

ATTACHMENTS

FOR STORMWATER

MANAGEMENT PLAN

**For Proposed Improvements at
23 Central Street, Newbury, Massachusetts**

21 April 2020

Stormwater Checklist

Illicit Discharge Statement

Construction Period Operation and Maintenance Plan

Long Term Operation and Maintenance Plan

Area Maps, GIS, Oliver, Subcatchment Area Plans & Tables

Soil and Test Pit Investigation Logs

Invisible Systems Rainstore 3 Product Information

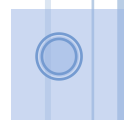
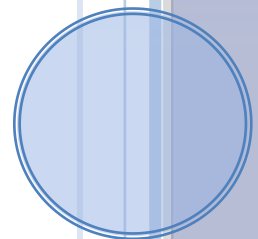
Prepared by

Anthony Guba, P.E.

A.L. Prime Energy Consultant, Inc.

18 Lark Avenue, Saugus, MA 01906

Mobile 512-745-6400

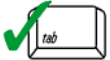




Checklist for Stormwater Report

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

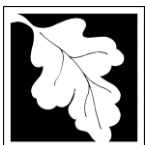
In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans 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.

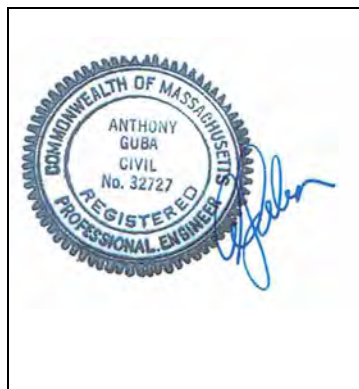
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



4/29/20

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.

Illicit Discharge Statement

A.L. Prime, 23 Central Street, Byfield MA

Per the requirements of Standard 10 of the Massachusetts Stormwater Management Standards it shall be stated that NO ILLICIT DISCHARGES TO THE STORMWATER SYSTEM EXIST ON THIS SITE. This includes the discharge of hazardous material as well as the wastewater systems on site.

No discharges of any kind are allowed into stormwater systems other than stormwater and irrigation runoff. There will be no connections between any wastewater piping and stormwater piping or system.



4/29/20

Signature of Owner making this Certification

Stormwater System Construction Phase Operation and Maintenance Plan

A.L. Prime, 23 Central Street, Byfield MA

Owner – A.L. Prime Energy Consultant, Inc., 18 Lark Ave, Saugus MA 01906, 781-246-0201

Primary contact – Brian Hughes, Director of Construction, mobile 781-929-2831

The Construction Contractor under the direction of the property owner is responsible to implement this plan throughout the duration of the site construction schedule. The responsible persons may employ others to complete actual work as necessary.

This plan is to be used in conjunction with the approved site plan package and any Town of Newbury Board or municipal approvals, decisions, permits, and conditions or any applicable regulations or bylaws regarding the proposed improvements.

A.L. Prime is proposing to construct a gas station including a convenience store and drive-thru coffee shop at 23 Central Street, Byfield. The location is slightly under one acre and situated just east of the Central Street interchange with Interstate 95. It is zoned Highway Commercial, presently used as residential, and abutted by other residential and commercial uses. The proposed work includes razing the existing improvements and constructing a new store, fueling islands and canopy, underground tanks, utilities, pavement, and landscaping.

The site is relatively flat and slopes primarily to the north. The development will adjust grades throughout the site and most of the site will be disturbed at some point during the project.

Erosion Control is most demanding during the construction phase when the site is disturbed and has the most potential to produce silt laden runoff. All contractor and sub-contractor employees are to be trained and aware of this plan. Daily inspection of the system and adherence to this plan are required to insure that the system meets the design expectations. Please refer to the project drawings, and in particular the Erosion Control, Grading, Utilities, and Site Detail drawings for more information regarding the design and procedures for maintaining erosion control.

Construction Sequence (see ER-1 Drawing)

1. Estimated time of construction for this project is five months.
2. Temp control measures and any required ma dep signage to be installed prior to any site work or demo of existing improvements.
3. Install perimeter fencing, silt controls, construction entrances and establish stockpile areas prior to site work excavation
4. Throughout project, inspect the erosion and sedimentation control structures daily and after any storm events and maintain as necessary. Repair damaged or deteriorated erosion control measures immediately upon identification
5. Drainage shall be prevented from entering the subsurface infiltration system components before the system is completed and backfilled

6. Catch basin inlet protection must remain until base pavement is installed and all stockpiles are removed and no longer necessary
7. Temporary hay bales, straw wattles, or silt fences may be removed after final soil stabilization and base pavement has been installed and issuance of any required approval from municipal authority
8. Upon conclusion of construction and after all final stabilization is achieved, clean all drainage structures of all dirt, debris, or any loose materials.

Construction Period Activities

The Construction Contractor shall implement the following measures:

- There will be no vehicle or equipment maintenance conducted on the site other than daily equipment checks and maintenance
- Disturbed areas will be kept moist or covered and stabilized to control dust
- All stockpiles materials will be managed to prevent migration by either rain or wind. When not in use for any extended period of time, stockpiles should be covered. When possible, reduce the amount of stockpile material necessary by having such material delivered as needed. All stockpiles to be maintained in a neat and orderly manner
- Manage concrete washout. Such washout is prohibited from catch basins and drainage systems
- Employ all available mosquito control measures eliminating standing water where possible and draining or filling temporary pools of water. There will be no application of pesticides or herbicides during the course of this construction

Stormwater System Long Term Operation and Maintenance Plan

A.L. Prime, 23 Central Street, Byfield MA

The property owner, A.L. Prime Energy Consultant, Inc., is the party responsible for the post-development long term operation and maintenance of the stormwater system at this location. This responsibility transfers to any successor owner and this plan should be updated with new ownership any time the property transfers. Owner responsibility for the maintenance of the stormwater system is intended to remain in perpetuity, or until the system is removed or modified and a new plan is approved.

Owner – A.L. Prime Energy Consultant, Inc., 18 Lark Ave, Saugus MA 01906, 781-246-0201

Primary contact – Nasser Abu-Eid, Vice President, mobile 617-212-3551

Alternate contacts – Bassil Zaza, Dir of Operations, mobile 617-212-3553

Brian Hughes, Dir of Const, mobile 781-929-2831

Anthony Guba, Dir of Engineering, mobile 512-745-6400

The responsible persons may employ others to complete actual work as necessary. Any and all work done will be at the expense of the site owner and no expense will accrue to the Town of Newbury.

The subject site consists of a gas station including a convenience store and drive-thru coffee shop. The parcel is slightly less than one acre and situated just east of the Central Street interchange with Interstate 95. It is zoned Highway Commercial. Site improvements include a 4,850 square foot store, fueling islands and canopy, underground tanks, utilities, pavement, and landscaping.

The site is relatively flat and slopes primarily to the north and south as divided near the centerline of the store. Attached is a site plan that shows the site layout and main components of the stormwater management system. The system is comprised of two surface retention basins and four underground infiltration systems. Runoff from roof and pavement areas is routed to these systems to reduce any flow off the site and to promote groundwater recharge.

In order to keep these systems operating properly, the owner will implement this plan to maintain all the system components. All new employees are to be trained and aware of this plan. Scheduled inspection of the system and adherence to this plan are required to insure that the system meets the design expectations. This plan is to be used in conjunction with the approved site plan package and any Town of Newbury Board or municipal approvals, decisions, permits, and conditions or any applicable regulations or bylaws regarding the proposed improvements.

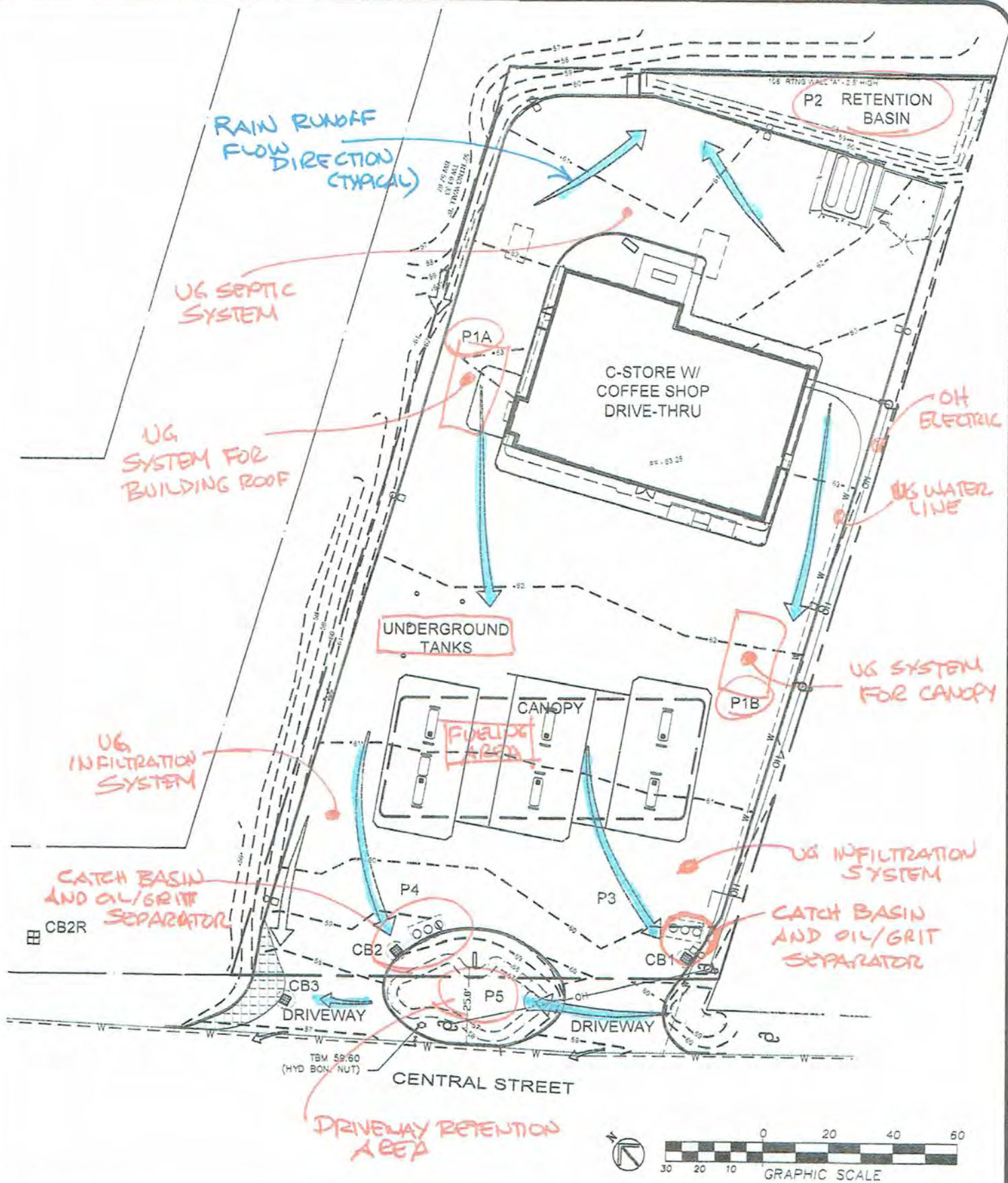
Long Term Operation and Maintenance Procedures

1. See attached plan and inspection/maintenance log form. Follow the routine inspection and/or maintenance schedule as indicated.
 - a. The site is to have pavement swept at least annually in the spring to remove accumulated sand from winter season

- b. Catch Basins and Oil/Grit separators are to be inspected at least annually and cleaned as necessary to remove accumulated sediment.
- 2. See the station Emergency Response Plan that is posted at the station
- 3. All spills must be attended to and cleaned up immediately
- 4. No vehicle washing or maintenance on site. All vehicle fueling to be conducted at the vehicle fueling area under the canopy and within the dry chemical fire protection system
- 5. This site has an on-site septic system. Any connection between that system and the stormwater drainage system is prohibited. No discharges of any kind are allowed into stormwater systems other than stormwater and irrigation runoff
- 6. Only designated areas at the screened trash enclosure is to be used for storage of used absorbents and liquid removed from any petroleum tank or dispenser sump or fill or vapor bucket
- 7. Snow plowing to use area to rear and sides to stockpile any snow. If snow exceeds available storage areas, remove from site and transport to properly permitted facility. Do not store snow in retention basin areas.
- 8. Inspect and properly maintain the perimeter grooves (PLB) around the fueling area
- 9. Deicing materials will only be used to the extent needed to make the drive aisles and walkways safe
- 10. Fertilizers, herbicides, and pesticides will only be used to the extent needed to maintain healthy plant materials and landscaped areas
- 11. Employ all available mosquito control measures eliminating standing water where possible and draining or filling temporary pools of water

The owner agrees to the above plan, including the attached inspection log and frequency. Any and all work done will be at the expense of the site owner and no expense will accrue to the Town of Newbury.

