions (Design Point 2).

6.4 Results

A runoff analysis of the pre- and post-construction conditions was completed using the TR-20 methodology and is summarized in Table 4 below. Supporting calculations for the pre- and post-construction conditions are included in Appendices C and E respectively.

Table 6.1: Watershed Data

	Area (SF)	**CN**	**Tc (min.)**
Existing Conditions			
Watershed 1	11,244	49	7.2
Watershed 2	18,527	62	10.2
Existing Site Total	***29,771***	***57***	***--***
Proposed Conditions			
Subwatershed 1	1,392	39	6.0
Subwatershed 2A	4,400	98	6.0
Subwatershed 2B	8,481	81	6.0
Subwatershed 2C	8,786	79	7.2
Subwatershed 2D	6,712	79	6.0
Proposed Site Total	***29,771***	***76***	***--***
Δ	***0***	***+19***	***--***

As shown in Table 6.1 above, the overall watershed area remains unchanged when comparing existing to proposed conditions. However, under proposed conditions, the CN value has increased when comparing existing to proposed conditions due to the increase in impervious areas associated with the proposed development.

Table 6.2: Stormwater Runoff Discharge

	Peak Discharge (cfs) to Design Point				
	1-Year	2-Year	10-Year	25-Year	100-Year
Existing DP #1	0.00	0.01	0.09	0.24	0.68
Proposed DP #1	0.00	0.00	0.00	0.01	0.04
ΔQ	0.00	-0.01	-0.09	-0.23	-0.64
Existing DP #2	0.06	0.15	0.54	0.89	1.75
Proposed DP #2	0.02	0.05	0.19	0.33	1.69
ΔQ	-0.04	-0.10	-0.35	-0.56	-0.06

As shown in Table 6.2, through the use of various infiltration practices, the peak stormwater runoff rates realized at all design points have been decreased or remain the same for all design storm events when comparing the existing condition to the proposed condition.

Table 6.3: Stormwater Total Runoff Volume

	Total Runoff Volume (cf) to Design Point				
	1-Year	2-Year	10-Year	25-Year	100-Year
Existing DP #1	32	120	563	1,049	2,411
Proposed DP #1	0	0	21	55	170
ΔV	-32	-120	-542	-994	-2,241
Existing DP #2	441	810	2,126	3,334	6,340
Proposed DP #2	145	272	732	1,159	3,239
ΔV	-296	-538	-1,394	-2,175	-3,101

As shown in Table 6.3, through the use of infiltration practices, the total runoff volume realized at all design points has been decreased for all design storm events when comparing the existing condition to the proposed condition.

7 CONCLUSIONS

As shown in Sections 5 and 6 above, the proposed improvements have been designed in order to minimize impacts of the proposed site development by reducing peak stormwater runoff rates for the 1, 2, 10, 25, and 100-year design storm events and increasing the quality of the stormwater leaving the site by the installation of BMP's including an underground infiltration system and an infiltration basin in accordance with the Stormwater Rules. In addition, stormwater runoff volumes have been reduced for the 1, 2, 10, 25, and 100-year design storm events.

Due to the implementation of the proposed stormwater management appurtenances, which infiltrate and detain stormwater, all proposed design points experience reduction in peak stormwater runoff rates and total stormwater volumes. The proposed stormwater management system has been designed to be in compliance with the rules and regulations stipulated in the Storwmater Rules. The stormwater management system as designed will not have any negative impacts to neighboring properties or the city-owned drainage system. In addition, as shown within this report, the WQv design storm, the 1-, 2, 10, and 25-year design storm events are completely infiltrated on-site thereby improving current water quality conditions.

Appendix A

Soil Evaluation Test Pit Location Plan
And Logs

TEST HOLE LOCATION: SEE TEST HOLE LOCATION PLAN

GROUND SURFACE EL. / DATUM: 107.5' / NAVD88

EXCAVATOR TYPE: TAKEUCHI TB235-2

OPERATOR: SHALVEY BROS LANDSCAPE, INC.

DATE START/FINISH: JANUARY 30, 2024

WEATHER: OVERCAST, FLURRIES, 29 Deg. F

EXCAVATOR REACH: APPROX. 12-FT

JCE REPRESENTATIVE: D. DECESARIS, PE (RI 10162)

TH-1

DEPTH (FT)	SAMPLE TYPE/NO.	LAYER	REMARKS/ NOTES	SOIL / ROCK DESCRIPTION	EST. HYDRAULIC CONDUCTIVITY
0		TS		(0-12") SANDY SILT (ML); Dark brown, moist, 60% nonplastic fines, 40% fine to coarse sand. TOPSOIL. *USDA Class: Silt Loam.*	N/A
1		GLACIAL DEPOSITS		(12-36") SILTY SAND (SM); Orange brown, dry, 65% fine to coarse sand, 30% nonplastic fines, 5% fine to coarse gravel. *USDA Class: Sandy Loam.*	HSG A 2.41 in/hr
3				(36-114") WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM); Brown/gray, dry, 50% fine to coarse sand, 40% fine to coarse gravel, 10% nonplastic fines. *USDA Class: Sand.*	HSG A 8.27 in/hr
10				Bottom of test hole at 114-inches; excavation backfilled with previously excavated material upon completion.	

NOTES:

SHGWT: > 114-inches

IMPERVIOUS / LIMITING LAYER: Not encountered

PROJECT NAME: 1455 Park Avenue, Cranston

PROJECT NUMBER: 23-84

JCE
JOE CASALI ENGINEERING, INC.
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DRAINAGE · WETLANDS · ISDS · TRAFFIC · FLOODPLAIN
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(401) 944-1300 (401) 944-1313 FAX WWW.JOECASALI.COM

TEST HOLE LOCATION: SEE TEST HOLE LOCATION PLAN

GROUND SURFACE EL. / DATUM: 106.0' / NAVD88

EXCAVATOR TYPE: TAKEUCHI TB235-2

OPERATOR: SHALVEY BROS LANDSCAPE, INC.

DATE START/FINISH: JANUARY 30, 2024

WEATHER: OVERCAST, FLURRIES, 29 Deg. F

EXCAVATOR REACH: APPROX. 12-FT

JCE REPRESENTATIVE: D. DECESARIS, PE (RI 10162)

TH-2

DEPTH (FT)	SAMPLE TYPE/NO.	LAYER	REMARKS/ NOTES	SOIL / ROCK DESCRIPTION	EST. HYDRAULIC CONDUCTIVITY
0		TS		(0-12") SANDY SILT (ML); Dark brown, moist, 60% nonplastic fines, 40% fine to coarse sand. TOPSOIL. *USDA Class: Silt Loam.*	N/A
1		GLACIAL DEPOSITS		(12-36") SILTY SAND (SM); Orange brown, dry, 65% fine to coarse sand, 30% nonplastic fines, 5% fine to coarse gravel. *USDA Class: Sandy Loam.*	HSG A 2.41 in/hr
3				(36-108") WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM); Brown/gray, dry, 50% fine to coarse sand, 40% fine to coarse gravel, 10% nonplastic fines. *USDA Class: Sand.*	HSG A 8.27 in/hr
9				Bottom of test hole at 108-inches; excavation backfilled with previously excavated material upon completion.	
10					
11					
12					
13					

NOTES:

SHGWT: > 108-inches

IMPERVIOUS / LIMITING LAYER: Not encountered

PROJECT NAME: 1455 Park Avenue, Cranston

PROJECT NUMBER: 23-84

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TEST HOLE LOCATION: SEE TEST HOLE LOCATION PLAN

GROUND SURFACE EL. / DATUM: 104.5' / NAVD88

EXCAVATOR TYPE: TAKEUCHI TB235-2

OPERATOR: SHALVEY BROS LANDSCAPE, INC.

