

STORMWATER MANAGEMENT REPORT

Pare Project No. 25038.00

Adirondack Club Parking Lot Expansion 800 Chestnut Street Franklin, Massachusetts 02038

A.P. 248, Lot 80

Prepared for:

The Adirondack Club
800 Chestnut Street
Franklin, MA 02038

Prepared by:

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JUNE 2025



ENGINEERS * SCIENTISTS ✿ PLANNERS

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INTRODUCTION

Pare Corporation has prepared this report to summarize the stormwater management system for the proposed Adirondack Club Parking Lot Expansion project. The site is located at 800 Chestnut Street in Franklin, Massachusetts on Assessors' Map 248, Lot 80. The property is bounded on the southern side by Acorn Place, the eastern side by Conrail Railroad, and the western side by Chestnut Street. The project includes the expansion of a paved parking area in the northern portion of the property along with a re-routed paved walkway, restoration of an existing infiltration basin, new stormwater treatment practices, and other associated site improvements.

The following sections of the report discuss the existing conditions, proposed development, methodology employed to evaluate stormwater runoff for existing and proposed conditions, and design elements for the proposed stormwater management system components. Supporting documentation is provided in the attached appendices.

The proposed stormwater management system was designed in accordance with the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Handbook, the Town of Franklin Best Development Practices Guidebook, and the Town of Franklin stormwater requirements.



METHODOLOGY

Hydrologic calculations for existing and proposed conditions were performed using HydroCAD Version 10.20 software, which uses TR-55 methodology to calculate runoff and TR-20 methodology for storm routing through the stormwater detention facilities. Site hydrology was evaluated for the 2-year, 10-year, and 100-year Type III 24-hour storms in accordance with the guidelines of the Massachusetts Stormwater Handbook. Existing and Proposed Watershed Maps delineating the sub watersheds and associated stormwater flow paths can be found in Appendix D.

The hydraulic design calculations were completed using the Static Method to calculate the accumulated flows to each structure. The stormwater conveyance systems were designed using Manning's Equation. The stormwater conveyance systems were designed to handle the runoff generated by a 25-year design storm.



EXISTING CONDITIONS OF STUDY AREA

The project area is bound by Flooring America Design Center to the north, Chestnut Street to the west, Acorn Place to the South, and a residential area to the east. The watershed analyzed for the project has a total area of approximately 5.13 acres. The limit of disturbance for the project is approximately 3.8 acres, with approximately 1.73 acres of that being impervious cover.

The site is not within a Natural Heritage Priority Habitat. There are no Certified Vernal Pools or Potential Vernal Pools onsite as mapped by MassGIS. The Site is located in an Approved Wellhead Protection Area (Zone II) Wellhead Protection Area. There are no Zone A's, B's, or C's associated with the limit of disturbance. There are no delineated natural resources or buffer zones associated with this site.

According to the FEMA Flood Insurance Rate Map for the Town of Franklin, Massachusetts, the site is entirely located in a Zone X area or Area of Minimal Flood Hazard.

Geotechnical Investigations and Soil Data

Natural Resources Conservation Service (NRCS) soil mapping shows the soils located at the site are Hinckley loamy sand, with a Hydrology Soil Group (HSG) rating of A.

Five test pits were excavated on March 8, 2025 to observe subsurface soil characteristics at the site. A Massachusetts Certified Soil Evaluator observed test pit excavation and prepared logs which are provided in Appendix A. Test pit locations are identified on the project plans. The on-site soil generally consists of coarse sand.

Based upon the NRCS classification of soils surrounding the site and soil properties observed during test pit excavation, the on-site soils have been modeled as HSG A in this analysis. Two monitoring wells adjacent to the east and west ends of the existing basins were observed to have no standing water to an elevation of 33 feet below surface grade during the wet season. Therefore, groundwater is considered to be at a depth of 33 feet below existing grade. A falling head test was also conducted in Test Pit 1 and yielded an infiltration rate of 42 in./hr. A sieve analysis of the existing parent material was also conducted and the results of the analysis are included in this report.



Existing Hydrology

The existing topography of the site in the vicinity of the proposed work generally slopes northeast towards the existing infiltration basin in the northern portion of the property. Most of the project area drains to this point. The remainder of the project area flows overland off-site to the north.

Two design points were analyzed for the project; Design Point DP-1 is the existing infiltration basin in the northern portion of the lot, and Design Point DP-2 is the area located offsite to the north. Three existing sub catchment areas were delineated as follows:

- EDA-1 is comprised of existing lawn and wooded area along with an impervious walk located in the northeastern portion of the site. EDA-1 flows overland north and discharges to DP-1.
- EDA-2 consists of the existing parking lot. This area is primarily comprised of paved impervious surface. This portion sheet flows to catch basins and is collected and routed through a settling tank and is then discharged to DP-1.
- EDA-3 consists of the area to the north of the existing parking lot. This area is comprised of existing gravel and paved area. This portion flows overland west and discharges to DP-2.



PROPOSED CONDITIONS OF STUDY AREA

The proposed improvements primarily include expanding the existing parking lot to the north and rerouting a paved walkway. The proposed condition has approximately 2.74 acres of impervious surface within the limit of disturbance, resulting in a net increase of 1.01 acres of impervious area.

All new stormwater collection, storage, and treatment systems have been designed in accordance with the Massachusetts Stormwater Handbook. The parking expansion project is classified as a new development project, and as such, it is required to adhere to all ten standards per the Handbook.

The site proposes stormwater discharges to an existing infiltration basin. The stormwater systems have been designed to treat and manage all impervious runoff from the site. These systems are designed to infiltrate 100% of the impervious runoff in all storms up to and including the 100-year storm event, at a minimum. There is no off-site runoff from impervious surfaces.

Stormwater on site is managed using a drainage network of catch basins, conveyance piping, proprietary treatment BMP's (best management practice), and overland flows. The drainage piping has been designed to adequately convey the 25-year storm, with design consideration made for the 100-year storm.

The grading scheme is designed to mimic the existing conditions drainage patterns where possible. Stormwater is conveyed to BMPs via overland flow and drainage piping. The BMPs are designed to address flow-rate and quality of runoff from the developed site. These features include:

- **Source Control and Maintenance:** Properly maintaining sources of pollutants to produce higher quality stormwater runoff. Source controls include removal of sediment buildup from BMPs.
- **Infiltration Basin:** Approved in accordance with the Handbook to promote water quality, exfiltration, and recharge. The majority of stormwater runoff flowing into this system received by the conveyance system for the rest of the existing and proposed parking lots. All stormwater coming from proposed pollutant loading surfaces is pretreated prior to entering the basin.

A majority of the stormwater flows directly to the existing infiltration basin where it is fully exfiltrated through the 100-year storm. Some small areas adjacent to the northern property line flow off-site. The proposed sub catchments are as follows:



- PDA-1 is comprised of existing lawn and wooded area along with an impervious walk located in the northeastern portion of the site. This portion sheet flows north and discharges to DP-1.
- PDA-2A consists of the existing parking lot. This area is primarily comprised of impervious surface. This portion sheet flows north and discharges to DP-1.
- PDA-2B consist of the proposed parking lot portion of the project. The drainage characteristics of this sub catchment match that of PDA-2A with this area being separately delineated as the proposed work distinction.
- PDA-3 consists of the area to the north of the existing parking lot. This area is comprised of existing miscellaneous lawn areas across the site directly abutting the property line. This portion sheet flows west and discharged to DP-2L directly off-site.



STORMWATER MANAGEMENT STANDARDS

The stormwater management system is designed to meet the 10 Minimum Standards per the Massachusetts Stormwater Handbook. The Stormwater Checklist has been completed and is included in Appendix A. The following sections describe the approach to meeting the requirements for each Minimum Standard.

Standard 1: No New Untreated Discharges or Erosion to Wetlands

Massachusetts Stormwater Standard #1 states that there shall be no new untreated discharges, and all new discharges are adequately treated. All proposed flows ultimately discharge to the existing basin where they are managed and fully exfiltrated.

Standard 2: Peak Rate Attenuation

Massachusetts Stormwater Standard #2 states that runoff rates from the developed site must not exceed existing runoff rates. The tables below depict the peak runoff rates from the pre to post development conditions for DP-1. The results of the hydrologic model are provided in Appendix C.

As displayed in the table below, there is no outflow from the existing basin both in the pre- and post-development conditions. The area adjacent to the property line and conveying off-site has been dramatically reduced, with that increase being reflected in Table 1 as well. Due to the nature of the existing basin and conveyance design, Standard #2 is fully met and far exceeds what is required in the Stormwater Handbook. In addition to the reduction in peak flows, the routing of a greater portion of the site to the existing basin drastically reduces the volumes that are conveyed off-site with a majority of the volume being exfiltrated into the soil.

Table 1: Peak Flow Rates (CFS)

Design Storms:	2 Year Storm (2.50 inches)	10 Year Storm (3.20 inches)	25 Year Storm (4.70 inches)	100 Year Storm (6.70 inches)
DP-1				
Pre	0.00	0.00	0.00	0.00
Post	0.00	0.00	0.00	0.00
<u>Difference</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
DP-2				
Pre	0.02	0.31	0.65	1.37
Post	0.00	0.00	0.02	0.06
<u>Difference</u>	<u>-0.02</u>	<u>-0.31</u>	<u>-0.63</u>	<u>-1.31</u>



Table 2: Peak Volumes (CF)

Design Storms:	2 Year Storm (2.50 inches)	10 Year Storm (3.20 inches)	25 Year Storm (4.70 inches)	100 Year Storm (6.70 inches)
DP-1				
Pre	0	0	0	0
Post	0	0	0	0
<u>Difference</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
DP-2				
Pre	1,691	3,419	4,765	7,320
Post	0	95	207	440
<u>Difference</u>	<u>-1,691</u>	<u>-3,324</u>	<u>-4,558</u>	<u>-6,880</u>

Minimum Standard 3: Stormwater Recharge

Massachusetts Stormwater Standard #3 states that loss of groundwater recharge from the proposed development shall be eliminated or minimized and at a minimum the recharge volume, which is dependent on soil type, shall be recharged to the groundwater. The intent of this standard is to ensure that the infiltration volume of precipitation into the ground under post-development conditions is at least as much as the infiltration volume under pre-development conditions.

The required recharge volume was calculated using the soil-type dependent infiltration depth factor of 0.60 inches (as specified by the Handbook). The factor was applied to the net impervious area to calculate the required recharge volume. The “*Static*” method, as specified by the Handbook, was used to size infiltration BMPs that will achieve the required recharge volume.

Using the appropriate Rawls Rate and soil characteristics, the groundwater recharge was modeled using the methodology specified in Volume 3 of the Handbook. All the impervious runoff from the modeled area conveys to the existing basin where it is fully exfiltrated (see Standard #2). As a result, Standard #3 is fully met and exceeded in the current design.

Separation between proposed infiltration interfaces and seasonal high groundwater meets and exceeds the minimum 2-foot separation requirement based on the provided evidence from the soil evaluation and monitoring well observations. The existing basin is designed to drawdown within 72 hours from the end of a storm event. Page 48 of the PRO hydro calculations in Appendix B displays zero discarded outflow at hour 26 of the 100-yr storm. This shows that full drawdown occurs before the 72-hour limit in the existing basin. All other storms fully exfiltrate prior to hour 26 of the given event.



Minimum Standard 4: Water Quality

Per the Massachusetts Stormwater Handbook, the 80% TSS treatment standard is presumed to be met when suitable nonstructural practices for source control and pollution prevention are implemented, stormwater management best practices are sized to capture the prescribed runoff volume, stormwater management BMPs are maintained as designed, and for redevelopment, to meet these standards to the maximum extent practicable through retrofitted or expanded stormwater management systems. Additionally, the Town of Franklin requirement in the Best Development Practices Guidance requires additional TSS treatment to 90%. The system design meets all criteria described above utilizing deep sump catch basins, grit manholes, water quality unit hydrodynamic separators, and an infiltration basin. Stormwater quality design calculations are provided in Appendix C of this report to display that the required pretreatment and primary treatment are provided. In summary, the total TSS treatment efficiency provided by the proposed stormwater system is 96%. The Best Development Practices guidance also requires 60% treatment of phosphorus. This treatment is provided entirely by the existing infiltration basin, which achieves an efficiency of between 60-80% total phosphorus reduction (Volume 2 Chapter 2). This efficiency profile lies fully above the requirements laid out by the Town of Franklin and thus further satisfies the Best Development Practices guidance.