 4/29/20
Signature of Owner accepting this Plan



4Prime

A.L. PRIME ENERGY
18 LARK AVENUE
SAUGUS MA 01906
(781)246-0201

PROPOSED SITE LAYOUT

ADDRESS
A.L. PRIME SITE #TBD
BYFIELD MA
23 CENTRAL ST

REVISION	ORIGIN DATE	AG	0	04-21-2020
	DESCRIPTION	BY	REV#	DATE

SCALE SEE GRAPHIC

FILE
TBD-019-01 BYF

SHEET 1 OF 1

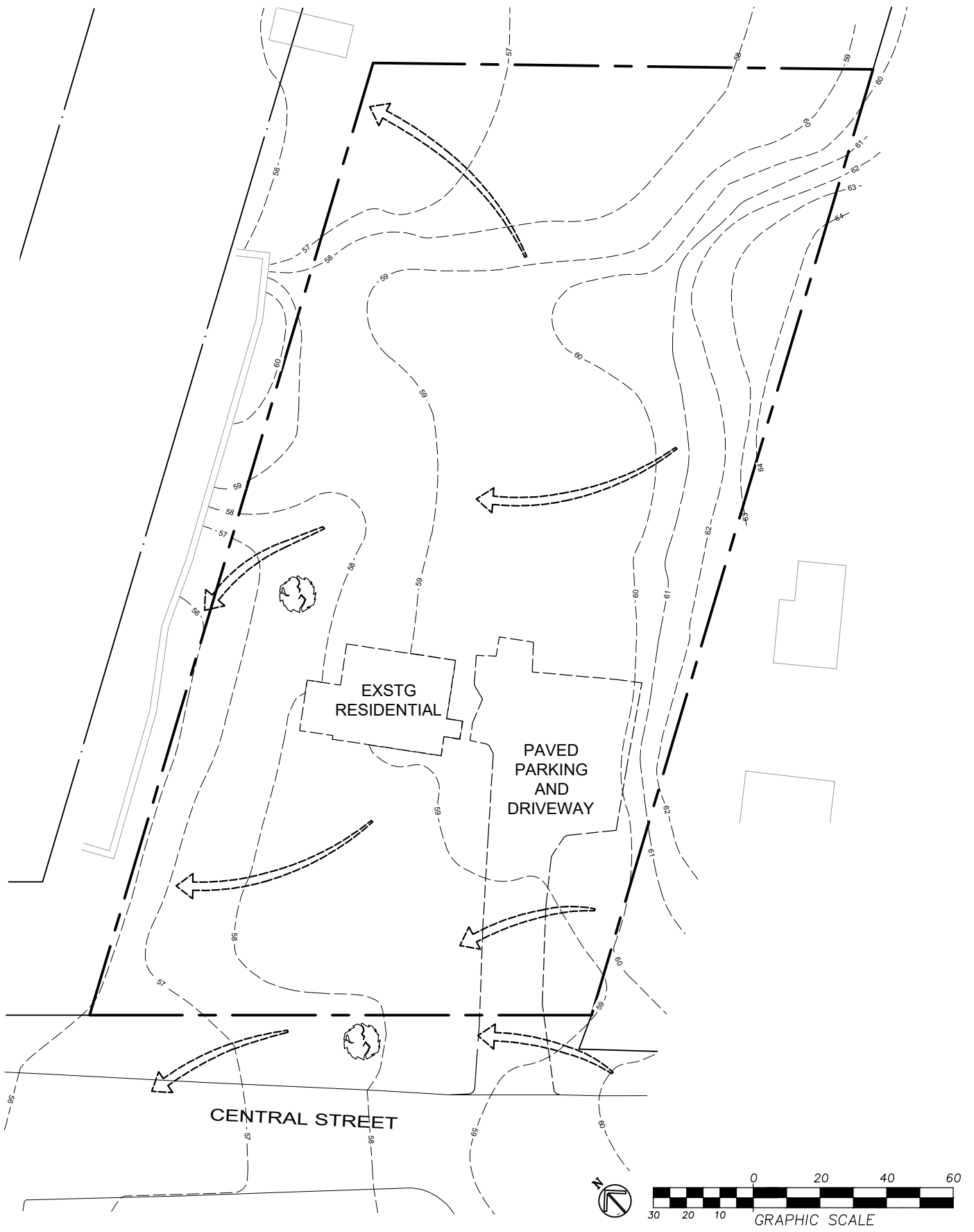
SW-2.0

Stormwater Management System Inspection Log

A.L. Prime Energy Consultant, Inc.
23 Central Street, Byfield MA

	Date	Comments	Date	Comments
Pavement Areas				
Inspect every spring and after major snowstorms for accumulation of sand				
Sweep areas in April.				
Sweep pavement if needed due to sand accumulation				
Retention Basins				
Inspect in April and November, measure depth of sediment. Remove sediment whenever found in the spreader at inlet to north retention area. Remove sediment in basin any time the total depth accumulates to more than 6" in either of those areas.				
Inspect if necessary between other scheduled inspections, due to major storms, site fuel spill, or other concern				
Catch Basins				
Inspect in April and November, measure depth of sediment				
Inspect if necessary between other scheduled inspections, due to major storms, site fuel spill, or other concern				
Remove any floating contaminant or sheen as soon as possible. Remove all sediment if total accumulated is less than 12" from bottom of outlet tee				
Oil/Grit Separator				
Inspect in April. Remove cover to measure accumulated sediment and floating contaminant				
Inspect if necessary between other scheduled inspections, due to major storms, site fuel spill, or other concern				
Remove any floating contaminant immediately. Remove all sediment if that accumulated is less than 12" from bottom of outlet tee.				

Additional notes regarding any inspections:



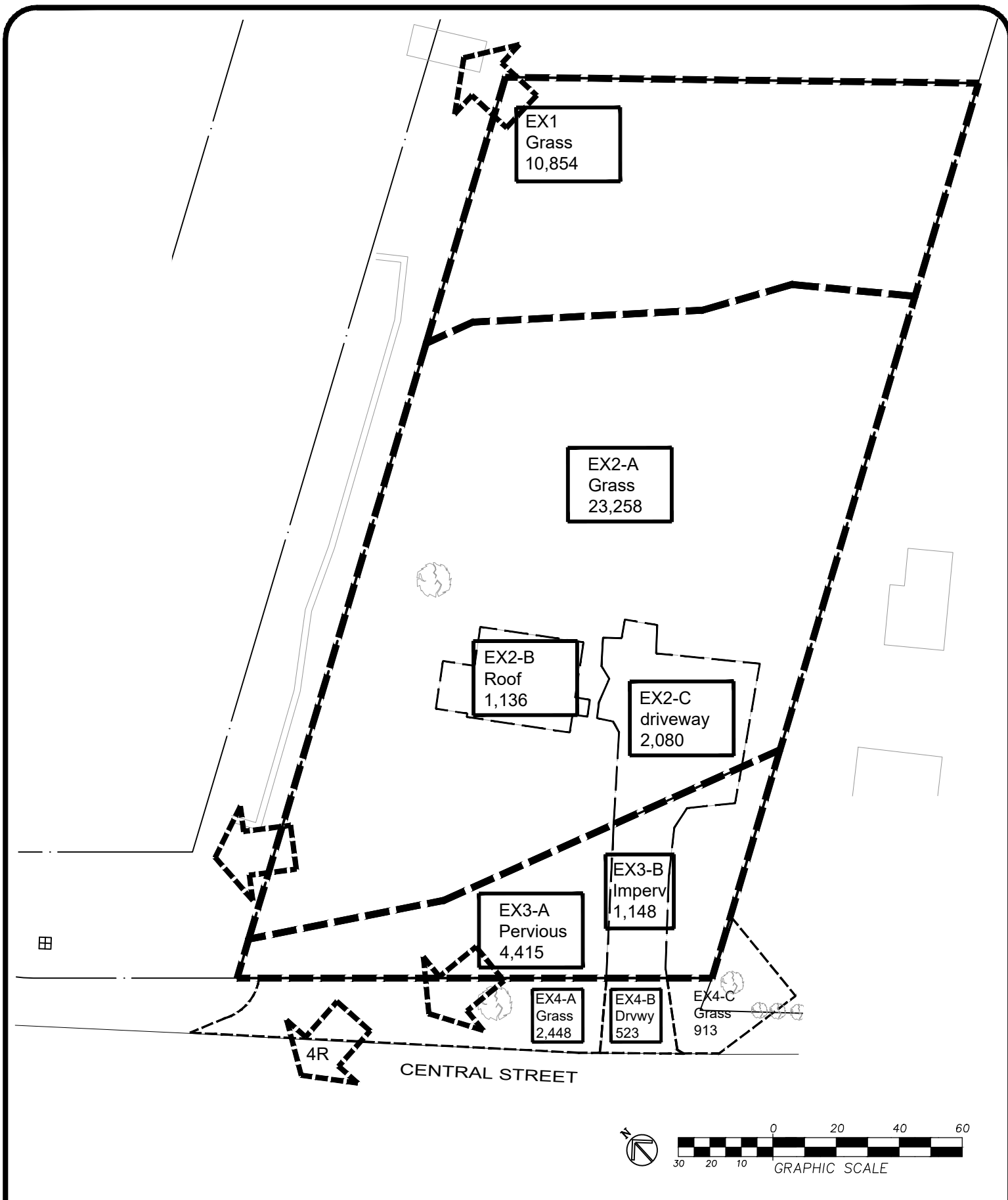
4Prime
Energy
A.L. PRIME ENERGY
18 LARK AVENUE
SAUGUS MA 01906
(781)246-0201

EXISTING SITE LAYOUT

ADDRESS
A.L. PRIME SITE #TBD
BYFIELD MA
23 CENTRAL ST

REVISION	DESCRIPTION	BY	REV #	DATE
	ORIGIN DATE	AG	0	04-21-2020

SCALE
SEE GRAPHIC
FILE
TBD-019-01 BYF
SHEET 1 OF 1
SW-EX



4Prime
Energy
A.L. PRIME ENERGY
18 LARK AVENUE
SAUGUS MA 01906
(781)246-0201

PRE DEV RUNOFF AREAS			
REVISION	ADDRESS	A.L PRIME SITE #TBD BYFIELD MA 23 CENTRAL ST	
	ORIGIN DATE	AG	0 04-21-2020
	DESCRIPTION	BY	REV # DATE

SCALE
SEE GRAPHIC
FILE
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SHEET 1 OF 1
SW-1.0

Pre-Development Sub-Catchment Areas

Total Study Area Total: 46775 1.074 (acre)
PreDev On-site Area Total: 42891 0.985 (acre)

CN Slope d (ft)

EX1 Rear 10854

		10854			61	0.054	146
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EX2 Middle 26474

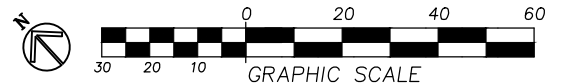
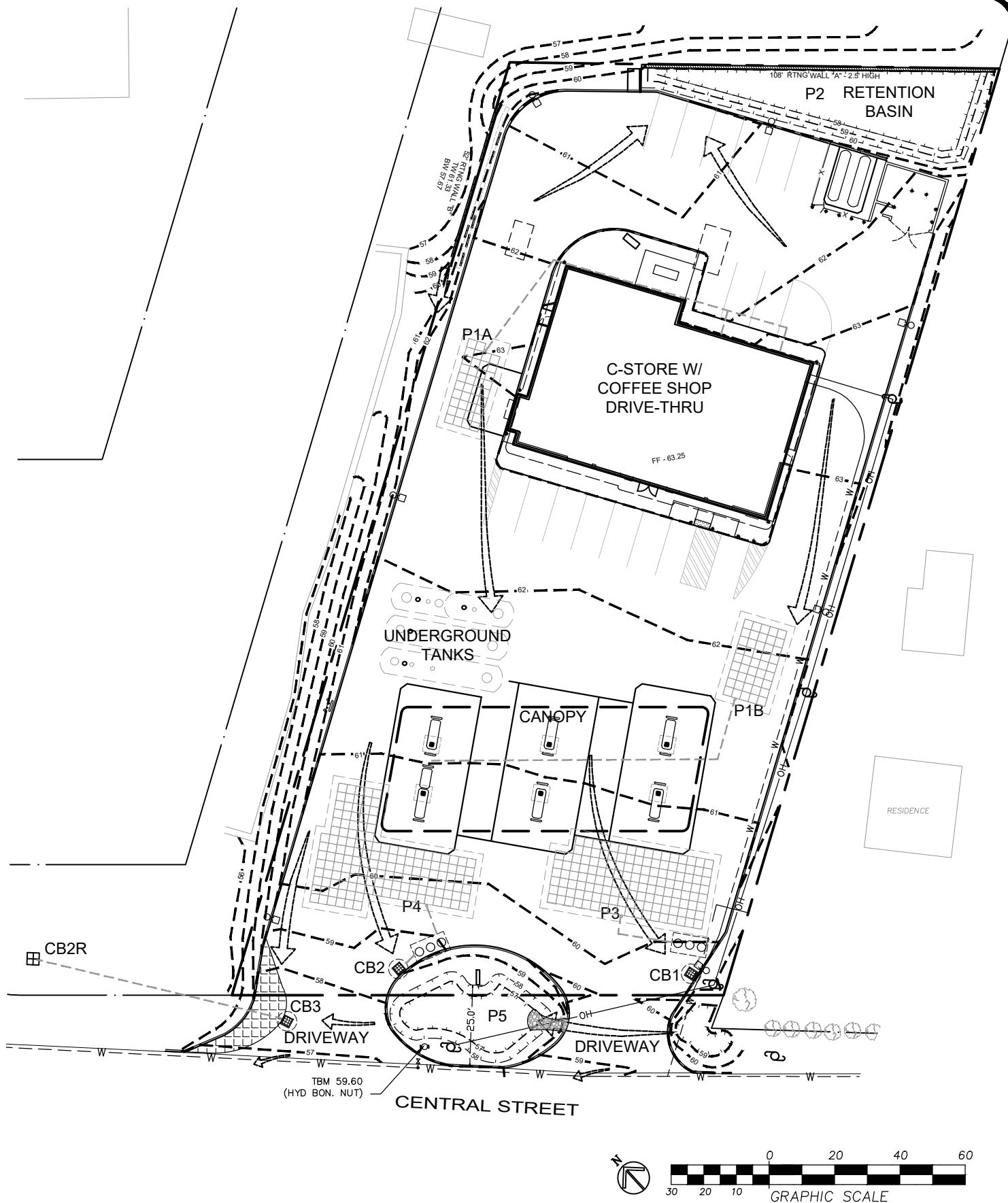
a	Pervious		23258		61	0.038	212
b	Building		1136		98	0.045	44
c	Driveway		2080		98	0.026	152