DATE START/FINISH: JANUARY 30, 2024

WEATHER: OVERCAST, FLURRIES, 29 Deg. F

EXCAVATOR REACH: APPROX. 12-FT

JCE REPRESENTATIVE: D. DECESARIS, PE (RI 10162)

TH-3

DEPTH (FT)	SAMPLE TYPE/NO.	LAYER	REMARKS/ NOTES	SOIL / ROCK DESCRIPTION	EST. HYDRAULIC CONDUCTIVITY
0		TS		(0-6") SANDY SILT (ML); Dark brown, moist, 60% nonplastic fines, 40% fine to coarse sand. TOPSOIL. *USDA Class: Silt Loam.*	N/A
1		GLACIAL DEPOSITS		(6-36") SILTY SAND (SM); Orange brown, dry, 65% fine to coarse sand, 30% nonplastic fines, 5% fine to coarse gravel. *USDA Class: Sandy Loam.*	
2					HSG A 2.41 in/hr
3				(36-108") WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM); Brown/gray, dry, 50% fine to coarse sand, 40% fine to coarse gravel, 10% nonplastic fines. *USDA Class: Sand.*	
4					
5					
6					HSG A 8.27 in/hr
7					
8					
9				Bottom of test hole at 108-inches; excavation backfilled with previously excavated material upon completion.	
10					
11					
12					
13					

NOTES:

SHGWT: > 108-inches

IMPERVIOUS / LIMITING LAYER: Not encountered

PROJECT NAME: 1455 Park Avenue, Cranston

PROJECT NUMBER: 23-84

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TEST HOLE LOCATION: SEE TEST HOLE LOCATION PLAN

GROUND SURFACE EL. / DATUM: 104.5' / NAVD88

EXCAVATOR TYPE: TAKEUCHI TB235-2

OPERATOR: SHALVEY BROS LANDSCAPE, INC.

DATE START/FINISH: JANUARY 30, 2024

WEATHER: OVERCAST, FLURRIES, 29 Deg. F

EXCAVATOR REACH: APPROX. 12-FT

JCE REPRESENTATIVE: D. DECESARIS, PE (RI 10162)

TH-4

DEPTH (FT)	SAMPLE TYPE/NO.	LAYER	REMARKS/ NOTES	SOIL / ROCK DESCRIPTION	EST. HYDRAULIC CONDUCTIVITY
0		TS		(0-6") SANDY SILT (ML); Dark brown, moist, 60% nonplastic fines, 40% fine to coarse sand. TOPSOIL. *USDA Class: Silt Loam.*	N/A
1		GLACIAL DEPOSITS		(6-24") SILTY SAND (SM); Orange brown, dry, 65% fine to coarse sand, 30% nonplastic fines, 5% fine to coarse gravel. *USDA Class: Sandy Loam.*	HSG A 2.41 in/hr
2				(24-108") WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM); Brown/gray, dry, 50% fine to coarse sand, 40% fine to coarse gravel, 10% nonplastic fines. *USDA Class: Sand.*	
3					
4					
5					HSG A 8.27 in/hr
6					
7					
8					
9				Bottom of test hole at 108-inches; excavation backfilled with previously excavated material upon completion.	
10					
11					
12					
13					

NOTES:

SHGWT: > 108-inches

IMPERVIOUS / LIMITING LAYER: Not encountered

PROJECT NAME: 1455 Park Avenue, Cranston

PROJECT NUMBER: 23-84

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TEST HOLE LOCATION: SEE TEST HOLE LOCATION PLAN

GROUND SURFACE EL. / DATUM: 104.5' / NAVD88

EXCAVATOR TYPE: TAKEUCHI TB235-2

OPERATOR: SHALVEY BROS LANDSCAPE, INC.

DATE START/FINISH: JANUARY 30, 2024

WEATHER: OVERCAST, FLURRIES, 29 Deg. F

EXCAVATOR REACH: APPROX. 12-FT

JCE REPRESENTATIVE: D. DECESARIS, PE (RI 10162)

TH-5

DEPTH (FT)	SAMPLE TYPE/NO.	LAYER	REMARKS/ NOTES	SOIL / ROCK DESCRIPTION	EST. HYDRAULIC CONDUCTIVITY
0		TS		(0-12") SANDY SILT (ML); Dark brown, moist, 60% nonplastic fines, 40% fine to coarse sand. TOPSOIL. *USDA Class: Silt Loam.*	N/A
1		GLACIAL DEPOSITS		(12-36") SILTY SAND (SM); Orange brown, dry, 65% fine to coarse sand, 30% nonplastic fines, 5% fine to coarse gravel. *USDA Class: Sandy Loam.*	HSG A 2.41 in/hr
3				(36-108") WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM); Brown/gray, dry, 50% fine to coarse sand, 40% fine to coarse gravel, 10% nonplastic fines. *USDA Class: Sand.*	HSG A 8.27 in/hr
9				Bottom of test hole at 108-inches; excavation backfilled with previously excavated material upon completion.	
10					
11					
12					
13					

NOTES:

SHGWT: > 108-inches

IMPERVIOUS / LIMITING LAYER: Not encountered

PROJECT NAME: 1455 Park Avenue, Cranston

PROJECT NUMBER: 23-84

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Appendix B

Existing Condition Watershed Map

LEGEND

- WATERSHED BOUNDARY LINE
- TIME OF CONCENTRATION LINE
- UNDERGROUND TIME OF CONCENTRATION LINE

#1463 PARK AVE.
"MARCHETTI'S RESTAURANT"

#1455 PARK AVE.

#1447 PARK AVE.
"NBC HAIR STUDIO"

PARK AVE

OVERALL WATERSHED
AREA = 29,771 SF

EXISTING PROPERTY LINE (TYP.)

WATERSHED 2
AREA = 18,527 SF
TC = 10.2 MIN.
CN = 62

WATERSHED 1
AREA = 11,244 SF
TC = 7.3 MIN.
CN = 49

TIME OF CONCENTRATION LINE (TYP.)

CITY DRAINAGE SYSTEM
(DESIGN POINT #2)

DP2

EXISTING CATCH BASIN
(DESIGN POINT #1)

DP1

SCALE (FEET)

0 15 30 60 120

1 INCH = 30 FT

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ITRI COMMONS

8-UNIT RESIDENTIAL DEVELOPMENT
1455 PARK AVENUE
CRANSTON, RHODE ISLAND
AP 11-2, LOTS 269, 2822 & 2823

REVISIONS:

NO.	DATE:	DESCRIPTION

DESIGNED BY:	SD
DRAWN BY:	SD
CHECKED BY:	JAC
DATE:	MARCH 2024
PROJECT NO:	23-84

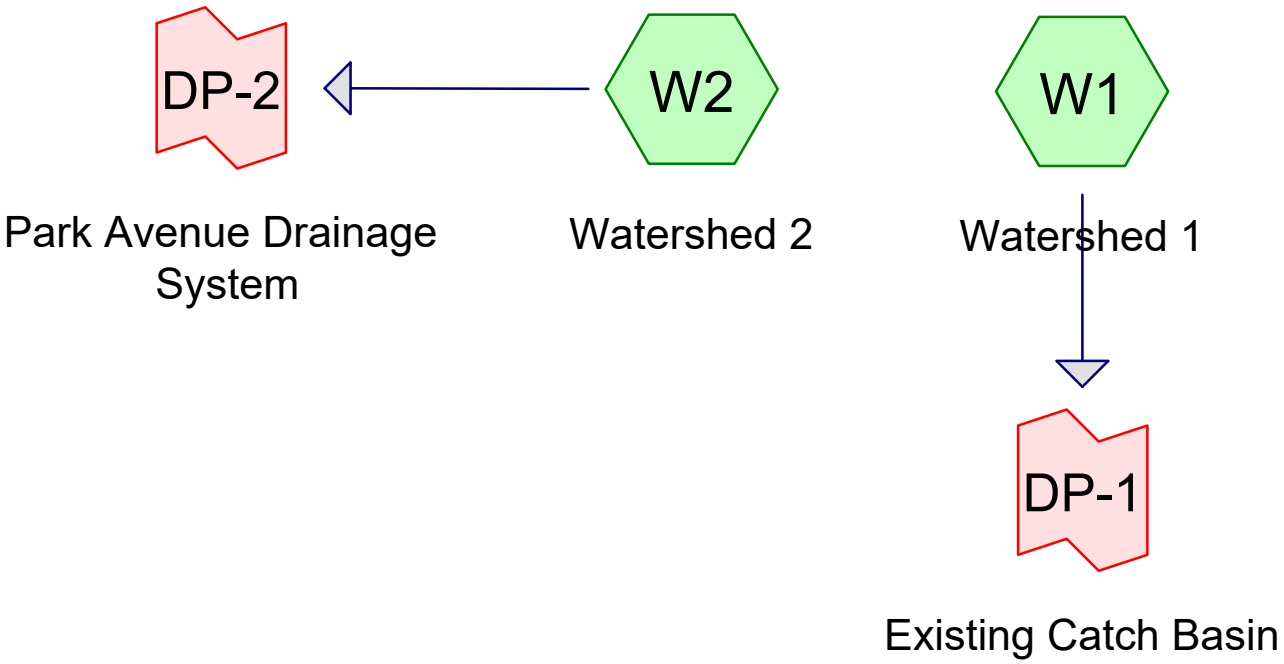
STORMWATER REPORT

EXISTING CONDITIONS WATERSHED MAP

SHEET 1 OF 1

Appendix C

Existing Condition HydroCAD Calculations



Subcat Reach Pond Link

Routing Diagram for Itri Commons - Existing Conditions
Prepared by Joe Casali Engineering, Inc, Printed 3/13/2024

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
20,690	39	>75% Grass cover, Good, HSG A (W1, W2)
9,081	98	Impervious Surface, HSG A (W1, W2)

Summary for Subcatchment W1: Watershed 1

Runoff = 0.00 cfs @ 15.44 hrs, Volume= 32 cf, Depth= 0.03"
Routed to Link DP-1 : Existing Catch Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

	Area (sf)	CN	Description
*	1,840	98	Impervious Surface, HSG A
	9,404	39	>75% Grass cover, Good, HSG A
	11,244	49	Weighted Average
	9,404	39	83.64% Pervious Area
	1,840	98	16.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	20	0.0200	1.01		**Sheet Flow, SEG A** Smooth surfaces n= 0.011 P2= 3.30"
6.9	80	0.0300	0.19		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
7.2	100	Total			

Summary for Subcatchment W2: Watershed 2

Runoff = 0.06 cfs @ 12.31 hrs, Volume= 441 cf, Depth= 0.29"
Routed to Link DP-2 : Park Avenue Drainage System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

	Area (sf)	CN	Description
*	7,241	98	Impervious Surface, HSG A
	11,286	39	>75% Grass cover, Good, HSG A
	18,527	62	Weighted Average
	11,286	39	60.92% Pervious Area
	7,241	98	39.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
0.3	55	0.0200	2.87		**Shallow Concentrated Flow, SEG B** Paved Kv= 20.3 fps
0.3	63	0.0500	3.35		**Shallow Concentrated Flow, SEG C** Grassed Waterway Kv= 15.0 fps
10.2	218	Total			

Summary for Link DP-1: Existing Catch Basin

Inflow Area = 11,244 sf, 16.36% Impervious, Inflow Depth = 0.03" for 1-Year event
Inflow = 0.00 cfs @ 15.44 hrs, Volume= 32 cf
Primary = 0.00 cfs @ 15.44 hrs, Volume= 32 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Park Avenue Drainage System

Inflow Area = 18,527 sf, 39.08% Impervious, Inflow Depth = 0.29" for 1-Year event
Inflow = 0.06 cfs @ 12.31 hrs, Volume= 441 cf
Primary = 0.06 cfs @ 12.31 hrs, Volume= 441 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

Summary for Subcatchment W1: Watershed 1

Runoff = 0.09 cfs @ 12.16 hrs, Volume= 563 cf, Depth= 0.60"
Routed to Link DP-1 : Existing Catch Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
*	1,840	98	Impervious Surface, HSG A
	9,404	39	>75% Grass cover, Good, HSG A
	11,244	49	Weighted Average
	9,404	39	83.64% Pervious Area
	1,840	98	16.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	20	0.0200	1.01		**Sheet Flow, SEG A** Smooth surfaces n= 0.011 P2= 3.30"
6.9	80	0.0300	0.19		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
7.2	100	Total			

Summary for Subcatchment W2: Watershed 2

Runoff = 0.54 cfs @ 12.16 hrs, Volume= 2,126 cf, Depth= 1.38"
Routed to Link DP-2 : Park Avenue Drainage System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
*	7,241	98	Impervious Surface, HSG A
	11,286	39	>75% Grass cover, Good, HSG A
	18,527	62	Weighted Average
	11,286	39	60.92% Pervious Area
	7,241	98	39.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
0.3	55	0.0200	2.87		**Shallow Concentrated Flow, SEG B** Paved Kv= 20.3 fps
0.3	63	0.0500	3.35		**Shallow Concentrated Flow, SEG C** Grassed Waterway Kv= 15.0 fps
10.2	218	Total			

Summary for Link DP-1: Existing Catch Basin

Inflow Area = 11,244 sf, 16.36% Impervious, Inflow Depth = 0.60" for 10-Year event
Inflow = 0.09 cfs @ 12.16 hrs, Volume= 563 cf
Primary = 0.09 cfs @ 12.16 hrs, Volume= 563 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Park Avenue Drainage System

Inflow Area = 18,527 sf, 39.08% Impervious, Inflow Depth = 1.38" for 10-Year event
Inflow = 0.54 cfs @ 12.16 hrs, Volume= 2,126 cf
Primary = 0.54 cfs @ 12.16 hrs, Volume= 2,126 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

Summary for Subcatchment W1: Watershed 1

Runoff = 0.68 cfs @ 12.12 hrs, Volume= 2,411 cf, Depth= 2.57"
Routed to Link DP-1 : Existing Catch Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (sf)	CN	Description
*	1,840	98	Impervious Surface, HSG A
	9,404	39	>75% Grass cover, Good, HSG A
	11,244	49	Weighted Average
	9,404	39	83.64% Pervious Area
	1,840	98	16.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	20	0.0200	1.01		**Sheet Flow, SEG A** Smooth surfaces n= 0.011 P2= 3.30"
6.9	80	0.0300	0.19		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
7.2	100	Total			

Summary for Subcatchment W2: Watershed 2

Runoff = 1.75 cfs @ 12.15 hrs, Volume= 6,340 cf, Depth= 4.11"
Routed to Link DP-2 : Park Avenue Drainage System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (sf)	CN	Description
*	7,241	98	Impervious Surface, HSG A
	11,286	39	>75% Grass cover, Good, HSG A
	18,527	62	Weighted Average
	11,286	39	60.92% Pervious Area
	7,241	98	39.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
0.3	55	0.0200	2.87		**Shallow Concentrated Flow, SEG B** Paved Kv= 20.3 fps
0.3	63	0.0500	3.35		**Shallow Concentrated Flow, SEG C** Grassed Waterway Kv= 15.0 fps
10.2	218	Total			

Summary for Link DP-1: Existing Catch Basin

Inflow Area = 11,244 sf, 16.36% Impervious, Inflow Depth = 2.57" for 100-Year event
Inflow = 0.68 cfs @ 12.12 hrs, Volume= 2,411 cf
Primary = 0.68 cfs @ 12.12 hrs, Volume= 2,411 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Park Avenue Drainage System

Inflow Area = 18,527 sf, 39.08% Impervious, Inflow Depth = 4.11" for 100-Year event
Inflow = 1.75 cfs @ 12.15 hrs, Volume= 6,340 cf
Primary = 1.75 cfs @ 12.15 hrs, Volume= 6,340 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

Appendix D

Proposed Condition Watershed Map

LEGEND

- WATERSHED BOUNDARY LINE
- TIME OF CONCENTRATION LINE
- UNDERGROUND TIME OF CONCENTRATION LINE

#1463 PARK AVE.
"MARCHETTI'S RESTAURANT"

TIME OF CONCENTRATION LINE (TYP.)