Minimum Standard 5: Land Uses with a Higher Potential Pollutant Load

Massachusetts Stormwater Standard #5 requires that source control and pollution prevention be implemented for land uses with higher potential pollutant loads. The proposed development is defined as a LUHPPL due to the high intensity parking use associated with the lot.

The performance standards for LUHPPL's are listed below along with an accompanying response for how the standard is being met by the proposed project.



- *Discharges from certain land uses with higher potential pollutant loads may be subject to additional requirements including the need to obtain an individual or general discharge permit pursuant to the MA Clean Waters Act or Federal Clean Water Act. The parking use being proposed for the site does not constitute the need for a MA Clean Waters Act or Federal Clean Water Act permit.*
- *All proponents must implement source control and pollution prevention. An Operation & Maintenance Plan and Long Term Pollution Prevention Plan are provided as part of this filing.*
- *All BMPs shall be designed in accordance with specifications and sizing methodologies in the Massachusetts Stormwater Handbook Volumes 2 and 3. The existing basin was previously approved and meets the Stormwater Handbook requirements for the design of infiltration basins. A maintenance scope is proposed as part of this project to restore the basin to the designed operating conditions for infiltration basins in addition to the proposed O&M and LTPPP provided.*
- *The required water quality volume equals 1 inch times the total impervious area of the post-development site. The water quality volume calculations are provided in Appendix C.*
- *Many land uses have the potential to generate higher potential pollutant loads of oil and grease. These land uses include, without limitation, industrial machinery and equipment and railroad equipment maintenance, log storage and sorting yards, aircraft maintenance areas, railroad yards, fueling stations, vehicle maintenance and repair, construction businesses, paving, heavy equipment storage and/or maintenance, the storage of petroleum products, high-intensity-use parking lots, and fleet storage areas. To treat the runoff from such land uses, the following BMPs must be used to pretreat the runoff prior to discharge to an infiltration structure: an oil grit separator, a sand filter, organic filter, filtering bioretention area, or equivalent. An oil-grit separator is provided prior to all other pretreatment or treatment BMP's.*
- *At least 44% TSS removal is required prior to discharge to an infiltration device. Until they complete the STEP or TARP verification process outlined in Volume 2, proprietary BMPs may not be used as a terminal treatment device for runoff from land uses with higher potential pollutant loads. For purposes of this requirement, subsurface structures, even those that have a storage chamber that has been manufactured are not considered propriety BMPs, since the treatment occurs in the soil below the structure, not in the structure. Oil-Grit Separation and a proprietary Water Quality unit in series are provided as pretreatment BMP's prior to discharge to the Infiltration Basin. Per TSS calculations in Appendix C, 63% of TSS is removed prior to discharge to the infiltration basin.*

Minimum Standard 6: Critical Areas

The proposed development is located within a Zone II Wellhead Protection Area. Therefore, Massachusetts Stormwater Standard #6 applies to this project. Below is a list of the performance standards associated with an Outstanding Resource and how this project meets each standard.

- *Unless necessary to manage stormwater from essential drinking water facilities, no stormwater BMPs may be located within the Zone I. There are no Zone I's associated with this development.*
- *Proponents must comply with local source water protection ordinances, bylaws, and regulations. The project meets the stormwater requirements in the Town of Franklin's Best Development Practices Guidebook.*



- *The Drinking Water Regulations, 310 CMR 22.21(2)(b)(7)¹, require the development of land use controls in the Zone II that prohibit land uses that result in rendering 15% or 2500 square feet of a lot impervious, whichever is larger, unless a system of artificial recharge that does not degrade groundwater quality is provided. Developers can comply with these land use controls by designing, constructing, operating and maintaining a stormwater management system in compliance with the Stormwater Management Standards. Per the water quality calculations provided, the pretreatment provided far exceeds what is required of the site. Furthermore, the depth to groundwater beneath the infiltration basin (an acceptable BMP within the Town of Franklin’s Best Development Practices Guidebook) is such that a greater level of treatment occurs before the exfiltrated stormwater interfaces with the groundwater table. All BMP’s have been designed per the Massachusetts Stormwater Handbook and the Town of Franklin’s Best Development Practices Guidebook.*
- *BMPs must be designed according to the specifications and sizing methodologies in Volumes 2 and 3 of the Massachusetts Stormwater Handbook. The existing basin was previously approved and meets the Stormwater Handbook requirements for the design of infiltration basins. A maintenance scope is proposed as part of this project to restore the basin to the designed operating conditions for infiltration basins in addition to the proposed O&M and LTPPP provided.*
- *Required Water Quality Volume = 1.0 inch times impervious area. The water quality volume calculations are provided in Appendix C.*
- *At least 44% TSS must be removed prior to discharge to the infiltration structure. Per TSS Calculations in Appendix C, 63% of TSS is removed prior to discharge to the infiltration basin.*
- *For discharges within the Zone I, Zone II or IWPA, proprietary BMPs may be used for pretreatment only, unless verified for other uses by TARP or STEP. For the purpose of this requirement, subsurface structures, even those that have a storage chamber that has been manufactured are not proprietary BMPs, since the pretreatment occurs in the soil below the structure, not in the structure itself. See Volume 2. The only proposed proprietary BMP’s proposed as part of this project are for pretreatment and not primary treatment. Thusly, this performance standard is fully satisfied.*

Minimum Standard 7: Redevelopment and Infill Projects

Massachusetts Stormwater Standard #7 applies to road maintenance and improvement projects, development of previously developed sites, or remedial projects for stormwater improvement. This site was not previously developed and does not qualify as a Redevelopment Project.

¹ Drinking Water Regulations – <http://www.mass.gov/eea/docs/dep/water/ccdefreg.pdf>



Minimum Standard 8: Construction Period Controls

Massachusetts Stormwater Standard #8 requires that a plan to control construction-related impacts be prepared and implemented. Projects which disturb one acre of land or more are required to obtain coverage under the National Pollution Discharge Elimination System (NPDES) Construction General Permit (CGP) issued by the Environmental Protection Agency (EPA) and prepare a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP will include means and methods at the discretion of the Contractor to comply with the NPDES CGP. The SWPPP under the CGP will be required to be prepared and submitted by the Contractor as the Operator of the site prior to construction. The location and type of erosion and sediment control features, including perimeter erosion controls, are identified on the plans.

Minimum Standard 9: Operation and Maintenance Plan

Massachusetts Stormwater Standard #9 requires that an Operation and Maintenance Manual and Long Term Pollution Prevention Plan be prepared and implemented to ensure that the stormwater management systems function as designed. These reports are provided under a separate cover.

Minimum Standard 10: Illicit Discharges to Drainage System

Massachusetts Stormwater Standard #10 prohibits illicit discharges to the proposed stormwater management system. Based on the best-available information and in-field reviews of the current site, there are no known non-stormwater discharges that will be connected to the proposed stormwater collection system that would convey pollutants directly to groundwater or surface waters.



SUMMARY

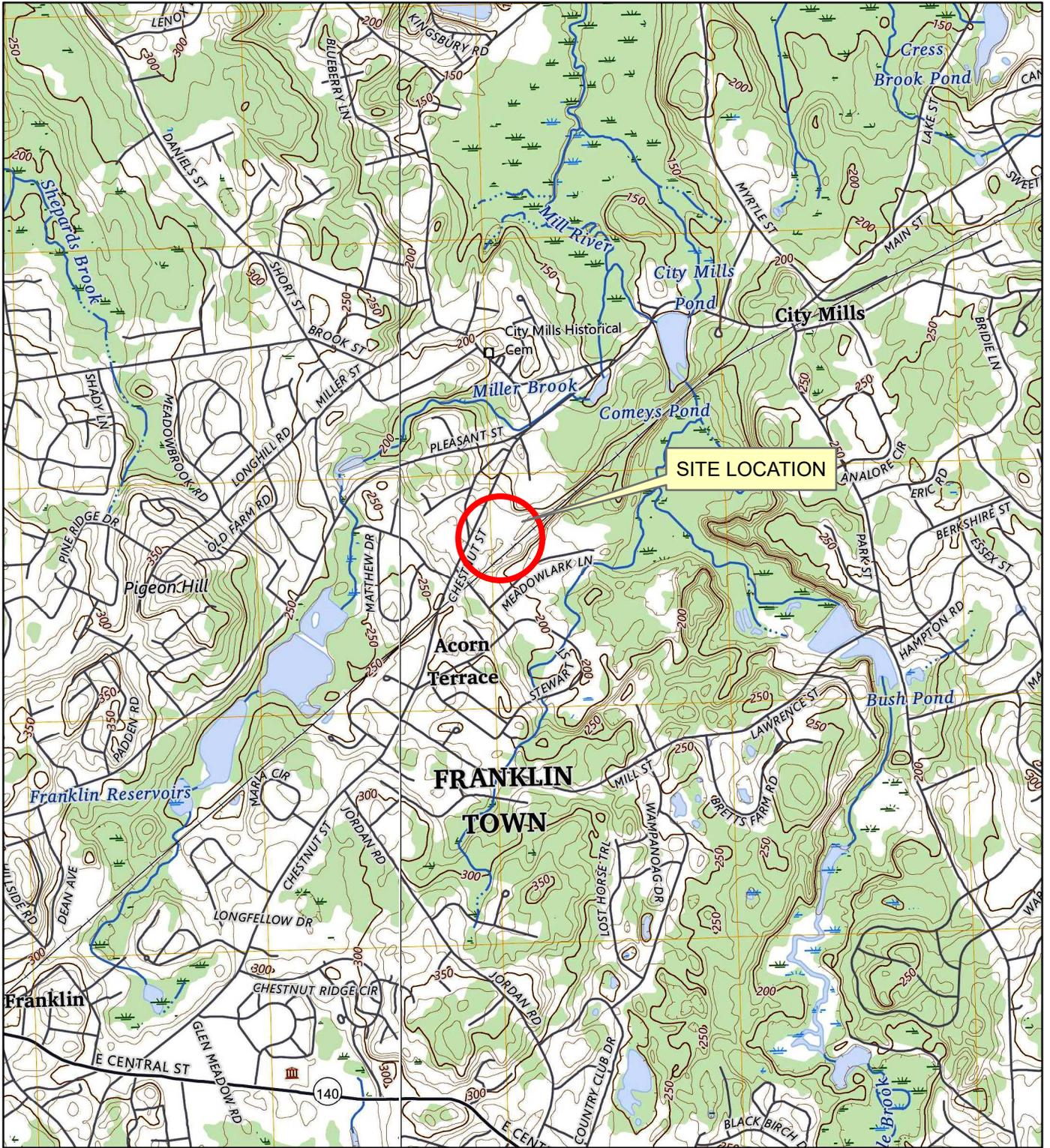
The post-development stormwater management system has been designed in accordance with the Massachusetts Stormwater Handbook and the Town of Franklin requirements. The proposed stormwater management systems address both the quantity and quality of the stormwater runoff up to and beyond the requirements in the regulations. The stormwater management system promotes substantial recharge and water quality measures within the hydrologic analysis area. TSS loading from the site is managed through source control and best management practices. The parking lot expansion project will have no impact on the municipal stormwater system.