EX3 Front 5563

a	pervious		4415		61	0.033	183
b	impervious		1148		98	0.024	166

EX4 ROW

a	Pervious West			2448		61	0.025	78
b	Imperv pvmnt			523		98	0.021	105
c	Pervious East			913		61	0.250	118



A.L. PRIME ENERGY
18 LARK AVENUE
SAUGUS MA 01906
(781)246-0201

PROPOSED SITE LAYOUT

ADDRESS
A.L PRIME SITE #TBD
BYFIELD MA
23 CENTRAL ST

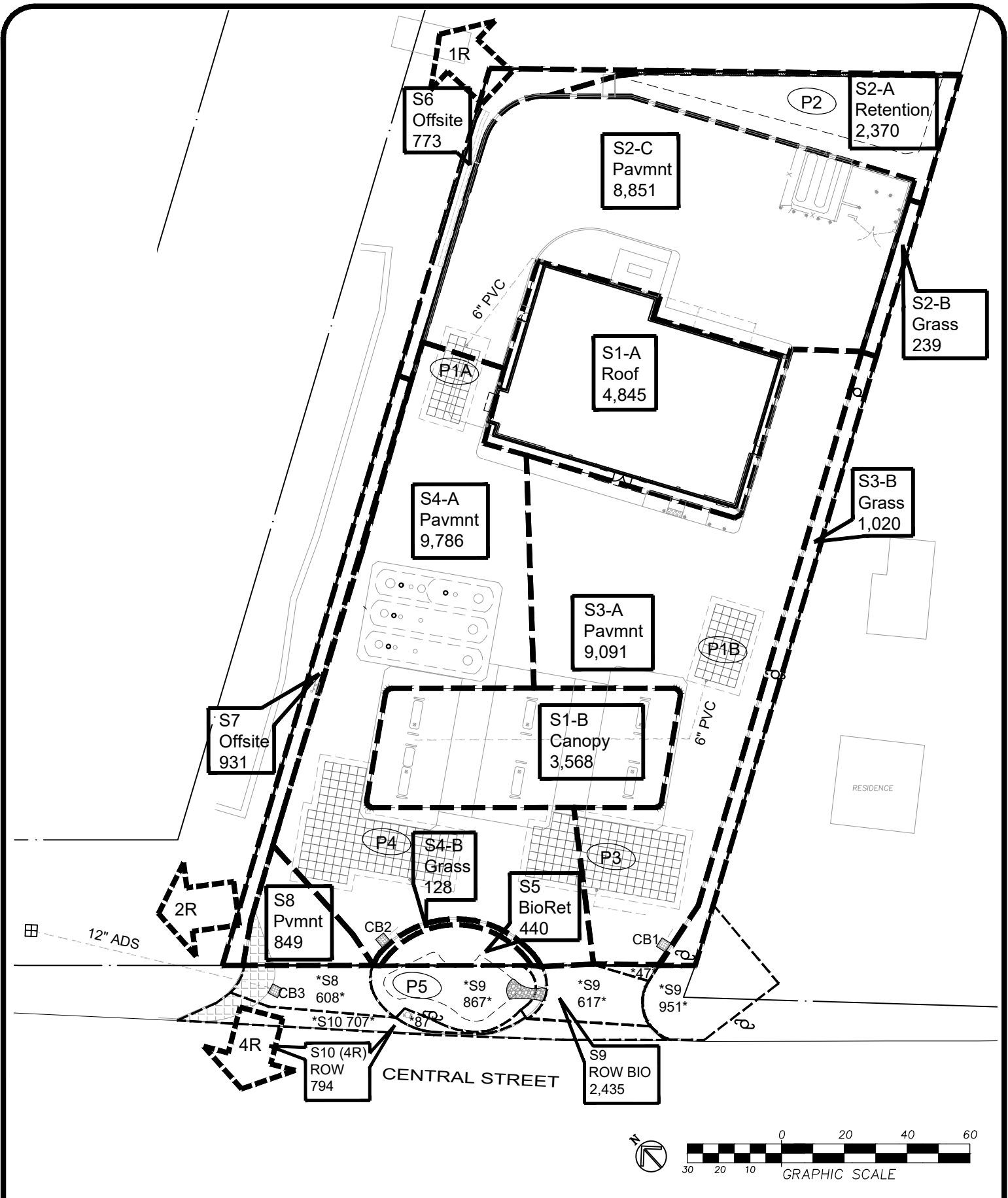
REVISION	ORIGIN DATE	AG	0	04-21-2020
	DESCRIPTION	BY	REV #	DATE

SCALE
SEE GRAPHIC

FILE
TBD-019-01 BYF

SHEET 1 OF 1

SW-2.0



A.L. PRIME ENERGY
18 LARK AVENUE
SAUGUS MA 01906
(781)246-0201

POST DEV RUNOFF AREAS

ADDRESS
A.L. PRIME SITE #TBD
BYFIELD MA
23 CENTRAL ST

REVISION

ORIGIN DATE
DESCRIPTION

AG 0 04-21-2020
BY REV # DATE

SCALE
SEE GRAPHIC

FILE
TBD-019-01 BYF

SHEET 1 OF 1

SW-3.0

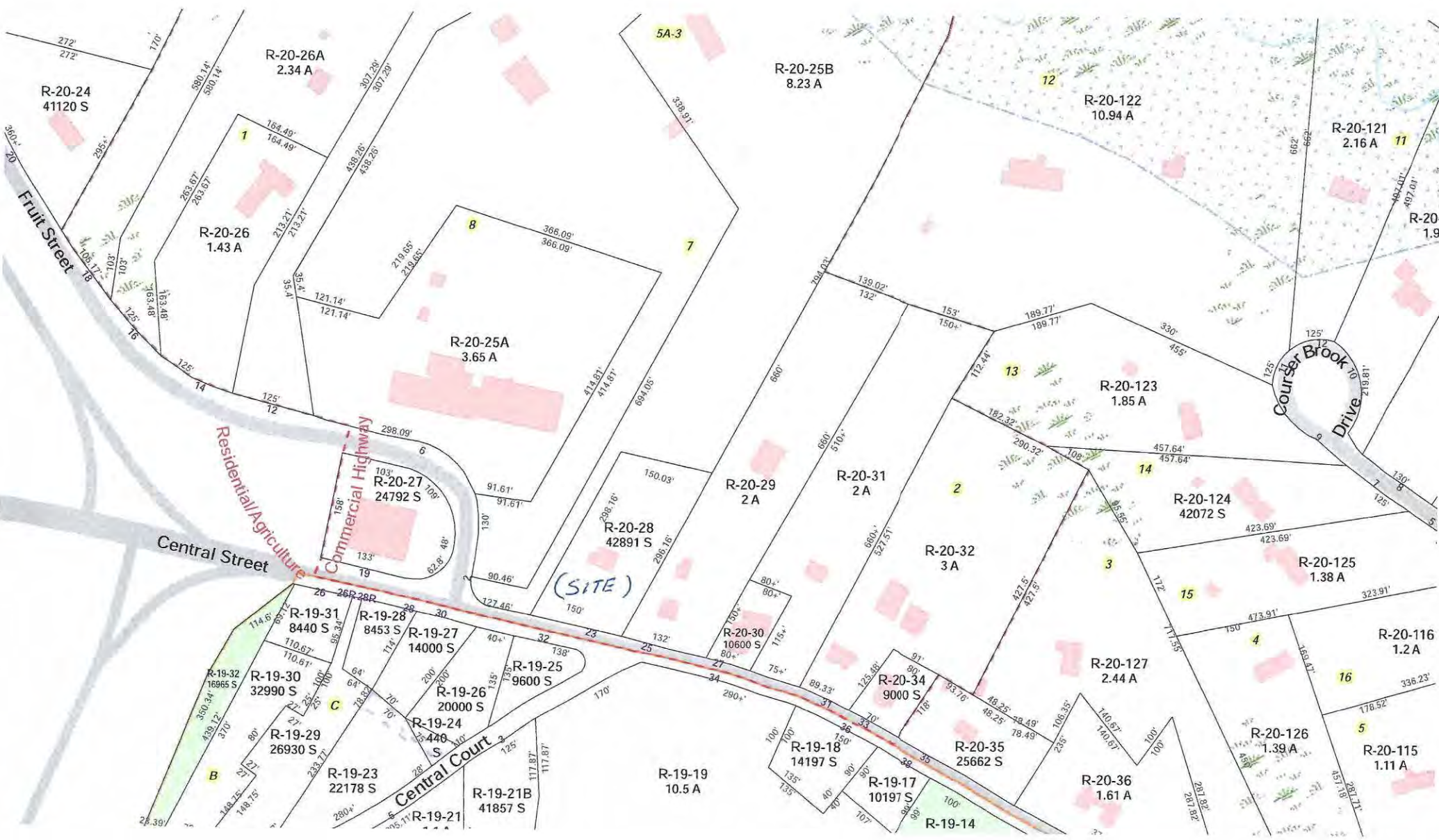
Post-Development Sub-Catchment Areas

Total Study Area Total:		46775	1.074 (acre)				
PostDev On-site Area Total:		42891	0.985 (acre)				
			on site	off site	CN	Slope	d (ft)
S1A Roof (P1A)		4845					
	store roof		4845		98	0.010	110
S1B Roof (P1B)		3568					
	canopy roof		3568		98	0.020	165
S2 Rear total (P2)		11460					
a	basin		2370		98	0.000	68
b	pervious		239		79	0.033	120
c	pavement		8851		98	0.014	125
S3 CB1 E Side total (P3)		10111					
a	pavement		9091		98	0.016	198
b	grass slope		1020		79	0.016	205
	off site driveway			47	98	0.042	10.5
S4 CB2 W Side total (P4)		9914					
a	pavement		9786		98	0.012	205
b	pervious		128		79	0.330	22
S5 Retention area		440					
	front bioretention		440		98	0.000	9
S6 Runs offsite (1R)		773					
	to North A		773		79	0.250	5
S7 Runs offsite (2R)		931					
	to West B		931		79	0.330	5
S8 Pavement to off (2R)		849					
a	to CB3		849		98	0.020	65
	driveway			608	98	0.016	35
S9 Driveway Retention area							
	(S9) off site driveway			617	98	0.018	32
	(S9) off site pervious			951	79	0.037	27
	(S9) off site biortntn area			867	98	0.000	5
S10 to ROW (4R)							
a	paved			707	98	0.085	10
b	pervious			87	79	0.330	5

Runoff Comparison of Rates and Volumes from Pre to Post Conditions

	<u>Total Runoff to St (4R) or (S10)</u>		<u>Total Runoff to Offsite (5R)</u>	
	<u>Rate</u>	<u>Volume</u>	<u>Rate</u>	<u>Volume</u>
2yr Pre Dev	0.16	0.012	0.73	0.048
2yr Post Dev	0.08	0.004	0.31	0.016
Change	-0.08	-0.008	-0.42	-0.032
% change Pre to Post	-50%	-67%	-58%	-67%
10yr Pre Dev	0.41	0.027	2.06	0.117
10yr Post Dev	0.11	0.006	0.49	0.026
Change	-0.3	-0.021	-1.57	-0.091
% change Pre to Post	-73%	-78%	-76%	-78%
100yr Pre Dev	0.83	0.054	4.40	0.240
100yr Post Dev	0.17	0.009	0.75	0.04
Change	-0.66	-0.045	-3.65	-0.2
% change Pre to Post	-80%	-83%	-83%	-83%

<u>Infiltration Area Specifics</u>						
Pond	<u>P1A</u>	<u>P1B</u>	<u>P2</u>	<u>P3</u>	<u>P4</u>	<u>P5</u>
Type	RS-3	RS-3	Retention	RS-3	RS-3	Retention
design unit	38ea(12)	45ea(6)	n/a	140ea(6)	150ea(6)	n/a
total RS-3 units	456	270	n/a	840	900	n/a
SF	334	487	1998	1300	1479	905
ESHGW*	54.5	56.2	56.0	54.8	54.3	54.8
bottom of sys	56.80	58.20	58.00	56.80	56.30	57.00
stone base	0.50	0.25	n/a	0.30	0.20	n/a
invert of chamber	57.30	58.45	n/a	57.10	56.50	n/a
top of sys	61.30	60.45	60.25	59.10	58.50	58.25
100 yr peak elev	60.53	60.08	60.21	58.82	57.97	57.89
100yr peak cushion	0.77	0.37	0.04	0.28	0.53	0.36
Proposed final grade	62.78	61.60	60.50	60.10	59.50	58.50
Min cover over chamber	1.48	1.15	n/a	1.00	1.00	n/a
Catchment Area Inlet RIM**	63.25	60.5	60.20	59.80	58.55	59.10
RIM - 100yr cushion	2.72	0.42	-0.01	0.98	0.58	1.21
	* for P1B and P5, using highest nearby ESHGW found					
	** for downspout, use grade elev, assuming loose connection at grade					





Attest: John D. B. 1
Register of Deeds

Robert & I
 Excuse me -
 My dear friends
 Jack Hammer & Co. Ltd.

