

EMBARC

June 3, 2021

Ara Yogurtian
TOWN OF BELMONT
Office of Community Development
ayogurtian@belmontma.gov

**Re: 91 Beatrice Circle 40B, Belmont MA
Preliminary Architectural Peer Review Response**

Dear Ara:

Please see our responses, below, to the itemized responses as they correspond to the bullet points stated in the attached peer review letter.

4. – Consult with Applicant’s design team

Two design consultations have occurred since the peer review letter was submitted: Friday May 14, 2021 and Friday May 21, 2021.

5. a. – Orientation of building in relation to parking areas, open space and on-site amenities.

In response to the lack of programmable outdoor space, a number of changes have been made. The (4) single family residences have been replaced with a row of (5) townhouses, and the previous row of (8) townhouses was reduced to (7) townhouse units. This allowed for the creation of several open areas around the site for a children’s play area, bike storage, a shared patio space, snow storage and private patios.

Trash and recycling will be handled by the creation of a dumpster area at the end of the shared driveway, easily accessible to the residents and shielded from view of the neighbors by the west retaining wall.

Responses to bulleted items, in order:

- Buffering has been increased throughout the edges of the site, the exception being along frontage road, where the buildings were moved closer to the existing Town-owned buffer land and away from abutting homes.
- Driveway slope has been addressed, the steepness reduced to a 10% grade from Frontage Road to the property line with a gently sloping area beyond that and the driveway adjusted to meet Frontage Road at a perpendicular angle.
- The travel lane has been amended to allow for the addition of a garage entry at that location, increasing the efficiency of the lane.
- An accessible parking space has been added at the surface parking area per IBC and MAAB regulations.
- Landscape plan has included additional screening at the end of the travel lane as well as a screening fence at the rear property line and a low fence atop the East retaining wall to shield headlight glare.
- The buffer from this existing retaining wall at the West of the site has been increased to allow for further protection during and after construction.
- The accessible walkway to the public way has been relocated to allow for sloping to correspond to MAAB regulations.

- Programmable open space has been added to the development as noted in the first paragraph above. The unit mix has also changed, adjusting the count to (8) 3-bedroom units and (4) 4-bedroom units, maintaining the 12 total units on site.
- The open space has been adjusted to include more programmable open space, as noted in the landscape architecture drawings.
- The 5 ft buffer between buildings has been eliminated, and these open space “fragments” have been collated to create larger, programmed open space.
- Single family structures have been eliminated, and the townhouses will all feature sprinklers in accordance with all applicable fire and life safety regulations.
- Landscape and civil plans have been revised and coordinated.
- A bike storage area has been added to the design.
- The mechanical units will be ground mounted and are shown on the site plans.

5.b. Function, use and adequacy of open space and landscaped areas.

- These have all been amended as noted above.

5.c. Use and treatment of natural resources.

- Civil engineering and buffering issues have been addressed.

5.d. Building design, setbacks, massing and scale in relationship to the surrounding context and topography.

- The scale of the front row of townhouses has been revised from (8) units down to (7) units, and the distance from the West property line increased. The single-family homes at the rear of the site have been replaced with townhouses to increase useable open space, and they have been revised from 4-bedroom units to 3-bedroom units.

5.e. Viewsheds of the project visible from the public street, public areas and from the vantage point of nearby residential neighborhoods.

- Viewshed from Frontage Road at the driveway entrance depicting the revised design has been provided, additional contextual images, showing the changes noted above, will be included for our next public hearing.

5.f. Pedestrian and vehicular access and circulation; adequacy of accessibility provisions. Of particular interest are the implications of access and egress in terms of pedestrians, bicyclists and motorists. Adequacy of parking facilities.

- Bicycle storage has been included in the revised plans.

5.g. Integration of building and site, including but not limited to preservation of existing tree cover, if any.

- Site open space has been revised, as noted above, to allow for the preservation of existing tree cover at the South-West portion of the site. Proposed buffering has also been increased.

