

# STORMWATER MANAGEMENT PLANS

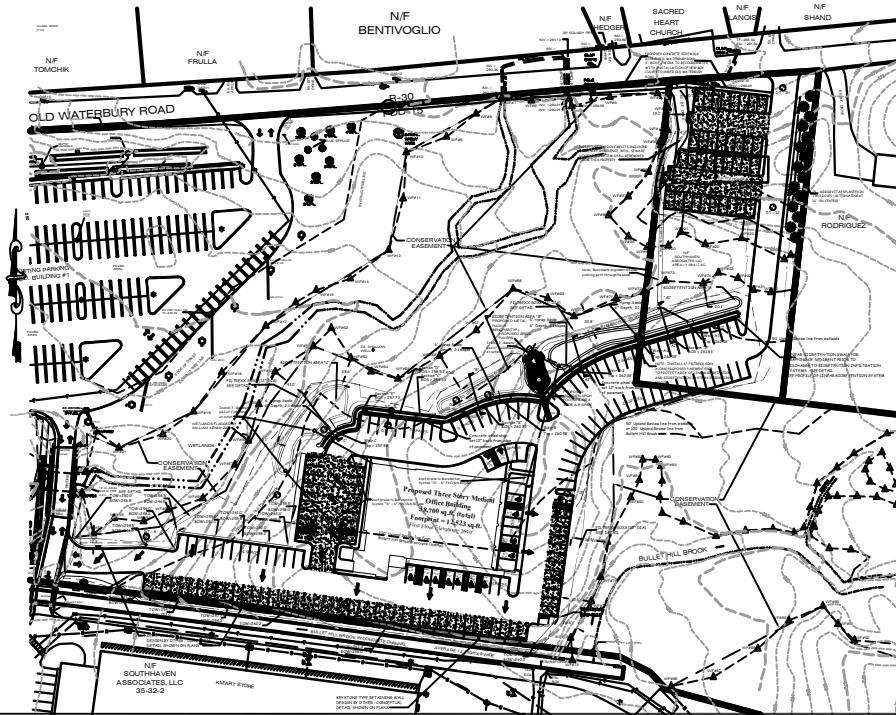
## 22 & 96 OLD WATERBURY ROAD

### SOUTHBURY - CONNECTICUT

#### PREPARED FOR

#### SRG FAMILY, LLC

#### DATE: 6/16/15, Rev. 10/25/15



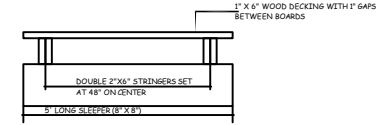
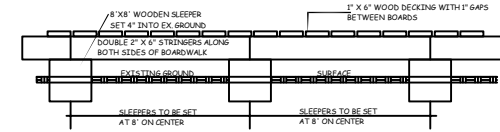
PLAN LIST:  
SHEET 1: OVERALL STORMWATER MANAGEMENT PLAN  
SHEET 2: STORMWATER MANAGEMENT PLAN  
SHEET 3: STORMWATER MANAGEMENT PLAN  
SHEET 4: SOIL TEST RESULTS, CROSS SECTIONS & SWALE PROFILE  
SHEET 5: CONSTRUCTION DETAILS & CONSTRUCTION NARRATIVE  
SHEET 6: PERMEABLE PAVEMENT PLAN & SPECIFICATIONS  
NOTE: ALL PLANS DATED: JUNE 16, 2015

TRINKAUS ENGINEERING, LLC  
CIVIL ENGINEERS  
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203-264-4558 (phone & fax)  
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[www.trinkausengineering.com](http://www.trinkausengineering.com)



NOTE: THE CONSTRUCTION SEQUENCE FOR THE STORMWATER MANAGEMENT PLAN AND LOW IMPACT SUSTAINABLE DEVELOPMENT PRACTICES (LINEAR BIORETENTION, BIORETENTION AND PERMEABLE PAVEMENT ARE FOUND ON THIS PLANS AND MUST BE IMPLEMENTED AS STATED TO ENSURE COMPLIANCE WITH DESIGN STANDARDS AS WELL AS FOR LONG TERM FUNCTIONALITY OF THE LIDS SYSTEMS.