Adirondack Club
ADIRONDACK CLUB PARKING LOT EXPANSION

APPENDIX A

**Site Locus
Aerial Map
Test Pit Logs
Falling Head Test
Sieve Analysis
NRCS Soils Map
FEMA Firmette
Stormwater Checklist**



SITE LOCATION MAP

SCALE: 1" = 2,000'



8 BLACKSTONE VALLEY PLACE
LINCOLN, RI 02865
(401) 334-4100

10 LINCOLN ROAD, SUITE 210
FOXBORO, MA 02035
(508) 543-1755

FIGURE 1

ADIRONDACK CLUB PARKING LOT EXPANSION FRANKLIN, MA



ANNOTATED AERIAL PHOTOGRAPH

SCALE: 1" = 100'



8 BLACKSTONE VALLEY PLACE
LINCOLN, RI 02865
(401) 334-4100

10 LINCOLN ROAD, SUITE 210
FOXBORO, MA 02035
(508) 543-1755

PARE PROJECT No. 25036.00

JUNE 2025

FIGURE 2

ADIRONDACK CLUB
PARKING LOT EXPANSION
FRANKLIN, MA

Property Owner:	Adirondack Club		
Project:	Adirondack Club Parking Expansion	Contractor:	
Property Location:	800 Chestnut St., Franklin, MA	Excavator: 120	
Date of Test Hole:	March 8, 2025		
Soil Evaluator:	Spencer Lynds SE#14275	State / SE Expiration: MA / 6/30/2027	
Weather:	Sunny	Shaded: Yes <input type="checkbox"/> No <input type="checkbox"/>	

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Fill	0 - 6											
C1	6 - 120								S	Massive	Loose	0%

Soil Class: <u>Class A</u>	Total Depth of Test Hole: <u>120"</u>
Depth to Groundwater or Seepage: <u>N/A</u>	Depth to Impervious or Limiting Layer: <u>-</u>
Estimated Seasonal High Water Table: <u>120"</u>	Surface Elevation of Test Pit (approximate): <u>-</u>

COMMENTS:
 GW Monitoring Well at abandoned TP-3 location - no water to 33'
 No bedrock encountered, FH Test conducted @ 36" = 42 in/hr

Property Owner:	Adirondack Club		
Project:	Adirondack Club Parking Expansion	Contractor:	
Property Location:	800 Chestnut St., Franklin, MA	Excavator: 120	
Date of Test Hole:	March 8, 2025		
Soil Evaluator:	Spencer Lynds SE#14275	State / SE Expiration: MA / 6/30/2027	
Weather:	Sunny	Shaded: Yes <input type="checkbox"/> No <input type="checkbox"/>	

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Fill	0 - 6											
C1	6 - 60								S	Massive	Loose	0%

Soil Class: <u>Class A</u>	Total Depth of Test Hole: <u>60"</u>
Depth to Groundwater or Seepage: <u>N/A</u>	Depth to Impervious or Limiting Layer: <u>-</u>
Estimated Seasonal High Water Table: <u>N/A</u>	Surface Elevation of Test Pit (approximate): <u>-</u>

COMMENTS:
 GW Monitoring Well at abandoned TP-3 location - no water to 33'
 No bedrock encountered, Sieve sample taken

Property Owner:	Adirondack Club		
Project:	Adirondack Club Parking Expansion	Contractor:	
Property Location:	800 Chestnut St., Franklin, MA	Excavator: 120	
Date of Test Hole:	March 8, 2025		
Soil Evaluator:	Spencer Lynds SE#14275	State / SE Expiration: MA / 6/30/2027	
Weather:	Sunny	Shaded: Yes <input type="checkbox"/> No <input type="checkbox"/>	

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				

ABANDONED

Soil Class: <u> N/A </u>	Total Depth of Test Hole: <u> N/A </u>	
Depth to Groundwater or Seepage: <u> N/A </u>	Depth to Impervious or Limiting Layer: <u> - </u>	
Estimated Seasonal High Water Table: <u> 33' </u>	Surface Elevation of Test Pit (approximate): <u> - </u>	

COMMENTS:
 GW Monitoring Well at abandoned TP-3 location - no water to 33'

Property Owner:	Adirondack Club		
Project:	Adirondack Club Parking Expansion	Contractor:	
Property Location:	800 Chestnut St., Franklin, MA	Excavator: 120	
Date of Test Hole:	March 8, 2025		
Soil Evaluator:	Spencer Lynds SE#14275	State / SE Expiration: MA / 6/30/2027	
Weather:	Sunny	Shaded: Yes <input type="checkbox"/> No <input type="checkbox"/>	

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Fill A	0 - 12											
C1	12 - 60								S	Massive	Loose	0%
C2	60 - 108								CS	Massive	Loose	0%

Soil Class: <u>Class A</u>	Total Depth of Test Hole: <u>108"</u>
Depth to Groundwater or Seepage: <u>N/A</u>	Depth to Impervious or Limiting Layer: <u>-</u>
Estimated Seasonal High Water Table: <u>108"</u>	Surface Elevation of Test Pit (approximate): <u>-</u>

COMMENTS:
 GW Monitoring Well at abandoned TP-3 location - no water to 33'
 No bedrock encountered

Property Owner:	Adirondack Club		
Project:	Adirondack Club Parking Expansion	Contractor:	
Property Location:	800 Chestnut St., Franklin, MA	Excavator: 120	
Date of Test Hole:	March 8, 2025		
Soil Evaluator:	Spencer Lynds SE#14275	State / SE Expiration: MA / 6/30/2027	
Weather:	Sunny	Shaded: Yes <input type="checkbox"/> No <input type="checkbox"/>	

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Fill	0 - 90											
C1	90 - 120								S	Massive	Loose	0%

Soil Class: <u>Class A</u>	Total Depth of Test Hole: <u>120"</u>
Depth to Groundwater or Seepage: <u>N/A</u>	Depth to Impervious or Limiting Layer: <u>-</u>
Estimated Seasonal High Water Table: <u>120"</u>	Surface Elevation of Test Pit (approximate): <u>-</u>

COMMENTS:

GW Monitoring Well at abandoned TP-3 location - no water to 33'
 No bedrock encountered, fill contained various pieces of debris such as concrete, pavement, organics, etc.

FALLING HEAD PERMEABILITY TEST TEST PIT 1

TIME (MINUTES)	DEPTH FROM TOP OF PIPE (INCHES)	% DEPTH FROM Start	% OF WATER FROM BOTTOM
0.04	0.00	0%	100%
0.11	1.00	4%	96%
0.18	2.00	8%	92%
0.25	3.00	13%	88%
0.35	4.00	17%	83%
0.43	5.00	21%	79%
0.52	6.00	25%	75%
0.62	7.00	29%	71%
0.70	8.00	33%	67%
0.81	9.00	38%	63%
0.93	10.00	42%	58%
1.06	11.00	46%	54%
1.19	12.00	50%	50%
1.31	13.00	54%	46%
1.45	14.00	58%	42%
1.58	15.00	63%	38%
1.72	16.00	67%	33%

From Hvorslev, 1951

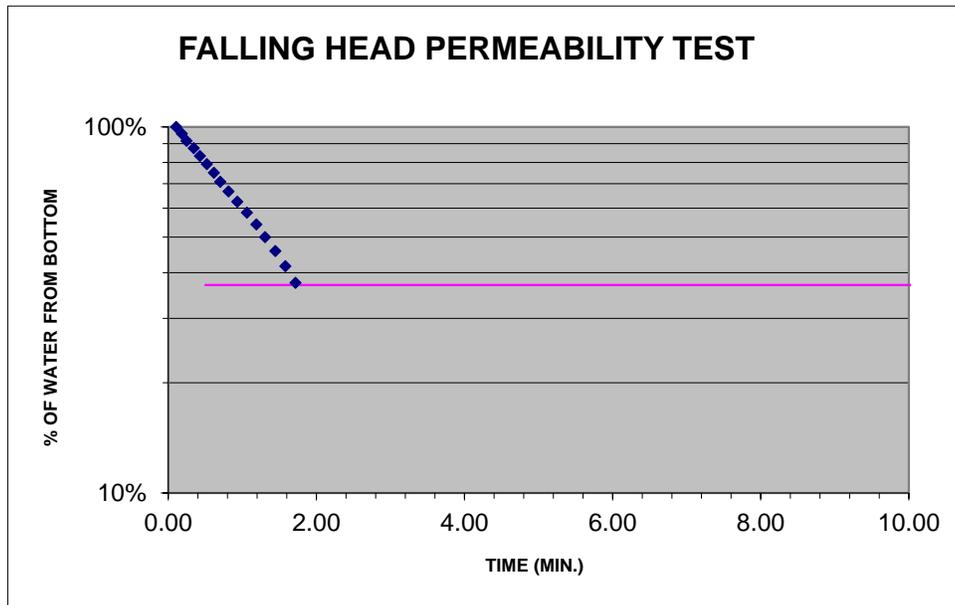
Permeability (Km) = $\pi(D)/11T$

Km = 9.81E-04 ft/sec = **42 in/hr**

Where T is time at % from bottom = 37%
D is Diameter of pipe

T = 96
D = 0.33

From graph (seconds)
(4 inch PVC pipe)

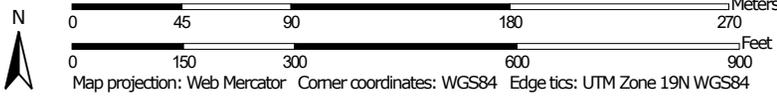


Soil Map—Norfolk and Suffolk Counties, Massachusetts



Soil Map may not be valid at this scale.

Map Scale: 1:3,090 if printed on A landscape (11" x 8.5") sheet.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts

Survey Area Data: Version 20, Aug 27, 2024

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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

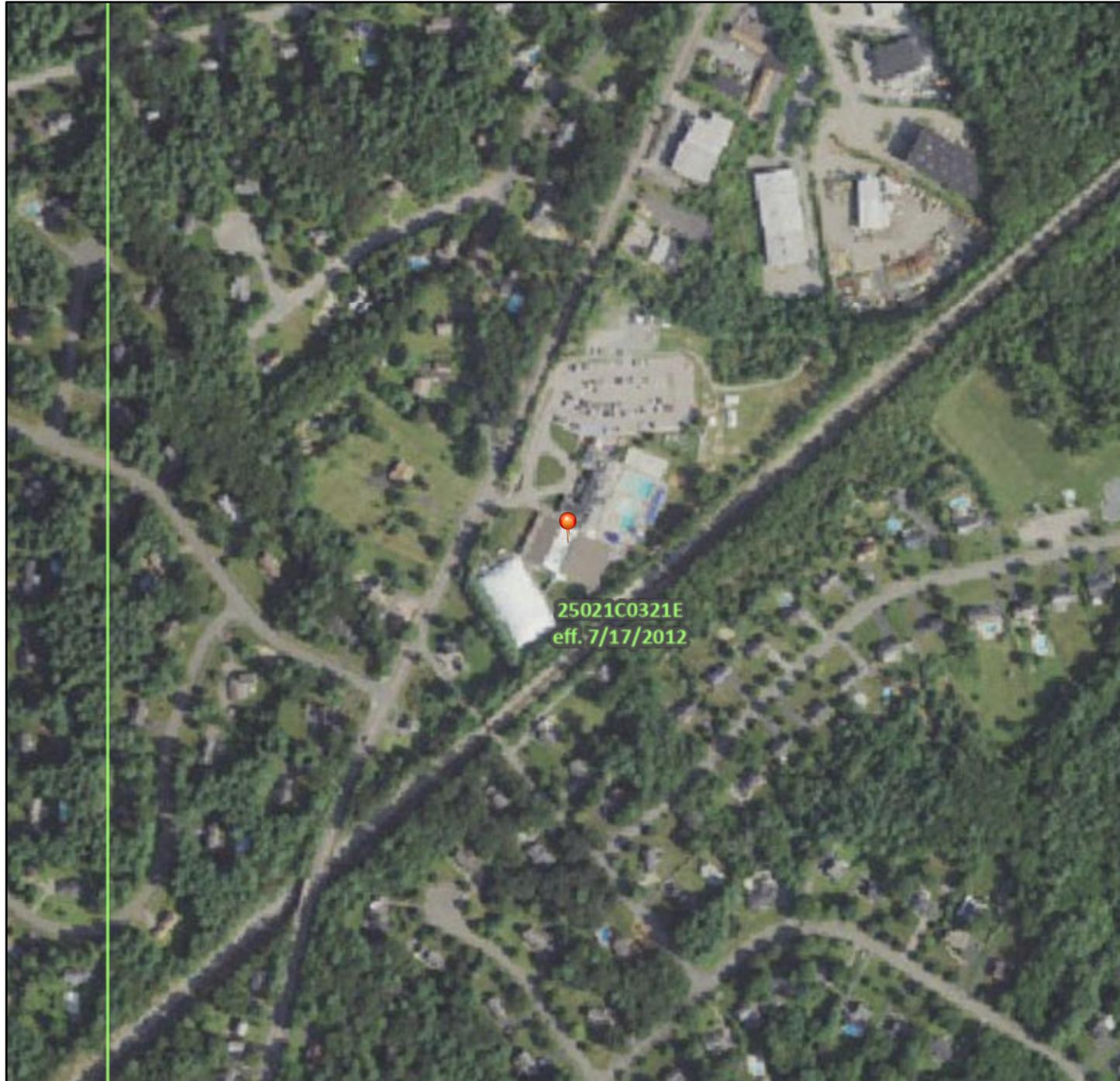
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
245C	Hinckley loamy sand, 8 to 15 percent slopes	0.9	2.6%
253D	Hinckley loamy sand, 15 to 35 percent slopes	13.7	40.0%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	3.3	9.6%
420C	Canton fine sandy loam, 8 to 15 percent slopes	3.0	8.7%
600	Pits, sand and gravel	8.3	24.3%
653	Udorthents, sandy	5.1	14.8%
Totals for Area of Interest		34.2	100.0%