5.j. Exterior lighting

- A site lighting plan photometrics analysis is being coordinated and will be included in future submissions.

5.k. Proposed landscape elements, planting materials, and planting design.

- See comments above for how these elements have been addressed.

5.l. Feasibility of incorporating environmental and energy performance standards in the design, construction and operation of the buildings.

- The project will comply with all local and national building and energy standards, and will be compliant with the Stretch Energy Code as noted by the peer reviewer.

5.m. Any other design-related considerations identified by me, ZBA, town staff, working group, or the citizenry of Belmont.

In order of bullet points:

- Improvements to the existing sidewalk and crosswalk condition at Frontage Road have been proposed in addition to the revised accessible walkway, a bus shelter is not currently included in the plans.
- No MAAB Group 2 units will be provided, as the townhouse unit type, and total unit count, does not fall under the provisions MAAB regulations.
- Bicycle storage has been included in the revised plans.
- The townhouse garages will be designed to allow for the future provision of EV charging stations.
- No specified outdoor smoking area is proposed for the project but the amount of usable outdoor space has increased in the revised plans.
- Revised plans show a crosswalk layout that should allow for an improvement over existing-conditions.

Summary

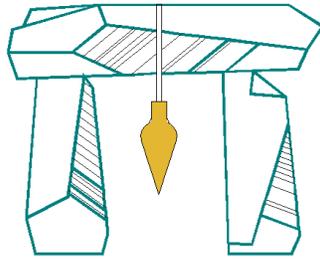
The project has been revised to address the issues included in the peer review report as discussed during the (2) working sessions that occurred during the month of May. The revisions allow the project to be a better “fit” contextually and within the larger fabric of Belmont.

Sincerely,

Tim Loranger | Architect
Associate

cc: Daniel Riggs, Dartagnan Brown, Jesse Schomer, Joe Tamposi

DeCelle-Burke-Sala



& Associates, Inc.

Engineering Report
for a
Multi-Unit Residential Development
91 Beatrice Circle
Belmont, Massachusetts

Prepared by:

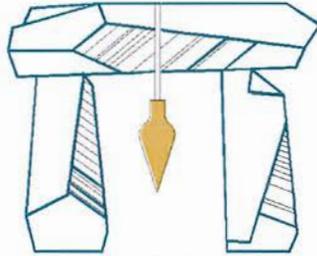
DeCelle-Burke-Sala & Associates, Inc.
1266 Furnace Brook Parkway
Suite 401
Quincy, MA 02169

Prepared for:

91 Beatrice Circle LLC
c/o Regnante Sterio
401 Edgewater Pl., #603
Wakefield, MA 01880

Revised: June 1, 2021

DeCelle-Burke-Sala



& Associates, Inc.

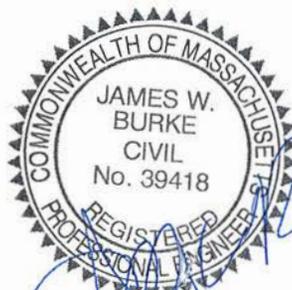
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SECTION 1 - PROJECT NARRATIVE

Existing Conditions

The project site is one parcel of land totaling 23,496 square feet of land designated as Map 51 Lot 36 with the Town of Belmont Assessors. The site is currently improved with a one and one-half story single-family home with driveway access off Frontage Road and is zoned Single Residence A. The residential building is approximately a 2,730 square foot (s.f.) footprint with a 456 s.f. single story detached garage. The driveway extends from Frontage Road to the garage and provides for additional on-site parking.

The Subject Property is bounded by single-family homes to the east, west and south. Frontage Road, also known as Hinckley Way, is located to the north of the Subject Property. Frontage Road abuts Massachusetts' Route 2/Concord Turnpike. The Concord Turnpike is an eight-lane main thoroughfare providing service for commuter traffic for the City of Boston and the west and northwest communities of the Metro Boston region. Frontage Road is a one-way two lane road that travels east and provides access to the Concord Turnpike further east of the Subject Property. Frontage Road also delineates the municipal boundary between Arlington and Belmont and is part of the MBTA bus routes #62, 76, 78, and 84, providing service to the MBTA's Red Line in Cambridge, Massachusetts.