NOTE: REFERENCE IS MADE TO OTHER SITE PLANS FOR MORE INFORMATION ON THIS PROJECT.



CROSS SECTION FOR WOODEN BOARDWALK ACROSS UPLAND AND WETLAND AREAS  
NOT TO SCALE

TRINKAUS ENGINEERING, LLC

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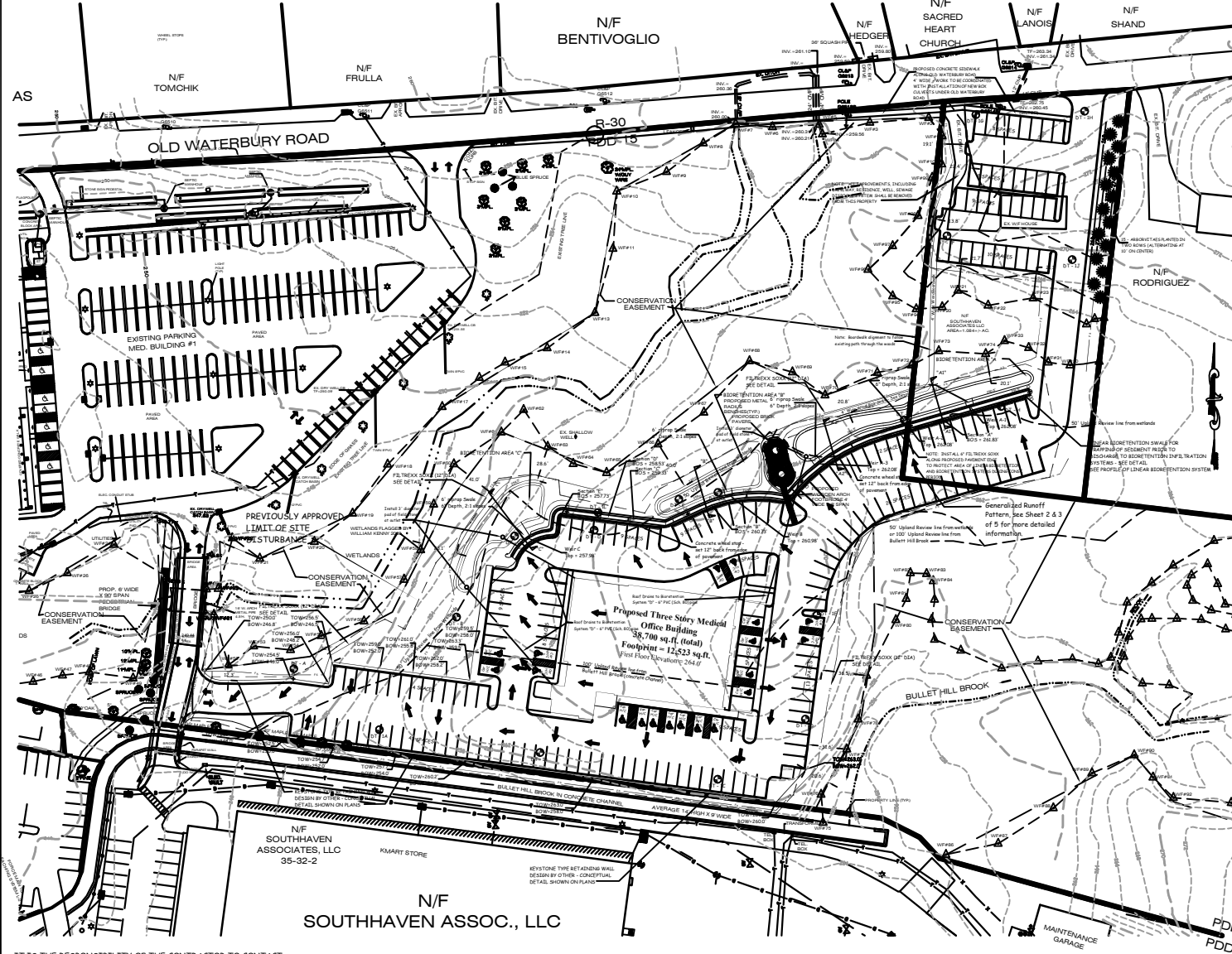
OVERALL STORMWATER  
MANAGEMENT PLAN