National Flood Hazard Layer FIRMMette



71°22'33"W 42°6'16"N



1:6,000

71°21'56"W 42°5'49"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
OTHER FEATURES		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation
MAP PANELS		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **5/20/2025 at 5:17 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

¹ The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

² For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

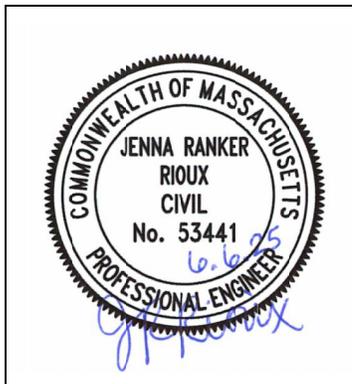
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- New development
- Redevelopment
- Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- No disturbance to any Wetland Resource Areas
- Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- Reduced Impervious Area (Redevelopment Only)
- Minimizing disturbance to existing trees and shrubs
- LID Site Design Credit Requested:
 - Credit 1
 - Credit 2
 - Credit 3
- Use of "country drainage" versus curb and gutter conveyance and pipe
- Bioretention Cells (includes Rain Gardens)
- Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- Treebox Filter
- Water Quality Swale
- Grass Channel
- Green Roof
- Other (describe): _____

Standard 1: No New Untreated Discharges

- No new untreated discharges
- Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic Field¹
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - Site is comprised solely of C and D soils and/or bedrock at the land surface
 - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - Solid Waste Landfill pursuant to 310 CMR 19.000
 - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - is within the Zone II or Interim Wellhead Protection Area
 - is near or to other critical areas
 - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - involves runoff from land uses with higher potential pollutant loads.
 - The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
 - The ½" or 1" Water Quality Volume or
 - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does **not** cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - Limited Project
 - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - Bike Path and/or Foot Path
 - Redevelopment Project
 - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - Name of the stormwater management system owners;
 - Party responsible for operation and maintenance;
 - Schedule for implementation of routine and non-routine maintenance tasks;
 - Plan showing the location of all stormwater BMPs maintenance access areas;
 - Description and delineation of public safety features;
 - Estimated operation and maintenance budget; and
 - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

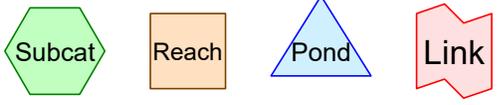
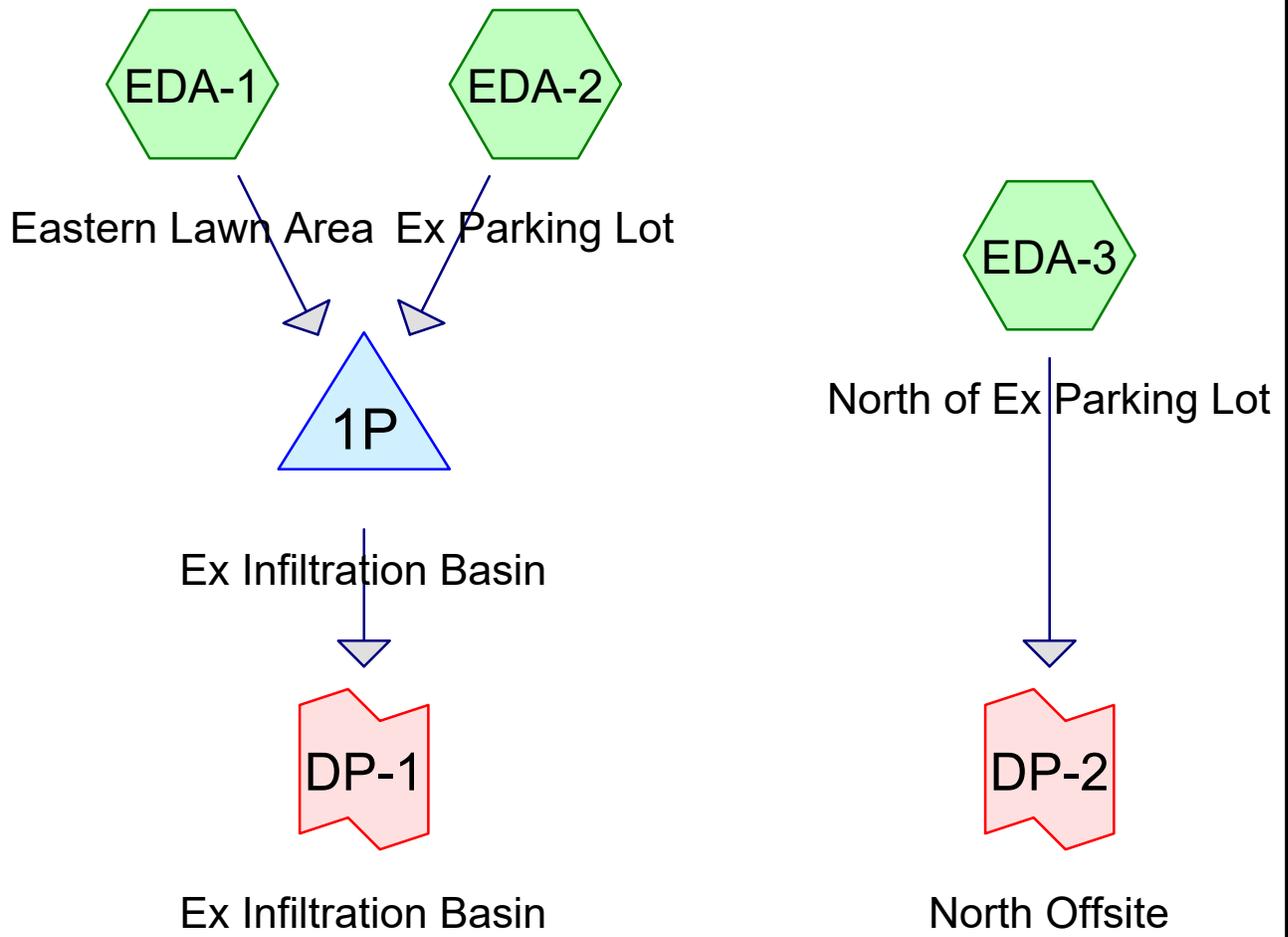
Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

Adirondack Club
ADIRONDACK CLUB PARKING LOT EXPANSION

APPENDIX B

Hydrologic Calculations – Existing and Proposed Conditions
Hydraulic Design Table



EX hydro

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23058.00 Existing Condition 2 year
Type III 24-hr 2-YR Rainfall=3.20"

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Page 2

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentEDA-1: Eastern Lawn Area Runoff Area=90,997 sf 7.28% Impervious Runoff Depth=0.22"
Flow Length=246' Tc=15.6 min CN=39/98 Runoff=0.36 cfs 1,641 cf

SubcatchmentEDA-2: Ex Parking Lot Runoff Area=71,543 sf 86.42% Impervious Runoff Depth=2.57"
Flow Length=287' Tc=9.5 min CN=42/98 Runoff=3.93 cfs 15,300 cf

SubcatchmentEDA-3: North of Ex Parking Runoff Area=60,819 sf 11.03% Impervious Runoff Depth=0.33"
Flow Length=222' Tc=13.4 min CN=41/98 Runoff=0.38 cfs 1,691 cf

Pond 1P: Ex Infiltration Basin Peak Elev=220.08' Storage=1,513 cf Inflow=4.24 cfs 16,941 cf
Discarded=2.18 cfs 16,942 cf Primary=0.00 cfs 0 cf Outflow=2.18 cfs 16,942 cf

Link DP-1: Ex Infiltration Basin Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link DP-2: North Offsite Inflow=0.38 cfs 1,691 cf
Primary=0.38 cfs 1,691 cf

Total Runoff Area = 223,358 sf Runoff Volume = 18,632 cf Average Runoff Depth = 1.00"
66.35% Pervious = 148,194 sf 33.65% Impervious = 75,164 sf

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23058.00 Existing Condition 2 year
Type III 24-hr 2-YR Rainfall=3.20"

Printed 6/4/2025

Page 3

Summary for Subcatchment EDA-1: Eastern Lawn Area

Runoff = 0.36 cfs @ 12.20 hrs, Volume= 1,641 cf, Depth= 0.22"
Routed to Pond 1P : Ex Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
84,371	39	>75% Grass cover, Good, HSG A
6,425	98	Paved parking, HSG A
200	98	Roofs, HSG A
90,997	43	Weighted Average
84,371	39	92.72% Pervious Area
6,626	98	7.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0110	0.13		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
3.0	120	0.0092	0.67		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	9	0.0235	3.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	17	0.0588	1.21		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.6	246	Total			

EX hydro

Prepared by Pare Corporation

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23058.00 Existing Condition 2 year
Type III 24-hr 2-YR Rainfall=3.20"

Printed 6/4/2025

Page 4

Summary for Subcatchment EDA-2: Ex Parking Lot

Runoff = 3.93 cfs @ 12.13 hrs, Volume= 15,300 cf, Depth= 2.57"
Routed to Pond 1P : Ex Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
3,228	49	50-75% Grass cover, Fair, HSG A
6,487	39	>75% Grass cover, Good, HSG A
61,828	98	Paved parking, HSG A
71,543	90	Weighted Average
9,715	42	13.58% Pervious Area
61,828	98	86.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	37	0.2784	0.18		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
4.8	63	0.0476	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.3	187	0.0134	2.35		Shallow Concentrated Flow, Paved Kv= 20.3 fps
9.5	287	Total			

EX hydro

Prepared by Pare Corporation

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23058.00 Existing Condition 2 year
Type III 24-hr 2-YR Rainfall=3.20"

Printed 6/4/2025

Page 5

Summary for Subcatchment EDA-3: North of Ex Parking Lot

Runoff = 0.38 cfs @ 12.17 hrs, Volume= 1,691 cf, Depth= 0.33"
Routed to Link DP-2 : North Offsite

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
13,426	49	50-75% Grass cover, Fair, HSG A
40,682	39	>75% Grass cover, Good, HSG A
6,476	98	Paved parking, HSG A
235	98	Roofs, HSG A
60,819	48	Weighted Average
54,108	41	88.97% Pervious Area
6,710	98	11.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	100	0.0830	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	47	0.1178	1.72		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.4	47	0.0745	1.91		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	28	0.1071	1.64		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.4	222	Total			

EX hydro

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Summary for Pond 1P: Ex Infiltration Basin

Inflow Area = 162,539 sf, 42.12% Impervious, Inflow Depth = 1.25" for 2-YR event
 Inflow = 4.24 cfs @ 12.13 hrs, Volume= 16,941 cf
 Outflow = 2.18 cfs @ 12.33 hrs, Volume= 16,942 cf, Atten= 49%, Lag= 12.3 min
 Discarded = 2.18 cfs @ 12.33 hrs, Volume= 16,942 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link DP-1 : Ex Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 220.08' @ 12.33 hrs Surf.Area= 4,482 sf Storage= 1,513 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 2.7 min (763.3 - 760.6)

Volume	Invert	Avail.Storage	Storage Description
#1	219.00'	58,045 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
219.00	4,055	0.0	0	0
219.99	4,055	28.0	1,124	1,124
220.00	4,055	100.0	41	1,165
221.00	9,291	100.0	6,673	7,838
222.00	11,084	100.0	10,188	18,025
223.00	12,550	100.0	11,817	29,842
224.00	14,090	100.0	13,320	43,162
225.00	15,675	100.0	14,883	58,045

Device	Routing	Invert	Outlet Devices
#1	Discarded	219.00'	21.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	224.80'	60.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=2.18 cfs @ 12.33 hrs HW=220.08' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 2.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=219.00' TW=0.00' (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

EX hydro

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23058.00 Existing Condition 2 year
Type III 24-hr 2-YR Rainfall=3.20"

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Stage-Discharge for Pond 1P: Ex Infiltration Basin

