DeCELLE
BURKE
& Associates, Inc.

Site Engineering Report

for a

Proposed Apartment Building
at
2 Prescott Street and 39 Lincoln Street
in
Reading, Massachusetts

Prepared by:

DeCelle-Burke and Associates, Inc.
1266 Furnace Brook Parkway
Suite 401
Quincy, MA 02169

Prepared for:

Reading MKM, LLC
c/o KM Dover LLC
109 Oak Street, Suite G20
Newton, MA 02464

September 12, 2016

Table of Contents

Section 1 **Project Narrative**

Existing Conditions

The project locus, located at 2 Prescott Street, 31 and 39 Lincoln Street in Reading, Massachusetts, is two existing multi-story commercial/industrial buildings and 31 Lincoln Street, an automotive repair garage fronting on two streets with undefined on-site parking. The multi-lot property fronts on Lincoln Street and Prescott Street. The site is bordered to the north by the public ways previously mentioned, and to the west, south and east by multiple residential lots. The locus is zoned Residential Single Family 15 (S-15). The locus currently provides business space for a moving company, an auto repair shop and one building is unoccupied.

The Assessor's lot identification for the parcels is Map 16 Lots 224, 225, and 226. The majority of the 42,658± square foot lots are impervious, with two existing structures and one large paved lot of approximately 28,110± square feet. The site is accessed from multiple existing curb cuts, off of Prescott and Lincoln Street. Parking for the buildings is provided by the large connected paved lot which is unpainted. Minimal vertical curbing exists around the project site and bituminous concrete sidewalks are located along the entire frontage.

The Prescott Street building is serviced by public water, public sewer and overhead power and communications from the Prescott Street public layouts, The Lincoln Street buildings are serviced from the Lincoln Street layout. Although roof leaders are utilized for the existing building, no existing drainage is located at the site. The site drains overland uncontrolled into abutting streets and private properties.

This site is relatively flat with a general runoff from west to east. The lots have a minimal slope with the high point of 107.3'at the southwest corner and the low point of 104.8' located in the vicinity of the Lincoln Street curb cut. The plan datum is shown on the North American Vertical Datum of 1988 (NAVD 88).

There is no significant vegetation found on the site and site soils are defined by the Natural Resources Conservation Service (NRCS) as Merrimac sandy mix. These soils are excessively to well-drained soil. The site soils have been confirmed with two test pits, excavated on November 30, 2015, soils were noted to be HSG A soils and consistent with the record soil mapping.

Proposed Conditions

The proposed project includes a new building with 72 dwelling units with a 74 space garage on the first level. The proposed building use will be affordable apartments with surface parking under and around the buildings. The building will have a footprint of 24,456± square feet. The new building is proposed five-stories with the first level being parking on existing grade.

The parking lot under the building will have two-way traffic lanes and two, two-way entrance/exits. One leads to the Prescott Street curb cut and one onto Lincoln Street. Included in the seventy four (74) parking spaces are four (4) van accessible handicap spaces.

The exterior surface parking lot is graded to provide positive drainage away from the garage. Two separate stormwater systems are proposed for the parking area. The larger system consists of two catch basins and two drain manholes connecting into an underground recharge structure consisting of eighteen (18) Cultec Recharger 280XLHD units. The smaller system collects storm runoff for five parking spaces with one catch basin and one DMH connected to a single 280XLHD with a 6" overflow connected to the public drain system. The systems are designed to capture, treat and convey the stormwater runoff from the open parking area to the public drain system located in Lincoln Street. The majority of the site's runoff will be generated from the roof. The roof runoff shall be collected separately and conveyed to a row of Cultec Rechargers 280XLHDs installed side by side along the centerline of the building. The system has fifty-four (54) chambers, eleven total leaders from the roof connecting directly into the system and a 6" schedule 40 PVC overflow pipe through a single drain manhole and to a drain line located in Lincoln Street. The system is designed specifically to contain only roof runoff. The roof runoff shall be conveyed to the system by internal building roof drains. The system is designed to buffer up to a 100-year storm event and overflow to Lincoln Street.

The parking level also includes an oil/water separator system to protect against spills inside the parking area. This system will consist of four area drains connected in line with a 4" cast iron sewer pipe and will all be collected in an oil/separator with vents and a connection to the public sewer main via a 4" SDR 35 PVC pipe.

The proposed building will also be serviced by a new sewer service, a new fire protection system and new domestic water service. Underground gas and power shall be extended on site as will communications. All services will be conveyed off of Lincoln Street via the mechanical rooms. The new domestic water service will be a 4-inch cement lined ductile iron pipe (CLDI). The fire protection services are a 6-inch CLDI pipe. The sewer service will be a 6-inch PVC sewer pipe with a direct tap to the public sewer. Power and communications are coming from underground services currently found on Lincoln Street. Gas service shall be provided off the gas main located on Lincoln Street.

All utility connections shall conform to town requirements and meet all utility purveyor requirements as well. The proposed drainage system meets current stormwater management regulations by reducing the off-site peak flow, providing for the recharge of roof runoff and providing for the removal of sediment and pollutants from entering the public storm drain system.

Massachusetts Stormwater Handbook Ten Standards Compliance

The proposed site stormwater controls decreases the stormwater runoff volume and peak flows for each storm event when compared to current conditions. This allows the project to be in compliance with Standard 2 the MassDEP Stormwater Management Requirements. The results of the calculations are tabulated below for comparison with the existing and proposed condition values. The project also complies with the other stormwater management standards outlined in the MassDEP Stormwater Management Requirements. The project complies with the following Standards:

Standard 1 - No New stormwater conveyances discharge untreated stormwater directly to the waters of the Commonwealth;

Standard 2 - Post Development peak discharge rates are less than pre-development;

Standard 3 - The recharge volume required for this project is exceeded for the proposed impervious areas.

Standard 4 - The impervious area generated is roof and it is captured and recharged into the ground for all storm event. Roof runoff does not generate suspended solids to control.

Standard 5 - N/A

Standard 6 - N/A

Standard 7 - The project is re-development and compliance with the Stormwater Management Standards is required to the maximum extent practicable. It is our belief that all Standards are met given the capture of the proposed roof runoff and treatment and recharge of the surface parking lot runoff.

Standard 8 - Erosion Control Plan is included in this report.

Standard 9 - A Long Term Operation and Maintenance Plan is attached to this report.

Standard 10 - Per Standard No. 10 of the MassDEP Stormwater Management Standards, there shall be no illicit discharges to the stormwater management system. It is strictly prohibited to discharge any products or substances onto the ground surface or into any drainage structures, such as catch basin inlets, manholes, recharge structures, water quality units, fore bays, basin or drainage outlets that would be a detriment to the environment

It is our belief that the project complies with the Stormwater Management Standards to the maximum extent practicable. The project as proposed will protect the Abutters in the short term through proper construction and erosion protection techniques. It will also protect the environment form long term impacts due to the improved stormwater controls.

Stormwater Runoff Comparison Chart for Pre- and Post-Construction

2-Year Storm (3.25")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	**2.58**	Flow off-site	**0.07**

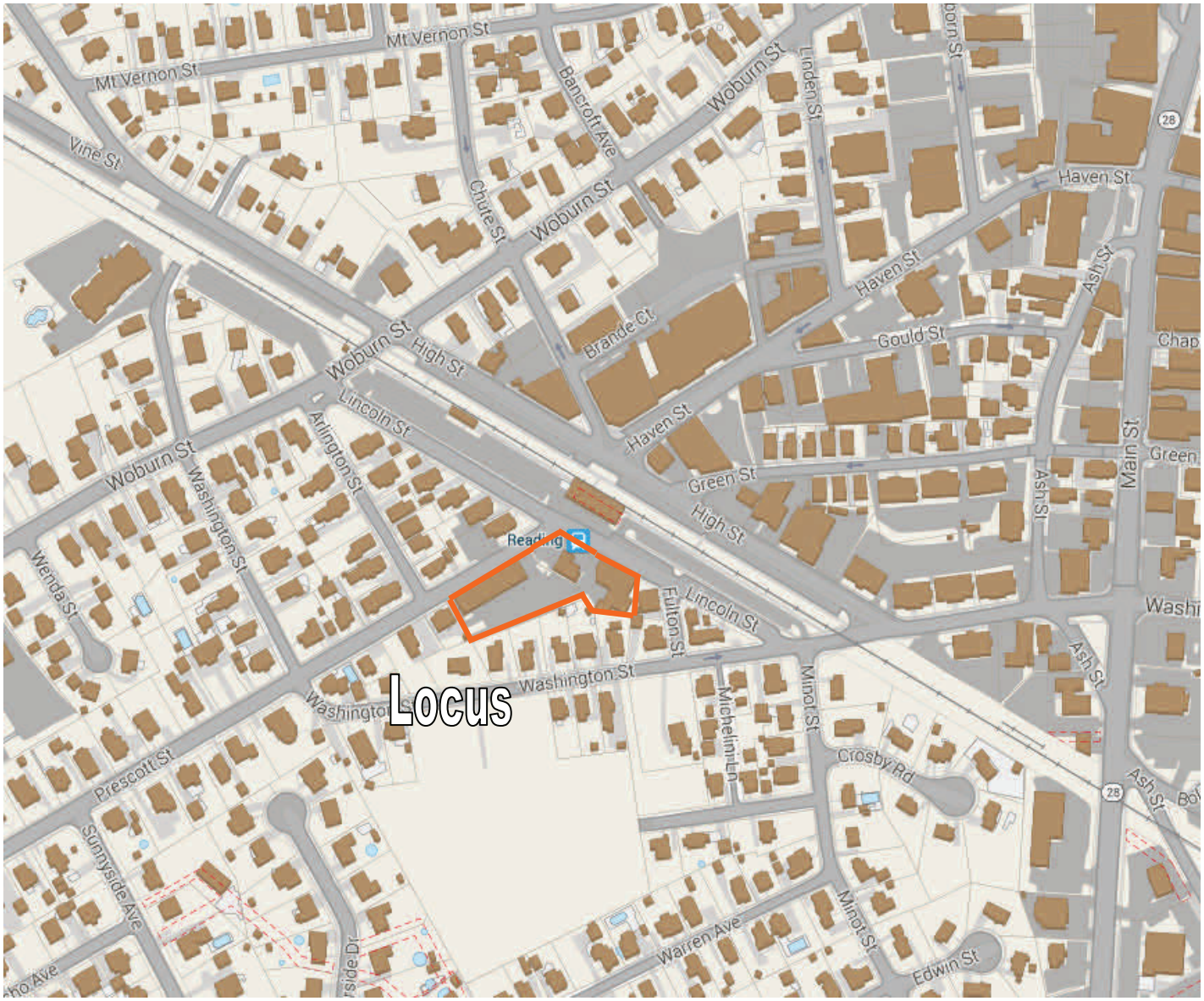
10-Year Storm (5.09")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	**4.15**	Flow off-site	**.29**

25-Year Storm (6.23")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	**5.12**	Flow off-site	**.46**

100-Year Storm (8.0")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	**6.61**	Flow off-site	**.75**