SHEET 1 OF 6  
PROJECT #010-2012

SCALE: 1" = 40'

DATE: June 16, 2015, 10/25/15

PREPARED FOR  
SRG FAMILY, LLC  
22 & 96 OLD WATERBURY ROAD  
SOUTHBRIDGE - CONNECTICUT



IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT  
"CALL BEFORE YOU DIG" AT 1-800-922-4495 FOR THE LOCATION  
OF ALL POSSIBLE UNDERGROUND UTILITIES ON OR ADJACENT TO  
THIS PROPERTY.  
NOTE: ALL SURVEY DATA HAS BEEN PROVIDED BY STUART SOMERS, CO., LLC





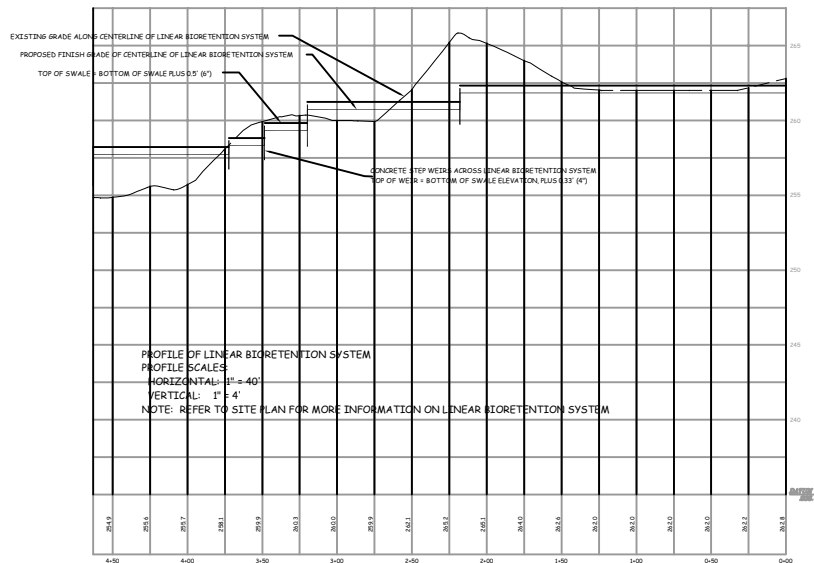


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IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT "CALL BEFORE YOU DIG" AT 1-800-922-4495 FOR THE LOCATION OF ALL POSSIBLE UNDERGROUND UTILITIES ON OR ADJACENT TO THIS PROPERTY.

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RESULTS OF SOIL TESTING BY TRINKAUS ENGINEERING, LLC  
ON 2/26/12, 2012

D1 - A 1.0" PER 6.25 MINUTES, EQUALS 3.0" PER HOUR INFILTRATION RATE (SAND)  
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RESULTS OF DOUBLE RING INFILTRATION TESTS PERFORMED BY TRINKAUS ENGINEERING, LLC ON 2/26/12, 2012

PROTOCOL: DOUBLE RING INFILTRATION TESTS WERE PERFORMED ADJACENT TO EACH OF THE DEEP TEST HOLES BY TRINKAUS ENGINEERING, LLC

A SECOND TEST PIT WAS EXCAVATED TO A DEPTH OF 10 - 12" APPROXIMATELY FIVE (5) FEET AWAY FROM THE INITIAL PIT

THE TOP LAYER OF SOIL AT THE BOTTOM OF THE TEST PIT WAS REMOVED BY HAND SHOVEL (ELIMINATES THE COMPACTED MATERIAL WHICH RESULTS FROM THE EXCAVATION EQUIPMENT)