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
219.00	0.00	0.00	0.00	224.10	6.93	6.93	0.00
219.10	1.97	1.97	0.00	224.20	7.00	7.00	0.00
219.20	1.97	1.97	0.00	224.30	7.08	7.08	0.00
219.30	1.97	1.97	0.00	224.40	7.16	7.16	0.00
219.40	1.97	1.97	0.00	224.50	7.23	7.23	0.00
219.50	1.97	1.97	0.00	224.60	7.31	7.31	0.00
219.60	1.97	1.97	0.00	224.70	7.39	7.39	0.00
219.70	1.97	1.97	0.00	224.80	7.47	7.47	0.00
219.80	1.97	1.97	0.00	224.90	13.75	7.54	6.20
219.90	1.97	1.97	0.00	225.00	25.16	7.62	17.54
220.00	1.97	1.97	0.00				
220.10	2.23	2.23	0.00				
220.20	2.48	2.48	0.00				
220.30	2.73	2.73	0.00				
220.40	2.99	2.99	0.00				
220.50	3.24	3.24	0.00				
220.60	3.50	3.50	0.00				
220.70	3.75	3.75	0.00				
220.80	4.01	4.01	0.00				
220.90	4.26	4.26	0.00				
221.00	4.52	4.52	0.00				
221.10	4.60	4.60	0.00				
221.20	4.69	4.69	0.00				
221.30	4.78	4.78	0.00				
221.40	4.87	4.87	0.00				
221.50	4.95	4.95	0.00				
221.60	5.04	5.04	0.00				
221.70	5.13	5.13	0.00				
221.80	5.21	5.21	0.00				
221.90	5.30	5.30	0.00				
222.00	5.39	5.39	0.00				
222.10	5.46	5.46	0.00				
222.20	5.53	5.53	0.00				
222.30	5.60	5.60	0.00				
222.40	5.67	5.67	0.00				
222.50	5.74	5.74	0.00				
222.60	5.82	5.82	0.00				
222.70	5.89	5.89	0.00				
222.80	5.96	5.96	0.00				
222.90	6.03	6.03	0.00				
223.00	6.10	6.10	0.00				
223.10	6.18	6.18	0.00				
223.20	6.25	6.25	0.00				
223.30	6.33	6.33	0.00				
223.40	6.40	6.40	0.00				
223.50	6.47	6.47	0.00				
223.60	6.55	6.55	0.00				
223.70	6.62	6.62	0.00				
223.80	6.70	6.70	0.00				
223.90	6.77	6.77	0.00				
224.00	6.85	6.85	0.00				

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Type III 24-hr 2-YR Rainfall=3.20"

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Stage-Area-Storage for Pond 1P: Ex Infiltration Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
219.00	4,055	0	224.10	14,248	44,579
219.10	4,055	114	224.20	14,407	46,012
219.20	4,055	227	224.30	14,566	47,460
219.30	4,055	341	224.40	14,724	48,925
219.40	4,055	454	224.50	14,883	50,405
219.50	4,055	568	224.60	15,041	51,901
219.60	4,055	681	224.70	15,199	53,413
219.70	4,055	795	224.80	15,358	54,941
219.80	4,055	908	224.90	15,517	56,485
219.90	4,055	1,022	225.00	15,675	58,045
220.00	4,055	1,165			
220.10	4,579	1,596			
220.20	5,102	2,080			
220.30	5,626	2,617			
220.40	6,149	3,205			
220.50	6,673	3,847			
220.60	7,197	4,540			
220.70	7,720	5,286			
220.80	8,244	6,084			
220.90	8,767	6,935			
221.00	9,291	7,838			
221.10	9,470	8,776			
221.20	9,650	9,732			
221.30	9,829	10,706			
221.40	10,008	11,697			
221.50	10,188	12,707			
221.60	10,367	13,735			
221.70	10,546	14,781			
221.80	10,725	15,844			
221.90	10,905	16,926			
222.00	11,084	18,025			
222.10	11,231	19,141			
222.20	11,377	20,271			
222.30	11,524	21,416			
222.40	11,670	22,576			
222.50	11,817	23,750			
222.60	11,964	24,939			
222.70	12,110	26,143			
222.80	12,257	27,361			
222.90	12,403	28,594			
223.00	12,550	29,842			
223.10	12,704	31,105			
223.20	12,858	32,383			
223.30	13,012	33,676			
223.40	13,166	34,985			
223.50	13,320	36,310			
223.60	13,474	37,649			
223.70	13,628	39,004			
223.80	13,782	40,375			
223.90	13,936	41,761			
224.00	14,090	43,162			

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Type III 24-hr 2-YR Rainfall=3.20"

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Summary for Link DP-1: Ex Infiltration Basin

Inflow Area = 162,539 sf, 42.12% Impervious, Inflow Depth = 0.00" for 2-YR 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= 0.00-48.00 hrs, dt= 0.01 hrs

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23058.00 Existing Condition 2 year
Type III 24-hr 2-YR Rainfall=3.20"

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Summary for Link DP-2: North Offsite

Inflow Area = 60,819 sf, 11.03% Impervious, Inflow Depth = 0.33" for 2-YR event

Inflow = 0.38 cfs @ 12.17 hrs, Volume= 1,691 cf

Primary = 0.38 cfs @ 12.17 hrs, Volume= 1,691 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

EX hydro

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23058.00 Existing Condition 10 year
Type III 24-hr 10-YR Rainfall=4.70"

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Page 1

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentEDA-1: Eastern Lawn Area Runoff Area=90,997 sf 7.28% Impervious Runoff Depth=0.46"
Flow Length=246' Tc=15.6 min CN=39/98 Runoff=0.53 cfs 3,474 cf

SubcatchmentEDA-2: Ex Parking Lot Runoff Area=71,543 sf 86.42% Impervious Runoff Depth=3.89"
Flow Length=287' Tc=9.5 min CN=42/98 Runoff=5.82 cfs 23,191 cf

SubcatchmentEDA-3: North of Ex Parking Runoff Area=60,819 sf 11.03% Impervious Runoff Depth=0.67"
Flow Length=222' Tc=13.4 min CN=41/98 Runoff=0.56 cfs 3,419 cf

Pond 1P: Ex Infiltration Basin Peak Elev=220.40' Storage=3,216 cf Inflow=6.27 cfs 26,665 cf
Discarded=2.99 cfs 26,665 cf Primary=0.00 cfs 0 cf Outflow=2.99 cfs 26,665 cf

Link DP-1: Ex Infiltration Basin Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link DP-2: North Offsite Inflow=0.56 cfs 3,419 cf
Primary=0.56 cfs 3,419 cf

Total Runoff Area = 223,358 sf Runoff Volume = 30,085 cf Average Runoff Depth = 1.62"
66.35% Pervious = 148,194 sf 33.65% Impervious = 75,164 sf

EX hydro

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23058.00 Existing Condition 25 year
Type III 24-hr 25-YR Rainfall=5.50"

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Page 1

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentEDA-1: Eastern Lawn Area Runoff Area=90,997 sf 7.28% Impervious Runoff Depth=0.67"
Flow Length=246' Tc=15.6 min CN=39/98 Runoff=0.63 cfs 5,101 cf

SubcatchmentEDA-2: Ex Parking Lot Runoff Area=71,543 sf 86.42% Impervious Runoff Depth=4.61"
Flow Length=287' Tc=9.5 min CN=42/98 Runoff=6.83 cfs 27,481 cf

SubcatchmentEDA-3: North of Ex Parking Runoff Area=60,819 sf 11.03% Impervious Runoff Depth=0.94"
Flow Length=222' Tc=13.4 min CN=41/98 Runoff=0.71 cfs 4,765 cf

Pond 1P: Ex Infiltration Basin Peak Elev=220.56' Storage=4,268 cf Inflow=7.37 cfs 32,582 cf
Discarded=3.40 cfs 32,582 cf Primary=0.00 cfs 0 cf Outflow=3.40 cfs 32,582 cf

Link DP-1: Ex Infiltration Basin Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link DP-2: North Offsite Inflow=0.71 cfs 4,765 cf
Primary=0.71 cfs 4,765 cf

Total Runoff Area = 223,358 sf Runoff Volume = 37,347 cf Average Runoff Depth = 2.01"
66.35% Pervious = 148,194 sf 33.65% Impervious = 75,164 sf

EX hydro

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23058.00 Existing Condition 100 year
Type III 24-hr 100-YR Rainfall=6.70"

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Page 1

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentEDA-1: Eastern Lawn Area Runoff Area=90,997 sf 7.28% Impervious Runoff Depth=1.09"
Flow Length=246' Tc=15.6 min CN=39/98 Runoff=1.14 cfs 8,236 cf

SubcatchmentEDA-2: Ex Parking Lot Runoff Area=71,543 sf 86.42% Impervious Runoff Depth=5.70"
Flow Length=287' Tc=9.5 min CN=42/98 Runoff=8.42 cfs 33,998 cf

SubcatchmentEDA-3: North of Ex Parking Runoff Area=60,819 sf 11.03% Impervious Runoff Depth=1.43"
Flow Length=222' Tc=13.4 min CN=41/98 Runoff=1.23 cfs 7,230 cf

Pond 1P: Ex Infiltration Basin Peak Elev=220.82' Storage=6,270 cf Inflow=9.19 cfs 42,234 cf
Discarded=4.06 cfs 42,234 cf Primary=0.00 cfs 0 cf Outflow=4.06 cfs 42,234 cf

Link DP-1: Ex Infiltration Basin Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link DP-2: North Offsite Inflow=1.23 cfs 7,230 cf
Primary=1.23 cfs 7,230 cf

Total Runoff Area = 223,358 sf Runoff Volume = 49,463 cf Average Runoff Depth = 2.66"
66.35% Pervious = 148,194 sf 33.65% Impervious = 75,164 sf

EX hydro

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23058.00 Existing Condition WQv 1.2" Storm
Type III 24-hr WQv Rainfall=1.20"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentEDA-1: Eastern Lawn Area Runoff Area=90,997 sf 7.28% Impervious Runoff Depth=0.07"
Flow Length=246' Tc=15.6 min CN=39/98 Runoff=0.12 cfs 544 cf

SubcatchmentEDA-2: Ex Parking Lot Runoff Area=71,543 sf 86.42% Impervious Runoff Depth=0.85"
Flow Length=287' Tc=9.5 min CN=42/98 Runoff=1.39 cfs 5,078 cf

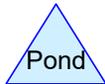
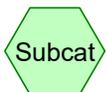
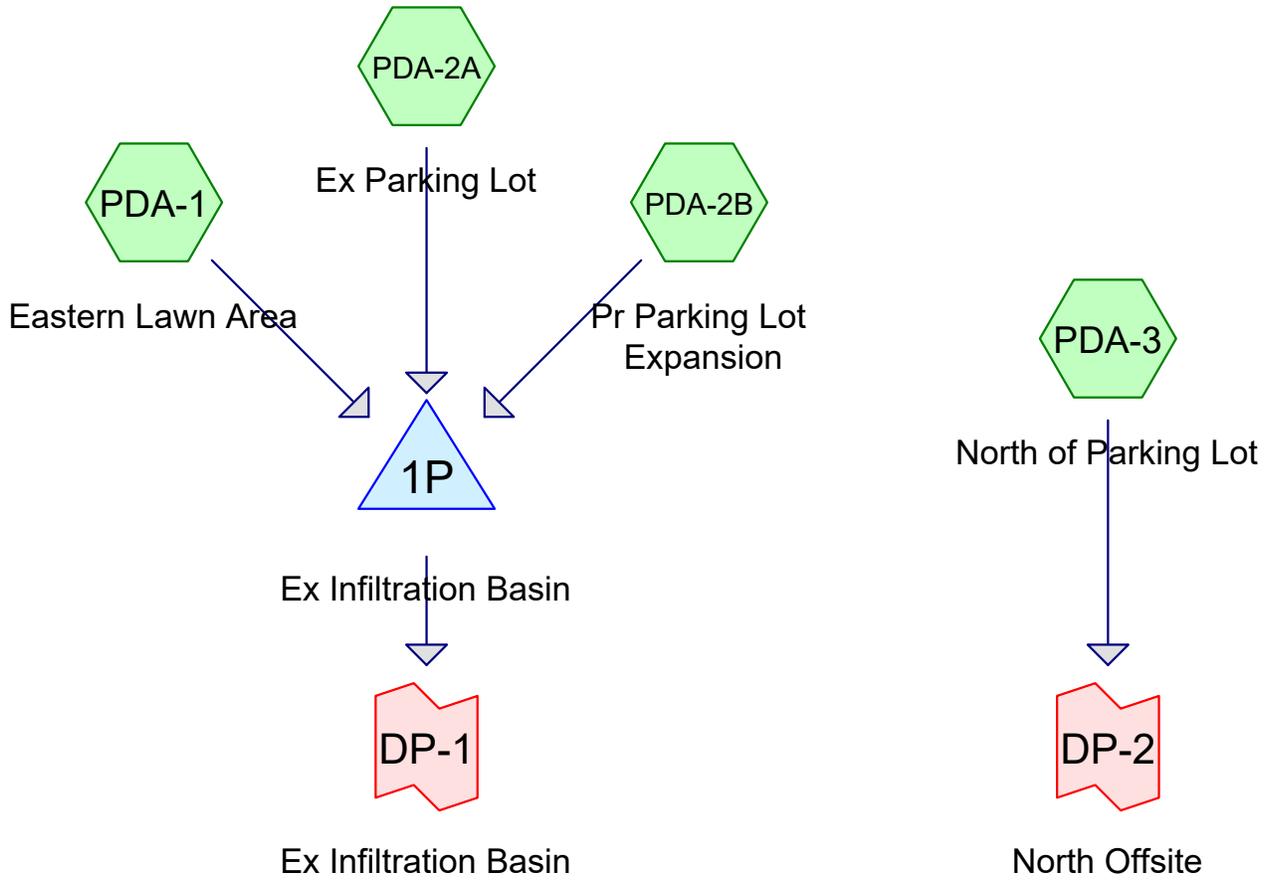
SubcatchmentEDA-3: North of Ex Parking Runoff Area=60,819 sf 11.03% Impervious Runoff Depth=0.11"
Flow Length=222' Tc=13.4 min CN=41/98 Runoff=0.13 cfs 551 cf