OVERALL WATERSHED
AREA = 29,771 SF

EXISTING PROPERTY LINE (TYP.)

WATERSHED 2D
AREA = 6,712 SF
TC = 7.8 MIN.
CN = 61

#1455 PARK AVE.

WATERSHED 2A
AREA = 4,400 SF
TC = 6.0 MIN.
CN = 98

UNDERGROUND
INFILTRATION SYSTEM #1

PARK AVE

CITY DRAINAGE SYSTEM
(DESIGN POINT #2)

DP2

UNDERGROUND
INFILTRATION SYSTEM #2

WATERSHED 2C
AREA = 15,498 SF
TC = 7.2 MIN.
CN = 79

#1447 PARK AVE.
"NBC HAIR STUDIO"

EXISTING CATCH BASIN
(DESIGN POINT #1)

DP1

WATERSHED 2B
AREA = 8,481 SF
TC = 6.0 MIN.
CN = 81

WATERSHED 1
AREA = 1,392 SF
TC = 6.0 MIN.
CN = 39

SCALE (FEET)
0 15 30 60 120
1 INCH = 30 FT

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ITRI COMMONS

8-UNIT RESIDENTIAL DEVELOPMENT
1455 PARK AVENUE
CRANSTON, RHODE ISLAND
AP 11-2, LOTS 269, 2822 & 2823

REVISIONS:

NO.	DATE.	DESCRIPTION

DESIGNED BY:	SD
DRAWN BY:	SD
CHECKED BY:	JAC
DATE:	MARCH 2024
PROJECT NO:	23-84

STORMWATER REPORT

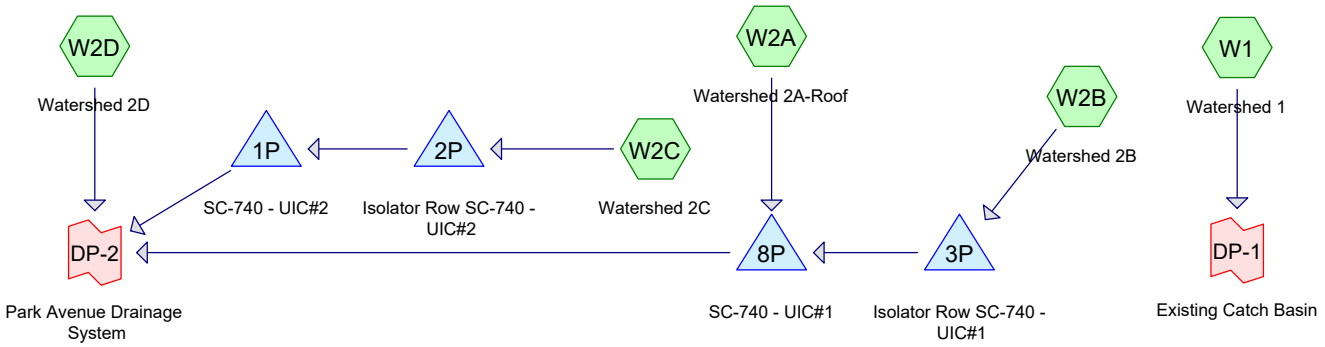
PROPOSED CONDITIONS WATERSHED MAP

SHEET 1 OF 1

Q:\23-84 Daniel Balkun\Drainage\Watershed Maps\1455 Park Avenue [Watershed Map] - R1.dwg Mar. 13, 2024 12:31pm

Appendix E

Proposed Condition HydroCAD Calculations



Subcat Reach Pond Link

Routing Diagram for Itri Commons - Proposed Conditions
Prepared by Joe Casali Engineering, Inc, Printed 3/13/2024

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
10,822	39	>75% Grass cover, Good, HSG A (W1, W2B, W2C, W2D)
3,243	98	Existing Impervious Surface, HSG A (W2C, W2D)
1,840	98	Existing Parking Lot, HSG A (W2B)
4,189	98	Paved parking, HSG A (W2B)
5,277	98	Proposed Parking Lot, HSG A (W2C)
4,400	98	Roofs, HSG A (W2A)

Summary for Subcatchment W1: Watershed 1

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Link DP-1 : Existing Catch Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
1,392	39	>75% Grass cover, Good, HSG A
1,392	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	25	0.0100	0.10		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
4.2	25	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment W2A: Watershed 2A-Roof

Runoff = 0.26 cfs @ 12.09 hrs, Volume= 906 cf, Depth= 2.47"
Routed to Pond 8P : SC-740 - UIC#1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
4,400	98	Roofs, HSG A
4,400	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment W2B: Watershed 2B

Runoff = 0.24 cfs @ 12.10 hrs, Volume= 769 cf, Depth= 1.09"
Routed to Pond 3P : Isolator Row SC-740 - UIC#1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

	Area (sf)	CN	Description
*	1,840	98	Existing Parking Lot, HSG A
	2,452	39	>75% Grass cover, Good, HSG A
	4,189	98	Paved parking, HSG A
	8,481	81	Weighted Average
	2,452	39	28.91% Pervious Area
	6,029	98	71.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	26	0.0100	0.10		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
0.4	62	0.0200	2.87		**Shallow Concentrated Flow, SEG B** Paved Kv= 20.3 fps
4.7	88	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment W2C: Watershed 2C

Runoff = 0.21 cfs @ 12.11 hrs, Volume= 713 cf, Depth= 0.97"
Routed to Pond 2P : Isolator Row SC-740 - UIC#2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

	Area (sf)	CN	Description
*	5,277	98	Proposed Parking Lot, HSG A
	2,760	39	>75% Grass cover, Good, HSG A
*	749	98	Existing Impervious Surface, HSG A
	8,786	79	Weighted Average
	2,760	39	31.41% Pervious Area
	6,026	98	68.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	45	0.0100	0.11		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
0.5	110	0.0270	3.34		**Shallow Concentrated Flow, SEG B** Paved Kv= 20.3 fps
7.2	155	Total			

Summary for Subcatchment W2D: Watershed 2D

Runoff = 0.02 cfs @ 12.31 hrs, Volume= 145 cf, Depth= 0.26"
Routed to Link DP-2 : Park Avenue Drainage System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

	Area (sf)	CN	Description
	4,218	39	>75% Grass cover, Good, HSG A
*	2,494	98	Existing Impervious Surface, HSG A
	6,712	61	Weighted Average
	4,218	39	62.84% Pervious Area
	2,494	98	37.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	45	0.0100	0.90		**Sheet Flow, SEG A** Smooth surfaces n= 0.011 P2= 3.30"
6.0	55	0.0200	0.15		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
1.0	143	0.0270	2.46		**Shallow Concentrated Flow, SEG B** Grassed Waterway Kv= 15.0 fps
7.8	243	Total			

Summary for Pond 1P: SC-740 - UIC#2

Inflow Area = 8,786 sf, 68.59% Impervious, Inflow Depth = 0.01" for 1-Year event
Inflow = 0.00 cfs @ 23.92 hrs, Volume= 5 cf
Outflow = 0.00 cfs @ 23.94 hrs, Volume= 5 cf, Atten= 0%, Lag= 1.6 min
Discarded = 0.00 cfs @ 23.94 hrs, Volume= 5 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link DP-2 : Park Avenue Drainage System