Section 2 – Supporting Maps

Assessors Map
USGS Map
FEMA MAP
Soils Map



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DATE:	TITLE:	SCALE:
September 12, 2016	***ASSESSORS MAP***	***NOT TO SCALE***

PREPARED FOR:

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PROJECT TITLE:

Proposed Apartment Building
2 Prescott St. 31 & 39 Lincoln St.
Reading, MA 01867

DATE:	TITLE:	SCALE:
September 12, 2016	***USGS MAP***	***NOT TO SCALE***

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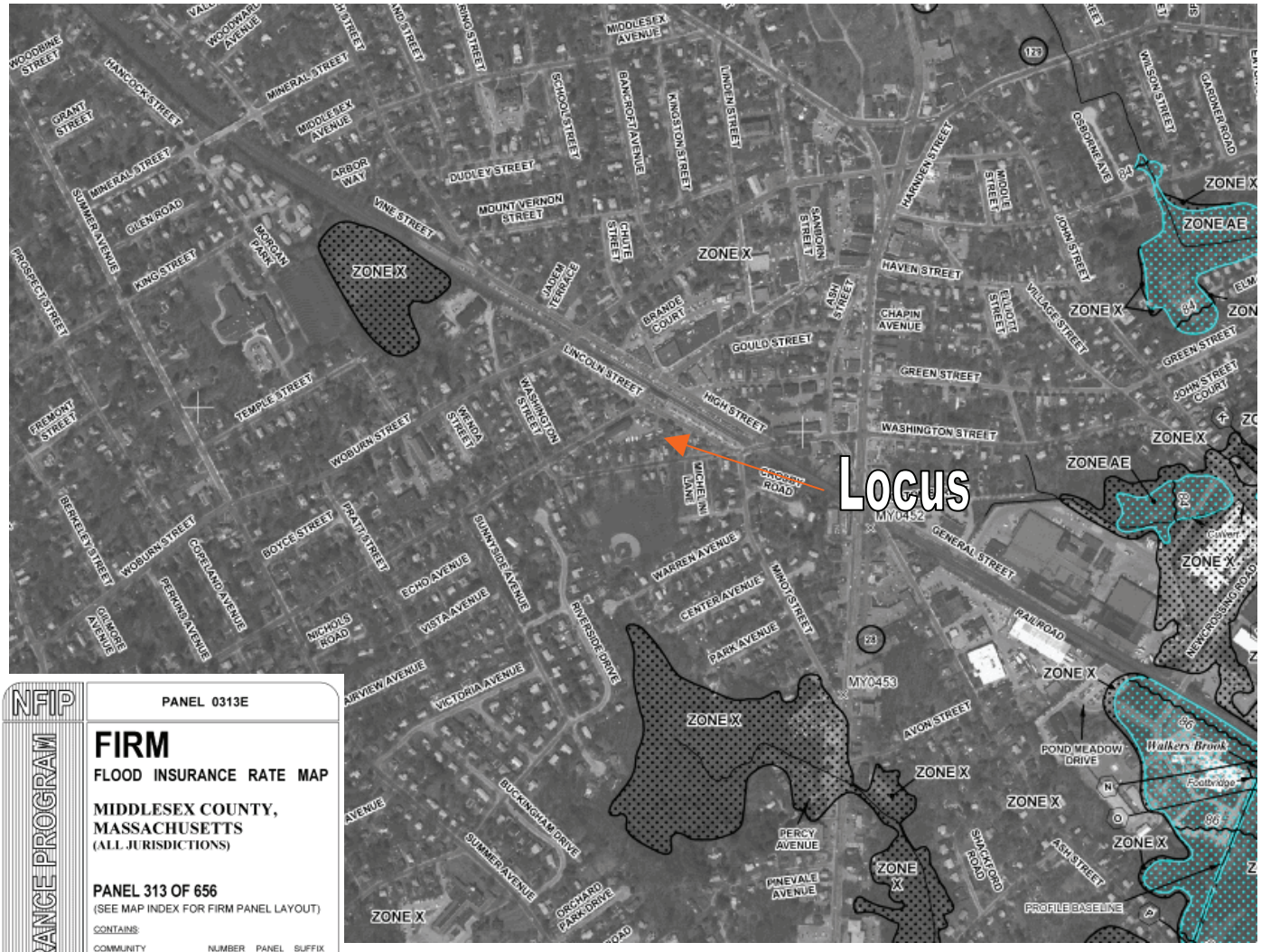

DATE:	TITLE:	SCALE:
September 12, 2016	***FEMA FLOOD MAP***	***NOT TO SCALE***

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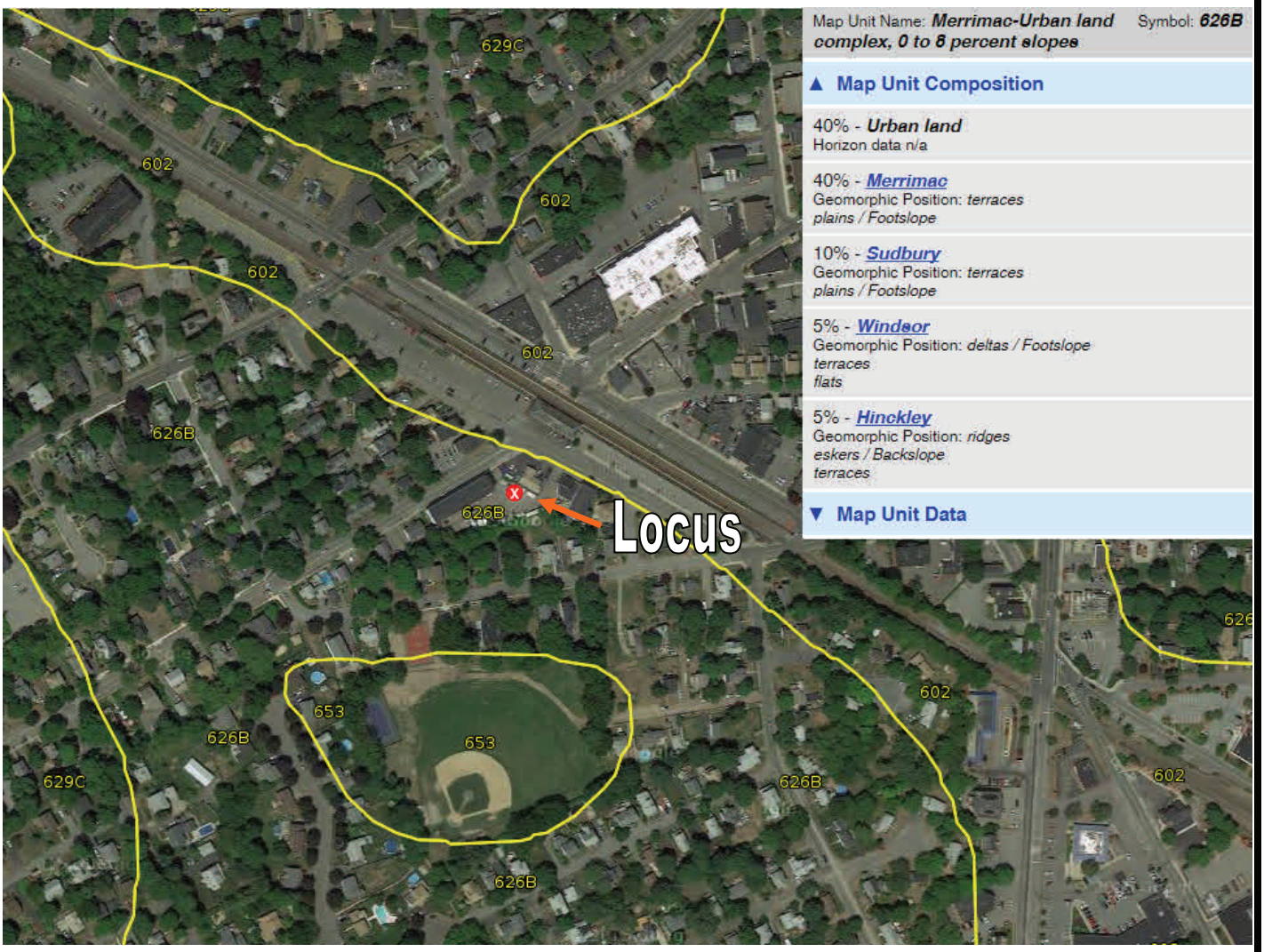

Soils Map provided by a website maintained by the University of California-Davis and supported by the Natural Resources Conservation Service.

DATE:	TITLE:	SCALE:
September 12, 2016	***SOILS MAP***	***NOT TO SCALE***

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Section 3 **–** **Management Plans**

Stormwater Operation & Maintenance Plan
Erosion and Sedimentation Control Plan

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Stormwater Operation & Site Maintenance Plan
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Proposed Apartment Buildings
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Introduction

This Stormwater Operation & Maintenance Plan (OMP) has been devised for the redevelopment of existing commercial lots located at 2 Prescott Street, 31 and 39 Lincoln Street in Reading, Massachusetts. The OMP is outlined below to provide long term operation and maintenance procedures of the stormwater controls installed to manage the stormwater flow generated on the site and improve runoff quality. The landowners are required to implement the procedures and ensure the long term benefits of the stormwater controls approved and installed for this project. The OMP provides simple operational and maintenance procedures for the stormwater control structures as well as perform various tasks to remove pollutants from areas that would have potential to be picked up on site and moved via stormwater offsite.

The landowners shall be responsible to inspect, maintain and operate the stormwater management system as well as inspect the grounds for eroded areas and collected pollutants. Appointing a responsible person in charge to implement this OMP on behalf of the landowner is preferred but the landowners shall be responsible at all times for implementing this OMP. The purpose of the OMP is to maintain the long term benefits from the Stormwater Management features constructed that support groundwater recharge and pollution prevention.

Responsible Party - Reading MKM, LLC
c/o KM Dover LLC
109 Oak Street, Suite G20
Newton, MA 02464

The responsible party listed above is responsible for inspecting, maintaining and keeping copies of maintenance records for the following plan and will be referred to as the Site Manager for the remainder of this report. If another individual/company is responsible for the every day management of the property the name and contact information shall be made available to the Reading Department of Public Works. The responsible party can expect a yearly budget of $1,200 to $1,600 per year to maintain the site. The responsible party will be referenced as the Manager throughout the rest of this OMP.

Non-Structural Operations

Parking Lot Sweeping

Parking Lot sweeping will be performed twice during the year, in April-May and in September-October. The Site Manager shall contract with a property management company that provides street sweeping services. The contractor shall be a company in good standing in the Commonwealth of Massachusetts and experienced in performing these services. All sweepings shall be disposed of by the hired company off-site in a legal manner.

Snow Management

Proper snow management practices will be implemented to minimize runoff and pollutant loading impacts. Plowed snow from the driveway access areas and the rear exterior parking lot will be placed in pervious areas at the edges of the parking lot where it can slowly infiltrate. Areas where plowing is difficult the site manager shall be responsible for removing the slow by hand or snow blower and placed at the edges of the parking area to slowly infiltrate into the ground. All accumulated sediment from snowmelt shall be removed each spring. If excessive snow inhibits movement around the site the Manager will be responsible to find a contractor to remove the snow from the site and disposed of in a legal manner. Care must be taken to reduce impact to vegetation in the snow storage areas.