APR 15, 1977
DATE

- 1) PARCEL A TO BE CONVEYED AND COMBINED WITH LOT 54-3
- 2) THIS PLAN DOES NOT SHOW ANY UNRECORDED OR UNWRITTEN EASEMENTS WHICH MAY EXIST A REASONABLE AND DILIGENT ATTEMPT HAS BEEN MADE TO OBSERVE ANY APPARENT, VISIBLE USES OF THE LAND, HOWEVER, THIS DOES NOT CONSTITUTE A GUARENTEE THAT NO SUCH EASEMENTS EXIST

CERTIFY
THAT THIS ACTUAL SURVEY WAS MADE
ON THE GROUND BETWEEN AUGUST 23 AND
SEPTEMBER 3, 1999.
THAT THIS PLAN CONFORMS TO THE
RULES AND REGULATIONS OF THE
REGISTER OF DEEDS.



REGISTERED PROFESSIONAL LAND SURVEYOR DATE

SHOWING
A PARCEL CONVEYANCE
AT
23 REAR CENTRAL ST.

MILLENNIUM ENGINEERING, INC.
ENGINEERS AND LAND SURVEYORS
62 ELM ST. SAUSBURY, MA 01952

SCALE: 1"=50'	PROJECT: 990470
DATE: SEPTEMBER 7, 1999	SHEET: 1 OF 1

[illegible]

PLAN BK. 155 PLAN 84

COMMERCIAL
AREA 40,000 S.F.
FRONTAGE 200'

(IN FEET)
1 inch = 50 ft

LOT 1
42,891 S.F.



23 CENTRAL STREET, NEW

Zoom to a town



Soil Map—Essex County, Massachusetts, Northern Part



Soil Map may not be valid at this scale.

Map Scale: 1:1,060 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84



Natural Resources
Conservation Service

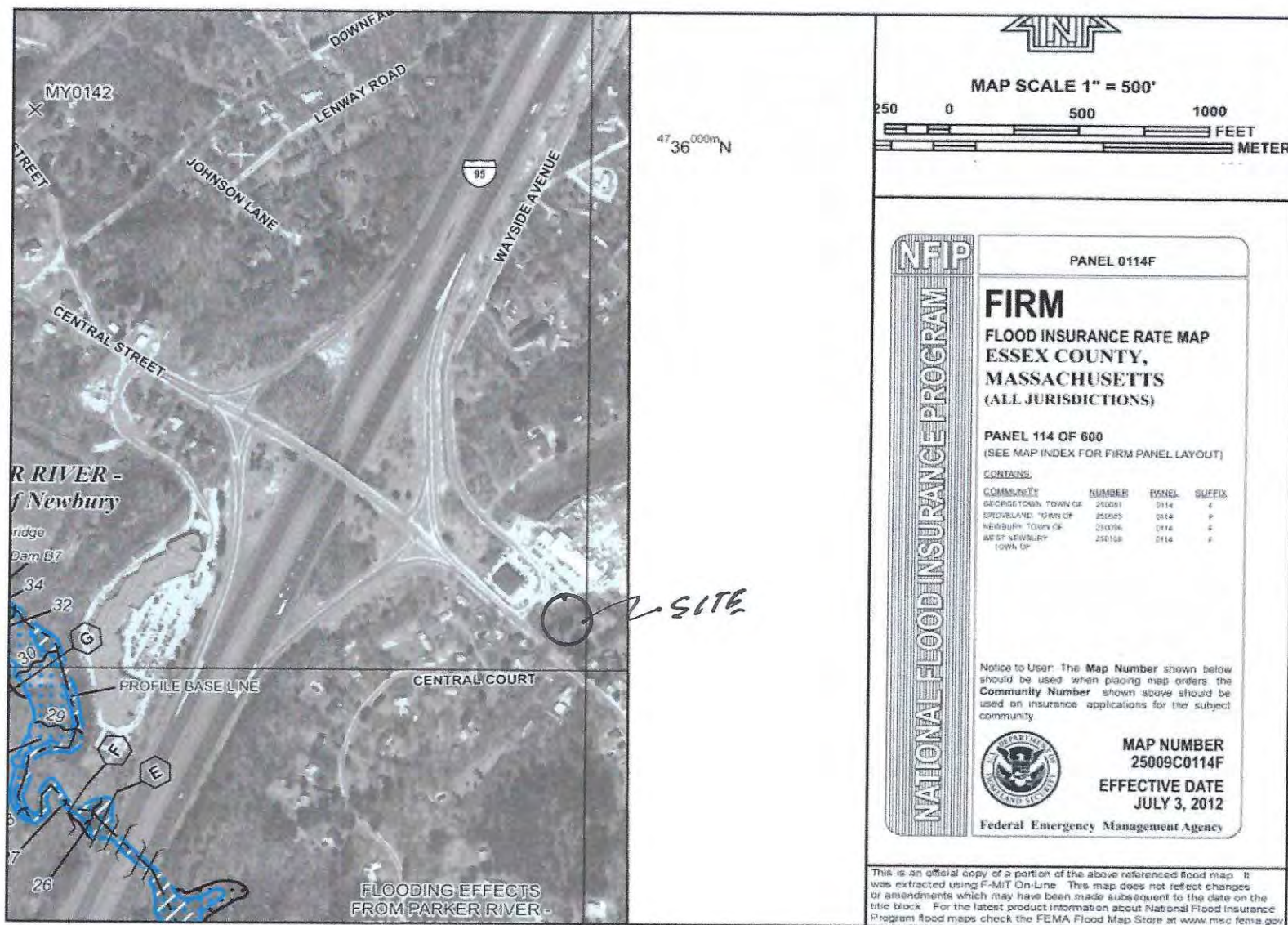
Web Soil Survey
National Cooperative Soil Survey

5/1/2020
Page 1 of 3

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	1.1	22.9%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	0.9	19.8%
651	Udorthents, smoothed	2.7	57.4%
Totals for Area of Interest		4.6	100.0%







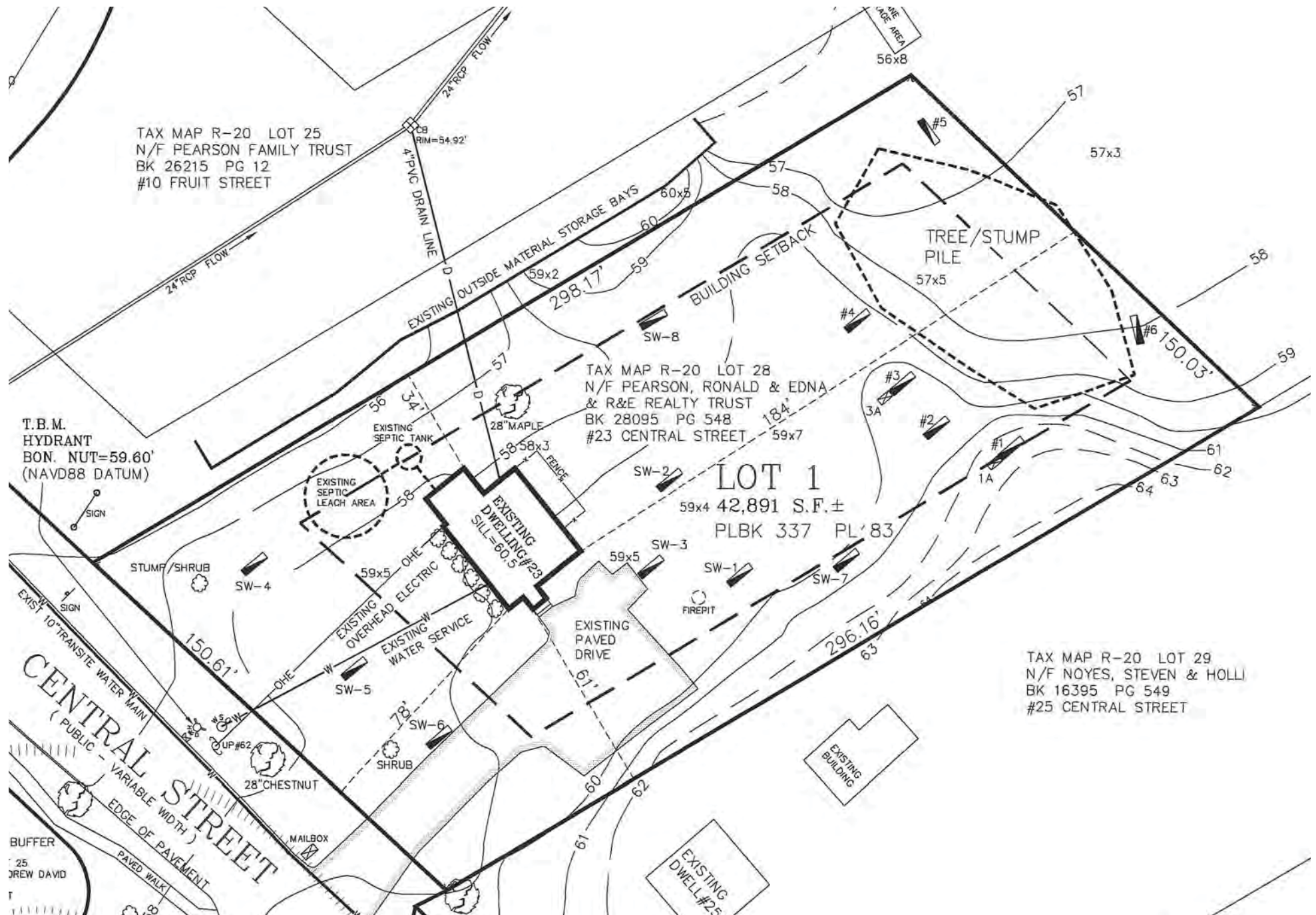
TAX MAP R-20 LOT 25
N/F PEARSON FAMILY TRUST
BK 26215 PG 12
#10 FRUIT STREET

T.B.M.
HYDRANT
BON. NUT=59.60'
(NAVD88 DATUM)

TAX MAP R-20 LOT 28
N/F PEARSON, RONALD & EDNA
& R&E REALTY TRUST
BK 28095 PG 548
#23 CENTRAL STREET

LOT 1
59x4 42,891 S.F.±
PLBK 337 PL' 83

TAX MAP R-20 LOT 29
N/F NOYES, STEVEN & HOLLI
BK 16395 PG 549
#25 CENTRAL STREET



SOIL LOG

HEALTH AGENT DEBORAH ROGERS
SOIL EVALUATOR ROBERT GRASSO

USDA - S.C.S. SOIL TYPES
THE ENTIRE SITE IS MAPPED AS:
Ur - URBAN LAND

DATE: 12-02-2019

TEST PIT # 01

ELEV = 62.7

10"	FILL
20"	Ab - F.S.L. 10YR 2/2
32"	BW - F.S.L. 10YR 4/6
121"	C - S.LOAM 2.5Y 5/4

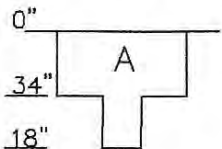
WATER TABLE

NONE OBSERVED

40" ESTIMATED 59.4'

PERCOLATION TESTS

DATE 12-02-2019



6 MIN 12" - 9"
7 MIN 9" - 6"
3 MIN/INCH RATE

DATE: 12-02-2019

TEST PIT # 02

ELEV = 60.3'

9"	FILL
16"	Ab - F.S.L. 10YR 2/2
34"	BW - F.S.L. 10YR 4/6
124"	C - S.LOAM 2.5Y 5/4

WATER TABLE

NONE OBSERVED

40" ESTIMATED 57.0'

DATE: 12-02-2019

TEST PIT # 03

ELEV = 60.2'

30"	FILL
37"	Ab - F.S.L. 10YR 2/2
50"	BW - F.S.L. 10YR 4/6
122"	C - S.LOAM 2.5Y 5/4

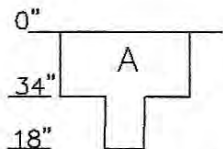
WATER TABLE

NONE OBSERVED

52" ESTIMATED 55.9'

PERCOLATION TESTS

DATE 12-02-2019



6 MIN 12" - 9"
7 MIN 9" - 6"
3 MIN/INCH RATE

DATE: 12-02-2019

TEST PIT # 04

ELEV = 59.8'

29"	FILL
36"	Ab - F.S.L. 10YR 2/2
51"	BW - F.S.L. 10YR 4/6
124"	C - S.LOAM 2.5Y 5/4

WATER TABLE

NONE OBSERVED

52" ESTIMATED 55.5'

SOIL EVALUATOR ROBERT GRASSO
DATE: 12-06-2019

TEST PIT # 05

ELEV = 56.8'

36"	FILL
46"	Ab - F.S.L. 10YR 2/2
57"	BW - F.S.L. 10YR 6/1
132"	C - V.F.S.L. 10YR 4/6

WATER TABLE

96" OBSERVED

57" ESTIMATED 52.1'

DATE: 12-06-2019

TEST PIT # 06

ELEV = 58.0'

4"	FILL
84"	C - L.SAND 2.5Y 5/4

WATER TABLE

NONE OBSERVED

24" ESTIMATED 56.0'

TAX MAP R-19 LOT 31
N/F BURKE, JILL PG 53
BK 27343
#26 CENTRAL S.