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs / 6
Peak Elev= 97.50' @ 23.94 hrs Surf.Area= 512 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.0 min (1,437.9 - 1,436.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	97.50'	425 cf	**6.25'W x 81.94'L x 3.50'H Field A** 1,792 cf Overall - 505 cf Embedded = 1,287 cf x 33.0% Voids
#2A	98.00'	505 cf	**ADS_StormTech SC-740 +Cap** x 11 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		930 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	97.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	100.80'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.10 cfs @ 23.94 hrs HW=97.50' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=97.50' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: SC-740 - UIC#2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

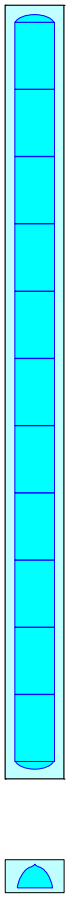
11 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 79.94' Row Length +12.0" End Stone x 2 = 81.94' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

11 Chambers x 45.9 cf = 505.3 cf Chamber Storage

1,792.4 cf Field - 505.3 cf Chambers = 1,287.0 cf Stone x 33.0% Voids = 424.7 cf Stone Storage

Chamber Storage + Stone Storage = 930.1 cf = 0.021 af
Overall Storage Efficiency = 51.9%
Overall System Size = 81.94' x 6.25' x 3.50'

11 Chambers
66.4 cy Field
47.7 cy Stone



Summary for Pond 2P: Isolator Row SC-740 - UIC#2

Inflow Area = 8,786 sf, 68.59% Impervious, Inflow Depth = 0.97" for 1-Year event
Inflow = 0.21 cfs @ 12.11 hrs, Volume= 713 cf
Outflow = 0.00 cfs @ 23.92 hrs, Volume= 5 cf, Atten= 98%, Lag= 708.2 min
Primary = 0.00 cfs @ 23.92 hrs, Volume= 5 cf
Routed to Pond 1P : SC-740 - UIC#2

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Peak Elev= 100.15' @ 23.92 hrs Surf.Area= 468 sf Storage= 709 cf

Plug-Flow detention time= 786.4 min calculated for 5 cf (1% of inflow)
Center-of-Mass det. time= 580.3 min (1,436.9 - 856.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	97.50'	388 cf	**6.25'W x 74.82'L x 3.50'H Field A** 1,637 cf Overall - 459 cf Embedded = 1,177 cf x 33.0% Voids
#2A	98.00'	459 cf	**ADS_StormTech SC-740 +Cap** x 10 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		848 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	100.15'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.00 cfs @ 23.92 hrs HW=100.15' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.17 fps)

Pond 2P: Isolator Row SC-740 - UIC#2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

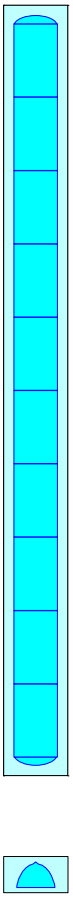
10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

10 Chambers x 45.9 cf = 459.4 cf Chamber Storage

1,636.6 cf Field - 459.4 cf Chambers = 1,177.2 cf Stone x 33.0% Voids = 388.5 cf Stone Storage

Chamber Storage + Stone Storage = 847.9 cf = 0.019 af
Overall Storage Efficiency = 51.8%
Overall System Size = 74.82' x 6.25' x 3.50'

10 Chambers
60.6 cy Field
43.6 cy Stone



Summary for Pond 3P: Isolator Row SC-740 - UIC#1

Inflow Area = 8,481 sf, 71.09% Impervious, Inflow Depth = 1.09" for 1-Year event
Inflow = 0.24 cfs @ 12.10 hrs, Volume= 769 cf
Outflow = 0.07 cfs @ 12.51 hrs, Volume= 422 cf, Atten= 72%, Lag= 24.8 min
Primary = 0.07 cfs @ 12.51 hrs, Volume= 422 cf
Routed to Pond 8P : SC-740 - UIC#1

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 103.03' @ 12.50 hrs Surf.Area= 245 sf Storage= 350 cf

Plug-Flow detention time= 226.4 min calculated for 422 cf (55% of inflow)
Center-of-Mass det. time= 105.7 min (954.1 - 848.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	100.50'	207 cf	**6.25'W x 39.22'L x 3.50'H Field A** 858 cf Overall - 230 cf Embedded = 628 cf x 33.0% Voids
#2A	101.00'	230 cf	**ADS_StormTech SC-740 +Cap** x 5 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		437 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	103.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.06 cfs @ 12.51 hrs HW=103.03' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.54 fps)

Pond 3P: Isolator Row SC-740 - UIC#1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

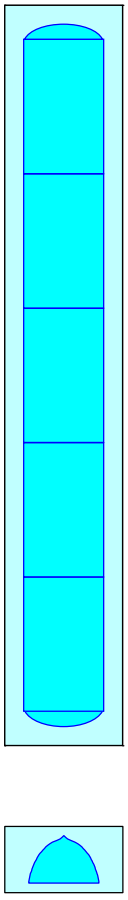
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

5 Chambers x 45.9 cf = 229.7 cf Chamber Storage

857.9 cf Field - 229.7 cf Chambers = 628.2 cf Stone x 33.0% Voids = 207.3 cf Stone Storage

Chamber Storage + Stone Storage = 437.0 cf = 0.010 af
Overall Storage Efficiency = 50.9%
Overall System Size = 39.22' x 6.25' x 3.50'

5 Chambers
31.8 cy Field
23.3 cy Stone



Summary for Pond 8P: SC-740 - UIC#1

Inflow Area = 12,881 sf, 80.96% Impervious, Inflow Depth = 1.24" for 1-Year event
Inflow = 0.26 cfs @ 12.09 hrs, Volume= 1,327 cf
Outflow = 0.25 cfs @ 12.10 hrs, Volume= 1,327 cf, Atten= 3%, Lag= 0.9 min
Discarded = 0.25 cfs @ 12.10 hrs, Volume= 1,327 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link DP-2 : Park Avenue Drainage System

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 100.53' @ 12.10 hrs Surf.Area= 1,363 sf Storage= 15 cf

Plug-Flow detention time= 1.0 min calculated for 1,325 cf (100% of inflow)
Center-of-Mass det. time= 1.0 min (822.8 - 821.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	100.50'	1,043 cf	**34.75'W x 39.22'L x 3.50'H Field A** 4,770 cf Overall - 1,608 cf Embedded = 3,162 cf x 33.0% Voids
#2A	101.00'	1,608 cf	**ADS_StormTech SC-740 +Cap** x 35 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 35 Chambers in 7 Rows
		2,651 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	103.85'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.26 cfs @ 12.10 hrs HW=100.53' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.50' (Free Discharge)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: SC-740 - UIC#1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

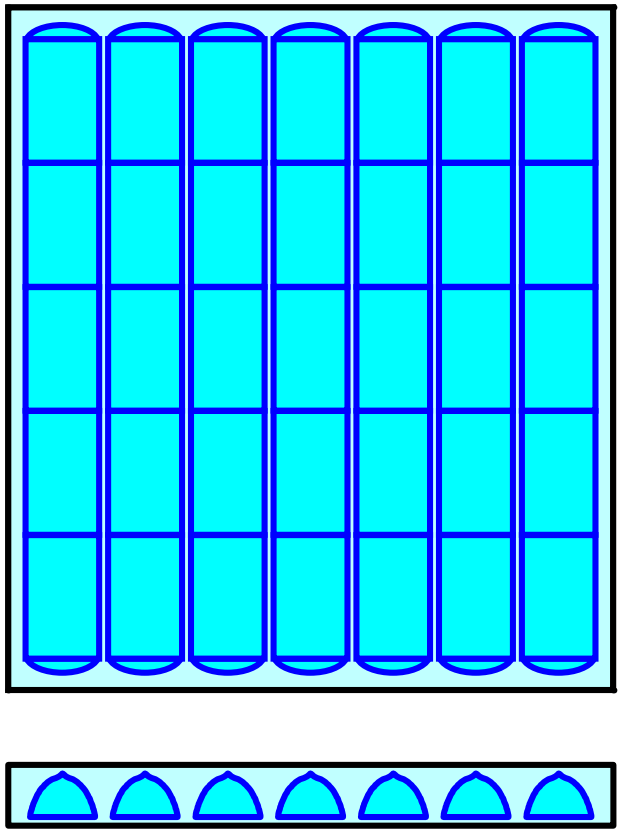
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