A DOUBLE RING INFILTRATION TEST USING A DOUBLE RING INFILTRATION RATE ONLY (WAS) IS NECESSARY FOR THE DESIGN OF LOW IMPACT DEVELOPMENT INFILTRATION TREATMENT SYSTEMS

THE RESULTS ARE SHOWN BELOW:

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THE RESULTS ARE SHOWN BELOW:

THE FIVE BIOTENTION SYSTEMS SHALL BE SEEDED WITH THE NEW ENGLAND CONSERVATION/WILDLIFE MIX SHOWN BELOW. THE PROJECT LANDSCAPE ARCHITECT MAY INTRODUCE SHRUB SPECIES TO THIS SEED MIX IF DESIRED TO INCREASE THE DIVERSITY OF PLANT SPECIES WITHIN THE BIOTENTION SYSTEMS.

New England Conservation Wildlife Mix

Botanical Name	Common Name
<i>Andropogon gerardi</i>	Big Bluestem
<i>Achillea millefolium</i>	Common Yarrow
<i>Aster novae-angliae</i>	Common Aster
<i>Chamaenerion fasciculata</i>	Partridge Pea
<i>Dianthus canadensis</i>	Shaw's Pink
<i>Elymus virginicus</i>	Virgin Wildrye
<i>Eragrostis canadensis</i>	Spotted Foxtail
<i>Euthamia graminifolia</i>	Common Black-eyed Susan
<i>Festuca rubra</i>	Creeping Red Fescue
<i>Helleborus scaberrimus</i>	Ox-eye Daisy
<i>Panicum canadense</i>	Common Panicum
<i>Panicum virgatum</i>	Switchgrass
<i>Rudbeckia hirta</i>	Black-eyed Susan
<i>Schizanthus scaberrimus</i>	Little Bluestem
<i>Solidago juncea</i>	Early Goldenrod
<i>Sorghastrum nutans</i>	Indian Grass

Planting Notes: Always apply on clean bare soil. The mix may be applied by hydro-seeding, by mechanical spreader, or on a small site it can be spread by hand. Lightly rake, or roll to ensure proper seed-soil contact. Best results are obtained with a Spring seeding. Late Spring or Summer seeding will benefit with light mulching of seed-free straw to conserve moisture. If conditions are other than usual, watering may be required. Late Fall and Winter dormant seeding require an increase in the seeding rate. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed-free soil surface is necessary for optimal results.

Application Rate: 25 lbs/acre

Website for more information: [www.neseng.com](http://www.neseng.com)

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SOIL TEST RESULTS, CROSS SECTIONS & SWALE PROFILE  
SHEET 4 OF 6  
PROJECT #010-2012  
SCALES AS NOTED  
DATE: June 16, 2015, 10/25/15

PREPARED FOR  
SRG FAMILY, LLC  
22 & 96 OLD WATERBURY ROAD  
SOUTHBRURY - CONNECTICUT

NOTE: THE CONSTRUCTION SEQUENCE FOR THE STORMWATER MANAGEMENT PLAN AND LOW IMPACT SUSTAINABLE DEVELOPMENT PRACTICES (LINEAR BIORETENTION, BIOTENTION AND PERMEABLE PAVEMENT ARE FOUND ON THIS PLANS AND MUST BE IMPLEMENTED AS STATED TO ENSURE COMPLIANCE WITH DESIGN STANDARDS AS WELL AS FOR LONG TERM FUNCTIONALITY OF THE LIDS SYSTEMS.

NOTE: REFERENCE IS MADE TO OTHER SITE PLANS FOR MORE INFORMATION ON THIS PROJECT.