The Subject Property has mature landscaping around the home and along Frontage Road. The site has topography ranging in elevation from 236 on the west of the lot to elevation 218 on the east side of the lot. The majority of the lot surface topography rolls to the east and toward Frontage Road. Soils are mapped by the Natural Resources Conservation Service (NRCS) as a Charlton-Hollis Rock Complex consisting of shallow well-drained gravel and sand with ledge. Test pits were performed by this office confirming the mapping.

Public water and sewer with connections out to Frontage Road service the single-family home. Underground power and communications also service the home. There are no existing stormwater controls for the property. All existing stormwater flows over-ground to Frontage Road.

Proposed Conditions

The proposed project is to demolish the existing building and all existing pavement on site and construct a multi-unit affordable residential development subject to the Massachusetts Chapter 40B Housing regulations. The project will consist of two new residential buildings, one townhouse style building with seven units and one townhouse style building with five units for a total of twelve dwelling units. Each building will be a slab-on-grade style building.

Each residential unit has a single car garage with access off a shared driveway that is centered between the buildings. The driveway is accessed from Frontage Road in a similar location to the existing driveway. The driveway also provides access to an eight (8) space surface parking lot providing a total of twenty (20) spaces for a parking ratio of 1.67. A six-foot wide pedestrian walkway extends up the driveway from Frontage Road and connects to a walkway for the townhouse building and to the main driveway to the development.

The grade on site shall be lowered to the proposed driveway elevation of 227 down to 225. Two retaining walls on either end of the site shall stabilize the site at a more level elevation for vehicular traffic and parking. A slab-on-grade construction has been chosen for the proposed buildings to minimize the amount of ledge removal required for the project.

New utilities will be brought on-site in the vicinity of the driveway from Frontage Road. New water supply, fire protection, sewage disposal, power, communications and gas shall be brought on the site underground. A 6" water supply pipe shall extend from the water main and provide individual domestic services for each townhouse unit and fire protection for each building. A new 6" PVC sewer pipe shall extend from the sewer main and connect to the proposed southerly building providing a separate service for each unit. The northerly building shall have a 6" PVC sewer service for each unit extended to a 6" PVC sewer line that connects to an existing sewer manhole that serviced the old home. The existing sewer connection from this manhole to the sewer main shall remain in service.

Currently no stormwater controls exist on the site. The proposed stormwater control system consists of a surface collection system that includes two water quality catch basins, two deep sump catch basins, an area drain, a trench drain, one water quality manhole, six drain manholes, an underground infiltration system and an underground detention tank. The underground infiltration system consists of a single row of sixteen (16) Cultec Recharger 280HD's and surrounding stone. The infiltration system has been designed to collect the roof runoff from the proposed building and a large portion of the driveway runoff. The infiltration system has been sized to meet the required recharge and water quality volumes as required. The underground infiltration system has a 10 inch HDPE overflow which connects to the underground detention system for the larger storm events. The underground detention system is an eight (8) foot wide by seventy-six (76) foot long by (6) foot high underground concrete box culvert. The box culvert has been designed to detain the stormwater onsite until it can be released in a controlled manner to reduce the peak runoff flows entering the Belmont drainage system. The box culvert has been designed with an outlet control structure that connects to the Belmont drainage system through the use of a proposed drain manhole in Frontage Road, The stormwater system as proposed meets MassDEP Stormwater Management Standards through the use of infiltration, detention and water quality BMP's.

Stormwater Management

It is the intent of this report to show compliance with the Massachusetts Stormwater Management Standards (the “Standards”). This office generated hydrographs for both existing and proposed conditions to compare peak flows for various storms. A comparison of this data is included further below in this report.