Pond 1P: Ex Infiltration Basin Peak Elev=219.01' Storage=9 cf Inflow=1.49 cfs 5,623 cf
Discarded=1.49 cfs 5,623 cf Primary=0.00 cfs 0 cf Outflow=1.49 cfs 5,623 cf

Link DP-1: Ex Infiltration Basin Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link DP-2: North Offsite Inflow=0.13 cfs 551 cf
Primary=0.13 cfs 551 cf

Total Runoff Area = 223,358 sf Runoff Volume = 6,174 cf Average Runoff Depth = 0.33"
66.35% Pervious = 148,194 sf 33.65% Impervious = 75,164 sf



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23058.00 Proposed Condition 2 yr
Type III 24-hr 2-YR Rainfall=3.20"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPDA-1: Eastern Lawn Area Runoff Area=90,997 sf 4.95% Impervious Runoff Depth=0.15"
Tc=15.6 min CN=39/98 Runoff=0.24 cfs 1,115 cf

SubcatchmentPDA-2A: Ex Parking Lot Runoff Area=71,543 sf 92.76% Impervious Runoff Depth=2.75"
Tc=6.0 min CN=39/98 Runoff=4.73 cfs 16,410 cf

SubcatchmentPDA-2B: Pr Parking Lot Runoff Area=52,874 sf 91.39% Impervious Runoff Depth=2.71"
Tc=6.0 min CN=39/98 Runoff=3.45 cfs 11,949 cf

SubcatchmentPDA-3: North of Parking Lot Runoff Area=7,945 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39/0 Runoff=0.00 cfs 0 cf

Pond 1P: Ex Infiltration Basin Peak Elev=220.57' Storage=4,332 cf Inflow=8.35 cfs 29,475 cf
Discarded=3.42 cfs 29,475 cf Primary=0.00 cfs 0 cf Outflow=3.42 cfs 29,475 cf

Link DP-1: Ex Infiltration Basin Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link DP-2: North Offsite Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 223,358 sf Runoff Volume = 29,475 cf Average Runoff Depth = 1.58"
46.64% Pervious = 104,177 sf 53.36% Impervious = 119,180 sf

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23058.00 Proposed Condition 2 yr
Type III 24-hr 2-YR Rainfall=3.20"

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Summary for Subcatchment PDA-1: Eastern Lawn Area

Runoff = 0.24 cfs @ 12.20 hrs, Volume= 1,115 cf, Depth= 0.15"
Routed to Pond 1P : Ex Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
86,495	39	>75% Grass cover, Good, HSG A
4,301	98	Paved parking, HSG A
200	98	Roofs, HSG A
90,997	42	Weighted Average
86,495	39	95.05% Pervious Area
4,501	98	4.95% Impervious Area

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

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Type III 24-hr 2-YR Rainfall=3.20"

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Summary for Subcatchment PDA-2A: Ex Parking Lot

Runoff = 4.73 cfs @ 12.08 hrs, Volume= 16,410 cf, Depth= 2.75"
Routed to Pond 1P : Ex Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
5,182	39	>75% Grass cover, Good, HSG A
66,360	98	Paved parking, HSG A
71,543	94	Weighted Average
5,182	39	7.24% Pervious Area
66,360	98	92.76% Impervious Area

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

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Type III 24-hr 2-YR Rainfall=3.20"

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Summary for Subcatchment PDA-2B: Pr Parking Lot Expansion

Runoff = 3.45 cfs @ 12.08 hrs, Volume= 11,949 cf, Depth= 2.71"
Routed to Pond 1P : Ex Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
4,555	39	>75% Grass cover, Good, HSG A
48,319	98	Paved parking, HSG A
52,874	93	Weighted Average
4,555	39	8.61% Pervious Area
48,319	98	91.39% Impervious Area

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

PRO hydro

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23058.00 Proposed Condition 2 yr
Type III 24-hr 2-YR Rainfall=3.20"

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Summary for Subcatchment PDA-3: North of Parking Lot

Runoff = 0.00 cfs @ 24.01 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Link DP-2 : North Offsite

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
7,945	39	>75% Grass cover, Good, HSG A
7,945	39	100.00% Pervious Area

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

PRO hydro

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Summary for Pond 1P: Ex Infiltration Basin

Inflow Area = 215,413 sf, 55.33% Impervious, Inflow Depth = 1.64" for 2-YR event
 Inflow = 8.35 cfs @ 12.08 hrs, Volume= 29,475 cf
 Outflow = 3.42 cfs @ 12.30 hrs, Volume= 29,475 cf, Atten= 59%, Lag= 13.0 min
 Discarded = 3.42 cfs @ 12.30 hrs, Volume= 29,475 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link DP-1 : Ex Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 220.57' @ 12.30 hrs Surf.Area= 7,044 sf Storage= 4,332 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 6.5 min (763.3 - 756.8)

Volume	Invert	Avail.Storage	Storage Description
#1	219.00'	58,045 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
219.00	4,055	0.0	0	0
219.99	4,055	28.0	1,124	1,124
220.00	4,055	100.0	41	1,165
221.00	9,291	100.0	6,673	7,838
222.00	11,084	100.0	10,188	18,025
223.00	12,550	100.0	11,817	29,842
224.00	14,090	100.0	13,320	43,162
225.00	15,675	100.0	14,883	58,045

Device	Routing	Invert	Outlet Devices
#1	Discarded	219.00'	21.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	224.80'	60.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=3.42 cfs @ 12.30 hrs HW=220.57' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 3.42 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=219.00' TW=0.00' (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

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23058.00 Proposed Condition 2 yr
Type III 24-hr 2-YR Rainfall=3.20"

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Stage-Discharge for Pond 1P: Ex Infiltration Basin

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
219.00	0.00	0.00	0.00	224.10	6.93	6.93	0.00
219.10	1.97	1.97	0.00	224.20	7.00	7.00	0.00
219.20	1.97	1.97	0.00	224.30	7.08	7.08	0.00
219.30	1.97	1.97	0.00	224.40	7.16	7.16	0.00
219.40	1.97	1.97	0.00	224.50	7.23	7.23	0.00
219.50	1.97	1.97	0.00	224.60	7.31	7.31	0.00
219.60	1.97	1.97	0.00	224.70	7.39	7.39	0.00
219.70	1.97	1.97	0.00	224.80	7.47	7.47	0.00
219.80	1.97	1.97	0.00	224.90	13.75	7.54	6.20
219.90	1.97	1.97	0.00	225.00	25.16	7.62	17.54
220.00	1.97	1.97	0.00				
220.10	2.23	2.23	0.00				
220.20	2.48	2.48	0.00				
220.30	2.73	2.73	0.00				
220.40	2.99	2.99	0.00				
220.50	3.24	3.24	0.00				
220.60	3.50	3.50	0.00				
220.70	3.75	3.75	0.00				
220.80	4.01	4.01	0.00				
220.90	4.26	4.26	0.00				
221.00	4.52	4.52	0.00				
221.10	4.60	4.60	0.00				
221.20	4.69	4.69	0.00				
221.30	4.78	4.78	0.00				
221.40	4.87	4.87	0.00				
221.50	4.95	4.95	0.00				
221.60	5.04	5.04	0.00				
221.70	5.13	5.13	0.00				
221.80	5.21	5.21	0.00				
221.90	5.30	5.30	0.00				
222.00	5.39	5.39	0.00				
222.10	5.46	5.46	0.00				
222.20	5.53	5.53	0.00				
222.30	5.60	5.60	0.00				
222.40	5.67	5.67	0.00				
222.50	5.74	5.74	0.00				
222.60	5.82	5.82	0.00				
222.70	5.89	5.89	0.00				
222.80	5.96	5.96	0.00				
222.90	6.03	6.03	0.00				
223.00	6.10	6.10	0.00				
223.10	6.18	6.18	0.00				
223.20	6.25	6.25	0.00				
223.30	6.33	6.33	0.00				
223.40	6.40	6.40	0.00				
223.50	6.47	6.47	0.00				
223.60	6.55	6.55	0.00				
223.70	6.62	6.62	0.00				
223.80	6.70	6.70	0.00				
223.90	6.77	6.77	0.00				
224.00	6.85	6.85	0.00				

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Type III 24-hr 2-YR Rainfall=3.20"

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Stage-Area-Storage for Pond 1P: Ex Infiltration Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
219.00	4,055	0	224.10	14,248	44,579
219.10	4,055	114	224.20	14,407	46,012
219.20	4,055	227	224.30	14,566	47,460
219.30	4,055	341	224.40	14,724	48,925
219.40	4,055	454	224.50	14,883	50,405
219.50	4,055	568	224.60	15,041	51,901
219.60	4,055	681	224.70	15,199	53,413
219.70	4,055	795	224.80	15,358	54,941
219.80	4,055	908	224.90	15,517	56,485
219.90	4,055	1,022	225.00	15,675	58,045
220.00	4,055	1,165			
220.10	4,579	1,596			
220.20	5,102	2,080			
220.30	5,626	2,617			
220.40	6,149	3,205			
220.50	6,673	3,847			
220.60	7,197	4,540			
220.70	7,720	5,286			
220.80	8,244	6,084			
220.90	8,767	6,935			
221.00	9,291	7,838			
221.10	9,470	8,776			
221.20	9,650	9,732			
221.30	9,829	10,706			
221.40	10,008	11,697			
221.50	10,188	12,707			
221.60	10,367	13,735			
221.70	10,546	14,781			
221.80	10,725	15,844			
221.90	10,905	16,926			
222.00	11,084	18,025			
222.10	11,231	19,141			
222.20	11,377	20,271			
222.30	11,524	21,416			
222.40	11,670	22,576			
222.50	11,817	23,750			
222.60	11,964	24,939			
222.70	12,110	26,143			
222.80	12,257	27,361			
222.90	12,403	28,594			
223.00	12,550	29,842			
223.10	12,704	31,105			
223.20	12,858	32,383			
223.30	13,012	33,676			
223.40	13,166	34,985			
223.50	13,320	36,310			
223.60	13,474	37,649			
223.70	13,628	39,004			
223.80	13,782	40,375			
223.90	13,936	41,761			
224.00	14,090	43,162			

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Type III 24-hr 2-YR Rainfall=3.20"

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Summary for Link DP-1: Ex Infiltration Basin

Inflow Area = 215,413 sf, 55.33% Impervious, Inflow Depth = 0.00" for 2-YR 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
Routed to nonexistent node 1R

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

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23058.00 Proposed Condition 2 yr
Type III 24-hr 2-YR Rainfall=3.20"

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Summary for Link DP-2: North Offsite

Inflow Area = 7,945 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR event
Inflow = 0.00 cfs @ 24.01 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 24.01 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 1R

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

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23058.00 Proposed Condition 10 year
Type III 24-hr 10-YR Rainfall=4.70"

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Page 1

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPDA-1: Eastern Lawn Area Runoff Area=90,997 sf 4.95% Impervious Runoff Depth=0.36"
Tc=15.6 min CN=39/98 Runoff=0.36 cfs 2,709 cf