NOTE: TO ENSURE THE PROPER INSTALLATION AND LONG TERM FUNCTIONALITY OF LOW IMPACT SUSTAINABLE DEVELOPMENT STORMWATER MANAGEMENT SYSTEMS, IT IS IMPERATIVE THAT THE FOLLOWING CONSTRUCTION SEQUENCE FOR THE LINEAR BIORETENTION (AKA BIOSWALES), BIOTENTION AND PERMEABLE PAVEMENT BE STRICTLY FOLLOWED. ALL INSTALLATION WORK OF THE LIDS SYSTEMS MUST BE OVERSEEN BY TRINKAUS ENGINEERING, LLC.

Sequence of Construction for stormwater management components only:

1. Clear trees from areas of proposed linear and standard Biotention systems. Chip brush to be used as mulch.
2. It is very important for the functionality of the Biotention systems that earth disturbing activities are minimized in these areas.
3. Install perimeter Filtrtex Soxx (12" dia) as shown on the Stormwater management plans prepared by Trinkaus Engineering, LLC.
4. All erosion control measures must be installed in accordance with the details provided on these plans. Erosion control measures must be inspected by Trinkaus Engineering prior to the commencement of work on the Biotention systems.
5. Work shall be done on one Biotention system at a time in order to minimize site disturbance. The location of the Biotention system shall be staked in the field by Stuart Somers, Co, LLC for the contractor.
6. The Biotention system shall be graded in accordance with the Stormwater management plan prepared by Trinkaus Engineering. If necessary, the loam layer shall be excavated and replaced with sand and gravel from other excavation of this site. The bottom and side walls of the excavated shall be scarified by hand rake prior to the placement of the sand and gravel and/or the soil media mix for the Biotention facility. All excavation equipment must be located outside the limits of the Biotention system to prevent compaction of the native soils.
7. After the Biotention system has been installed, the side slopes and berm shall be covered with a minimum of 4" of topsoil, seeded and mulched.
8. TOPSOIL IS NOT PLACED ON THE TOP OF THE SOIL MEDIA WITHIN THE BIORETENTION SYSTEM.
9. The Conservation Seed mix by New England Wetland Plants shall be used on the bottom area of the Biotention systems, the side slopes and berm as well. The seeds shall be covered by hay mulch.
10. The Biotention system shall be watered as necessary to ensure the establishment of the plants and seeded areas.
11. Downgradient Filtrtex Soxx shall remain in place until a permanent vegetative cover has been established on the disturbed area around the Biotention system.

THIS SEQUENCE OF CONSTRUCTION OF THE BIORETENTION SYSTEM SHALL BE REPEATED UNTIL ALL FIVE BIORETENTION SYSTEMS HAVE BEEN INSTALLED BY THE CONTRACTOR. SEQUENCE OF CONSTRUCTION OF LINEAR BIORETENTION SYSTEM AND DISCHARGE POINTS INTO STANDARD BIORETENTION SYSTEMS.