Structural Operations

Catch Basin and Deep Sump Drain Manhole

Catch basins and deep sump manholes are installed to remove trash, debris, sediment and a percentage of grease and oil from stormwater. The stormwater runoff will go through the first structural phase of sediment removal. The catch basin allows for sediment collection from the ground runoff and remove said particles prior to entry into the drain manhole and then into the drainage system. The second phase of particle removal is the drain manhole. After passing through the manhole the suspended particles will be significantly reduced. Oil and grease will float on the surface of the pooled water and be trapped by an inverted elbow or other trap device. To ensure maximum capacity and efficiency, the sumps will be cleaned when half of the available capacity of the deep sump has been used or at a minimum of once per year. The Manager shall inspect the manhole sumps at least twice per year. The Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in cleaning stormwater sumps with a vacuum truck. All sediment and water retrieved from the tanks shall be shall be disposed of by the hired company off-site in a legal manner. The Manager shall provide a written inspection report of which an example form is attached.

Underground Cultec Chambers

The underground Cultec chambers were installed to recharge stormwater runoff from the roof of the buildings. The benefit of this structural stormwater BMP is the roof does not generate any sediment. The removal of particles from this runoff is not necessary and allows for long term life of the system with limited care. The Manager shall, however, check for sedimentation or ponding within the chamber. Sedimentation and ponding will impact the recharge capabilities of the chamber. The chambers shall be inspected a minimum of twice per year or if other evidence requires more frequent inspections such as consistent overflows or breakout is observed. The Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in cleaning stormwater structures with a vacuum truck. All sediment and water retrieved from the chambers shall be shall be disposed of by the hired company off-site in a legal manner. The Manager shall provide a written inspection report of which an example form is attached..

Oil/Water Separator

The oil/water separator is not part of the stormwater management system but it is designed to prevent the covered garage to be a source of pollution. The separator is designed to capture heavy amount of oil or perhaps gasoline by allowing the pollutants to float on top of a deep water sump. The separator is required in all covered parking garages and is connected to the public sewer. If a spill of gasoline or oil occurs within the garage the separator is designed to allow these pollutants to float on top of the water present in the separator. If a spill occurs the Manager shall contact a contractor in good standing in the Commonwealth of Massachusetts with experience in cleaning oil/water separators with a vacuum truck. The separator shall be filled with clean water before being put on line. All of the contaminated water retrieved from the separator shall be shall be disposed of by the hired company off-site in a legal manner. The Manager shall provide a written report of the incident.

Site Management

The site shall be inspected on a quarterly basis for rutting, potholes, broken berms, depressions eroded areas and any other site damage caused by vehicular or human activity. The landscaped areas shall be raked as necessary to maintain their grade. Grassed areas shall be raked out and seeded as needed to maintain an even vegetated surface. The Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in paving to repair any potholes, broken berms or other damaged paved area. The Manager shall hire a landscaper in good standing in the Commonwealth of Massachusetts with experience in re-vegetating eroded areas.

Record Keeping

Records of the inspections and maintenance for the Non-Structural and Structural Operations performed or organized by Manager for the property shall be up to date and available for review and inspection. An example record keeping sheet is attached.

2 Prescott, 31 & 39 Lincoln Street Apartment Buildings

Stormwater Operation & Site Maintenance Plan

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Best Management Practice	Inspection Frequency	Date Inspected	Contractor	Current Conditions and Minimum Maintenance / Repairs, if necessary	Completed Maintenance / Repair (i.e. date, contractor, tasks complete, etc...)
Site Sweeping	Biannual				
Catch Basin and Drain Manhole cleaning	Annual				
Underground Cultec Chambers	Biannual				
Oil/Water Separator	Biannual				
Parking Lot	Biannaul				
Vegetated Areas	Biannaul				
Overall Site Condition	Biannaul				

Property Manager: _____ **Date** _____

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Erosion and Sedimentation Control Plan
for
Proposed Apartment Buildings
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2 Prescott Street and 39 Lincoln Street
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Table of Contents

1.0 - Plan Objectives

- Control existing, and potential erosion, sediment transport and pollutant impact events by installing and maintaining construction related Best Management Practices (BMP's) to reduce and/or prevent the discharge of stormwater pollutants into wetland resources of the Commonwealth of Massachusetts;

- To protect surface stormwater quality, ground water quality, and minimize off-site sediment transport into the wetland resources during construction;

- To prevent local and off-site flooding by controlling peak rates and volumes of stormwater runoff during construction; and

- To eliminate illicit discharges to municipal stormwater drainage systems that causes pollution during construction.

2.0 - Introduction

This Erosion and Sedimentation Control Plan (The "Plan") has been devised for the redevelopment of the existing commercial lots located at 2 Prescott Street, 31 and 39 Lincoln Street in Reading, Massachusetts. These parcels are adjacent to one another at the corner of Prescott and Lincoln Streets. The purpose of the Plan is to protect the surrounding environment from contaminated stormwater during redevelopment. The stormwater will be treated before release and surfaces stabilized to minimize erosive events by implementing, installing and maintaining construction related Best Management Practices (BMP's) to reduce and/or prevent the discharge of stormwater pollutants and sediments into municipal stormwater systems and wetland resources of the Commonwealth of Massachusetts. The BMP's are described in the Stormwater Management Standards developed by the Massachusetts Department for Environmental Protection and it is our belief that short term construction related pollution prevention generated from this site can be achieved.

3.0 - Current Site Conditions

The project locus, located at 2 Prescott Street, 31 and 39 Lincoln Street in Reading, Massachusetts, is two existing multi-story commercial/industrial buildings and 31 Lincoln Street, an automotive repair garage fronting on two streets with undefined on-site parking. The multi-lot property fronts on Lincoln Street and Prescott Street. The site is bordered to the north by the public ways previously mentioned and to the west, south and east by multiple residential lots. The locus is zoned Residential Single Family 15 (S-15). The locus currently provides business space for a moving company, an auto repair shop and one building is unoccupied.

The Assessor's lot identification for the parcels is Map 16 Lots 224, 225, and 226. The majority of the 42,658± square foot lots are impervious, with two existing structures and one large paved lot of approximately 28,110± square feet. The site is accessed from multiple existing curb cuts, off of Prescott and Lincoln Street. Parking for the buildings is provided by the large connected paved lot which is unpainted. Minimal vertical curbing exists around the project site and bituminous concrete sidewalks are located along the entire frontage.

The Prescott Street building is serviced by public water, public sewer and overhead power and communications from the Prescott Street public layouts, The Lincoln Street buildings are serviced from the Lincoln Street layout. Although roof leaders are utilized for the existing building, no existing drainage is located at the site. The site drains overland uncontrolled into abutting streets and private properties.

This site is relatively flat with a general runoff from west to east. The lots have a minimal slope with the high point of 107.3'at the southwest corner and the low point of 104.8' located in the vicinity of the Lincoln Street curb cut. The plan datum is shown on the North American Vertical Datum of 1988 (NAVD 88).

There is no significant vegetation found on the site and site soils are defined by the Natural Resources Conservation Service (NRCS) as Merrimac sandy mix. These soils are excessively to well-drained soil. The site soils have been confirmed with two test pits, excavated on November 30, 2015, soils were noted to be HSG A soils and consistent with the record soil mapping.

4.0 - Project Description

The proposed project includes a new building with 72 dwelling units with a 74 space garage on the first level. The proposed building use will be affordable apartments with surface parking under and around the building. The building will have a footprint of 24,456± square feet and have five-stories with the first level being parking on existing grade.

The parking lot under the building will have two-way traffic lanes and two, two-way entrance/exits. One leads to the Prescott Street curb cut and one onto Lincoln Street. Included in the seventy four (74) parking spaces are four (4) van accessible handicap spaces.

The exterior surface parking lot is graded to provide positive drainage away from the garage. Two separate stormwater systems are proposed for the parking area. The larger system consists of two catch basins and two drain manholes connecting into an underground recharge structure consisting of eighteen (18) Cultec Recharger 280XLHD

units. The smaller system collects storm runoff for five parking spaces with one catch basin and one DMH connected to a single 280XLHD with a 6" overflow connected to the public drain system. The systems are designed to capture, treat and convey the stormwater runoff from the open parking area to the public drain system located in Lincoln Street. The majority of the site's runoff will be generated from the roof. The roof runoff shall be collected separately and conveyed to a row of Cultec Rechargers 280XLHDs installed side by side along the centerline of the building. The system has fifty-four (54) chambers, eleven total leaders from the roof connecting directly into the system and a 6" schedule 40 PVC overflow pipe through a single drain manhole and to a drain line located in Lincoln Street. The system is designed specifically to contain only roof runoff. The roof runoff shall be conveyed to the system by internal building roof drains. The system is designed to buffer up to a 100-year storm event and overflow to Lincoln Street.

The parking level also includes an oil/water separator system to protect against spills inside the parking area. This system will consist of four area drains connected in line with a 4" cast iron sewer pipe and will all be collected in an oil/separator with vents and a connection to the public sewer main via a 4" SDR 35 PVC pipe.

The proposed building will also be serviced by a new sewer service, a new fire protection system and new domestic water service. Underground gas and power shall be extended on site as will communications. All services will be conveyed off of Lincoln Street via the mechanical rooms. The new domestic water service will be a 4-inch cement lined ductile iron pipe (CLDI). The fire protection services are a 6-inch CLDI pipe. The sewer service will be a 6-inch PVC sewer pipe with a direct tap to the public sewer. Power and communications are coming from underground services currently found on Lincoln Street. Gas service shall be provided off the gas main located on Lincoln Street.

All utility connections shall conform to town requirements and meet all utility purveyor requirements as well. The proposed drainage system meets current stormwater management regulations by reducing the off-site peak flow, providing for the recharge of roof runoff and providing for the removal of sediment and pollutants from entering the public storm drain system.

5.0 - Erosion & Sedimentation Control Plan

The contractor shall implement an Erosion and Sedimentation Control Plan that protects the surrounding environment from sediment laden stormwater runoff generated during construction activities and from other pollutants generated from construction activities such as litter and dust. Construction sequencing is part of managing a site as is implementing many BMP's that assist in controlling construction related pollutants.