Nine test holes were performed on site and a sandy loam parent material was found sitting on top of ledge at varying depths. A Rawl’s Rate of 2.41 inches per hour was used for exfiltration at the request of the peer review engineer from Weston and Sampson. Minimums for Times of Concentration for both existing and proposed conditions for hydrograph generation were used where the time of concentration was calculated under 6 minutes. Impervious land coverage increases but the majority of runoff will now be treated by the underground infiltration system or proprietary stormwater structures. The runoff for the 2, 10, 25 and 100-year storm events are reduced and the project as proposed exceeds the recharge volume requirement.

The project complies with the Standards laid out in the Massachusetts Stormwater Handbook as explained below:

Standard 1 - No new stormwater conveyances discharge untreated stormwater directly to the waters of the Commonwealth. All stormwater runoff with the potential for collecting suspended solids and pollutants is pretreated prior to its release into the ground for infiltration or released to the town drainage system.

Standard 2 - Post-development discharge rates do not exceed pre-development through the use of underground infiltration and detention. The proposed site has been graded to capture the majority of the stormwater runoff so that it can be treated and released to best match the existing site hydraulics. Two design points have been compared when determining the peak discharge rates for the project locus. The first is the peak flow discharging to the town drainage system in Frontage Road. The second is the peak flows discharging to the abutting properties to the south and east. A comparison chart for the pre- and post-development peak flows are included further below and HydroCAD analyses are included in Section 3 of this report.

Standard 3 - The proposed site design must ensure that the annual recharge for the post-development site shall approximate the annual recharge from the pre-development conditions based on the soil type. Also the infiltration structures must be designed to drain within 72 hours. The required recharge volume for the site has been calculated below:

Required Recharge Volume Calculation:

Given:

Collected Impervious Area=12,350 s.f.

Total Impervious Area=16,138 s.f.

Target Depth Factor=0.6in/hr for A soils

Solve:

Adjustment Factor=Total Impervious Area/Collected Impervious Area

Adjustment Factor= 16,138 s.f./12,350 s.f. = 1.31

$R_v = \text{Collected Impervious Area} \times \text{Target Depth Factor} \times \text{Adjustment Factor}$

$R_v = 12,350 \text{ s.f.} \times (0.6\text{in/hr}/12\text{in/ft}) \times 808 \text{ c.f.}$

$R_v = 808 \text{ c.f.}$

The proposed recharge system was designed to be able to recharge the required recharge volume and drain within the required 72 hour period. Supporting calculations based upon the *simple dynamic* method have been included in Section 3 of this report.

- Standard 4* - The site uses proprietary water quality structures to pretreat the stormwater runoff with the greatest potential to collect Total Suspended Solids (TSS) and pollutants prior to releasing the runoff into the underground infiltration system or detention system where it slowly infiltrates into the ground or is released to the town drainage system. TSS removal calculations are included in Section 3 of this report. Since removal efficiency may vary with each storm, 80% TSS removal is not required for each storm. It is the average removal over the year that is required to meet the standard. The required water quality volume of 1.0 inch of rain over the impervious area for the infiltration system has been calculated below along with the equivalent discharge rate for the proprietary treatment structures.

Water Quality Volume Calculation for Infiltration System:

Given:

Impervious Area to System (not including Roof)=4,875 s.f.

Solve:

$WQV = 1.0 \text{ in.} \times \text{Impervious Area}$

$WQV = (1.0 \text{ in}/12\text{in/ft}) \times 4,875 \text{ s.f.}$

$WQV = 406.25 \text{ c.f.}$

*406.25 c.f. (WQV) < 808 c.f. (R_v) Use R_v to size infiltration system

Water Quality Flow Calculation for CDS 1:

Given:

WQV=1.0 in.

Impervious Surface Drainage Area (A)= 3,753 s.f. = 0.0001346mi²

Time of Concentration (Tc)= 6 mins. = 0.1 hrs

Unit Peak Discharge (qu)= 774 csm/in

Solve:

$Q=(qu)(A)(WQV)$

$Q=(774 \text{ csm/in}) \times (0.0001346 \text{ mi}^2) \times (1 \text{ in.})$

Q=0.1042 cfs

CDS2015-4-C by Contech used with a MFTR of 0.93 cfs

Water Quality Flow Calculation for CDS 2:

Given:

WQV=1.0 in.