1. Once the Biotention systems have been installed and stabilized, the next step is the installation of the Linear Biotention system along the north and west perimeter of the proposed parking facility. This work includes the installation of the "step" weirs in the Linear Biotention systems as well as the outlet weirs to each Biotention system.
2. The centerline of the Linear Biotention system, the location of the "step" weir and outlet weirs shall be staked in the field by the office of Stuart Somers, Co, LLC.
3. A 6" diameter Filtrtex Soxx shall be installed below the linear Biotention system and above the installed Biotention system to protect the installed Biotention systems during the installation of the linear Biotention systems.
4. The area for the Linear Biotention system shall be excavated to the required design surface elevation, including the depth of the soil media to be used here for each specific section of level elevation as shown on the plans.
5. Once each section of the Linear Biotention system has been excavated, the "step" weir shall be installed in accordance with the details provided on these plans. The contractor may pre-cast concrete slabs which can then be set into place for these weirs. Prior to the setting of the outlet weirs, the outlet channel of field stones to the Biotention system shall be graded and installed in accord with the details shown on this plan. Once the swale has been installed, the outlet weir shall be set in place per the plan.
6. Once the "step" weirs have been installed, the specified soil media for the Linear Biotention system shall be placed by excavator and hand raked and lightly compacted to the required design elevation.
7. The outer five (5) feet of the driveway and/or parking area shall be excavated in accord with the pavement detail provided by Stuart Somers, Co, LLC and the gravel base installed. Per the detail shown on this plan, the gravel base must extend a minimum of 6" beyond the pavement edge which will place it under a portion of the filter strip. The gravel shall be compacted per the specifications of the pavement detail by Stuart Somers, Co, LLC.
8. The topsoil for the 12" wide filter strip shall be placed and lightly compacted per the plan. IT IS EXTREMELY IMPORTANT THAT THE TOP OF THE TOP COMPACTED TOPSOIL IS AT LEAST 2" BELOW THE TOP OF THE FINAL PAVEMENT ELEVATION AT THE EDGE OF THE DRIVEWAY AND PARKING FACILITY. THIS WILL ALLOW SHEET FLOW OF THE RUNOFF FROM THE PARKING AREA TO "FALL OFF THE EDGE" OF THE PAVEMENT AND EASILY ENTER THE FILTER STRIP AND LINEAR BIORETENTION SYSTEM.
9. Once the topsoil has been placed, the Linear Biotention system and filter strip shall be seeded with one of the seed mixtures shown on this plan. The seed shall be covered with hay mulch and watered as necessary to ensure that it becomes established as soon as possible after installation.
10. The 6" Filtrtex Soxx shall be relocated to the outside edge of the filter strip and reinstalled, this will prevent the introduction of silt from the upgradient construction areas during the site disturbance phase.

PERMEABLE PAVEMENT WILL BE USED IN THREE SPECIFIC AREAS OF THE SITE TO ADDRESS STORMWATER QUALITY AND VOLUMETRIC REDUCTION. THESE AREAS ARE SHOWN ON SHEET 6 OF THIS PLAN SET. PERMEABLE PAVEMENT WILL BE THE LAST LIDS SYSTEM INSTALLED ON THIS SITE TO PREVENT DAMAGE TO THE SURFACE AS WELL AS TO PREVENT PREMATURE CLOGGING OF THE INFILTRATIVE SURFACE.

1. During the site work phase of the project, the topsoil and loam shall be removed from the areas of the proposed permeable pavement down to the elevation of the native sand and gravel layer.
2. The excavated material shall be replaced with native sand and gravel material excavated from other portions of the site. The replacement sand and gravel shall be placed in 12" lifts and lightly compacted by driving the bulldozer back and forth over this replacement material.
3. No gravel for the permeable base shall be installed at this time. Construction shall continue on the site per the approved plans.
4. When all construction is complete on the building, biotention, linear biotention, retaining walls, sidewalks and standard pavement, only then will the permeable pavement be installed.
5. The top of the native or replacement soils shall be scarified by hydraulic excavator and reggraded to the required elevation and slope (same as finish grade). The sand and gravel material shall then be rolled with a 7.5 ton roller (no vibrating).
6. The gravel for the reservoir layer shall be placed for the permeable pavement areas, spread by small bulldozer and rolled by 3 ton roller (no vibrating).
7. The checker course layer shall be placed for the permeable pavement areas, spread by small bulldozer and rolled by a 3 ton roller (no vibrating).
8. Permeable pavement shall be installed in two lifts under the direct supervision of Trinkaus Engineering, LLC and in full compliance with the UNHSC specification (attached to stormwater management report).
9. After both layers of Permeable Pavement have been installed, bituminous curbing shall be installed per the plans. Vehicles shall not be allowed on the permeable pavement until the Temperature is 100 degrees or less.