35 Chambers x 45.9 cf = 1,607.9 cf Chamber Storage

4,769.7 cf Field - 1,607.9 cf Chambers = 3,161.8 cf Stone x 33.0% Voids = 1,043.4 cf Stone Storage

Chamber Storage + Stone Storage = 2,651.3 cf = 0.061 af
Overall Storage Efficiency = 55.6%
Overall System Size = 39.22' x 34.75' x 3.50'

35 Chambers
176.7 cy Field
117.1 cy Stone



Summary for Link DP-1: Existing Catch Basin

Inflow Area = 1,392 sf, 0.00% Impervious, Inflow Depth = 0.00" for 1-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Park Avenue Drainage System

Inflow Area = 28,379 sf, 66.77% Impervious, Inflow Depth = 0.06" for 1-Year event
Inflow = 0.02 cfs @ 12.31 hrs, Volume= 145 cf
Primary = 0.02 cfs @ 12.31 hrs, Volume= 145 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

Summary for Subcatchment W1: Watershed 1

Runoff = 0.00 cfs @ 12.50 hrs, Volume= 21 cf, Depth= 0.18"
Routed to Link DP-1 : Existing Catch Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
1,392	39	>75% Grass cover, Good, HSG A
1,392	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	25	0.0100	0.10		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
4.2	25	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment W2A: Watershed 2A-Roof

Runoff = 0.47 cfs @ 12.09 hrs, Volume= 1,710 cf, Depth= 4.66"
Routed to Pond 8P : SC-740 - UIC#1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
4,400	98	Roofs, HSG A
4,400	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment W2B: Watershed 2B

Runoff = 0.65 cfs @ 12.09 hrs, Volume= 2,048 cf, Depth= 2.90"
Routed to Pond 3P : Isolator Row SC-740 - UIC#1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
*	1,840	98	Existing Parking Lot, HSG A
	2,452	39	>75% Grass cover, Good, HSG A
	4,189	98	Paved parking, HSG A
	8,481	81	Weighted Average
	2,452	39	28.91% Pervious Area
	6,029	98	71.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	26	0.0100	0.10		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
0.4	62	0.0200	2.87		**Shallow Concentrated Flow, SEG B** Paved Kv= 20.3 fps
4.7	88	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment W2C: Watershed 2C

Runoff = 0.61 cfs @ 12.11 hrs, Volume= 1,988 cf, Depth= 2.72"
Routed to Pond 2P : Isolator Row SC-740 - UIC#2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
*	5,277	98	Proposed Parking Lot, HSG A
	2,760	39	>75% Grass cover, Good, HSG A
*	749	98	Existing Impervious Surface, HSG A
	8,786	79	Weighted Average
	2,760	39	31.41% Pervious Area
	6,026	98	68.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	45	0.0100	0.11		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
0.5	110	0.0270	3.34		**Shallow Concentrated Flow, SEG B** Paved Kv= 20.3 fps
7.2	155	Total			

Summary for Subcatchment W2D: Watershed 2D

Runoff = 0.19 cfs @ 12.13 hrs, Volume= 732 cf, Depth= 1.31"
Routed to Link DP-2 : Park Avenue Drainage System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
	4,218	39	>75% Grass cover, Good, HSG A
*	2,494	98	Existing Impervious Surface, HSG A
	6,712	61	Weighted Average
	4,218	39	62.84% Pervious Area
	2,494	98	37.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	45	0.0100	0.90		**Sheet Flow, SEG A** Smooth surfaces n= 0.011 P2= 3.30"
6.0	55	0.0200	0.15		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
1.0	143	0.0270	2.46		**Shallow Concentrated Flow, SEG B** Grassed Waterway Kv= 15.0 fps
7.8	243	Total			

Summary for Pond 1P: SC-740 - UIC#2

Inflow Area = 8,786 sf, 68.59% Impervious, Inflow Depth = 1.75" for 10-Year event
Inflow = 0.44 cfs @ 12.22 hrs, Volume= 1,280 cf
Outflow = 0.10 cfs @ 12.20 hrs, Volume= 1,277 cf, Atten= 78%, Lag= 0.0 min
Discarded = 0.10 cfs @ 12.20 hrs, Volume= 1,277 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link DP-2 : Park Avenue Drainage System

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs / 6
Peak Elev= 98.42' @ 12.66 hrs Surf.Area= 512 sf Storage= 237 cf

Plug-Flow detention time= 16.4 min calculated for 1,277 cf (100% of inflow)
Center-of-Mass det. time= 14.9 min (912.9 - 898.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	97.50'	425 cf	**6.25'W x 81.94'L x 3.50'H Field A** 1,792 cf Overall - 505 cf Embedded = 1,287 cf x 33.0% Voids
#2A	98.00'	505 cf	**ADS_StormTech SC-740 +Cap** x 11 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		930 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	97.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	100.80'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.10 cfs @ 12.20 hrs HW=97.64' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=97.50' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: Isolator Row SC-740 - UIC#2

Inflow Area = 8,786 sf, 68.59% Impervious, Inflow Depth = 2.72" for 10-Year event
Inflow = 0.61 cfs @ 12.11 hrs, Volume= 1,988 cf
Outflow = 0.44 cfs @ 12.22 hrs, Volume= 1,280 cf, Atten= 27%, Lag= 6.9 min
Primary = 0.44 cfs @ 12.22 hrs, Volume= 1,280 cf
Routed to Pond 1P : SC-740 - UIC#2

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Peak Elev= 100.25' @ 12.20 hrs Surf.Area= 468 sf Storage= 728 cf

Plug-Flow detention time= 175.2 min calculated for 1,280 cf (64% of inflow)
Center-of-Mass det. time= 71.5 min (898.0 - 826.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	97.50'	388 cf	**6.25'W x 74.82'L x 3.50'H Field A** 1,637 cf Overall - 459 cf Embedded = 1,177 cf x 33.0% Voids
#2A	98.00'	459 cf	**ADS_StormTech SC-740 +Cap** x 10 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		848 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	100.15'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.39 cfs @ 12.22 hrs HW=100.25' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.39 cfs @ 1.01 fps)

Summary for Pond 3P: Isolator Row SC-740 - UIC#1

Inflow Area = 8,481 sf, 71.09% Impervious, Inflow Depth = 2.90" for 10-Year event
Inflow = 0.65 cfs @ 12.09 hrs, Volume= 2,048 cf
Outflow = 0.64 cfs @ 12.10 hrs, Volume= 1,713 cf, Atten= 1%, Lag= 0.3 min
Primary = 0.64 cfs @ 12.10 hrs, Volume= 1,713 cf
Routed to Pond 8P : SC-740 - UIC#1

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 103.13' @ 12.10 hrs Surf.Area= 245 sf Storage= 362 cf

Plug-Flow detention time= 99.3 min calculated for 1,709 cf (83% of inflow)
Center-of-Mass det. time= 31.8 min (851.7 - 819.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	100.50'	207 cf	**6.25'W x 39.22'L x 3.50'H Field A** 858 cf Overall - 230 cf Embedded = 628 cf x 33.0% Voids
#2A	101.00'	230 cf	**ADS_StormTech SC-740 +Cap** x 5 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		437 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	103.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.63 cfs @ 12.10 hrs HW=103.13' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.63 cfs @ 1.19 fps)