Impervious Surface Drainage Area (A)= 1,138 s.f. = 0.00004025mi²

Time of Concentration (Tc)= 6 mins. = 0.1 hrs

Unit Peak Discharge (qu)= 774 csm/in

Solve:

$Q=(qu)(A)(WQV)$

$Q=(774 \text{ csm/in}) \times (0.00004025 \text{ mi}^2) \times (1 \text{ in.})$

Q=0.0316 cfs

CDS2015-4-C by Contech used with a MFTR of 0.93 cfs

Water Quality Flow Calculation for WQU MH:

Given:

WQV=1.0 in.

Impervious Surface Drainage Area (A)= 2,626 s.f. = 0.00009419mi²

Time of Concentration (Tc)= 6 mins. = 0.1 hrs

Unit Peak Discharge (qu)= 774 csm/in

Solve:

$Q=(qu)(A)(WQV)$

$Q=(774 \text{ csm/in}) \times (0.00009419 \text{ mi}^2) \times (1 \text{ in.})$

Q=0.073 cfs

SFMH48 Stormfilter Water Quality Unit by Contech used with a MFTR of 0.0334 cfs per filter x 3 filters for a total MFTR of 0.10 cfs.

- Standard 5* - The project locus does not qualify as a land use with higher potential pollutant loads.
- Standard 6* - The project locus does not lie within a Zone II, Interim Wellhead Protection Area or within an Area of Critical Environmental Concern.
- Standard 7* - The project does not qualify as a redevelopment project due to the increase in impervious area.
- Standard 8* - A plan to control construction related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities has been included in Section 2.
- Standard 9* - A long term operation and maintenance plan has been developed for this property to ensure the stormwater management systems function as designed and is included in Section 2.
- Standard 10* - Per Standard No. 10 of the MassDEP Stormwater Management Standards, there shall be no illicit discharges to the stormwater management system. The Property Manager is responsible for implementing the Operation and Maintenance Plan and overseeing activities at the facility to prevent illicit discharges to the drainage system from occurring. It is strictly prohibited to discharge any products or substances onto the ground surface or into any drainage structures, such as catch basin inlets, manholes, water quality units, vegetated areas, basin or drainage outlets that would be a detriment to the environment. The property manager shall endorse the validity of this statement in the Operations and Maintenance Plan and submit it to the Town of Belmont.

It is DBS's belief that the project complies with the Stormwater Management Standards. The project as proposed will protect the abutter in the short term through proper construction and erosion protection techniques. It will also protect the environment from long term impacts due to the improved stormwater controls.

Stormwater Runoff Comparison Chart for Pre- and Post-Construction Flow Runoff to Frontage Road

2-Year Storm (3.27")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.03	Flow off-site	0.03

10-Year Storm (5.16")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.30	Flow off-site	0.30

25-Year Storm (6.34")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.54	Flow off-site	0.49

100-Year Storm (8.15")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.98	Flow off-site	0.87

**Stormwater Runoff Comparison Chart for Pre- and Post-Construction Flow
Runoff to Abutters**

2-Year Storm (3.27")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.04	Flow off-site	0.00

10-Year Storm (5.16")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.31	Flow off-site	0.01

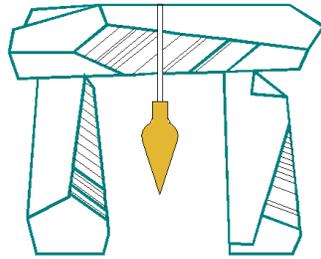
25-Year Storm (6.34")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.59	Flow off-site	0.05

100-Year Storm (8.15")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	1.15	Flow off-site	0.18

SECTION 3 - MANAGEMENT PLANS

Stormwater Operation & Maintenance Plan
Erosion and Sedimentation Control Plan

DeCelle-Burke-Sala



& Associates, Inc.