#### Construction Sequence for Construction of Each Biotention System

1. No construction equipment shall be permitted to drive over or be parked on top of any Biotention area.
2. Limits of Biotention systems shall be delineated in the field by the project land surveyor.
3. Tree stumps shall be removed from the Biotention area by hydraulic excavator and disposed of off-site in a proper manner.
4. After stumps have been removed, the earth shall be excavated to the required elevation for the bottom of the soil media layer. This excavation shall be done by a hydraulic excavator located outside the limits of the Biotention system.
5. After the excavation has occurred, the bottom and side walls of the Biotention system shall be scarified by hand labor using grade rakes.
6. The mixed soil media will be placed in the excavated area by hydraulic excavator and roughly leveled by the excavator. Final grading will be done by hand labor with rakes to achieve level surface of design elevation.
7. Native plant species will be planted in each basin in accord with the planting plan shown for each Biotention system.
8. All construction work associated with the installation of the Biotention systems will be overseen by Trinkaus Engineering, LLC.

#### MAINTENANCE OF FILTER STRIP AND LINEAR BIORETENTION SYSTEMS:

The Filter strip and Linear Biotention are the pre-treatment component of the stormwater management system for this project. They have been designed to intercept and allow sediments to settle out in the bottom of the Linear Biotention, which will prevent the introduction of sediment into the actual Biotention systems. This significantly improves the functionality and effectiveness of the Biotention systems to treat and infiltrate runoff.

1. The filter strip and Linear Biotention system shall be inspected on a quarterly basis by maintenance staff. The staff shall look for accumulated sediment, organic debris such as leaves and branches. Leaves and branches shall be removed on a quarterly basis, if necessary.
2. Any accumulated sediment in the filter strip and Linear Biotention system shall be removed at twice a year intervals. The first time shall be Mid to Late April at the end of winter. The second time shall be from the End of October to Mid November prior to the onset of winter.

#### SUGGESTED MAINTENANCE PROTOCOLS FOR THE PAVED SURFACE OF THE PARKING FACILITY:

1. Plowing during the winter shall be done as frequently as possible in accord with the desire of the owner. Frequent plowing can prevent the build up of compacted snow on the pavement surface.
2. While it is acceptable to plow the snow off the edge of the parking facility over the area of the Linear Biotention system, the stockpiling of excess snow in these areas should be avoided. Possible snow stockpile locations are shown on the Stormwater management plan, Sheet 1 of 5 for use during exceptional snowy winters.

#### MAINTENANCE OF BIORETENTION SYSTEMS:

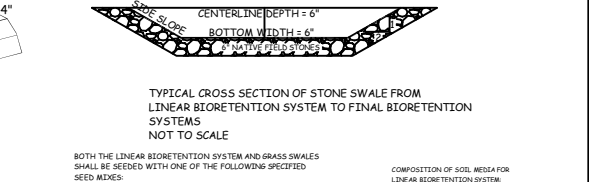
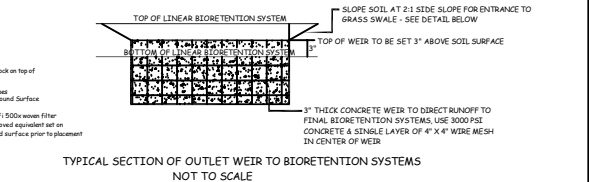
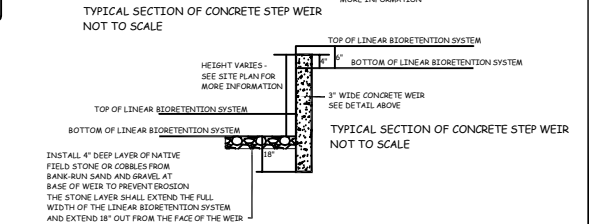
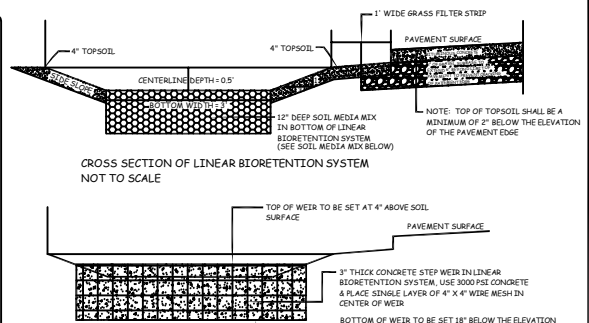
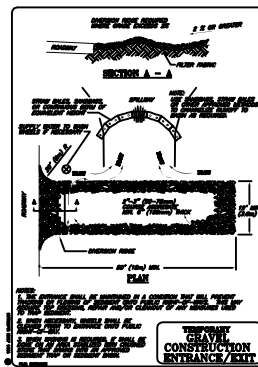
1. Biotention systems shall be inspected on an annual basis. Weeds shall be removed as necessary to ensure the colonization of the planted species.
2. If accumulated sediment is visible on the surface of the mulch, it shall be removed by hand and disposed of properly.
3. The Biotention system has been designed and sized to drain within 24 hours after a storm event. If significant ponding (>2") is observed after 24 hours, the soil surface may be clogged. The surface shall be raked to restore the infiltrative capacity.