Summary for Pond 8P: SC-740 - UIC#1

Inflow Area = 12,881 sf, 80.96% Impervious, Inflow Depth = 3.19" for 10-Year event
Inflow = 1.11 cfs @ 12.09 hrs, Volume= 3,422 cf
Outflow = 0.26 cfs @ 11.90 hrs, Volume= 3,417 cf, Atten= 77%, Lag= 0.0 min
Discarded = 0.26 cfs @ 11.90 hrs, Volume= 3,417 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link DP-2 : Park Avenue Drainage System

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 101.52' @ 12.50 hrs Surf.Area= 1,363 sf Storage= 778 cf

Plug-Flow detention time= 17.3 min calculated for 3,417 cf (100% of inflow)
Center-of-Mass det. time= 16.3 min (816.4 - 800.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	100.50'	1,043 cf	**34.75'W x 39.22'L x 3.50'H Field A** 4,770 cf Overall - 1,608 cf Embedded = 3,162 cf x 33.0% Voids
#2A	101.00'	1,608 cf	**ADS_StormTech SC-740 +Cap** x 35 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 35 Chambers in 7 Rows
		2,651 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	103.85'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.26 cfs @ 11.90 hrs HW=100.55' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.50' (Free Discharge)
2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link DP-1: Existing Catch Basin

Inflow Area = 1,392 sf, 0.00% Impervious, Inflow Depth = 0.18" for 10-Year event
Inflow = 0.00 cfs @ 12.50 hrs, Volume= 21 cf
Primary = 0.00 cfs @ 12.50 hrs, Volume= 21 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Park Avenue Drainage System

Inflow Area = 28,379 sf, 66.77% Impervious, Inflow Depth = 0.31" for 10-Year event
Inflow = 0.19 cfs @ 12.13 hrs, Volume= 732 cf
Primary = 0.19 cfs @ 12.13 hrs, Volume= 732 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

Summary for Subcatchment W1: Watershed 1

Runoff = 0.04 cfs @ 12.12 hrs, Volume= 170 cf, Depth= 1.46"
Routed to Link DP-1 : Existing Catch Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
1,392	39	>75% Grass cover, Good, HSG A
1,392	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	25	0.0100	0.10		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
4.2	25	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment W2A: Watershed 2A-Roof

Runoff = 0.84 cfs @ 12.09 hrs, Volume= 3,102 cf, Depth= 8.46"
Routed to Pond 8P : SC-740 - UIC#1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
4,400	98	Roofs, HSG A
4,400	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment W2B: Watershed 2B

Runoff = 1.40 cfs @ 12.09 hrs, Volume= 4,527 cf, Depth= 6.41"
Routed to Pond 3P : Isolator Row SC-740 - UIC#1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (sf)	CN	Description
*	1,840	98	Existing Parking Lot, HSG A
	2,452	39	>75% Grass cover, Good, HSG A
	4,189	98	Paved parking, HSG A
	8,481	81	Weighted Average
	2,452	39	28.91% Pervious Area
	6,029	98	71.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	26	0.0100	0.10		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
0.4	62	0.0200	2.87		**Shallow Concentrated Flow, SEG B** Paved Kv= 20.3 fps
4.7	88	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment W2C: Watershed 2C

Runoff = 1.36 cfs @ 12.10 hrs, Volume= 4,512 cf, Depth= 6.16"
Routed to Pond 2P : Isolator Row SC-740 - UIC#2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (sf)	CN	Description
*	5,277	98	Proposed Parking Lot, HSG A
	2,760	39	>75% Grass cover, Good, HSG A
*	749	98	Existing Impervious Surface, HSG A
	8,786	79	Weighted Average
	2,760	39	31.41% Pervious Area
	6,026	98	68.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	45	0.0100	0.11		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
0.5	110	0.0270	3.34		**Shallow Concentrated Flow, SEG B** Paved Kv= 20.3 fps
7.2	155	Total			

Summary for Subcatchment W2D: Watershed 2D

Runoff = 0.66 cfs @ 12.12 hrs, Volume= 2,230 cf, Depth= 3.99"
Routed to Link DP-2 : Park Avenue Drainage System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (sf)	CN	Description
	4,218	39	>75% Grass cover, Good, HSG A
*	2,494	98	Existing Impervious Surface, HSG A
	6,712	61	Weighted Average
	4,218	39	62.84% Pervious Area
	2,494	98	37.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	45	0.0100	0.90		**Sheet Flow, SEG A** Smooth surfaces n= 0.011 P2= 3.30"
6.0	55	0.0200	0.15		**Sheet Flow, SEG A** Grass: Short n= 0.150 P2= 3.30"
1.0	143	0.0270	2.46		**Shallow Concentrated Flow, SEG B** Grassed Waterway Kv= 15.0 fps
7.8	243	Total			

Summary for Pond 1P: SC-740 - UIC#2

Inflow Area = 8,786 sf, 68.59% Impervious, Inflow Depth = 5.20" for 100-Year event
Inflow = 1.35 cfs @ 12.11 hrs, Volume= 3,804 cf
Outflow = 1.19 cfs @ 12.17 hrs, Volume= 3,872 cf, Atten= 12%, Lag= 3.6 min
Discarded = 0.10 cfs @ 11.75 hrs, Volume= 2,863 cf
Primary = 1.09 cfs @ 12.17 hrs, Volume= 1,009 cf
Routed to Link DP-2 : Park Avenue Drainage System

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs / 6
Peak Elev= 100.90' @ 12.15 hrs Surf.Area= 512 sf Storage= 913 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 64.7 min (903.1 - 838.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	97.50'	425 cf	**6.25'W x 81.94'L x 3.50'H Field A** 1,792 cf Overall - 505 cf Embedded = 1,287 cf x 33.0% Voids
#2A	98.00'	505 cf	**ADS_StormTech SC-740 +Cap** x 11 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		930 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	97.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	100.80'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.10 cfs @ 11.75 hrs HW=97.67' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.95 cfs @ 12.17 hrs HW=100.89' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.95 cfs @ 1.01 fps)

Summary for Pond 2P: Isolator Row SC-740 - UIC#2

Inflow Area = 8,786 sf, 68.59% Impervious, Inflow Depth = 6.16" for 100-Year event
Inflow = 1.36 cfs @ 12.10 hrs, Volume= 4,512 cf
Outflow = 1.35 cfs @ 12.11 hrs, Volume= 3,804 cf, Atten= 0%, Lag= 0.3 min
Primary = 1.35 cfs @ 12.11 hrs, Volume= 3,804 cf
Routed to Pond 1P : SC-740 - UIC#2

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs
Peak Elev= 100.37' @ 12.11 hrs Surf.Area= 468 sf Storage= 750 cf

Plug-Flow detention time= 100.8 min calculated for 3,804 cf (84% of inflow)
Center-of-Mass det. time= 35.2 min (838.4 - 803.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	97.50'	388 cf	**6.25'W x 74.82'L x 3.50'H Field A** 1,637 cf Overall - 459 cf Embedded = 1,177 cf x 33.0% Voids
#2A	98.00'	459 cf	**ADS_StormTech SC-740 +Cap** x 10 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		848 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	100.15'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.33 cfs @ 12.11 hrs HW=100.37' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 1.33 cfs @ 1.53 fps)

Summary for Pond 3P: Isolator Row SC-740 - UIC#1

Inflow Area = 8,481 sf, 71.09% Impervious, Inflow Depth = 6.41" for 100-Year event
Inflow = 1.40 cfs @ 12.09 hrs, Volume= 4,527 cf
Outflow = 1.39 cfs @ 12.09 hrs, Volume= 4,181 cf, Atten= 1%, Lag= 0.2 min
Primary = 1.39 cfs @ 12.09 hrs, Volume= 4,181 cf
Routed to Pond 8P : SC-740 - UIC#1