**Stormwater Operation & Site Maintenance Plan
for
91 Beatrice Circle
Belmont, Massachusetts**

Prepared by:

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

Prepared for:

91 Beatrice Circle LLC
c/o Regnante Sterio
401 Edgewater Pl., #603
Wakefield, MA 01880

Revised June 1, 2021

Introduction

This Stormwater Operation & Maintenance Plan (SOMP) is for the residential development and property located at 91 Beatrice Circle in Belmont, Massachusetts. The SOMP is outlined below to provide long term operation and maintenance procedures of the stormwater controls installed to manage the stormwater flow generated on the site. The landowners are required to implement the procedures and ensure the long term benefits of the stormwater controls approved and installed for this project. The SOMP provides simple operational and maintenance procedures for the stormwater control structures as well as perform various tasks to remove pollutants from areas that would have potential to be picked up on site and moved via stormwater offsite.

The landowners, also known as the condominium association, shall be responsible to inspect, maintain and operate the stormwater management system as well as inspect the grounds for eroded areas and collected pollutants. The stormwater recharge structure is located under the driveway between the buildings and can be observed through inspection ports.

Appointing a responsible person in charge to implement this SOMP on behalf of the landowner is preferred but the landowners shall be responsible at all times for implementing this SOMP. The purpose of the SOMP is to maintain the long term benefits from the Stormwater Management features constructed that support groundwater recharge and pollution prevention.

Responsible Party - 91 Beatrice Circle LLC
c/o Regnante Sterio
401 Edgewater Pl., #603
Wakefield, MA 01880

The responsible party listed above is responsible for inspecting, maintaining and keeping copies of maintenance records for the following plan and will be referred to as the Site Manager for the remainder of this report. If another individual/company is responsible for the every day management of the property the name and contact information shall be made available to the Town of Belmont. The responsible party can expect a yearly budget of \$3,000 to \$4,000 per year to maintain this site. This includes the necessary stormwater structure inspections, maintenance procedures, and snow management.

Upon any future transfer of ownership all future owners will be obligated to use, maintain, and continue to adhere to this SOMP in accordance with the manufacturers recommendations and all inspection records will be maintained and made available to the Town of Belmont upon request.

Non-Structural Operations

Pavement Sweeping

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

Snow Management

Proper snow management practices will be implemented to minimize runoff and pollutant loading impacts. Plowed or shoveled snow will be placed in pervious areas at the edges of the pavement where it can slowly infiltrate. Snow will be placed on to pervious areas that are not subject to excessive shade from buildings or vegetation. All accumulated sediment from snowmelt shall be removed each spring. If excessive snow inhibits movement around the properties or the stormwater management facilities The Site Manager will be responsible to remove the snow from the site and dispose of it in a legal manner. At no time shall snow be stored behind a retaining wall or on abutting properties.

Landscape Maintenance

The Site Manager shall hire a landscaper to provide proper lawn mowing practices and necessary shrub pruning to minimize sediment and pollutant loading impacts. The Landscaper will be responsible for all lawn clippings and landscape related debris to be collected and disposed of off-site in a legal manner. All landscape maintenance shall be conducted in a manner as to disallow all clippings, trimmings, and landscape product from being discharged into the drainage system or to be carried off site by stormwater runoff.

Structural Operations

Deep Sump Catch Basins and Manholes

The deep sump catch basins were installed to capture stormwater runoff and provide pretreatment for TSS and oils. The catch basins were fitted with a proprietary water quality outlet control assembly called a SNOUT® to assist in the efficiency of capturing TSS and oils. The SNOUT® has manufacturer suggested maintenance procedures attached to this document. The Site Manager shall review and follow these maintenance procedures to maximize the efficiency of the water quality catch basin hood. To ensure maximum capacity and efficiency, the deep sump catch basins and manhole sumps will be cleaned when half of the available capacity of the sump has been used or at a minimum of twice per year. The Manager shall inspect and clean the sumps of the catch basins at least twice per year or if a 24” depth of sediment exists in the sump. The Manager shall also inspect the drain manholes to ensure no blockage or sediment buildup is located within the structure. The Manager shall also inspect the outlet control structure to ensure the outlet is free and clear of any sediment or trash buildup. The Site Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in cleaning stormwater sumps with a vacuum truck. All sediment and water retrieved from the sumps and other structures if required upon inspection, shall be disposed of by the hired company off-site in a legal manner. The Manager shall provide a written inspection report of which an example form is attached.