#### MAINTENANCE OF FIELD STONE SWALES:

1. The field stone swale shall be inspected on a quarterly basis by maintenance staff. Any organic debris, such as leaves and branches shall be removed.
2. Accumulated sediment shall be removed if the depth of sediment covers the stone surface. If sediment is just observed in the gaps between the field stones that is acceptable and does not need to be removed.

#### INSTALLATION OF STONE WETLAND CROSSING:

1. Clean trees and brush within limits of proposed wetland crossing. Stumps to be cut flush as close to the ground surface as possible.
2. Install layer of Miraf 500x woven filter fabric on top of ground surface in wetland area. Fabric should extend a minimum of 3' into the adjacent upland areas.
3. Installation of 6" PVC pipes across proposed wetland crossing at existing grade.
4. Construct boulder headwalls on both sides of proposed driveway by stacking the rocks in place.
5. Install a minimum of 12" of clean blasted rock on top of the filter fabric and mechanically compact the material.
6. Continue with the installation of the boulder walls until the finish height is reached.
7. Install gravel base for driveway.



BOTH THE LINEAR BIORETENTION SYSTEM AND GRASS SWALES SHALL BE SEEDS WITH ONE OF THE FOLLOWING SPECIFIED SEED MIXES:		COMPOSITION OF SOIL MEDIA FOR LINEAR BIORETENTION SYSTEM:	
1. KENTUCKY BLUEGRASS	0.45 LB/1,000 SQ. FT.	COARSE SAND (85%) (WASHED CONCRETE SAND)	LEAF COMPOST (15%) - Organic soil shall have no more than 2% clay.
2. CREEPING RED FESCUE	0.45 LB/1,000 SQ. FT.	ORGANIC SOIL (15%)	
3. CREEPING RED FESCUE	0.45 LB/1,000 SQ. FT.	ORGANIC SOIL (15%)	
4. CREEPING RED FESCUE	0.45 LB/1,000 SQ. FT.	ORGANIC SOIL (15%)	COMPOSITION OF SOIL MEDIA FOR BIORETENTION SYSTEMS A, B, AND C:
5. CREEPING RED FESCUE	0.45 LB/1,000 SQ. FT.	ORGANIC SOIL (15%)	
6. CREEPING RED FESCUE	0.45 LB/1,000 SQ. FT.	ORGANIC SOIL (15%)	

NOTE: CONTRACTOR MUST SCARIFY BOTTOM AND SIDES OF BIORETENTION SYSTEM PRIOR TO PLACEMENT OF SOIL MEDIA. SCARIFICATION SHALL BE DONE BY HAND WITH A YARD RAKE.

#### FILTRTEX® SEDIMENT CONTROL

NTS

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CONSTRUCTION DETAILS  
& CONSTRUCTION NARRATIVE

SHEET 5 OF 6  
PROJECT #1010-2012  
SCALE: 1" = 40'  
DATE: June 16, 2015, 10/25/15

PREPARED FOR  
SRG FAMILY, LLC  
22 & 96 OLD WATERBURY ROAD  
SOUTHBRURY - CONNECTICUT