SubcatchmentPDA-2A: Ex Parking Lot Runoff Area=71,543 sf 92.76% Impervious Runoff Depth=4.15"
Tc=6.0 min CN=39/98 Runoff=7.00 cfs 24,746 cf

SubcatchmentPDA-2B: Pr Parking Lot Runoff Area=52,874 sf 91.39% Impervious Runoff Depth=4.09"
Tc=6.0 min CN=39/98 Runoff=5.10 cfs 18,028 cf

SubcatchmentPDA-3: North of Parking Lot Runoff Area=7,945 sf 0.00% Impervious Runoff Depth=0.14"
Tc=6.0 min CN=39/0 Runoff=0.00 cfs 95 cf

Pond 1P: Ex Infiltration Basin Peak Elev=221.01' Storage=7,897 cf Inflow=12.35 cfs 45,483 cf
Discarded=4.52 cfs 45,483 cf Primary=0.00 cfs 0 cf Outflow=4.52 cfs 45,483 cf

Link DP-1: Ex Infiltration Basin Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link DP-2: North Offsite Inflow=0.00 cfs 95 cf
Primary=0.00 cfs 95 cf

Total Runoff Area = 223,358 sf Runoff Volume = 45,578 cf Average Runoff Depth = 2.45"
46.64% Pervious = 104,177 sf 53.36% Impervious = 119,180 sf

PRO hydro

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23058.00 Proposed Condition 25 year
Type III 24-hr 25-YR Rainfall=5.50"

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Page 1

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPDA-1: Eastern Lawn Area Runoff Area=90,997 sf 4.95% Impervious Runoff Depth=0.56"
Tc=15.6 min CN=39/98 Runoff=0.43 cfs 4,225 cf

SubcatchmentPDA-2A: Ex Parking Lot Runoff Area=71,543 sf 92.76% Impervious Runoff Depth=4.90"
Tc=6.0 min CN=39/98 Runoff=8.21 cfs 29,236 cf

SubcatchmentPDA-2B: Pr Parking Lot Runoff Area=52,874 sf 91.39% Impervious Runoff Depth=4.84"
Tc=6.0 min CN=39/98 Runoff=5.97 cfs 21,308 cf

SubcatchmentPDA-3: North of Parking Lot Runoff Area=7,945 sf 0.00% Impervious Runoff Depth=0.31"
Tc=6.0 min CN=39/0 Runoff=0.02 cfs 207 cf

Pond 1P: Ex Infiltration Basin Peak Elev=221.24' Storage=10,167 cf Inflow=14.48 cfs 54,770 cf
Discarded=4.73 cfs 54,770 cf Primary=0.00 cfs 0 cf Outflow=4.73 cfs 54,770 cf

Link DP-1: Ex Infiltration Basin Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link DP-2: North Offsite Inflow=0.02 cfs 207 cf
Primary=0.02 cfs 207 cf

Total Runoff Area = 223,358 sf Runoff Volume = 54,976 cf Average Runoff Depth = 2.95"
46.64% Pervious = 104,177 sf 53.36% Impervious = 119,180 sf

PRO hydro

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23058.00 Proposed Condition 100 year
Type III 24-hr 100-YR Rainfall=6.70"

Printed 6/4/2025

Page 1

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPDA-1: Eastern Lawn Area Runoff Area=90,997 sf 4.95% Impervious Runoff Depth=0.95"
Tc=15.6 min CN=39/98 Runoff=0.94 cfs 7,210 cf

SubcatchmentPDA-2A: Ex Parking Lot Runoff Area=71,543 sf 92.76% Impervious Runoff Depth=6.04"
Tc=6.0 min CN=39/98 Runoff=10.03 cfs 36,017 cf

SubcatchmentPDA-2B: Pr Parking Lot Runoff Area=52,874 sf 91.39% Impervious Runoff Depth=5.96"
Tc=6.0 min CN=39/98 Runoff=7.31 cfs 26,268 cf

SubcatchmentPDA-3: North of Parking Lot Runoff Area=7,945 sf 0.00% Impervious Runoff Depth=0.66"
Tc=6.0 min CN=39/0 Runoff=0.06 cfs 440 cf

Pond 1P: Ex Infiltration Basin Peak Elev=221.66' Storage=14,317 cf Inflow=17.74 cfs 69,495 cf
Discarded=5.09 cfs 69,495 cf Primary=0.00 cfs 0 cf Outflow=5.09 cfs 69,495 cf

Link DP-1: Ex Infiltration Basin Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link DP-2: North Offsite Inflow=0.06 cfs 440 cf
Primary=0.06 cfs 440 cf

Total Runoff Area = 223,358 sf Runoff Volume = 69,935 cf Average Runoff Depth = 3.76"
46.64% Pervious = 104,177 sf 53.36% Impervious = 119,180 sf

PRO hydro

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23058.00 Proposed Condition WQv 1.2" Storm

Type III 24-hr WQv Rainfall=1.20"

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Page 1

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPDA-1: Eastern Lawn Area Runoff Area=90,997 sf 4.95% Impervious Runoff Depth=0.05"
Tc=15.6 min CN=39/98 Runoff=0.08 cfs 370 cf

SubcatchmentPDA-2A: Ex Parking Lot Runoff Area=71,543 sf 92.76% Impervious Runoff Depth=0.91"
Tc=6.0 min CN=39/98 Runoff=1.67 cfs 5,451 cf

SubcatchmentPDA-2B: Pr Parking Lot Runoff Area=52,874 sf 91.39% Impervious Runoff Depth=0.90"
Tc=6.0 min CN=39/98 Runoff=1.21 cfs 3,969 cf

SubcatchmentPDA-3: North of Parking Lot Runoff Area=7,945 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39/0 Runoff=0.00 cfs 0 cf

Pond 1P: Ex Infiltration Basin Peak Elev=219.31' Storage=357 cf Inflow=2.94 cfs 9,789 cf
Discarded=1.97 cfs 9,789 cf Primary=0.00 cfs 0 cf Outflow=1.97 cfs 9,789 cf

Link DP-1: Ex Infiltration Basin Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link DP-2: North Offsite Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 223,358 sf Runoff Volume = 9,789 cf Average Runoff Depth = 0.53"
46.64% Pervious = 104,177 sf 53.36% Impervious = 119,180 sf

Adirondack Club
ADIRONDACK CLUB PARKING LOT EXPANSION

APPENDIX C

**Water Quality Volume Calculation
Water Quality Unit Sizing Calculation
TSS and Phosphorus Removal Calculation
Riprap Apron Sizing Calculation**



PROJECT	Adirondack Club	PROJECT NUMBER	25038
SUBJECT	Water Quality Volume Calculation		
COMPUTATIONS BY	SWL	DATE	6/6/2025
CHECK BY	JRR	DATE	6/6/2025

Water Quality Volume Calculation

Infiltration Basin

Vehicular Surface to Basin	2.74	acres
Vehicular Surface to Basin	119,180	sf
Required Water Quality Volume (WQV)	9,932	cf
Provided WQV	54,941	CF

1" WQV Req'd per Standard 5/6



Aqua-Filter™ Design Worksheet

Project Name: Adirondack Club

Structure ID: PDA-2A (Existing Lot)

Flow (cfs) to be treated

HDS req'd

Aqua-Filter HDS Sizing

AS Model	ID		Area (sf)	WQF	
	(in)	(ft)		(gpm)	(cfs) ¹
AS-2	30	2.5	4.91	245.4	0.55
AS-3	42	3.5	9.62	481.1	1.07
AS-4	54	4.5	15.90	795.2	1.77
AS-5	66	5.5	23.76	1187.9	2.65
AS-6	78	6.5	33.18	1659.2	3.70
AS-7	90	7.5	44.18	2208.9	4.92
AS-8	102	8.5	56.75	2837.3	6.32
AS-9	114	9.5	70.88	3544.1	7.90
AS-10	126	10.5	86.59	4329.5	9.65
AS-11	138	11.5	103.87	5193.4	11.57
AS-12	150	12.5	122.72	6135.9	13.67
AS-13	156	13.0	132.73	6636.6	14.79

AquaFilter Sizing

Rows	Loading Rate		20 (gpm)	gpm/sf (cfs)
	Area (sf)	(gpm)		
1	12	240	0.53	
2	24	480	1.07	
3	36	720	1.60	
4	48	960	2.14	
5	60	1200	2.67	
6	72	1440	3.21	
7	84	1680	3.74	
8	96	1920	4.28	
9	108	2160	4.81	
10	120	2400	5.35	
11	132	2640	5.88	
12	144	2880	6.42	
13	156	3120	6.95	
14	168	3360	7.49	
15	180	3600	8.02	
16	192	3840	8.56	
17	204	4080	9.09	
18	216	4320	9.63	
19	228	4560	10.16	
20	240	4800	10.69	
22	264	5280	11.76	
24	288	5760	12.83	
26	312	6240	13.90	

For further questions please contact:

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Aqua-Filter™ Design Worksheet

Project Name: Adirondack Club

Structure ID: PDA-2B (Proposed Lot)

Water Quality Flow (cfs) to be treated

HDS req'd

Aqua-Filter HDS Sizing

AS Model	ID		Area (sf)	WQF	
	(in)	(ft)		(gpm)	(cfs) ¹
AS-2	30	2.5	4.91	245.4	0.55
AS-3	42	3.5	9.62	481.1	1.07
AS-4	54	4.5	15.90	795.2	1.77
AS-5	66	5.5	23.76	1187.9	2.65
AS-6	78	6.5	33.18	1659.2	3.70
AS-7	90	7.5	44.18	2208.9	4.92
AS-8	102	8.5	56.75	2837.3	6.32
AS-9	114	9.5	70.88	3544.1	7.90
AS-10	126	10.5	86.59	4329.5	9.65
AS-11	138	11.5	103.87	5193.4	11.57
AS-12	150	12.5	122.72	6135.9	13.67
AS-13	156	13.0	132.73	6636.6	14.79

AquaFilter Sizing

Rows	Loading Rate		gpm/sf	
	Area (sf)	20 (gpm)	20 (gpm)	(cfs)
1	12	240	240	0.53
2	24	480	480	1.07
3	36	720	720	1.60
4	48	960	960	2.14
5	60	1200	1200	2.67
6	72	1440	1440	3.21
7	84	1680	1680	3.74
8	96	1920	1920	4.28
9	108	2160	2160	4.81
10	120	2400	2400	5.35
11	132	2640	2640	5.88
12	144	2880	2880	6.42
13	156	3120	3120	6.95
14	168	3360	3360	7.49
15	180	3600	3600	8.02
16	192	3840	3840	8.56
17	204	4080	4080	9.09
18	216	4320	4320	9.63
19	228	4560	4560	10.16
20	240	4800	4800	10.69
22	264	5280	5280	11.76
24	288	5760	5760	12.83
26	312	6240	6240	13.90

For further questions please contact:

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 pnapolitano@aquashieldinc.com
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PROJECT	ADIRONDACK CLUB	PAGE	1	OF	1
SUBJECT	TSS and Phosphorus Removal Calculation	PROJECT NUMBER	25038		
COMPUTATIONS BY	SWL	DATE	6/6/2025		
CHECK BY	JRR	DATE	6/6/2025		

TOTAL SUSPENDED SOLIDS (TSS) REMOVAL

BMP	TSS Removal Rate*	Starting TSS Load	TSS Removed	Remaining Load
PDA-1**				
Existing Infiltration Basin	80%	1.00	0.80	0.20
total TSS removal:			80%	
PDA-2A/B				
Street Sweeping*	10%	1.00	0.10	0.90
Oil-Grit Seperator*	25%	0.90	0.23	0.68
Aqua-Swirl*	93%	0.68	0.63	0.05
Existing Infiltration Basin	80%	0.05	0.04	0.01
total TSS removal:			99%	

Drainage Area	Impervious Area (SF)	% Impervious Area	TSS Removed	Weighted % TSS Removal
PDA-1	4,501	0.04	80%	3%
PDA-2A	66,360	0.56	97%	54%
PDA-2B	48,319	0.41	97%	39%
PDA-3	0	0.00	0%	0%
TOTAL	119,180	1.00		96%

***Pretreatment = 63%**

** No pollutant loading impervious requiring pretreatment **Total Annual TSS Removal Rate = 96%**

***Removal efficiency per MA SW Handbook minimum rate for infiltration basins

Phosphorus Removal

		TP Treatment		
		Basin	Imp. Area	Efficiency***
Existing Impervious	74,964			
Proposed Impervious	119,180	<i>Existing Basin</i>	119,180	60%
Net Increase	44,216	TOTAL	<u>119,180</u>	<u>60%</u>

60% = Min. Req'd



PROJECT Adirondack Club	PROJECT NUMBER 25038
SUBJECT Riprap Apron	
COMPUTATIONS BY SWL	DATE 6/6/2025
CHECK BY JRR	DATE 6/6/2025

RIPRAP APRON CALCULATIONS

A. Resources:

Based on Section 10.2 Riprap Apron of the FHWA HEC-14 (Publication No. FHWA-NIH-06-086).