SIGN

SMH

RIM=59.65'

UP #65

USDA - S.C.S. SOIL TYPES
THE ENTIRE SITE IS MAPPED AS:
Ur - URBAN LAND

SOIL LOG

SOIL EVALUATOR ROBERT GRASSO
DATE: 12-02-2019 DATE: 12-02-2019

TEST PIT # SW-1

ELEV = 59.4'

14"	A - F.S.L. 10YR 3/2	
28"	BW - F.S.L. 10YR 4/6	
50"	C1 - S.LOAM 2.5Y 5/4	
101"	C2 - V.F.S.L. 2.5Y 4/4	

WATER TABLE

NONE OBSERVED

38" ESTIMATED 56.2'

TEST PIT # SW-2

ELEV = 59.6'

42"	FILL	
72"	C1 - S.LOAM 2.5Y 5/4	
125"	C2 - V.F.S.L. 2.5Y 4/4	

WATER TABLE

NONE OBSERVED

58" ESTIMATED 54.8'

DATE: 12-06-2019

TEST PIT # SW-3

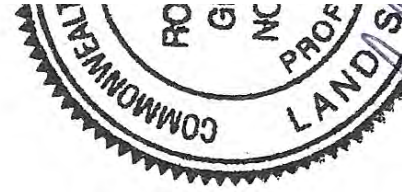
ELEV = 59.5'

23"	FILL	
29"	Ab - F.S.L. 10YR 2/2	
42"	BW - F.S.L. 10YR 4/6	
100"	C - S.LOAM 2.5Y 5/4	

WATER TABLE

NONE OBSERVED

45" ESTIMATED 55.8'



NALD & EDNA PEARSON

E REALTY TRUST

AP R-20 LOT 28

DEED: BK 28095 PG 548

3 CENTRAL STREET

EXISTING
BUILDING

SOIL LOG

SOIL EVALUATOR ROBERT GRASSO

DATE: 03-02-2020

TEST PIT # SW-4

ELEV = 57.8'

62"	FILL
112"	C- V.F.S.L. 2.5Y 5/3

WATER TABLE

58" OBSERVED

48" ESTIMATED 53.8'

DATE: 03-02-2020

TEST PIT # SW-5

ELEV = 58.5'

65"	FILL
106"	C- V.F.S.L. 2.5Y 5/3

WATER TABLE

65" OBSERVED

49" ESTIMATED 54.4'

DATE: 03-02-2020

TEST PIT # SW-6

ELEV = 59.0'

24"	FILL
30"	Ab - F.S.L. 10YR 2/2
41"	BW - F.S.L. 10YR 4/6
114"	C - F.S.L. 2.5Y 5/4

WATER TABLE

67" OBSERVED

51" ESTIMATED 54.8'

DATE: 03-02-2020

TEST PIT # SW-7

ELEV = 60.4'

9"	A - F.S.L. 10YR 3/2
29"	BW - F.S.L. 10YR 4/6
43"	C1 - M.SAND 2.5Y 5/4
103"	C2 - F.SAND 2.5Y 5/3

WATER TABLE

NONE OBSERVED

55" ESTIMATED 55.8'

DATE: 03-02-2020

TEST PIT # SW-8

ELEV = 58.6'

84"	FILL
126"	C- V.F.S.L. 2.5Y 5/3

WATER TABLE

81" OBSERVED

49" ESTIMATED 54.5'

SITE PLAN

SCALE 1" = 40'



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MassDEP has provided this form for use by on-site professionals and local Boards of Health. Other forms may be used, but the information must be substantially the same as provided here. Before using this form, check with your local Board of Health to determine the form they use.

A. Facility Information

R & E REALTY TRUST

Owner Name

23 CENTRAL STREET

Street Address

NEWBURY

City

MA

State

R-20 / 28

Map/Lot #

01922

Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Published Soil Survey Available? ☒ Yes ☐ No If yes: 1981 1"=1320' Ur
Year Published Publication Scale Soil Map Unit
- URBAN LAND
Soil Name
- VARIABLE
Soil Limitations
3. Surficial Geological Report Available? ☐ Yes ☒ No If yes:
Year Published Publication Scale Map Unit
- TILL
Geologic Material
- DRUMLIN
Landform
4. Flood Rate Insurance Map
- Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
- Within the 500-year flood boundary? ☐ Yes ☒ No Within a velocity zone? ☐ Yes ☒ No
5. Wetland Area: National Wetland Inventory Map
Map Unit Name
- Wetlands Conservancy Program Map
Map Unit Name



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

B. Site Information (Continued)

6. Current Water Resource Conditions (USGS): 11/19 Range: ☐ Above Normal ☒ Normal ☐ Below Normal
Month/Year

7. Other references reviewed: U.S.G.S. QUAD, FEMA, SCS SOILS

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: SW-1 12-02-2019 1 PM SNOW
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 59.4' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - Prop Commercial Stormwater NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)

LAWN DRUMLIN _____
Vegetation Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet

Property Line >10' Drinking Water Well >100' Other _____
feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____
Depth Weeping from Pit Depth Standing Water in Hole

Estimated Depth to High Groundwater: 38" 56.2'
inches elevation



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: SW-1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
14"	A	10YR 3/2				F.S.L.					
28"	BW	10YR 4/6				F.S.L.					
50"	C1	2.5Y 5/4	38"	7.5YR 5/8	20%	S.LOAM					
101"	C2	2.5Y 4/4				V.F.S.L.					

Additional Notes:



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: SW-2 12-02-2019 1 PM SNOW
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 59.6' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - Prop Commercial Stormwater NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)
LAWN DRUMLIN
Vegetation Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet
Property Line >10' Drinking Water Well >100' Other _____
feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____
Depth Weeping from Pit Depth Standing Water in Hole
Estimated Depth to High Groundwater: 58" 54.8'
inches elevation



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: SW-2

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
42"	FILL					-					
72"	C1	2.5Y 5/4	58"	7.5YR 5/8	20%	S.LOAM					
125"	C2	2.5Y 4/4				V.F.S.L.					

Additional Notes:



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

- | | | |
|--|------------------------|------------------------|
| <input type="checkbox"/> Depth observed standing water in observation hole | A. _____
inches | B. _____
inches |
| <input type="checkbox"/> Depth weeping from side of observation hole | A. _____
inches | B. _____
inches |
| <input checked="" type="checkbox"/> Depth to soil redoximorphic features (mottles) | A. SW1 - 38"
inches | B. SW2 - 58"
inches |
| <input type="checkbox"/> Groundwater adjustment (USGS methodology) | A. _____
inches | B. _____
inches |

2.

Index Well Number _____	Reading Date _____	Index Well Level _____
Adjustment Factor _____	Adjusted Groundwater Level _____	

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

- a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

- b. If yes, at what depth was it observed?

Upper boundary: 42"
inches Lower boundary: 101"
inches



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

ROBERT M. GRASSO, SE#933

Typed or Printed Name of Soil Evaluator / License #

12-02-2019

Date

10/97

Date of Soil Evaluator Exam

Name of Board of Health Witness

Board of Health

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with [Percolation Test Form 12](#).



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Field Diagrams

Use this sheet for field diagrams:



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

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A. Facility Information

R & E REALTY TRUST

Owner Name

23 CENTRAL STREET

Street Address

NEWBURY

City

MA

State

R-20 / 28

Map/Lot #

01922

Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Published Soil Survey Available? ☒ Yes ☐ No If yes: 1981 1"=1320' Ur
Year Published Publication Scale Soil Map Unit
URBAN LAND VARIABLE
Soil Name Soil Limitations
3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: Year Published Publication Scale Map Unit
TILL DRUMLIN
Geologic Material Landform
4. Flood Rate Insurance Map
- Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
- Within the 500-year flood boundary? ☐ Yes ☒ No Within a velocity zone? ☐ Yes ☒ No
5. Wetland Area: National Wetland Inventory Map Map Unit Name
Wetlands Conservancy Program Map Map Unit Name



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

B. Site Information (Continued)

6. Current Water Resource Conditions (USGS): 11/19 Range: ☐ Above Normal ☒ Normal ☐ Below Normal
Month/Year
7. Other references reviewed: U.S.G.S. QUAD, FEMA, SCS SOILS

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

- Deep Observation Hole Number: SW-3 12-06-2019 1 PM SNOW
Date Time Weather
1. Location
Ground Elevation at Surface of Hole: 59.5' Location (identify on plan): _____
2. Land Use RES - SINGLE FAMILY - Prop Commercial Stormwater NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)
LAWN DRUMLIN
Vegetation Landform
Position on Landscape (attach sheet)
3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet
Property Line >10' Drinking Water Well >100' Other _____
feet feet feet
4. Parent Material: TILL Unsuitable Materials Present: ☒ Yes ☐ No
If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock
5. Groundwater Observed: ☐ Yes ☒ No If yes: _____
Depth Weeping from Pit Depth Standing Water in Hole
Estimated Depth to High Groundwater: 45" 55.8'
inches elevation



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: SW-3

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
23"	-	-				FILL					
29"	Ab	10YR 2/2				F.S.L.					
42"	BW	10YR 4/6				F.S.L.					
100"	C	2.5Y 5/4	45"	7.5YR 5/8	20%	S.LOAM					

Additional Notes:



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

A. _____
inches

B. _____
inches

☐ Depth weeping from side of observation hole

A. _____
inches

B. _____
inches

☒ Depth to soil redoximorphic features (mottles)

A. SW3 - 45"
inches

B. _____
inches

☐ Groundwater adjustment (USGS methodology)

A. _____
inches

B. _____
inches

2.

Index Well Number _____

Reading Date _____

Index Well Level _____

Adjustment Factor _____

Adjusted Groundwater Level _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed?

Upper boundary:

42"
inches

Lower boundary:

100"
inches



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

ROBERT M. GRASSO, SE#933

Typed or Printed Name of Soil Evaluator / License #

12-06-2019

Date

10/97

Date of Soil Evaluator Exam

Name of Board of Health Witness

Board of Health

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with [Percolation Test Form 12](#).



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MassDEP has provided this form for use by on-site professionals and local Boards of Health. Other forms may be used, but the information must be substantially the same as provided here. Before using this form, check with your local Board of Health to determine the form they use.

A. Facility Information

R & E REALTY TRUST

Owner Name

23 CENTRAL STREET

Street Address

NEWBURY

City

MA

State

R-20 / 28

Map/Lot #

01922

Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Published Soil Survey Available? ☒ Yes ☐ No If yes: 1981 Year Published 1"=1320' Publication Scale Ur Soil Map Unit
URBAN LAND Soil Name VARIABLE Soil Limitations
3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: Year Published Publication Scale Map Unit
TILL Geologic Material DRUMLIN Landform
4. Flood Rate Insurance Map
- Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
- Within the 500-year flood boundary? ☐ Yes ☒ No Within a velocity zone? ☐ Yes ☒ No
5. Wetland Area: National Wetland Inventory Map Map Unit Name
Wetlands Conservancy Program Map Map Unit Name



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

B. Site Information (Continued)

6. Current Water Resource Conditions (USGS): 01/20 Range: ☐ Above Normal ☒ Normal ☐ Below Normal
Month/Year
7. Other references reviewed: U.S.G.S. QUAD, FEMA, SCS SOILS

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: SW-4 03-02-2020 1 PM CLEAR/SUNNY
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 57.8' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - Prop Commercial Stormwater NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)
- LAWN DRUMLIN
Vegetation Landform

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet
- Property Line >10' Drinking Water Well >100' Other _____
feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 58" 58"
Depth Weeping from Pit Depth Standing Water in Hole
- Estimated Depth to High Groundwater: 48" 53.8'
inches elevation



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: SW-4

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
62"	-	-	48"	7.5YR 5/8	15%	FILL					
112"	C	2.5Y 5/3				V.F.S.L.					

Additional Notes:



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: SW-5 03-02-2020 1 PM CLEAR/SUNNY
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 58.5' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - Prop Commercial Stormwater NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)
LAWN DRUMLIN
Vegetation Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet feet feet
Property Line >10' Drinking Water Well >100' Other _____
feet feet feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 65" 65"
Depth Weeping from Pit Depth Standing Water in Hole
Estimated Depth to High Groundwater: 49" 54.4'
inches elevation



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City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: SW-5

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
65"	FILL	-	49"	7.5YR 5/8	15%	-					
106"	C	2.5Y 5/3				V.F.S.L.					

Additional Notes:



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City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

B. Site Information (Continued)

6. Current Water Resource Conditions (USGS): 01/20 Range: ☐ Above Normal ☒ Normal ☐ Below Normal
Month/Year
7. Other references reviewed: U.S.G.S. QUAD, FEMA, SCS SOILS

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: SW-6 03-02-2020 1 PM CLEAR/SUNNY
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 59.0' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - Prop Commercial Stormwater NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)

LAWN DRUMLIN
Vegetation Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet
Property Line >10' Drinking Water Well >100' Other _____
feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 67" 67"
Depth Weeping from Pit Depth Standing Water in Hole

Estimated Depth to High Groundwater: 51" 54.8'
inches elevation



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: SW-6

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
24"	-	-				FILL					
30"	Ab	10YR 2/2				F.S.L.					
41"	BW	10YR 4/6				F.S.L.					
114"	C	2.5Y 5/4	51"	7.5YR 5/8	15%	F.S.L.					

Additional Notes:



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: SW-7 03-02-2020 1 PM CLEAR/SUNNY
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 60.4' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - Prop Commercial Stormwater NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)
LAWN DRUMLIN
Vegetation Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet
Property Line >10' Drinking Water Well >100' Other _____
feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____
Depth Weeping from Pit Depth Standing Water in Hole
Estimated Depth to High Groundwater: 55" 55.8'
inches elevation



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: SW-7

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
9"	A	10YR 3/2				F.S.L.					
29"	BW	10YR 4/6				F.S.L.					
43"	C1	2.5Y 5/4				M.SAND					
103"	C2	25Y 5/3	55"	7.5YR 5/8	15%	F.SAND					

Additional Notes:



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

B. Site Information (Continued)

6. Current Water Resource Conditions (USGS): 01/20 Range: ☐ Above Normal ☒ Normal ☐ Below Normal
Month/Year
7. Other references reviewed: U.S.G.S. QUAD, FEMA, SCS SOILS

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: SW-8 03-02-2020 1 PM CLEAR/SUNNY
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 58.6' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - Prop Commercial Stormwater NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)

LAWN DRUMLIN
Vegetation Landform

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet
Property Line >10' Drinking Water Well >100' Other _____
feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 81" 81"
Depth Weeping from Pit Depth Standing Water in Hole
- Estimated Depth to High Groundwater: 49" 54.5'
inches elevation



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: SW-8

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
84"	-	-	49"	7.5YR 5/8	15%	FILL					
126"	C	2.5Y 5/3				V.F.S.L.					