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 103.23' @ 12.09 hrs Surf.Area= 245 sf Storage= 372 cf

Plug-Flow detention time= 60.6 min calculated for 4,174 cf (92% of inflow)
Center-of-Mass det. time= 21.7 min (819.1 - 797.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	100.50'	207 cf	**6.25'W x 39.22'L x 3.50'H Field A** 858 cf Overall - 230 cf Embedded = 628 cf x 33.0% Voids
#2A	101.00'	230 cf	**ADS_StormTech SC-740 +Cap** x 5 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		437 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	103.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.36 cfs @ 12.09 hrs HW=103.22' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 1.36 cfs @ 1.54 fps)

Summary for Pond 8P: SC-740 - UIC#1

Inflow Area = 12,881 sf, 80.96% Impervious, Inflow Depth = 6.79" for 100-Year event
Inflow = 2.23 cfs @ 12.09 hrs, Volume= 7,283 cf
Outflow = 0.26 cfs @ 11.60 hrs, Volume= 7,280 cf, Atten= 88%, Lag= 0.0 min
Discarded = 0.26 cfs @ 11.60 hrs, Volume= 7,280 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link DP-2 : Park Avenue Drainage System

Routing by Stor-Ind method, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 103.59' @ 12.74 hrs Surf.Area= 1,363 sf Storage= 2,467 cf

Plug-Flow detention time= 66.7 min calculated for 7,280 cf (100% of inflow)
Center-of-Mass det. time= 66.3 min (851.8 - 785.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	100.50'	1,043 cf	**34.75'W x 39.22'L x 3.50'H Field A** 4,770 cf Overall - 1,608 cf Embedded = 3,162 cf x 33.0% Voids
#2A	101.00'	1,608 cf	**ADS_StormTech SC-740 +Cap** x 35 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 35 Chambers in 7 Rows
		2,651 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	103.85'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.26 cfs @ 11.60 hrs HW=100.54' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.50' (Free Discharge)
2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link DP-1: Existing Catch Basin

Inflow Area = 1,392 sf, 0.00% Impervious, Inflow Depth = 1.46" for 100-Year event
Inflow = 0.04 cfs @ 12.12 hrs, Volume= 170 cf
Primary = 0.04 cfs @ 12.12 hrs, Volume= 170 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

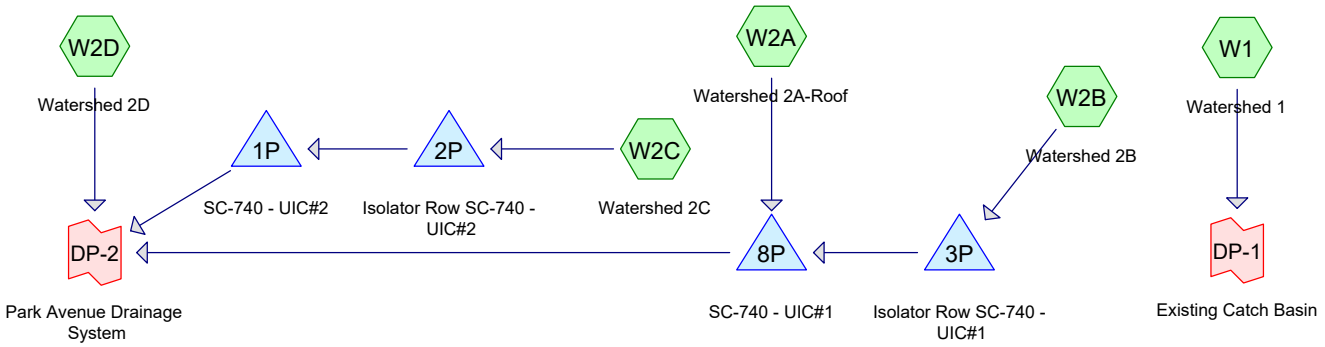
Summary for Link DP-2: Park Avenue Drainage System

Inflow Area = 28,379 sf, 66.77% Impervious, Inflow Depth = 1.37" for 100-Year event
Inflow = 1.69 cfs @ 12.16 hrs, Volume= 3,239 cf
Primary = 1.69 cfs @ 12.16 hrs, Volume= 3,239 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-28.00 hrs, dt= 0.05 hrs

Appendix F

Water Quality Calculations



Subcat Reach Pond Link

Routing Diagram for Itri Commons -WQv Conditions
Prepared by Joe Casali Engineering, Inc, Printed 3/13/2024

Pond 1P: SC-740 - UIC#2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

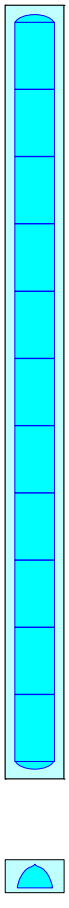
11 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 79.94' Row Length +12.0" End Stone x 2 = 81.94' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

11 Chambers x 45.9 cf = 505.3 cf Chamber Storage

1,792.4 cf Field - 505.3 cf Chambers = 1,287.0 cf Stone x 33.0% Voids = 424.7 cf Stone Storage

Chamber Storage + Stone Storage = 930.1 cf = 0.021 af
Overall Storage Efficiency = 51.9%
Overall System Size = 81.94' x 6.25' x 3.50'

11 Chambers
66.4 cy Field
47.7 cy Stone



Pond 2P: Isolator Row SC-740 - UIC#2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

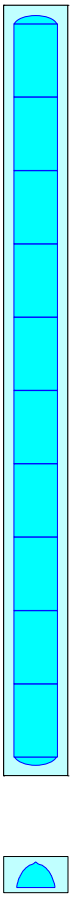
10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

10 Chambers x 45.9 cf = 459.4 cf Chamber Storage

1,636.6 cf Field - 459.4 cf Chambers = 1,177.2 cf Stone x 33.0% Voids = 388.5 cf Stone Storage

Chamber Storage + Stone Storage = 847.9 cf = 0.019 af
Overall Storage Efficiency = 51.8%
Overall System Size = 74.82' x 6.25' x 3.50'

10 Chambers
60.6 cy Field
43.6 cy Stone



Pond 3P: Isolator Row SC-740 - UIC#1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

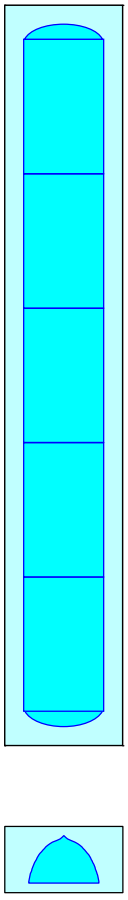
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

5 Chambers x 45.9 cf = 229.7 cf Chamber Storage

857.9 cf Field - 229.7 cf Chambers = 628.2 cf Stone x 33.0% Voids = 207.3 cf Stone Storage

Chamber Storage + Stone Storage = 437.0 cf = 0.010 af
Overall Storage Efficiency = 50.9%
Overall System Size = 39.22' x 6.25' x 3.50'

5 Chambers
31.8 cy Field
23.3 cy Stone



Pond 8P: SC-740 - UIC#1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

35 Chambers x 45.9 cf = 1,607.9 cf Chamber Storage

4,769.7 cf Field - 1,607.9 cf Chambers = 3,161.8 cf Stone x 33.0% Voids = 1,043.4 cf Stone Storage

Chamber Storage + Stone Storage = 2,651.3 cf = 0.061 af
Overall Storage Efficiency = 55.6%
Overall System Size = 39.22' x 34.75' x 3.50'

35 Chambers
176.7 cy Field
117.1 cy Stone