5.1 - Major Construction Sequence for Site

The sequence is developed to contain all potential sedimentation and erosion incidents that could occur during the construction of the project. The contractor however is responsible to manage the site effectively to control offsite sediment transport which may not be included in this plan. The sequence will coordinate the work within the erosion barrier and coordinate other sedimentation control features to reduce the stress upon a silt fence as well as limit off-site sediment transport. The sequencing is as follows:

- Place safety fence around property to limit access and protect the public.
- Place crushed stone apron at primary entrance to site.
- Place erosion control barrier at limit of work where possible.
- Install silt sacks in existing catch basins around site.
- Have water truck on-site for demolition process to minimize fugitive dust.
- Raze existing buildings; dispose of material in a legal manner.
- Remove existing bituminous concrete parking lot and dispose of in a legal manner.
- Rough grade lot to protect against unexpected construction site runoff.
- Excavate for drainage system. Remove deleterious material from excavation and to remove from site.
- Install proposed drainage system with silt sacks as required.
- Backfill and compact excavation as needed to construct drainage system in accordance with the approved plans. Place excavated soils as backfill for grading if possible to minimize stockpiled soils or have the unusable soils removed from the site.
- Excavate for building foundations, form foundations and backfill.
- Rough grade ground around building foundation and above drainage system and parking lot area to make sure site drains to new system.
- Install electrical and communication conduits. Backfill excavation as soon as possible to minimize stockpiled soils.
- Begin fine grade parking lot area.
- Place binder for parking lot.
- Install final landscaping, including hydro-seed, plantings, light poles, walkways and concrete pads.
- Install berms and final pave site.
- Clean up site.

The contractor has several procedures to perform to maintain the site. They include but are not limited to:

- Clean silt sacks of sediment as needed. All temporary erosion control to be inspected on a daily basis.
- Monitor daily, access points on Hancock Street for fugitive sediments and install temporary barriers or silt fences as necessary.
- Install temporary erosion barriers if expecting high volume of precipitation.
- Install/replace erosion control barrier at limit of work as needed. Barrier to be inspected on a weekly basis.
- Any stockpiled soils to be covered to minimize fugitive dust.
- Maintain a covered dumpster on site to minimize windblown debris from littering neighborhood and resource areas.
- Have a water truck onsite during the demolition portion of the project and during rough grading to minimize fugitive dust.

5.2 - Best Management Practices

The contractor shall use various types of structural and non-structural methodologies to minimize offsite polluting from construction activities. The following is a list of some BMP's that can be utilized, however, it is the contractor's responsibility to implement his strategies to minimize offsite sediment transport and fugitive dust and trash.

5.2.1 - Dumpster

The contractor shall have a dumpster on-site for the disposal of construction debris. The contractor shall cover the dumpster as needed to prevent windblown debris from becoming litter in the environment.

5.2.2 - Silt Collection and Filter Bags

The contractor shall install silt filters in the catch basins on site. They shall be inspected periodically for effectiveness and serviceability.

5.2.3 - Erosion Control Barrier

An erosion control barrier shall be installed at the Limit of Work and used around the site as needed. The barrier shall be used around soil stockpiles and localized excavations on site. The barrier needs to be effective in controlling sediment transport and not becoming strained as the project moves forward. The contractor shall inspect the barrier weekly or after a large storm event to identify any stressed areas and replace the barrier as needed. The barrier can be one or many of several types. Staked haybales, a geotextile fabric or a geotextile erosion control sock are typical types of barriers. The contractor shall inspect the barriers on a daily basis and repair the barriers as needed.

5.2.4 - Dust Control

The use of a water truck or other method to spray water over the site during the dry season to minimize blown dust shall be implemented. The water shall not be excessively spread so erosive forces occur. The contractor shall sweep the pavement once installed and cover stockpiled soils as needed to minimize dust.

5.2.5 - Disturbed Surface Maintenance

The contractor shall stabilize the ground surface as needed to prevent erosion. Stabilization of surfaces includes the placement of pavement, rip rap, wood bark mulch and the establishment of vegetated surfaces. Upon the completion of construction of a particular phase, all surfaces should be stabilized even though it is apparent that future construction efforts will cause their disturbance. Vegetated cover should be established during the proper growing season and should be enhanced by soil adjustment for proper pH, nutrients and moisture content. Surfaces that are disturbed by erosion processes or vandalism should be stabilized as soon as possible. Areas where construction activities have permanently or temporarily ceased should be stabilized within 14 days from the date of last construction activity, except when construction activity will resume within 21 days (e.g., the total time period that construction activity is temporarily ceased is less than 21 days). Hydro-mulching of grass surfaces is recommended, especially if seeding of the surfaces is required outside the normal growing season. Mulching may be used for temporary stabilization. Haybale dikes or silt fences should be set where required to trap products of erosion and should be maintained on a continuing basis during the construction process. During periods of intense precipitation temporary barriers like haybales, dikes or silt fences should be constructed to entrap the sediment.

5.2.6 - Temporary Stormwater Controls

The contractor shall rough grade the site as to not concentrate the stormwater runoff and cause erosive forces. The contractor shall use a temporary stormwater control device to treat construction site runoff for suspended solids. The catch basins and manholes can be installed to assist in capturing the construction site runoff. Once installed, the catch basins will need to be cleaned out of all sediment before connecting to the recharge system and final paving. The contractor shall sweep the pavement once installed as needed to minimize suspended solids in the stormwater.

Section 4 - **Stormwater Management Data**

Standard 3 Compliance
Standard 4 Compliance (TSS Removal)
HydroCAD Calculations
- **Existing Conditions**
  - **2-Year**
  - **10-Year**
  - **25-Year**
  - **100-Year**
- **Proposed Conditions**
  - **2-Year**
  - **10-Year**
  - **25-Year**
  - **100-Year**

Watershed Map

Calculation Sheet

DeCELLE BURKE & Associates, Inc.

Project: PROPOSED APARMENT BUILDING
2 Prescott Street 31, and 39 Lincoln Street
Reading MA
Client: Reading MKM LLC
109 Oak Street Newton MA
Date: September 12, 2016

Standard 3 Compliance

for Interior Basin

Find: Recharge Volume Requirement

Given: Rv = (AF)

Rv = (impervious area x depth factor)

A = 24,256 s.f. impervious area F= 0.6 " for A-soils

Solve: Rv = 24,256 s.f. x 0.6 "/12'= 1212.80 c.f.

Rv = 1212.80 c.f./43,560 s.f= 0.028 acre/ft

Find: Recharge System Infiltration Rate; i

Given: i= A x RR

Rawls Rate for in-situ-soils = RR = 8.27 in/hr

Recharge System Size 242 x 12 = 2904 s.f.

Solve: i= (2904s.f. x 8.27in/hr)/(12in/ft X 60min/hr X 60sec/min)

i= 0.5559 cfs

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Calculation Sheet

DeCELLE BURKE & Associates, Inc.

Project: PROPOSED APARMENT BUILDING
2 Prescott Street 31, and 39 Lincoln Street
Reading MA
Client: Reading MKM LLC
109 Oak Street Newton MA
Date: September 12, 2016

Standard 3 Compliance continued…

Determine if Recharge System can handle Required Recharge Volume; Rv

Given: Rv = 0.028 acre/ft

Recharge Field Height = 3.21 ft

Find: Depth of Rv within Recharge Field

Solve: **See HydroCAD Calculations Attached**

Rainfall Depth generating 0.028 ac/ft is 1.3 in

Corresponding Field Depth is 101.53 - 101.50 = 0.03 ft.

OK

Drawdown Time, T

Find: T= Rv / (A x RR)

Given: Recharge System= 2904 s.f. RR= 8.27 in/hr

Rv= 1212.80 c.f.

1212.8 c.f./(2904 s.f. x 8.27 in/hr)12in/ft

= 0.61 hrs < 72 hrs **CHECKS OK**

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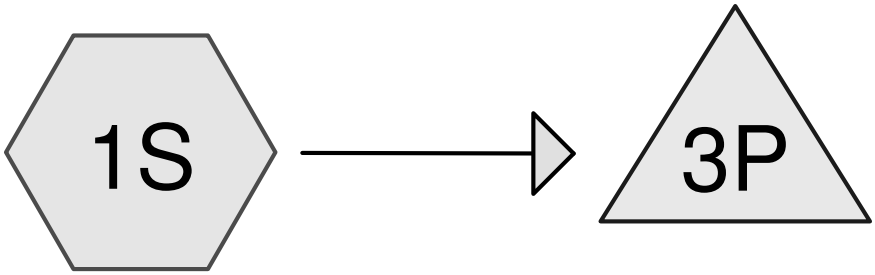

PROP ROOF BLD Interior Pond

Subcat Reach Pond Link

Routing Diagram for PC-stand3-interior
Prepared by DeCelle-Burke & Associates, Printed 10/4/2016

Summary for Subcatchment 1S: PROP ROOF BLD

Runoff = 0.58 cfs @ 12.14 hrs, Volume= 0.028 af, Depth> 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=1.30"

Area (sf)	CN	Description
24,256	98	Roofs, HSG A
24,256		100.00% Impervious Area

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

Summary for Pond 3P: Interior Pond

Inflow Area = 0.557 ac,100.00% Impervious, Inflow Depth > 0.60"
Inflow = 0.58 cfs @ 12.14 hrs, Volume= 0.028 af
Outflow = 0.56 cfs @ 12.17 hrs, Volume= 0.028 af, Atten= 3%, Lag= 1.7 min
Discarded = 0.56 cfs @ 12.17 hrs, Volume= 0.028 af
Primary = 0.00 cfs @ 11.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 11.00-13.00 hrs, dt= 0.05 hrs
Peak Elev= 101.53' @ 12.16 hrs Surf.Area= 2,904 sf Storage= 39 cf

Plug-Flow detention time= 1.3 min calculated for 0.028 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (728.4 - 727.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	2,678 cf	**242.00'W x 12.00'L x 3.21'H Field A** 9,317 cf Overall - 2,623 cf Embedded = 6,694 cf x 40.0% Voids
#2A	102.00'	2,623 cf	**Cultec R-280HD** x 54 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 54 rows
		5,301 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	103.50'	**6.0" Round Culvert** L= 70.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 103.50' / 101.00' S= 0.0357 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Discarded OutFlow Max=0.56 cfs @ 12.17 hrs HW=101.53' (Free Discharge)
1=Exfiltration (Controls 0.56 cfs)

Primary OutFlow Max=0.00 cfs @ 11.00 hrs HW=101.50' (Free Discharge)
2=Culvert (Controls 0.00 cfs)

Calculation Sheet

DeCELLE BURKE & Associates, Inc.

Project: PROPOSED APARMENT BUILDING
2 Prescott Street 31, and 39 Lincoln Street
Reading MA
Client: Reading MKM LLC
109 Oak Street Newton MA
Date: September 12, 2016

Standard 3 Compliance

for Exterior Large Parking Lot

Find: Recharge Volume Requirement

Given: Rv = (AF)

Rv = (impervious area x depth factor)

A = 9,213 s.f. impervious area F= 0.6 " for A-soils

Solve: Rv = 9,213 s.f. x 0.6 "/12'= 460.65 c.f.

Rv = 460.65 c.f./43,560 s.f= 0.011 acre/ft

Find: Recharge System Infiltration Rate; i

Given: i= A x RR

Rawls Rate for in-situ-soils = RR = 8.27 in/hr

Recharge System Size 131 x 7.92 = 1037.52 s.f.

Solve: i= (1037.52s.f. x 8.27in/hr)/(12in/ft X 60min/hr X 60sec/min)

i= 0.1986 cfs

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Calculation Sheet

DeCELLE BURKE & Associates, Inc.