Additional Notes:



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

A.
inches

B.
inches

☐ Depth weeping from side of observation hole

A.
inches

B.
inches

☒ Depth to soil redoximorphic features (mottles)

A. SW4 - 48"
inches

B. SW5 - 49"
inches

☐ Groundwater adjustment (USGS methodology)

A.
inches

B.
inches

2.

Index Well Number

Reading Date

Index Well Level

Adjustment Factor

Adjusted Groundwater Level

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes

☐ No

b. If yes, at what depth was it observed?

Upper boundary:

62"
inches

Lower boundary:

112"
inches



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

A. _____
inches

B. _____
inches

☐ Depth weeping from side of observation hole

A. _____
inches

B. _____
inches

☒ Depth to soil redoximorphic features (mottles)

A. SW6 - 51"
inches

B. SW7 - 55"
inches

☐ Groundwater adjustment (USGS methodology)

A. _____
inches

B. _____
inches

2.

Index Well Number _____

Reading Date _____

Index Well Level _____

Adjustment Factor _____

Adjusted Groundwater Level _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes

☐ No

b. If yes, at what depth was it observed?

Upper boundary:

30"
inches

Lower boundary:

103"
inches



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

A. _____
inches

B. _____
inches

☐ Depth weeping from side of observation hole

A. _____
inches

B. _____
inches

☒ Depth to soil redoximorphic features (mottles)

A. SW8 - 49"
inches

B. _____
inches

☐ Groundwater adjustment (USGS methodology)

A. _____
inches

B. _____
inches

2.

Index Well Number _____

Reading Date _____

Index Well Level _____

Adjustment Factor _____

Adjusted Groundwater Level _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed?

Upper boundary: 84"
inches

Lower boundary: 126"
inches



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

ROBERT M. GRASSO, SE#933

Typed or Printed Name of Soil Evaluator / License #

03-02-2020

Date

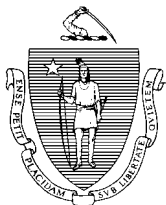
10/97

Date of Soil Evaluator Exam

Name of Board of Health Witness

Board of Health

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with [Percolation Test Form 12](#).



Commonwealth of Massachusetts
City/Town of NEWBURY
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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



A. Site Information

R & E REALTY TRUST

Owner Name

23 CENTRAL STREET

Street Address or Lot #

NEWBURY

City/Town

MA

State

01922

Zip Code

508-962-2675

Telephone Number

Contact Person (if different from Owner)

B. Test Results

	12-02-2019 Date	1 PM Time	12-02-2019 Date	1 PM Time
Observation Hole #	1A		3A	
Depth of Perc	33" + 20" = 53"		54" + 18" = 72"	
Start Pre-Soak	2:20		2:15	
End Pre-Soak	2:35		2:30	
Time at 12"	2:35		2:30	
Time at 9"	2:41		2:36	
Time at 6"	2:48		2:43	
Time (9"-6")	7 MIN		7 MIN	
Rate (Min./Inch)	3 MIN/INCH		3 MIN/INCH	
	Test Passed: <input checked="" type="checkbox"/>		Test Passed: <input checked="" type="checkbox"/>	
	Test Failed: <input type="checkbox"/>		Test Failed: <input type="checkbox"/>	

ROBERT M. GRASSO, SE#933

Test Performed By:

DEBORAH ROGERS - B.O.H. AGENT

Witnessed By:

Comments:



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MassDEP has provided this form for use by on-site professionals and local Boards of Health. Other forms may be used, but the information must be substantially the same as provided here. Before using this form, check with your local Board of Health to determine the form they use.

A. Facility Information

R & E REALTY TRUST

Owner Name

23 CENTRAL STREET

Street Address

NEWBURY

City

MA

State

R-20 / 28

Map/Lot #

01922

Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Published Soil Survey Available? ☒ Yes ☐ No If yes: 1981 1"=1320' Ur
Year Published Publication Scale Soil Map Unit
- URBAN LAND
Soil Name
- VARIABLE
Soil Limitations
3. Surficial Geological Report Available? ☐ Yes ☒ No If yes:
Year Published Publication Scale Map Unit
- TILL
Geologic Material
- DRUMLIN
Landform
4. Flood Rate Insurance Map
- Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
- Within the 500-year flood boundary? ☐ Yes ☒ No Within a velocity zone? ☐ Yes ☒ No
5. Wetland Area: National Wetland Inventory Map
Map Unit Name
- Wetlands Conservancy Program Map
Map Unit Name



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

B. Site Information (Continued)

6. Current Water Resource Conditions (USGS): 11/19 Range: ☐ Above Normal ☒ Normal ☐ Below Normal
Month/Year

7. Other references reviewed: U.S.G.S. QUAD, FEMA, SCS SOILS

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: 01 12-02-2019 1 PM SNOW
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 62.7' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - PROP COMMERCIAL NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)

LAWN DRUMLIN _____
Vegetation Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet

Property Line >10' Drinking Water Well >100' Other _____
feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____
Depth Weeping from Pit Depth Standing Water in Hole

Estimated Depth to High Groundwater: 40" 59.4'
inches elevation



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: 01

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10"	FILL					-					
20"	Ab	10YR 2/2				F.S.L.					
32"	BW	10YR 4/6				F.S.L.					
121"	C	2.5Y 5/4	40"	7.5YR 5/8	20%	S.LOAM					

Additional Notes:



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: 02 Date 12-02-2019 Time 1 PM Weather SNOW

1. Location

Ground Elevation at Surface of Hole: 60.3' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - PROP COMMERCIAL NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)
LAWN DRUMLIN
Vegetation Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet
Property Line >10' Drinking Water Well >100' Other _____
feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____
Depth Weeping from Pit _____ Depth Standing Water in Hole _____
Estimated Depth to High Groundwater: 40" 57.0'
inches elevation



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: 02

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
9"	FILL					-					
16"	Ab	10YR 2/2				F.S.L.					
34"	BW	10YR 4/6				F.S.L.					
124"	C	2.5Y 5/4	40"	7.5YR 5/8	20%	S.LOAM					

Additional Notes:



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

- | | | |
|--|----------------------|----------------------|
| <input type="checkbox"/> Depth observed standing water in observation hole | A. _____
inches | B. _____
inches |
| <input type="checkbox"/> Depth weeping from side of observation hole | A. _____
inches | B. _____
inches |
| <input checked="" type="checkbox"/> Depth to soil redoximorphic features (mottles) | A. 1 - 40"
inches | B. 2 - 40"
inches |
| <input type="checkbox"/> Groundwater adjustment (USGS methodology) | A. _____
inches | B. _____
inches |

2.

Index Well Number _____	Reading Date _____	Index Well Level _____
Adjustment Factor _____	Adjusted Groundwater Level _____	

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

- a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

- b. If yes, at what depth was it observed? Upper boundary: 34"
inches Lower boundary: 121"
inches



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

ROBERT M. GRASSO, SE#933

Typed or Printed Name of Soil Evaluator / License #

DEBORAH ROGERS

Name of Board of Health Witness

12-02-2019

Date

10/97

Date of Soil Evaluator Exam

NEWBURY

Board of Health

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with [Percolation Test Form 12](#).



Commonwealth of Massachusetts

City/Town of NEWBURY

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Field Diagrams

Use this sheet for field diagrams:



Commonwealth of Massachusetts

City/Town of NEWBURY

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MassDEP has provided this form for use by on-site professionals and local Boards of Health. Other forms may be used, but the information must be substantially the same as provided here. Before using this form, check with your local Board of Health to determine the form they use.

A. Facility Information

R & E REALTY TRUST

Owner Name

23 CENTRAL STREET

Street Address

NEWBURY

City

MA

State

R-20 / 28

Map/Lot #

01922

Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Published Soil Survey Available? ☒ Yes ☐ No If yes: 1981 1"=1320' Ur
Year Published Publication Scale Soil Map Unit
URBAN LAND VARIABLE
Soil Name Soil Limitations
3. Surficial Geological Report Available? ☐ Yes ☒ No If yes:
Year Published Publication Scale Map Unit
TILL DRUMLIN
Geologic Material Landform
4. Flood Rate Insurance Map
- Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
- Within the 500-year flood boundary? ☐ Yes ☒ No Within a velocity zone? ☐ Yes ☒ No
5. Wetland Area: National Wetland Inventory Map
Map Unit Name
Wetlands Conservancy Program Map
Map Unit Name



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

B. Site Information (Continued)

6. Current Water Resource Conditions (USGS): 11/19 Range: ☐ Above Normal ☒ Normal ☐ Below Normal
Month/Year

7. Other references reviewed: U.S.G.S. QUAD, FEMA, SCS SOILS

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: 03 12-02-2019 1 PM SNOW
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 60.2' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - PROP COMMERCIAL NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)

LAWN DRUMLIN _____
Vegetation Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet

Property Line >10' Drinking Water Well >100' Other _____
feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____
Depth Weeping from Pit Depth Standing Water in Hole

Estimated Depth to High Groundwater: 52" 55.9'
inches elevation



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: 03

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
30"	FILL					-					
37"	Ab	10YR 2/2				F.S.L.					
50"	BW	10YR 4/6				F.S.L.					
122"	C	2.5Y 5/4	52"	7.5YR 5/8	20%	S.LOAM					

Additional Notes:



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: 04 Date 12-02-2019 Time 1 PM Weather SNOW

1. Location

Ground Elevation at Surface of Hole: 59.8' Location (identify on plan):

2. Land Use RES - SINGLE FAMILY - PROP COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) NONE Surface Stones 1-3 Slope (%) LAWN Vegetation DRUMLIN Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body >400' feet Drainage Way >100' feet Possible Wet Area >100' feet Property Line >10' feet Drinking Water Well >100' feet Other feet

4. Parent Material: TILL Unsuitable Materials Present: Yes No

If Yes: Disturbed Soil Fill Material Impervious Layer(s) Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: Depth Weeping from Pit Depth Standing Water in Hole Estimated Depth to High Groundwater: 52" inches 55.5' elevation



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: 04

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
29"	FILL					-					
36"	Ab	10YR 2/2				F.S.L.					
51"	BW	10YR 4/6				F.S.L.					
124"	C	2.5Y 5/4	52"	7.5YR 5/8	20%	S.LOAM					

Additional Notes:



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

- | | | |
|--|----------------------|----------------------|
| <input type="checkbox"/> Depth observed standing water in observation hole | A. _____
inches | B. _____
inches |
| <input type="checkbox"/> Depth weeping from side of observation hole | A. _____
inches | B. _____
inches |
| <input checked="" type="checkbox"/> Depth to soil redoximorphic features (mottles) | A. 3 - 52"
inches | B. 4 - 52"
inches |
| <input type="checkbox"/> Groundwater adjustment (USGS methodology) | A. _____
inches | B. _____
inches |

2.

Index Well Number _____	Reading Date _____	Index Well Level _____
Adjustment Factor _____	Adjusted Groundwater Level _____	

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

- a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

- b. If yes, at what depth was it observed? Upper boundary: 51"
inches Lower boundary: 122"
inches



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

ROBERT M. GRASSO, SE#933

Typed or Printed Name of Soil Evaluator / License #

DEBORAH ROGERS

Name of Board of Health Witness

12-02-2019

Date

10/97

Date of Soil Evaluator Exam

NEWBURY

Board of Health

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Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Field Diagrams

Use this sheet for field diagrams:



Commonwealth of Massachusetts

City/Town of NEWBURY

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23 CENTRAL STREET

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NEWBURY

City

MA

State

R-20 / 28

Map/Lot #

01922

Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Published Soil Survey Available? ☒ Yes ☐ No If yes: 1981 Year Published 1"=1320' Publication Scale Ur Soil Map Unit
URBAN LAND
Soil Name VARIABLE
Soil Limitations
3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: Year Published Publication Scale Map Unit
TILL
Geologic Material DRUMLIN
Landform
4. Flood Rate Insurance Map
- Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
- Within the 500-year flood boundary? ☐ Yes ☒ No Within a velocity zone? ☐ Yes ☒ No
5. Wetland Area: National Wetland Inventory Map Map Unit Name
Wetlands Conservancy Program Map Map Unit Name



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

B. Site Information (Continued)

6. Current Water Resource Conditions (USGS): 11/19 Range: ☐ Above Normal ☒ Normal ☐ Below Normal
Month/Year
7. Other references reviewed: U.S.G.S. QUAD, FEMA, SCS SOILS

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: 05 16-06-2019 1 PM SUNNY
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 56.8' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - PROP COMMERCIAL NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)
- LAWN DRUMLIN
Vegetation Landform

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet
- Property Line >10' Drinking Water Well >100' Other _____
feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 96" 96"
Depth Weeping from Pit Depth Standing Water in Hole
- Estimated Depth to High Groundwater: 57" 52.1'
inches elevation



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: 05

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
36"	FILL	-				-					
46"	Ab	10YR 2/2				F.S.L.					
57"	BW	10YR 6/1	57"	7.5YR 5/8	15%	F.S.L.					
132"	C	10YR 4/6				V.F.S.L.					