B. Equations:

$$D_{50} = 0.2 D \left(\frac{Q}{\sqrt{g} D^{2.5}} \right)^{\frac{4}{3}} \left(\frac{D}{TW} \right) \quad (10.4)$$

Where,

- D₅₀ = riprap size, ft
- Q = design discharge, cfs
- D = culvert diameter, ft
- TW = tailwater depth, ft
- g = acceleration due to gravity, 32.2 ft/s²

Note:

Tailwater depth should be limited to between 0.4D and 1.0D. If tailwater is unknown, use 0.4D.

Based on rock specific gravity of 2.65.

FHWA Class	FHWA D ₅₀ (in)	RIDOT M.10.03.2		Apron	
		NSA No.	D ₅₀ (in)	Length ¹	Depth
1	5	R-3	4	4*D	3.5*D ₅₀
2	6	R-4	7	4*D	3.3*D ₅₀
3	10	R-5	10	5*D	2.4*D ₅₀
4	14	R-6	13	6*D	2.2*D ₅₀
5	20	R-7	18	7*D	2.0*D ₅₀
6	22	R-8	24	8*D	2.0*D ₅₀

¹D is the culvert rise.

Width (at apron end) = 3*D + (2/3)*Length

Width based on 1:3 flare

C. Calculations:

Pipe	D (in)	D (ft)	Q ₂₅ (cfs)	TW (ft)	Calculated		Select		Length (ft)	Width (ft)	Depth (in)
					D ₅₀ (ft)	D ₅₀ (in)	FHWA	D ₅₀ (in)			
WQU to Existing Basin	18	1.50	6.23	0.40	0.33	3.96	1.00	5	6.0	8.5	18

Adirondack Club
ADIRONDACK CLUB PARKING LOT EXPANSION

APPENDIX D

**H1.0 Existing Hydrology Plan
H2.0 Proposed Hydrology Plan**



SCALE ADJUSTMENT GUIDE
 0" 1"
 BAR IS ONE INCH ON ORIGINAL DRAWING

Adirondack Club Parking Lot Expansion

Franklin, Massachusetts



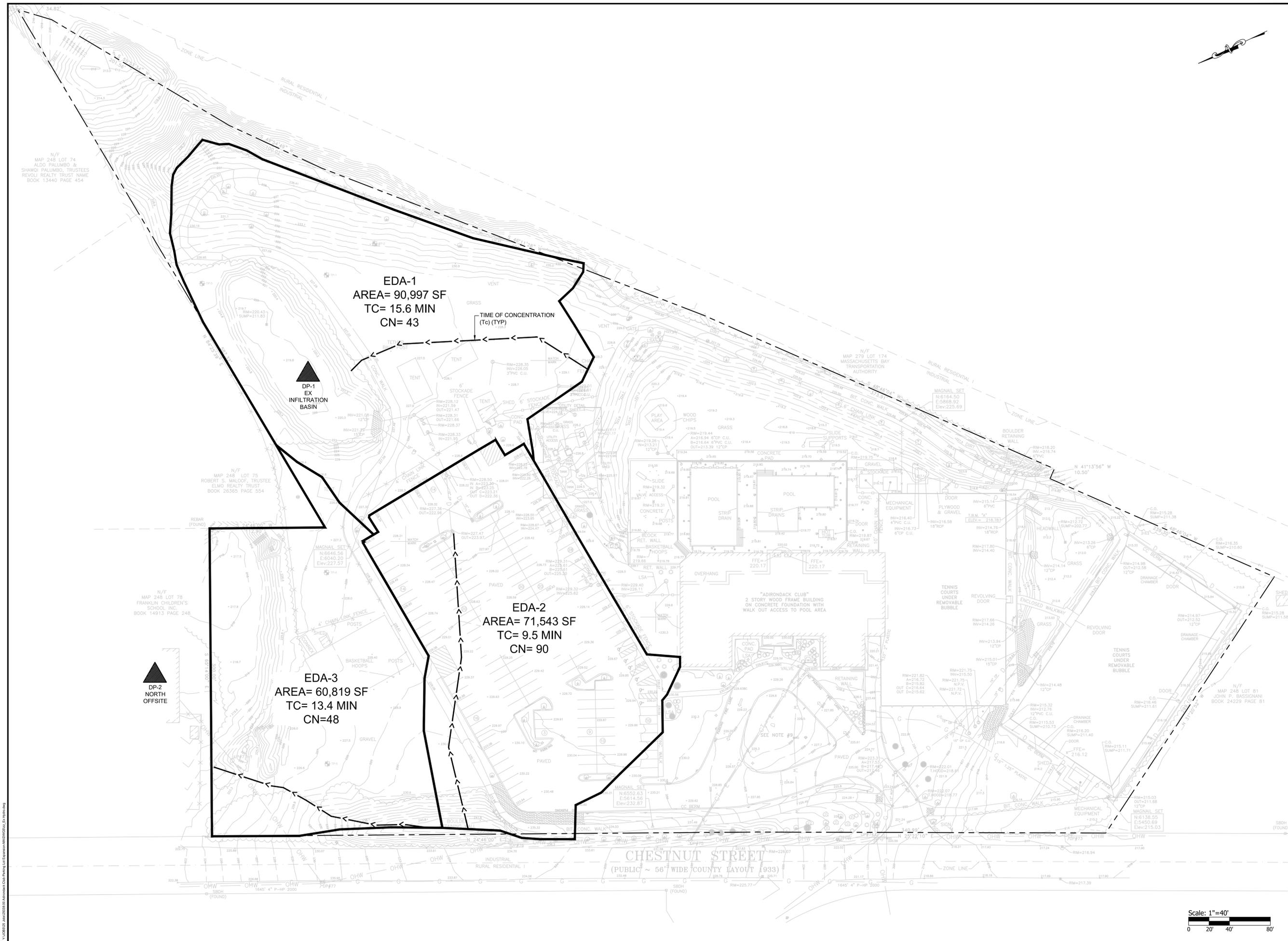
REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT NO.: 25038.00
 DATE: JUNE 6, 2025
 SCALE: 1"=40'
 DESIGNED BY: SWL
 CHECKED BY: JRR
 DRAWN BY: AKL
 APPROVED BY: JRR
 DRAWING TITLE:

EXISTING HYDROLOGY
 PLAN

DRAWING NO.:
H1.0
 SHEET NO. 1 OF 2



N/F
 MAP 248 LOT 74
 ALDO PALUMBO &
 SHAWQI PALUMBO, TRUSTEES
 REVOLI REALTY TRUST NAME
 BOOK 13440 PAGE 454

N/F
 MAP 248 LOT 75
 ROBERT S. MALOOF, TRUSTEE
 ELMO REALTY TRUST
 BOOK 26365 PAGE 554

N/F
 MAP 248 LOT 78
 FRANKLIN CHILDREN'S
 SCHOOL, INC.
 BOOK 14913 PAGE 248

Scale: 1"=40'
 0 20' 40' 80'

Adirondack Club Parking Lot Expansion

Franklin, Massachusetts



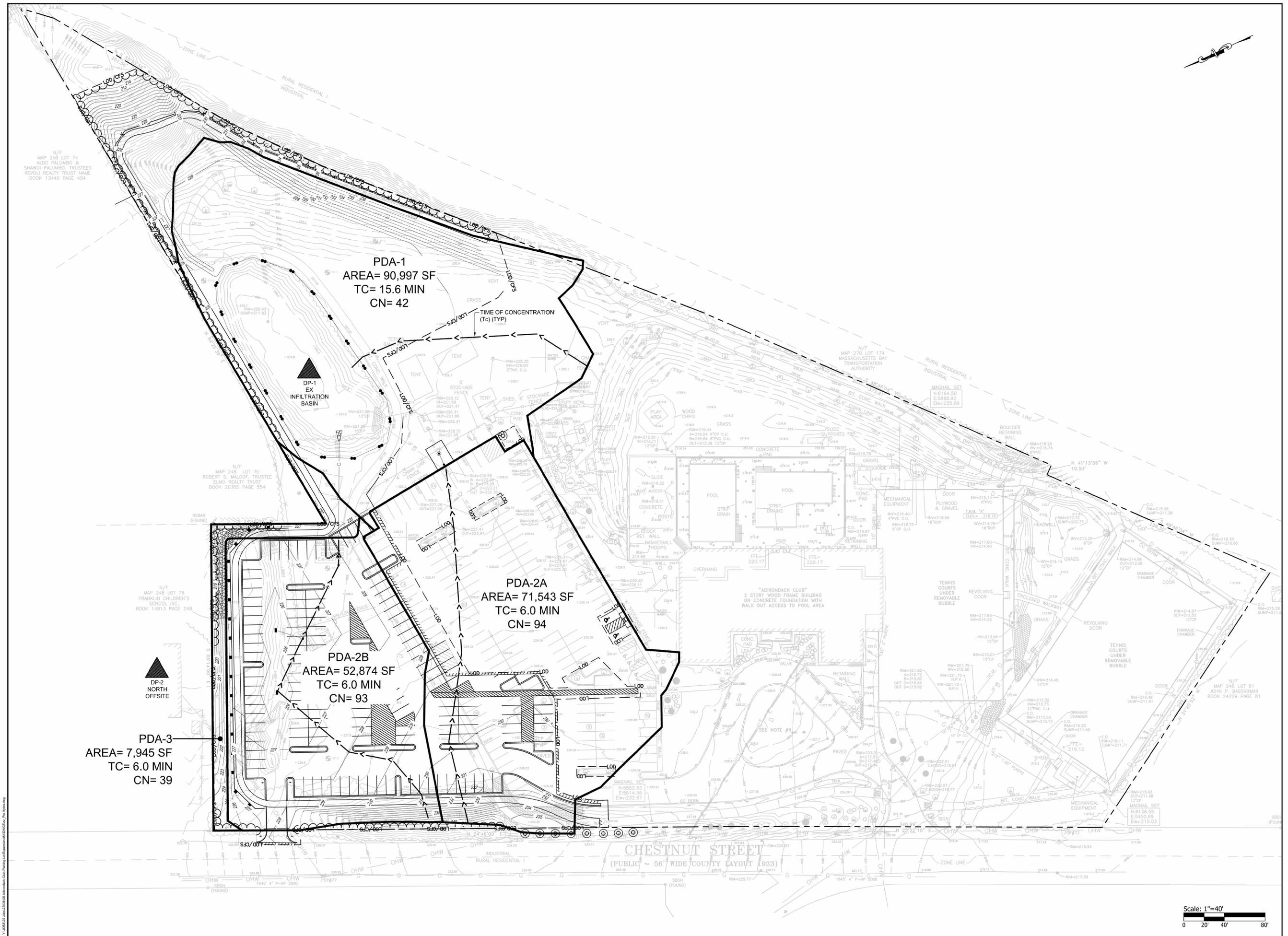
REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT NO.: 25038.00
 DATE: JUNE 6, 2025
 SCALE: 1"=40'
 DESIGNED BY: SWL
 CHECKED BY: JRR
 DRAWN BY: AKL
 APPROVED BY: JRR
 DRAWING TITLE:

PROPOSED HYDROLOGY
 PLAN

DRAWING NO.: H2.0
 SHEET NO. 2 OF 20



N/F
 MAP 248 LOT 74
 ALDO PALUMBO, TRUSTEES
 REVOLI REALTY TRUST NAME
 BOOK 15440 PAGE 454

N/F
 MAP 248 LOT 75
 ROBERT S. WALDOF, TRUSTEE
 ELMO REALTY TRUST
 BOOK 28365 PAGE 554

N/F
 MAP 248 LOT 78
 FRANKLIN CHILDREN'S
 SCHOOL INC.
 BOOK 14913 PAGE 248

N/F
 MAP 248 LOT 81
 JOHN P. BASSIGNANI
 BOOK 24229 PAGE 81

11/16/2025 2:00:00 PM Adirondack Club Parking Lot Expansion.dwg (2/25/25) JRR