Project: PROPOSED APARMENT BUILDING
2 Prescott Street 31, and 39 Lincoln Street
Reading MA
Client: Reading MKM LLC
109 Oak Street Newton MA
Date: September 12, 2016

Standard 3 Compliance continued…

Determine if Recharge System can handle Required Recharge Volume; Rv

Given: Rv = 0.011 acre/ft

Recharge Field Height = 3.21 ft

Find: Depth of Rv within Recharge Field

Solve: **See HydroCAD Calculations Attached**

Rainfall Depth generating 0.011 ac/ft is 0.9 in

Corresponding Field Depth is 101.56 - 101.50 = 0.06 ft.

OK

Drawdown Time, T

Find: T= Rv / (A x RR)

Given: Recharge System= 1037.52 s.f. RR= 8.27 in/hr

Rv= 460.65 c.f.

460.65 c.f./(1037.52 s.f. x 8.27 in/hr)12in/ft

= 0.64 hrs < 72 hrs **CHECKS OK**

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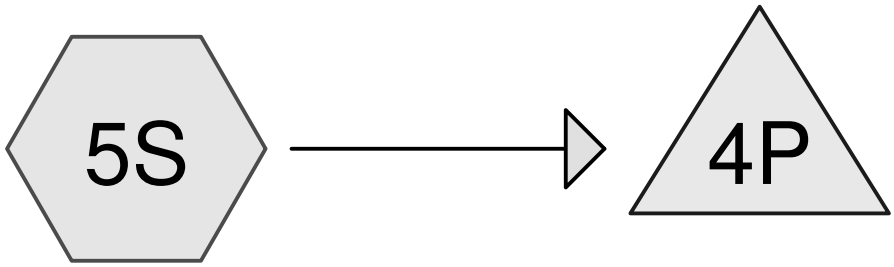

PROP PARKING Exterior Pond

Subcat Reach Pond Link

Routing Diagram for PC-stand3-large lot
Prepared by DeCelle-Burke & Associates, Printed 10/4/2016

Summary for Subcatchment 5S: PROP PARKING

Runoff = 0.22 cfs @ 12.14 hrs, Volume= 0.011 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=1.31"

Area (sf)	CN	Description
9,213	98	Paved parking, HSG A
9,213		100.00% Impervious Area

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

Summary for Pond 4P: Exterior Pond

Inflow Area = 0.212 ac,100.00% Impervious, Inflow Depth > 0.61"
Inflow = 0.22 cfs @ 12.14 hrs, Volume= 0.011 af
Outflow = 0.20 cfs @ 12.18 hrs, Volume= 0.011 af, Atten= 10%, Lag= 2.2 min
Discarded = 0.20 cfs @ 12.18 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 11.00-13.00 hrs, dt= 0.05 hrs
Peak Elev= 101.56' @ 12.19 hrs Surf.Area= 1,037 sf Storage= 24 cf

Plug-Flow detention time= 1.9 min calculated for 0.011 af (99% of inflow)
Center-of-Mass det. time= 1.5 min (728.9 - 727.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	1,022 cf	**7.92'W x 131.00'L x 3.21'H Field A** 3,327 cf Overall - 771 cf Embedded = 2,556 cf x 40.0% Voids
#2A	102.00'	771 cf	**Cultec R-280HD** x 18 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
#3	106.00'	800 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		2,594 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.00	0	0	0
106.40	4,000	800	800

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.20 cfs @ 12.18 hrs HW=101.56' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.20 cfs)

Calculation Sheet

DeCELLE BURKE & Associates, Inc.

Project: PROPOSED APARMENT BUILDING
2 Prescott Street 31, and 39 Lincoln Street
Reading MA
Client: Reading MKM LLC
109 Oak Street Newton MA
Date: September 12, 2016

Standard 3 Compliance

for Small Exterior

Find: Recharge Volume Requirement

Given: Rv = (AF)

Rv = (impervious area x depth factor)

A = 794 s.f. impervious area F= 0.6 " for A-soils

Solve: Rv = 794 s.f. x 0.6 "/12'= 39.70 c.f.

Rv = 39.70 c.f./43,560 s.f= 0.001 acre/ft

Find: Recharge System Infiltration Rate; i

Given: i= A x RR

Rawls Rate for in-situ-soils = RR = 8.27 in/hr

Recharge System Size 12 x 7.92 = 95.04 s.f.

Solve: i= (95.04s.f. x 8.27in/hr)/(12in/ft X 60min/hr X 60sec/min)

i= 0.0182 cfs

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Calculation Sheet

DeCELLE BURKE & Associates, Inc.

Project: PROPOSED APARMENT BUILDING
2 Prescott Street 31, and 39 Lincoln Street
Reading MA
Client: Reading MKM LLC
109 Oak Street Newton MA
Date: September 12, 2016

Standard 3 Compliance continued…

Determine if Recharge System can handle Required Recharge Volume; Rv

Given: Rv = 0.001 acre/ft

Recharge Field Height = 3.21 ft

Find: Depth of Rv within Recharge Field

Solve: **See HydroCAD Calculations Attached**

Rainfall Depth generating 0.001 ac/ft is 0.9 in

Corresponding Field Depth is 101.52 - 101.50 = 0.02 ft.

OK

Drawdown Time, T

Find: T= Rv / (A x RR)

Given: Recharge System= 95.04 s.f. RR= 8.27 in/hr

Rv= 39.70 c.f.

39.7 c.f./(95.04 s.f. x 8.27 in/hr)12in/ft

= 0.61 hrs < 72 hrs **CHECKS OK**

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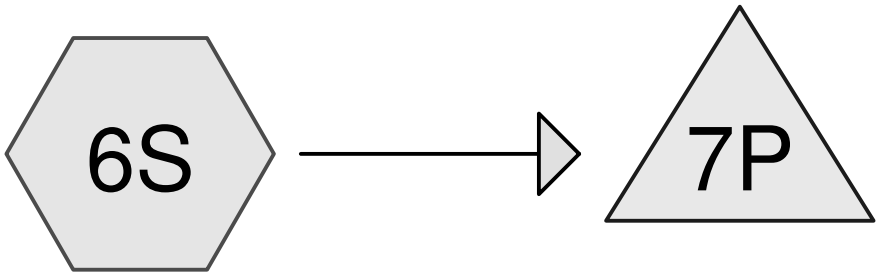


SMALL PARKING LOT Small Pond

Subcat Reach Pond Link

Routing Diagram for PC-stand3-REV3
Prepared by DeCelle-Burke & Associates, Printed 10/5/2016

Summary for Subcatchment 6S: SMALL PARKING LOT

Runoff = 0.01 cfs @ 12.07 hrs, Volume= 0.001 af, Depth> 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=0.90"

	Area (sf)	CN	Description
*	794	98	Parking Lot
	794		100.00% Impervious Area

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

Summary for Pond 7P: Small Pond

Inflow Area = 0.018 ac,100.00% Impervious, Inflow Depth > 0.39"
Inflow = 0.01 cfs @ 12.07 hrs, Volume= 0.001 af
Outflow = 0.01 cfs @ 12.10 hrs, Volume= 0.001 af, Atten= 2%, Lag= 1.4 min
Discarded = 0.01 cfs @ 12.10 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 11.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 11.00-13.00 hrs, dt= 0.05 hrs
Peak Elev= 101.52' @ 12.10 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 1.2 min calculated for 0.001 af (97% of inflow)
Center-of-Mass det. time= 0.9 min (725.7 - 724.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	0.002 af	**7.92'W x 12.00'L x 3.21'H Field A** 0.007 af Overall - 0.001 af Embedded = 0.006 af x 40.0% Voids
#2A	102.00'	0.001 af	**Cultec R-280HD** Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
		0.003 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	103.70'	**6.0" Round Culvert** L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 103.70' / 101.00' S= 0.0675 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Discarded OutFlow Max=0.02 cfs @ 12.10 hrs HW=101.52' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 11.00 hrs HW=101.50' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Lincoln and Prescott Street, Reading, MA

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	**0.05**	**1.00**	**0.05**	**0.95**
Deep Sump and Hooded Catch Basin	**0.25**	**0.95**	**0.24**	**0.71**
Subsurface Infiltration Structure	**0.80**	**0.71**	**0.57**	**0.14**
	0.00	**0.14**	**0.00**	**0.14**
	0.00	**0.14**	**0.00**	**0.14**

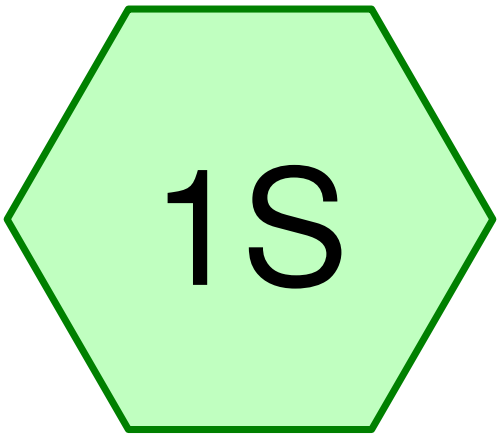
Total TSS Removal = **86%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

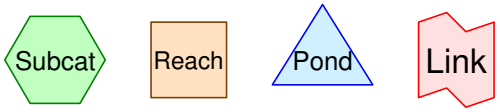
Project: **14.034 Proposed Apartment Building, Reading MA**
Prepared By: **DeCelle-Burke Assoc**
Date: **12-Sep-16**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1



Existing Conditions



Routing Diagram for xc-REV
Prepared by Microsoft, Printed 10/4/2016

Summary for Subcatchment 1S: Existing Conditions

Runoff = 2.58 cfs @ 12.14 hrs, Volume= 0.215 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
5,770	98	Roofs, HSG A
5,864	98	Roofs, HSG A
1,398	49	50-75% Grass cover, Fair, HSG A
28,110	98	Paved parking, HSG A
1,511	98	Roofs, HSG A
42,653	96	Weighted Average
1,398		3.28% Pervious Area
41,255		96.72% Impervious Area

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

Summary for Subcatchment 1S: Existing Conditions

Runoff = 4.15 cfs @ 12.14 hrs, Volume= 0.354 af, Depth> 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=5.09"

Area (sf)	CN	Description
5,770	98	Roofs, HSG A
5,864	98	Roofs, HSG A
1,398	49	50-75% Grass cover, Fair, HSG A
28,110	98	Paved parking, HSG A
1,511	98	Roofs, HSG A
42,653	96	Weighted Average
1,398		3.28% Pervious Area
41,255		96.72% Impervious Area

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

Summary for Subcatchment 1S: Existing Conditions

Runoff = 5.12 cfs @ 12.14 hrs, Volume= 0.439 af, Depth> 5.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.23"

Area (sf)	CN	Description
5,770	98	Roofs, HSG A
5,864	98	Roofs, HSG A
1,398	49	50-75% Grass cover, Fair, HSG A
28,110	98	Paved parking, HSG A
1,511	98	Roofs, HSG A
42,653	96	Weighted Average
1,398		3.28% Pervious Area
41,255		96.72% Impervious Area