Additional Notes:



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: 06 Date: 12-06-2019 Time: 1 PM Weather: SUNNY

1. Location

Ground Elevation at Surface of Hole: 58.0' Location (identify on plan): _____

2. Land Use RES - SINGLE FAMILY - PROP COMMERCIAL NONE 1-3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)
LAWN DRUMLIN
Vegetation Landform

3. Distances from: Open Water Body >400' Drainage Way >100' Possible Wet Area >100'
feet feet feet
Property Line >10' Drinking Water Well >100' Other _____
feet feet feet

4. Parent Material: TILL Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____
Depth Weeping from Pit _____ Depth Standing Water in Hole _____
Estimated Depth to High Groundwater: 24" 56.0'
inches elevation



Commonwealth of Massachusetts

City/Town of NEWBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (Continued)

Deep Observation Hole Number: 06

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
4"	FILL	-				-					
84"	C	2.5Y 5/4	24"	7.5YR 5/8	15%	L.SAND					

Additional Notes:



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

A. _____
inches

B. _____
inches

☐ Depth weeping from side of observation hole

A. _____
inches

B. _____
inches

☒ Depth to soil redoximorphic features (mottles)

A. 5 - 57"
inches

B. 6 - 24"
inches

☐ Groundwater adjustment (USGS methodology)

A. _____
inches

B. _____
inches

2.

Index Well Number _____

Reading Date _____

Index Well Level _____

Adjustment Factor _____

Adjusted Groundwater Level _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed?

Upper boundary:

57"
inches

Lower boundary:

132"
inches



Commonwealth of Massachusetts

City/Town of NEWBURY

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Signature of Soil Evaluator

ROBERT M. GRASSO, SE#933

Typed or Printed Name of Soil Evaluator / License #

Name of Board of Health Witness

12-06-2019

Date

10/97

Date of Soil Evaluator Exam

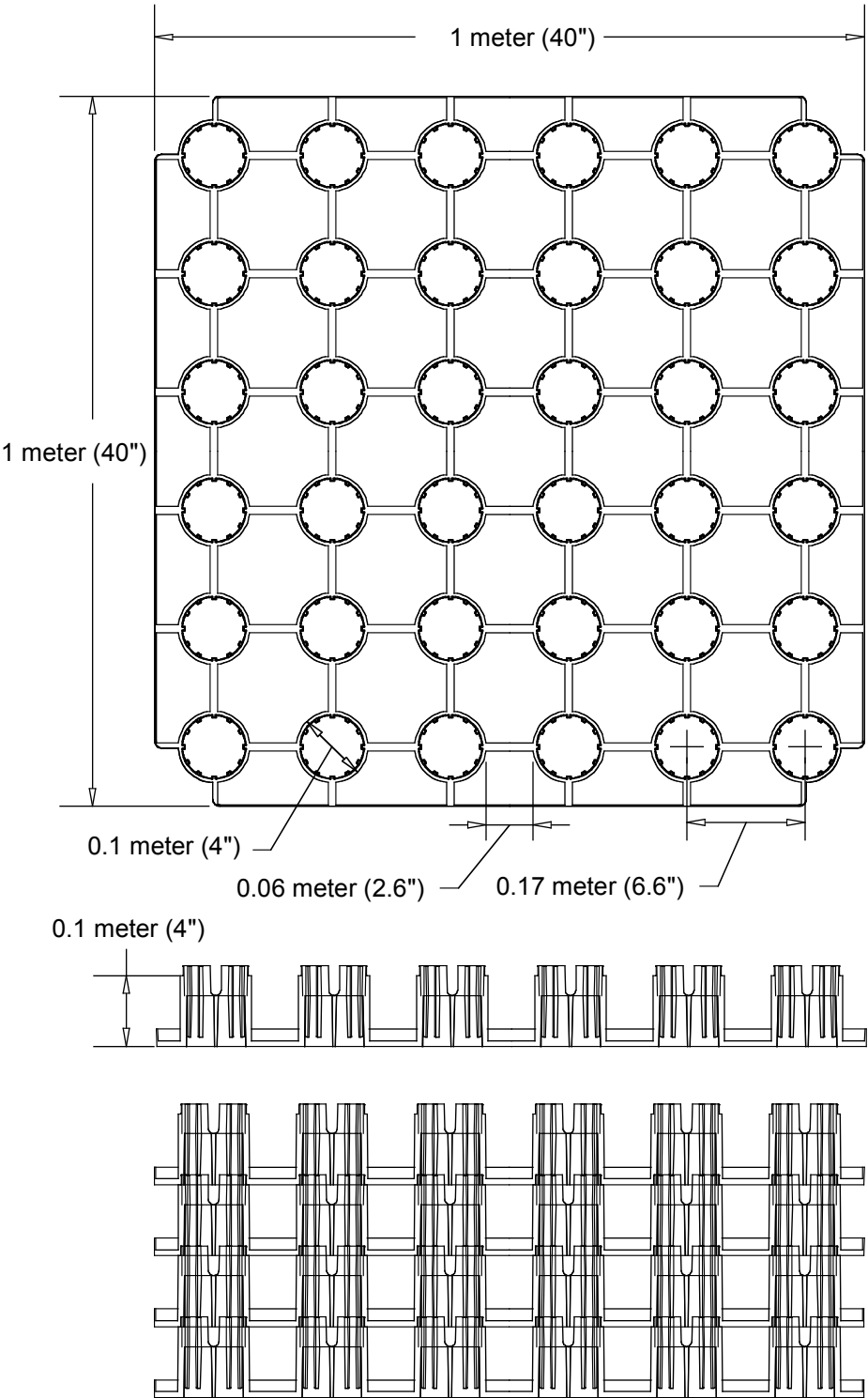
NEWBURY

Board of Health

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RAINSTORE3 Unit Details and Dimensions

Single Rainstore3 injection molded unit geometry and dimensions



NOT TO SCALE



Invisible Structures, Inc.
RS3detail04.dwg



303-233-8383
www.invisiblestructures.com
V4.1

Rainstore³ Installation Instructions

For Stormwater Drainage Detention & Retention with Geotextile Fabric

(A separate install guide for storm water harvesting for reuse, is available - call 303-233-8383 or visit invisiblestructures.com)

1) Introduction

- A. This document describes how to properly install the Rainstore³ water storage system with geotextile fabric for stormwater drainage detention and retention.
- B. **Detention** allows for short-term storage and release of storm water through outlet pipes. Nearby water treatment plants may have a limited capacity for handling storm water and thus, stormwater needs to be temporarily detained on site.
- C. **Retention** allows water to recharge the ground water through exfiltration. There are no standard outlet pipes from the system except in some cases when overflow pipes are called for.
- D. **Contractors:** Only licensed contractors should install the Rainstore³ system. The contractor should have a good performance record with similar construction projects. Homeowners should not install the Rainstore³ units themselves.
- E. **Landscaping:** Plant only grass, flowers, or shrubs with shallow root systems over the installed product. Trees should be carefully planned and CANNOT be planted directly above a complete Rainstore³ system. The deep tree roots can damage the water storage capacity of the system by tearing the geotextile fabric and clogging Rainstore³ cells with root growth. Trees can be planted around the system, or planted in an island of a parking lot devoid of Rainstore³ cells. Recommended distance from Rainstore³ system is 10 meters with a root barrier on the edge next to tree.
- F. **Warning:** Do NOT drive motorized equipment on any portion of the Rainstore³ area until installation is 100% complete. Driving over any part of the partial installation could damage the geogrid, fabric, or Rainstore³ cells, thus compromising the integrity of the entire installation. Walking on the Rainstore³ units is acceptable.
- G. **Warranty:** Invisible Structures, Inc. is not responsible for careless installations that do not follow the technical specifications. The ISI warranty only covers Rainstore³ material defects. Please see the separate warranty sheet in the Rainstore³ brochure, or call ISI at 800-233-1510.

2) Material Requirements

- A. **Rainstore³:** The cells arrive preassembled to the desired height. They will arrive in a box truck on pallets. When multiples cells are stacked on one pallet, white paper will divide each stack. Do not assemble, re-stack, or disassemble units onsite as this will void the product warranty. **DO NOT** cut Rainstore³ units. Units must be installed whole. Cutting is only permitted for maintenance port installation (see

- our Rainstore³ maintenance port design detail). DO NOT disassemble, reassemble, or reconfigure the height (stacks) of Rainstore³. Stacks must be assembled at Invisible Structures manufacturing facility.
- B. Geogrid: Acceptable examples are Tensar TriX 160, Tenax MS 330, or Huesker Fornit 30 or equivalent. Geogrid is available in 2 rolls sizes: 9.84 ft x 164 ft roll that weighs 102 lbs, or 13.1 ft x 264 ft that weighs 138 lbs. This product is not supplied by Invisible Structures.
 - C. Geotextile: Non-woven PP or PET of at least 8-ounce per square yard. The geotextile fabric is available in rolls measuring 12.5 ft x 360 feet or 15 ft x 300 feet. Both roll sizes weigh 240 lbs. This product is not supplied by Invisible Structures.
 - D. Silver or metallic tape: the corners of the completed installation should be marked with metallic tape for future utility detection.
 - E. Pipe Boot: to properly secure inlet, outlet, and maintenance ports to the Rainstore³ system use a pipe boot. Please view section 5.10 B for installation instructions.

3) Equipment Requirements

- A. A powered lift to move stacked Rainstore³ cells into the excavated area. A back hoe can have a fork or hanging chain attachment for lowering Rainstore³ units into the excavated area.
- B. A walk behind roller for backfill compaction. For installations with an area of 1,000 square feet or more, a light drivable roller such as the Bomag 125 D-4 that weighs 3,125 kgs (6890 lbs) or a compacter of similar weight may be used for compaction after the first six inches of fill material have been installed.

4) Shipping, Handling & Storage

4.1 Unloading:

- A. Rainstore³ cells arrive stacked to the desire height in a box truck on wooden pallets. Two or more workers per stacked unit can unload the cells. The Rainstore³ can also be removed from the truck with a powered lift.
 - **Powered lift**: Rainstore³ can be unloaded by a bobcat machine with a fork attachment or a larger bobcat with a scoop attachment. To unload the units with a powered lift, slide a pallet of Rainstore³ to the rear of the truck using workers or a pallet jack. Position the cells onto the fork or scoop attachment.
- B. Depending upon the height of the cells, a powered lift may be required for removal from the truck. This could be a bobcat, forklift, or back hoe.

- C. If a cell stack has a few cylinders that have become partially dislodged in transit or offloading, simply apply even pressure onto the top of the cell to re-connect the units – each cylinder top rib should touch adjacent cylinder's bottom rib. If there are more than twelve (12) cylinders disconnected in a cell stack, replacement cells are needed.

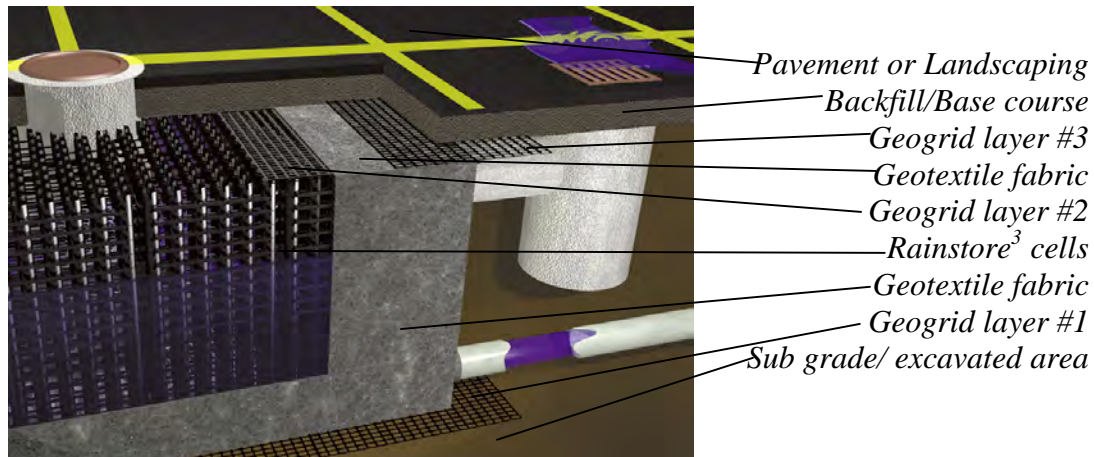
4.2 Sun exposure:

- A. If the product is not to be installed for five or more days after delivery, the Rainstore³ cells MUST be stored out of the sun. Rainstore³ should be stored in a shed or covered with a UV resistant tarp. Too much exposure to UV rays from the sun will weaken the plastic of the Rainstore³ cells. Failure to comply with appropriate storage requirements could result in breach of the product warranty.

4.3 Inclement weather:

- A. Install Rainstore³ only if the outside air temperature is 55 degrees Fahrenheit or above. The plastic becomes brittle below 40 degrees F.
- B. Rainstore³ should not be installed on muddy soil or in standing water. The excavated area should be dry before installation.

5) Installation



5.1 Excavation Preparation

- A. Excavate the area to the desired depth for the Rainstore³ system, as shown on site plans. Allow proper depth for the height of the Rainstore³ cells and the cover material.
- B. The excavated area must be dry, smooth, level, and devoid of rocks, lumps or debris. Before installing the Rainstore³, test the area with a 3 meter (10 feet) straight edge or laser level. The surface of the excavated area should not differ in

- elevation more than 6mm (0.25 inches). All irregularities must be corrected and re-leveled.
- C. Excavation must extend at least three feet beyond all sides of the Rainstore³ placement area to allow ample room for product installation and sidefill compaction.
 - D. All inlet pipes and filtering systems should be installed to the edge of the excavated area per manufacturer's recommendation. Please see section 5.10, for installation of connection pipes from these devices.
 - E. Typically, inlet pipes are located near or at the top of the Rainstore³ chambers and outlet pipes (if necessary) are located along the bottom of the system. An overflow pipe should be located at the top of the system.