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

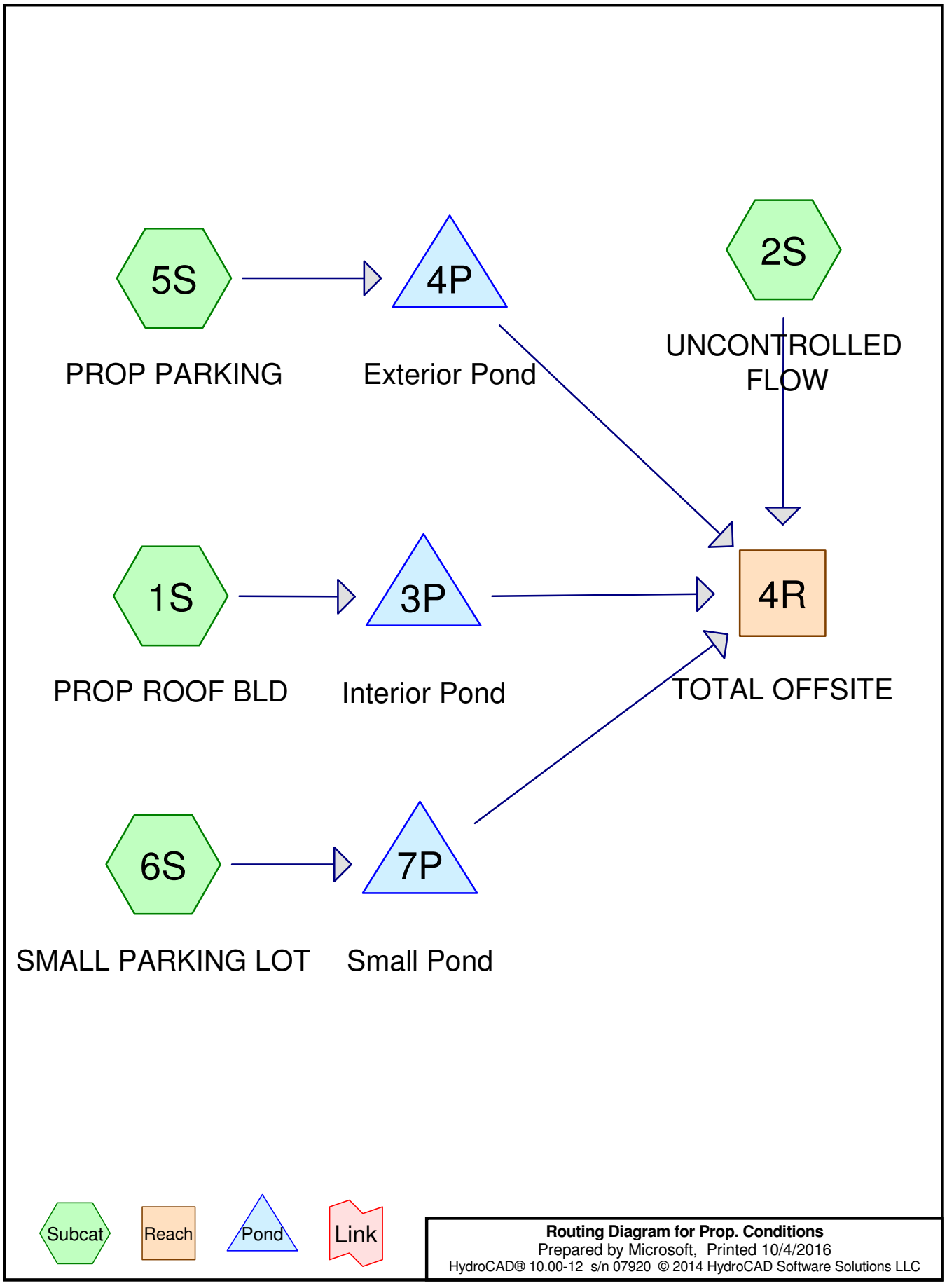
Summary for Subcatchment 1S: Existing Conditions

Runoff = 6.61 cfs @ 12.14 hrs, Volume= 0.572 af, Depth> 7.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.00"

Area (sf)	CN	Description
5,770	98	Roofs, HSG A
5,864	98	Roofs, HSG A
1,398	49	50-75% Grass cover, Fair, HSG A
28,110	98	Paved parking, HSG A
1,511	98	Roofs, HSG A
42,653	96	Weighted Average
1,398		3.28% Pervious Area
41,255		96.72% Impervious Area

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



Routing Diagram for Prop. Conditions
Prepared by Microsoft, Printed 10/4/2016

Summary for Subcatchment 1S: PROP ROOF BLD

Runoff = 1.52 cfs @ 12.14 hrs, Volume= 0.131 af, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
24,256	98	Roofs, HSG A
24,256		100.00% Impervious Area

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

Summary for Subcatchment 2S: UNCONTROLLED FLOW

Runoff = 0.07 cfs @ 12.11 hrs, Volume= 0.006 af, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
1,950	98	Paved parking, HSG A
6,237	49	50-75% Grass cover, Fair, HSG A
8,187	61	Weighted Average
6,237		76.18% Pervious Area
1,950		23.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5**

Summary for Subcatchment 5S: PROP PARKING

Runoff = 0.58 cfs @ 12.14 hrs, Volume= 0.050 af, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
9,213	98	Paved parking, HSG A
9,213		100.00% Impervious Area

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

Summary for Subcatchment 6S: SMALL PARKING LOT

Runoff = 0.06 cfs @ 12.07 hrs, Volume= 0.004 af, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
* 794	98	Parking Lot
794		100.00% Impervious Area

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

Summary for Reach 4R: TOTAL OFFSITE

Inflow Area = 0.975 ac, 85.31% Impervious, Inflow Depth > 0.08" for 2YR event
Inflow = 0.07 cfs @ 12.11 hrs, Volume= 0.006 af
Outflow = 0.07 cfs @ 12.11 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Interior Pond

Inflow Area = 0.557 ac,100.00% Impervious, Inflow Depth > 2.82" for 2YR event
Inflow = 1.52 cfs @ 12.14 hrs, Volume= 0.131 af
Outflow = 0.56 cfs @ 12.45 hrs, Volume= 0.131 af, Atten= 63%, Lag= 18.6 min
Discarded = 0.56 cfs @ 12.45 hrs, Volume= 0.131 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 102.14' @ 12.45 hrs Surf.Area= 2,904 sf Storage= 877 cf

Plug-Flow detention time= 7.6 min calculated for 0.130 af (100% of inflow)
Center-of-Mass det. time= 7.4 min (748.8 - 741.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	2,678 cf	**242.00'W x 12.00'L x 3.21'H Field A** 9,317 cf Overall - 2,623 cf Embedded = 6,694 cf x 40.0% Voids
#2A	102.00'	2,623 cf	**Cultec R-280HD** x 54 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 54 rows
		5,301 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	103.50'	**6.0" Round Culvert** L= 70.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 103.50' / 101.00' S= 0.0357 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Discarded OutFlow Max=0.56 cfs @ 12.45 hrs HW=102.14' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.56 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=101.50' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 4P: Exterior Pond

Inflow Area = 0.212 ac,100.00% Impervious, Inflow Depth > 2.82" for 2YR event
Inflow = 0.58 cfs @ 12.14 hrs, Volume= 0.050 af
Outflow = 0.20 cfs @ 12.47 hrs, Volume= 0.050 af, Atten= 65%, Lag= 19.7 min
Discarded = 0.20 cfs @ 12.47 hrs, Volume= 0.050 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 102.22' @ 12.47 hrs Surf.Area= 1,037 sf Storage= 366 cf

Plug-Flow detention time= 9.4 min calculated for 0.050 af (100% of inflow)
Center-of-Mass det. time= 9.1 min (750.5 - 741.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	1,022 cf	**7.92'W x 131.00'L x 3.21'H Field A** 3,327 cf Overall - 771 cf Embedded = 2,556 cf x 40.0% Voids
#2A	102.00'	771 cf	**Cultec R-280HD** x 18 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
#3	106.00'	800 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		2,594 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.00	0	0	0
106.40	4,000	800	800

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.20 cfs @ 12.47 hrs HW=102.22' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.20 cfs)

Summary for Pond 7P: Small Pond

Inflow Area = 0.018 ac,100.00% Impervious, Inflow Depth > 2.82" for 2YR event
Inflow = 0.06 cfs @ 12.07 hrs, Volume= 0.004 af
Outflow = 0.02 cfs @ 12.36 hrs, Volume= 0.004 af, Atten= 68%, Lag= 17.5 min
Discarded = 0.02 cfs @ 12.36 hrs, Volume= 0.004 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 102.19' @ 12.36 hrs Surf.Area= 0.002 ac Storage= 0.001 af

Plug-Flow detention time= 7.8 min calculated for 0.004 af (100% of inflow)
Center-of-Mass det. time= 7.6 min (745.2 - 737.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	0.002 af	**7.92'W x 12.00'L x 3.21'H Field A** 0.007 af Overall - 0.001 af Embedded = 0.006 af x 40.0% Voids
#2A	102.00'	0.001 af	**Cultec R-280HD** Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
		0.003 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	103.70'	**6.0" Round Culvert** L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 103.70' / 101.00' S= 0.0675 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Discarded OutFlow Max=0.02 cfs @ 12.36 hrs HW=102.19' (Free Discharge)
↑**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=101.50' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Summary for Subcatchment 1S: PROP ROOF BLD

Runoff = 2.40 cfs @ 12.14 hrs, Volume= 0.209 af, Depth> 4.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=5.09"

Area (sf)	CN	Description
24,256	98	Roofs, HSG A
24,256		100.00% Impervious Area

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

Summary for Subcatchment 2S: UNCONTROLLED FLOW

Runoff = 0.29 cfs @ 12.09 hrs, Volume= 0.020 af, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=5.09"

Area (sf)	CN	Description
1,950	98	Paved parking, HSG A
6,237	49	50-75% Grass cover, Fair, HSG A
8,187	61	Weighted Average
6,237		76.18% Pervious Area
1,950		23.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5**

Summary for Subcatchment 5S: PROP PARKING

Runoff = 0.91 cfs @ 12.14 hrs, Volume= 0.079 af, Depth> 4.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=5.09"

Area (sf)	CN	Description
9,213	98	Paved parking, HSG A
9,213		100.00% Impervious Area

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

Summary for Subcatchment 6S: SMALL PARKING LOT

Runoff = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af, Depth> 4.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=5.09"

Area (sf)	CN	Description
* 794	98	Parking Lot
794		100.00% Impervious Area

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

Summary for Reach 4R: TOTAL OFFSITE

Inflow Area = 0.975 ac, 85.31% Impervious, Inflow Depth > 0.25" for 10YR event
Inflow = 0.29 cfs @ 12.09 hrs, Volume= 0.020 af
Outflow = 0.29 cfs @ 12.09 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Interior Pond

Inflow Area = 0.557 ac,100.00% Impervious, Inflow Depth > 4.50" for 10YR event
Inflow = 2.40 cfs @ 12.14 hrs, Volume= 0.209 af
Outflow = 0.56 cfs @ 12.57 hrs, Volume= 0.209 af, Atten= 77%, Lag= 26.0 min
Discarded = 0.56 cfs @ 12.57 hrs, Volume= 0.209 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 102.75' @ 12.57 hrs Surf.Area= 2,904 sf Storage= 2,172 cf

Plug-Flow detention time= 20.7 min calculated for 0.209 af (100% of inflow)
Center-of-Mass det. time= 20.5 min (758.4 - 737.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	2,678 cf	**242.00'W x 12.00'L x 3.21'H Field A** 9,317 cf Overall - 2,623 cf Embedded = 6,694 cf x 40.0% Voids
#2A	102.00'	2,623 cf	**Cultec R-280HD** x 54 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 54 rows
		5,301 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	103.50'	**6.0" Round Culvert** L= 70.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 103.50' / 101.00' S= 0.0357 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Discarded OutFlow Max=0.56 cfs @ 12.57 hrs HW=102.75' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.56 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=101.50' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 4P: Exterior Pond

Inflow Area = 0.212 ac,100.00% Impervious, Inflow Depth > 4.50" for 10YR event
Inflow = 0.91 cfs @ 12.14 hrs, Volume= 0.079 af
Outflow = 0.20 cfs @ 12.58 hrs, Volume= 0.079 af, Atten= 78%, Lag= 26.9 min
Discarded = 0.20 cfs @ 12.58 hrs, Volume= 0.079 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 102.96' @ 12.58 hrs Surf.Area= 1,037 sf Storage= 868 cf

Plug-Flow detention time= 24.1 min calculated for 0.079 af (100% of inflow)
Center-of-Mass det. time= 23.7 min (761.7 - 737.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	1,022 cf	**7.92'W x 131.00'L x 3.21'H Field A** 3,327 cf Overall - 771 cf Embedded = 2,556 cf x 40.0% Voids
#2A	102.00'	771 cf	**Cultec R-280HD** x 18 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
#3	106.00'	800 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		2,594 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.00	0	0	0
106.40	4,000	800	800

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.20 cfs @ 12.58 hrs HW=102.96' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.20 cfs)

Summary for Pond 7P: Small Pond

Inflow Area = 0.018 ac,100.00% Impervious, Inflow Depth > 4.50" for 10YR event
Inflow = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af
Outflow = 0.02 cfs @ 12.49 hrs, Volume= 0.007 af, Atten= 80%, Lag= 25.1 min
Discarded = 0.02 cfs @ 12.49 hrs, Volume= 0.007 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 102.96' @ 12.49 hrs Surf.Area= 0.002 ac Storage= 0.002 af

Plug-Flow detention time= 21.0 min calculated for 0.007 af (100% of inflow)
Center-of-Mass det. time= 20.8 min (755.0 - 734.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	0.002 af	**7.92'W x 12.00'L x 3.21'H Field A** 0.007 af Overall - 0.001 af Embedded = 0.006 af x 40.0% Voids
#2A	102.00'	0.001 af	**Cultec R-280HD** Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
		0.003 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	103.70'	**6.0" Round Culvert** L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 103.70' / 101.00' S= 0.0675 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Discarded OutFlow Max=0.02 cfs @ 12.49 hrs HW=102.96' (Free Discharge)
↑**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=101.50' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Summary for Subcatchment 1S: PROP ROOF BLD

Runoff = 2.94 cfs @ 12.14 hrs, Volume= 0.257 af, Depth> 5.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.23"

Area (sf)	CN	Description
24,256	98	Roofs, HSG A
24,256		100.00% Impervious Area

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

Summary for Subcatchment 2S: UNCONTROLLED FLOW

Runoff = 0.46 cfs @ 12.09 hrs, Volume= 0.031 af, Depth> 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.23"

Area (sf)	CN	Description
1,950	98	Paved parking, HSG A
6,237	49	50-75% Grass cover, Fair, HSG A
8,187	61	Weighted Average
6,237		76.18% Pervious Area
1,950		23.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5**

Summary for Subcatchment 5S: PROP PARKING

Runoff = 1.12 cfs @ 12.14 hrs, Volume= 0.098 af, Depth> 5.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.23"

Area (sf)	CN	Description
9,213	98	Paved parking, HSG A
9,213		100.00% Impervious Area

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

Summary for Subcatchment 6S: SMALL PARKING LOT

Runoff = 0.11 cfs @ 12.07 hrs, Volume= 0.008 af, Depth> 5.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.23"

	Area (sf)	CN	Description
*	794	98	Parking Lot
	794		100.00% Impervious Area

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

Summary for Reach 4R: TOTAL OFFSITE

Inflow Area = 0.975 ac, 85.31% Impervious, Inflow Depth > 0.38" for 25YR event
Inflow = 0.46 cfs @ 12.09 hrs, Volume= 0.031 af
Outflow = 0.46 cfs @ 12.09 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Interior Pond

Inflow Area = 0.557 ac,100.00% Impervious, Inflow Depth > 5.54" for 25YR event
Inflow = 2.94 cfs @ 12.14 hrs, Volume= 0.257 af
Outflow = 0.57 cfs @ 12.62 hrs, Volume= 0.257 af, Atten= 81%, Lag= 29.0 min
Discarded = 0.57 cfs @ 12.62 hrs, Volume= 0.257 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 103.20' @ 12.62 hrs Surf.Area= 2,904 sf Storage= 3,053 cf

Plug-Flow detention time= 31.3 min calculated for 0.256 af (100% of inflow)
Center-of-Mass det. time= 31.0 min (767.9 - 736.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	2,678 cf	**242.00'W x 12.00'L x 3.21'H Field A** 9,317 cf Overall - 2,623 cf Embedded = 6,694 cf x 40.0% Voids
#2A	102.00'	2,623 cf	**Cultec R-280HD** x 54 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 54 rows
		5,301 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	103.50'	**6.0" Round Culvert** L= 70.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 103.50' / 101.00' S= 0.0357 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Discarded OutFlow Max=0.57 cfs @ 12.62 hrs HW=103.19' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.57 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=101.50' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 4P: Exterior Pond

Inflow Area = 0.212 ac,100.00% Impervious, Inflow Depth > 5.54" for 25YR event
Inflow = 1.12 cfs @ 12.14 hrs, Volume= 0.098 af
Outflow = 0.20 cfs @ 12.64 hrs, Volume= 0.098 af, Atten= 82%, Lag= 30.0 min
Discarded = 0.20 cfs @ 12.64 hrs, Volume= 0.098 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 103.49' @ 12.64 hrs Surf.Area= 1,037 sf Storage= 1,207 cf

Plug-Flow detention time= 35.8 min calculated for 0.098 af (100% of inflow)
Center-of-Mass det. time= 35.4 min (772.3 - 736.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	1,022 cf	**7.92'W x 131.00'L x 3.21'H Field A** 3,327 cf Overall - 771 cf Embedded = 2,556 cf x 40.0% Voids
#2A	102.00'	771 cf	**Cultec R-280HD** x 18 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
#3	106.00'	800 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		2,594 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.00	0	0	0
106.40	4,000	800	800

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.20 cfs @ 12.64 hrs HW=103.49' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.20 cfs)

Summary for Pond 7P: Small Pond

Inflow Area = 0.018 ac,100.00% Impervious, Inflow Depth > 5.54" for 25YR event
Inflow = 0.11 cfs @ 12.07 hrs, Volume= 0.008 af
Outflow = 0.02 cfs @ 12.53 hrs, Volume= 0.008 af, Atten= 83%, Lag= 27.7 min
Discarded = 0.02 cfs @ 12.53 hrs, Volume= 0.008 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 103.52' @ 12.53 hrs Surf.Area= 0.002 ac Storage= 0.002 af

Plug-Flow detention time= 31.4 min calculated for 0.008 af (100% of inflow)
Center-of-Mass det. time= 31.2 min (764.4 - 733.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	0.002 af	**7.92'W x 12.00'L x 3.21'H Field A** 0.007 af Overall - 0.001 af Embedded = 0.006 af x 40.0% Voids
#2A	102.00'	0.001 af	**Cultec R-280HD** Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
		0.003 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	103.70'	**6.0" Round Culvert** L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 103.70' / 101.00' S= 0.0675 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Discarded OutFlow Max=0.02 cfs @ 12.53 hrs HW=103.52' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=101.50' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

Summary for Subcatchment 1S: PROP ROOF BLD

Runoff = 3.79 cfs @ 12.14 hrs, Volume= 0.332 af, Depth> 7.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.00"

Area (sf)	CN	Description
24,256	98	Roofs, HSG A
24,256		100.00% Impervious Area

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

Summary for Subcatchment 2S: UNCONTROLLED FLOW

Runoff = 0.75 cfs @ 12.08 hrs, Volume= 0.050 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.00"

Area (sf)	CN	Description
1,950	98	Paved parking, HSG A
6,237	49	50-75% Grass cover, Fair, HSG A
8,187	61	Weighted Average
6,237		76.18% Pervious Area
1,950		23.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5**

Summary for Subcatchment 5S: PROP PARKING

Runoff = 1.44 cfs @ 12.14 hrs, Volume= 0.126 af, Depth> 7.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.00"

Area (sf)	CN	Description
9,213	98	Paved parking, HSG A
9,213		100.00% Impervious Area

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

Summary for Subcatchment 6S: SMALL PARKING LOT

Runoff = 0.14 cfs @ 12.07 hrs, Volume= 0.011 af, Depth> 7.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.00"

	Area (sf)	CN	Description
*	794	98	Parking Lot
	794		100.00% Impervious Area

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

Summary for Reach 4R: TOTAL OFFSITE

Inflow Area = 0.975 ac, 85.31% Impervious, Inflow Depth > 0.76" for 100YR event
Inflow = 0.75 cfs @ 12.08 hrs, Volume= 0.062 af
Outflow = 0.75 cfs @ 12.08 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Interior Pond

Inflow Area = 0.557 ac,100.00% Impervious, Inflow Depth > 7.14" for 100YR event
Inflow = 3.79 cfs @ 12.14 hrs, Volume= 0.332 af
Outflow = 0.89 cfs @ 12.57 hrs, Volume= 0.331 af, Atten= 77%, Lag= 26.1 min
Discarded = 0.57 cfs @ 12.57 hrs, Volume= 0.320 af
Primary = 0.32 cfs @ 12.57 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 103.87' @ 12.57 hrs Surf.Area= 2,904 sf Storage= 4,258 cf

Plug-Flow detention time= 43.0 min calculated for 0.331 af (100% of inflow)
Center-of-Mass det. time= 42.8 min (778.7 - 736.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	2,678 cf	**242.00'W x 12.00'L x 3.21'H Field A** 9,317 cf Overall - 2,623 cf Embedded = 6,694 cf x 40.0% Voids
#2A	102.00'	2,623 cf	**Cultec R-280HD** x 54 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 54 rows
		5,301 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	103.50'	**6.0" Round Culvert** L= 70.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 103.50' / 101.00' S= 0.0357 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Discarded OutFlow Max=0.57 cfs @ 12.57 hrs HW=103.86' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.57 cfs)