5.2 Geogrid – First Layer:

- A. Three separate layers of geogrid are required for the Rainstore³ system. Geogrid arrives in rolls and can be shipped on a flatbed truck. Rolls are available in two sizes: 9.84 ft x 164 ft roll that weighs 102 lbs, or 13.1 ft x 264 ft that weighs 138 lbs. This product is not supplied by Invisible Structures. Two or more workers should carry the geogrid roll into the excavated area.
- B. Spread the first layer of geogrid at the base of the excavated area. The geogrid will quickly unroll across the excavation area. Seams of the geogrid should overlap at least 12 inches. The first layer provides a stable and even surface for Rainstore³ cell installation.
- C. The geogrid layers may be temporarily anchored with rocks or adequate debris, to prevent it from rolling up before other system components can be installed.



Maintenance of a Rainstore3 Stormwater Storage Chamber

“How do I clean or maintain a Rainstore3 system?”

Invisible Structures, Inc. recommends that stormwater be pretreated prior to discharging into the chambers to avoid foreign matter accumulation inside the chamber. This can be accomplished by a variety of techniques or products. Some examples are:

Short Term Storage (Detention Basin)

“Zero” maintenance – the Preferred Method:

Use a natural, or “Bio-Filter”, inlet device – essentially a porous pavement or swale, to pre-filter trash and sediment laden runoff before capture and conveyance into a Rainstore3 chamber. Use of a simple 10-12” deep sand, or sand/gravel, filter pavement or swale will provide adequate vertical flow capacity (20 to 35+ inches per hour) and residence time to capture coarse debris and trash at the surface, with sediment and hydrocarbons (and even most traffic generated metals) kept in voids of the section for treatment action by bacteria and oxidation.

Water passing through the filter section can pass directly into the top of a Rainstore3 chamber, or be collected and transported over larger distances via Draincore2.

Only super fine sediments will pass through this section and be conveyed into the chamber. With relatively short storage times (24 to 48 hours) most of these sediments shall remain suspended, or be easily re-suspended by the next rain event for removal. Long term accumulations to a depth affecting exfiltration rates can be measured in decades, not years.

Trash pickup from the surface requires that Zero be in quotes. Also be aware that grass surface porous pavements (Grasspave2) offer greater biological activity, but at a higher surface maintenance cost – mowing, fertilization and irrigation. Gravel surface porous pavements (Gravelpave2) still provide biological activity at a level lower than with grass, but with lower maintenance required.

Short Term Storage (Detention Basin)

Low, but periodic maintenance:

Use a structural form of catch basin with a deep sump prior to use of a hooded elbow inlet into the chamber. Whether standard catch basins or sophisticated cyclonic flow devices are used, the objective is to remove any coarse debris and sediment (sand and larger) from entering the Rainstore3 chamber. Periodic maintenance will be required to remove trash and sediment that accumulates in the device. Frequency shall depend upon the physical nature of sediments carried and allowed into the “screening” device.

Fine sediments may still be transported into the chamber via the inlet pipe and will likely be dispersed rather evenly over the entire chamber bottom surface area, where they will then settle to the bottom – depending upon the duration of time water is left in the chamber and the size of the particle. Particles smaller than the AOS of the porous fabric liner will pass through the liner and continue migration until stopped by underlying soils. Particles larger than the AOS shall remain inside the chamber, and can be periodically re-suspended by injecting high-pressure water into a Maintenance Port, with removal of the sediment laden water via sump pump from the same, or other, port.

Eventually, especially if maintenance is too infrequent, the bottom of the chamber may develop a thick sediment layer sufficient to obstruct exfiltration through the bottom of the chamber. The sides of the chamber shall continue to function, but time for total water evacuation will increase.

This approach is most closely related to more traditional design responses, but is not the best solution long term for the client. Standard catch basins are lowest initial cost, but much higher in maintenance cost. Commercial cyclonic devices may have lower maintenance cost, but offer higher levels of cleaning efficiency at much higher initial investment cost.

Long Term Storage (Water Harvest Basin)

“Zero” maintenance – the Preferred Method:

Use a natural, or “Bio-Filter”, inlet device – essentially a porous pavement or swale, to pre-filter trash and sediment laden runoff before capture and conveyance into a Rainstore3 chamber. Use of a simple 10-12” deep sand, or sand/gravel, filter pavement or swale will provide adequate vertical flow capacity (20 to 35+ inches per hour) and residence time to capture coarse debris and trash at the surface, with sediment and hydrocarbons (and even most traffic generated metals) kept in voids of the section for treatment action by bacteria and oxidation.

Water passing through the filter section can pass directly into the top of a Rainstore3 chamber, or be collected and transported over larger distances via Draincore2.

Only super fine sediments will pass through this section and be conveyed into the chamber. With relatively short storage times (24 to 48 hours) most of these sediments shall be easily re-suspended by the next rain event for removal. This level of sediment can be safely captured and transported via pumps for water reuse in irrigation or gray water applications, or further filtered by an automatic sand filter device with “back-flush” capabilities.

A Note About Sump Pumps

Many of our clients have designed elaborate pump stations to remove water from Rainstore3 chambers (usually for water harvest applications). We would like to make you aware that several pump manufacturers now make standard small diameter profile sump pumps that could be useful and cost effective alternatives to subsurface pump stations that are usually placed adjacent to the chamber. With top surface evacuation pumps, all liner penetrations are kept to the top edges of the chamber and minimize potential leak points on harvest applications.

Some of the pumps are less than 3.5” diameter, which could fit inside any of the ring columns of the Rainstore3 structure itself. Most of the others are less than 7.5” diameter, and will fit inside an 8” pipe placed in a Maintenance Port configuration – removal of one “corner” column of rings. Provided that electricity and outlet pipes can be easily accommodated within the 12” minimum cover over the chamber, these sump pumps may provide a ready, easy and economical alternative to more expensive pump stations.

5.3 Geotextile Fabric:



Geogrid layer #3
Geotextile (encases Rainstore3)
Geogrid layer #2
Rainstore3 units
Geotextile (encases Rainstore3)
Geogrid layer #1

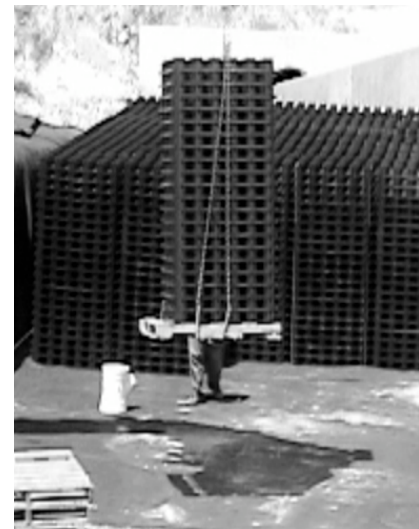
- A. A layer of geotextile fabric is installed on top of the first layer of geogrid. The geotextile encompasses all of the Rainstore³ cells. The fabric is permeable, allowing for slow exfiltration of water but preventing sediments from entering the cells from the surrounding area. *Detention systems may require an outlet pipe, please refer to your site plans.*
- B. The geotextile arrives in two rolls that measure 12.5 ft x 360 feet or 15 ft x 300 feet. Both roll sizes weigh 240 lbs. Two or more workers can lift and quickly install the geotextile by unrolling it over the geogrid material. Seams should overlap 12 inches. Seams can be joined with duct tape or a similar material to prevent shifting of the geotextile fabric.
- C. Be sure to leave excess fabric on all sides of the excavated area. The excess fabric will later be brought up and around to encompass the sides and top of the Rainstore³ cells. The geotextile can be temporarily anchored at the sides of the excavated area with rocks, bricks, or boards during installation.

5.4 Marking Rainstore³ Placement:

- A. The Rainstore³ installation area can be outlined on the geotextile using spray paint, chalk line, or even rope. If using rope, make sure to remove all rope after the Rainstore³ cells are in place.

5.5 Position the Cells:

- A. Depending upon the height of the Rainstore³ cells, two to four workers can carry the cells and place them on the geotextile fabric.
- B. Workers can also use a dolly to roll the stacked Rainstore³ cells into place. Take care not to allow the stacked unit to tip over to prevent stacked cells from damage. **Damaged units CANNOT**



- be installed and must be discarded. Call ISI for replacement pieces at 800-233-1510.** Rainstore³ units **CANNOT BE CUT** to fit the hole. Each unit must be installed whole. No Partial unit is allowed unless making room for a maintenance port (see 5.6).
- C. A powered lift can be used as a small crane to lower Rainstore³ cells into place. The powered lift should use wide strapping around the Rainstore³ cells. The strapping should be placed under the pallet the Rainstore³ cells are on to avoid damage to the bottom of the cells. To avoid product damage or replacement, make sure the strapping isn't too tight around the top, bottom, or sides of the stacked cells.
- D. There are two sets of banding surrounding the Rainstore³ cells and pallet. Only cut the metal banding that attaches the cells to the pallet, BUT NOT the banding that holds the cell stacks together. Remove and discard the pallet from under the Rainstore³ units. If white paper divides the stacked cells, remove and discard that as well.
- E. Final positioning of cells should be done by hand by at least two workers. The cells are placed side by side, **with the grid side down** on the geotextile fabric layer. Align bumpers on each side of all stacked cells to ensure square placement.



5.6 Maintenance Ports:

- A. Depending on the size of the maintenance port, one or four Rainstore³ columns can be removed to install a maintenance port. The Rainstore³ units can **ONLY** be cut for maintenance port installation – no other cutting is permitted. The Rainstore³ cells can be cut using a powered cutter, such as a chain saw or a reciprocating saw. **NOTE: Cut ONLY the GRID between the cylinders, NOT the cylinders themselves.** The location of the maintenance port should be clearly marked with tape or paint before Rainstore³ cells are cut.

5.7 Geogrid – Second Layer:

- A. The second geogrid layer is applied directly over the installed Rainstore³ cells and provides a walking surface for workers. This layer temporarily interlocks the cell stacks and prevents the geotextile fabric from being penetrated.
- B. The geogrid easily unrolls with two workers. The seams should overlap at least 12 inches.

5.8 Wrap Geotextile:

- A. After the second layer of geogrid is installed, the anchored geotextile fabric surrounding the Rainstore³ installation can be wrapped around all sides and the top of the Rainstore³ chamber.
- B. Remove anchor material from the geotextile fabric. Enclose the Rainstore³ cells by bringing the fabric around the sides to the top of the cells. Seams should be sealed according to manufacturer recommendations.

5.9 Add Maintenance Ports/ Connect Inlet & Outlet Pipes:

- A. Prefabricated boots are available to provide a water tight connection between the Rainstore³ units and any maintenance ports, inlet or outlet pipes. This replaces securing the geotextile fabric around a pipe using a hose clamp. The prefabricated boots are available from any geotextile manufacturer.
- B. Boot Pipe Installation (from Environment Protection, Inc.
www.geomembrane.com)
 - a. Prepare the sub grade around the area of the pipe. The sub grade must be smooth, uniform, and free of any protrusions.
 - b. Clean the surface of the liner around the penetration where the boot will be welded in place. Wipe away any dirt or dust particles. The surfaces of the liner, boot, and the pipe must be completely clean and dry.
 - c. Slide the boot sleeve on the pipe, making sure the boot is aligned and all surfaces are smooth. It may be necessary to trim the excess tapered portion of the boot sleeve.
 - d. Weld the boot apron to the liner using adhesive. Apply the adhesive to the liner and the boot apron. Let the adhesive setup for several seconds before pressing the boot apron and the liner together using a roller. Make sure to smooth out any bubbles or wrinkles.
 - e. Seal the boot sleeve to the pipe using the stainless steel hose clamp. The clamp around the pipe will form a watertight seal to the pipe.
- C. Maintenance ports/boots and pipes should be completely sealed to the impermeable PVC liner per manufacturer's requirements.

5.10 Side Backfill & Compaction:

- A. The area around the installed Rainstore³ structure must be backfilled with self containing structural aggregate. The fill material should be applied gradually. The fill should be compacted in a maximum of 12-inch high lifts to 95% proctor density. Backfill to the top of the geotextile wrapped Rainstore³ structure.
- B. To ensure the backfill is properly compacted, have a Geotechnical Engineer test the fill density on site.

5.11 Geogrid - Third Layer:

- A. When the side backfill compaction is complete, the third layer of geogrid is ready for installation. The final layer of geogrid must extend beyond all sides of the Rainstore³ installation at least three feet. The third layer helps dissipate the load of traffic. Have two workers unroll the geogrid. Make sure the seams overlap at least 12 inches.

5.12 Top Backfill:

- A. Add the top layer of backfill material over the geogrid material. The backfill must be compacted in six inch high lifts to 95% proctor density. Use a walk behind roller for small installations.
- B. For installations with an area of 1,000 square feet or more, a light drivable roller such as the Bomag 125 D-4 that weighs 3,125 kgs (6890 lbs) or a compacter of similar weight may be used for compaction after the first six inches of fill material have been installed.
- C. Fill material should measure 12 inches minimum and 36 inches maximum. To ensure the backfill is properly compacted, have a Geotechnical Engineer test the fill density on site.

5.13 Surface Material:

- A. Once compaction is complete, cover material may be placed. Landscaping materials such as grass, or shallow root shrubs may be planted. For parking lot applications: Grasspave2, Gravelpave2, asphalt, concrete or other pavement may be installed.