Primary OutFlow Max=0.31 cfs @ 12.57 hrs HW=103.86' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 0.31 cfs @ 2.05 fps)

Summary for Pond 4P: Exterior Pond

Inflow Area = 0.212 ac,100.00% Impervious, Inflow Depth > 7.14" for 100YR event
Inflow = 1.44 cfs @ 12.14 hrs, Volume= 0.126 af
Outflow = 0.20 cfs @ 12.73 hrs, Volume= 0.126 af, Atten= 86%, Lag= 35.6 min
Discarded = 0.20 cfs @ 12.73 hrs, Volume= 0.126 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 104.63' @ 12.73 hrs Surf.Area= 1,037 sf Storage= 1,759 cf

Plug-Flow detention time= 56.9 min calculated for 0.125 af (100% of inflow)
Center-of-Mass det. time= 56.3 min (792.3 - 736.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	1,022 cf	**7.92'W x 131.00'L x 3.21'H Field A** 3,327 cf Overall - 771 cf Embedded = 2,556 cf x 40.0% Voids
#2A	102.00'	771 cf	**Cultec R-280HD** x 18 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
#3	106.00'	800 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		2,594 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.00	0	0	0
106.40	4,000	800	800

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.20 cfs @ 12.73 hrs HW=104.62' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.20 cfs)

Summary for Pond 7P: Small Pond

Inflow Area = 0.018 ac,100.00% Impervious, Inflow Depth > 7.14" for 100YR event
Inflow = 0.14 cfs @ 12.07 hrs, Volume= 0.011 af
Outflow = 0.07 cfs @ 12.26 hrs, Volume= 0.011 af, Atten= 51%, Lag= 11.5 min
Discarded = 0.02 cfs @ 12.26 hrs, Volume= 0.010 af
Primary = 0.05 cfs @ 12.26 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 103.83' @ 12.26 hrs Surf.Area= 0.002 ac Storage= 0.003 af

Plug-Flow detention time= 33.9 min calculated for 0.011 af (100% of inflow)
Center-of-Mass det. time= 33.5 min (765.8 - 732.3)

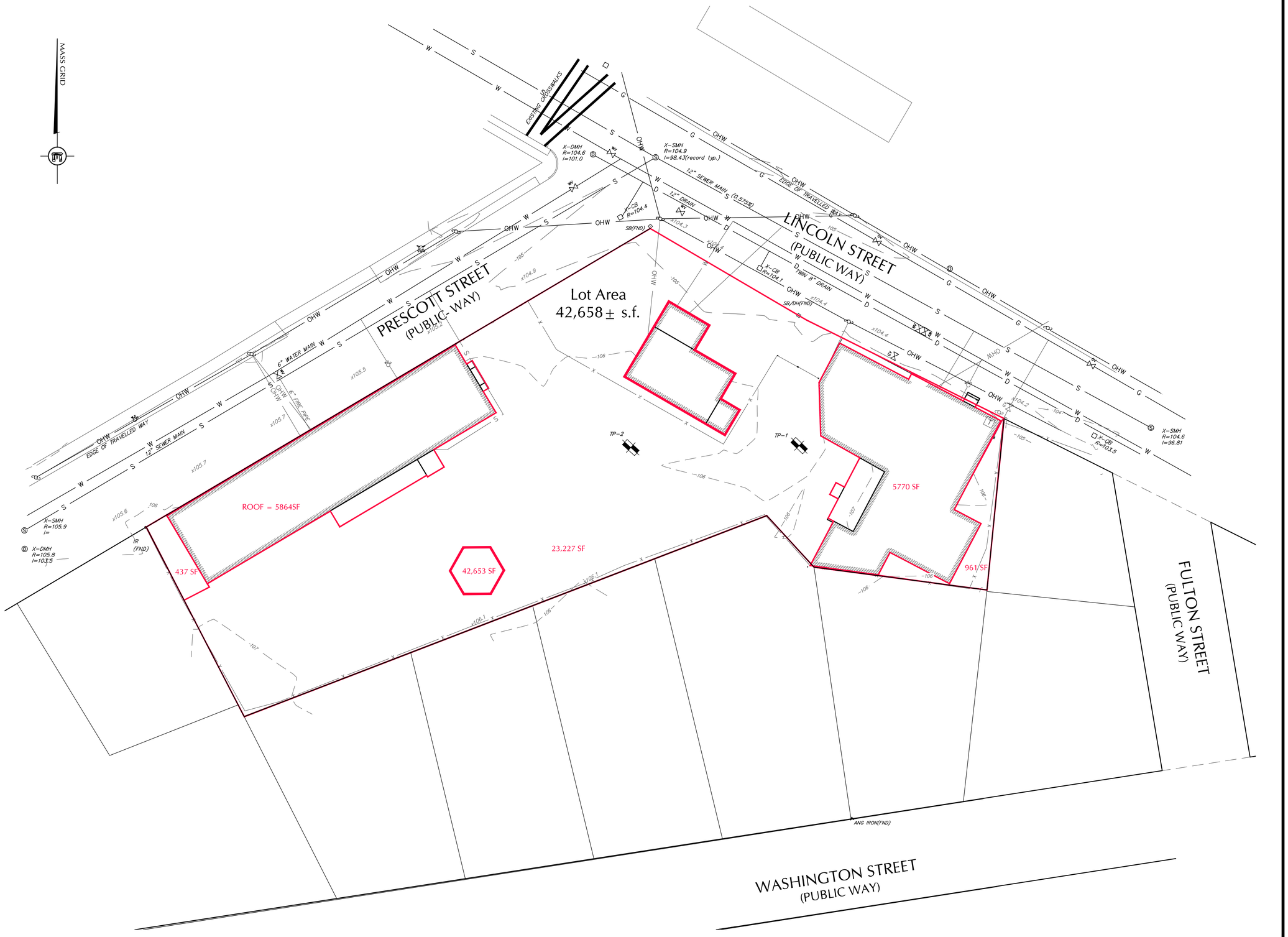
Volume	Invert	Avail.Storage	Storage Description
#1A	101.50'	0.002 af	**7.92'W x 12.00'L x 3.21'H Field A** 0.007 af Overall - 0.001 af Embedded = 0.006 af x 40.0% Voids
#2A	102.00'	0.001 af	**Cultec R-280HD** Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
		0.003 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	103.70'	**6.0" Round Culvert** L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 103.70' / 101.00' S= 0.0675 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Discarded OutFlow Max=0.02 cfs @ 12.26 hrs HW=103.83' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.05 cfs @ 12.26 hrs HW=103.83' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 0.05 cfs @ 1.21 fps)



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GENERAL NOTES:

PROJECT TITLE & LOCATION:

PROPOSED SITE PLAN
2 PRESCOTT ST & 39 LINCOLN ST
READING, MA

PLAN TITLE:

EXISTING WATERSHED

PREPARED FOR:

READING MKM, LLC
c/o KM DOVER LLC
109 OAK STREET SUITE G20
NEWTON, MA 02464

DATE: SEPTEMBER 12, 2016
REVISED:

JOB NUMBER: 14.034 | SHEET 1 OF 1

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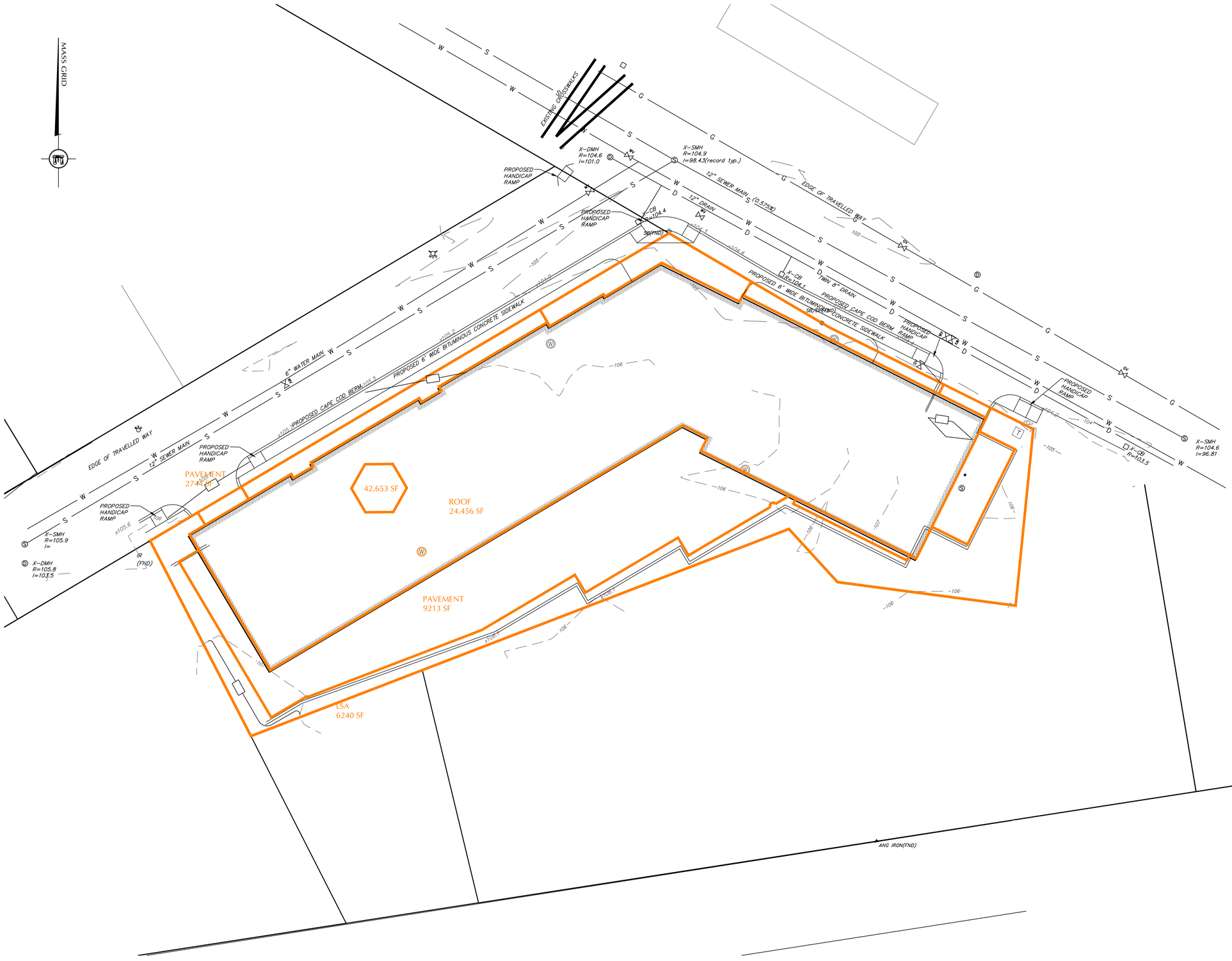
SCALE: 1" = 20'



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