SNOUT®

The SNOUT® is a locally manufactured stormwater treatment product that is a vented fiberglass water quality hood that is installed over the outlet pipe in a storm water structure with a sump that skims oils, floatables and trash off of the surface water while letting settleable solids sink to the bottom. The cleaner water exits from beneath the SNOUT, which is lower than the bottom of the pipe, but above the bottom of the

structure allowing both floatable material and solids that sink to stay in the structure. Each catch basin and deep sump manhole structure is fitted with the SNOUT®. The Manager shall inspect the SNOUT® at least four times per year, the same time as the sumps are inspected. During inspection, the anti-siphon vent and access hatch are recommended to be inspected. A simple flushing of the vent, or a gentle rodding with a flexible wire are all that's typically needed to maintain the anti-siphon properties. The Site Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in inspecting the SNOUT® and make sure it is operating as intended. If damaged the SNOUT® shall be repaired or replaced entirely. The Manager shall provide a written inspection report of each SNOUT® which an example form is attached. A copy of the SNOUT® Maintenance and Inspection Guide is attached to this document for additional information and manufacturer recommendations.

CDS 2015-4-C Water Quality Unit

The CDS 2015-4-C structure is a proprietary water quality treatment tank manufactured by Contech. Two units were installed for stormwater quality control and as pretreatment for the Cultec chamber recharge system. The Site Manager shall inspect the CDS unit more frequently once initially installed to determine the rate of sediment accumulation. To ensure maximum capacity and efficiency, the CDS Unit will be cleaned when half of the available capacity of the sump has been used or at a minimum of twice per year. We recommend the Site Manager clean the chambers a minimum of twice per year after becoming familiar with the unit or more often if necessary based on the initial inspections. The Site Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in cleaning stormwater sumps with a vacuum truck. All sediment and water retrieved from the sumps and other structures if required upon inspection, shall be disposed of by the hired company off-site in a legal manner. The Manager shall provide a written inspection report of which an example form is attached. A copy of the Contech Maintenance and Inspection Guide for the CDS Unit is attached to this document for additional information and manufacturer recommendations.

SFMH48 Stormfilter Water Quality Unit

The SFMH48 structure is a proprietary water quality treatment tank manufactured by Contech. The tank was installed for stormwater quality control and as pretreatment for the detention basin. The Site Manager shall inspect the SFMH48 unit more frequently once initially installed to determine the rate of sediment accumulation. To ensure maximum capacity and efficiency, the SFMH48 Unit will be cleaned when >4" of sediment has accumulated on the manhole floor or at a minimum of twice per year. We recommend the Site Manager clean the chamber a minimum of twice per year after becoming familiar with the unit or more often if necessary based on the initial inspections. The Site Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in cleaning stormwater sumps with a vacuum truck. All sediment and water retrieved from the sumps and other structures if required upon inspection, shall be disposed of by the hired company off-site in a legal manner. The Manager shall provide a written inspection report of which an example form is attached. A copy of the Contech Maintenance and Inspection Guide for the SFMH48 Unit is attached to this document for additional information and manufacturer recommendations.

Underground Cultec Chambers

The underground Cultec chambers were installed to improve water quality and recharge stormwater generated from the proposed parking lots, driveways and roofs. With two levels of treatment for the pavement runoff the infiltration chambers will remain effective with maintenance for a long period of time. The Site Manager shall inspect the chambers more

frequently once initially installed to determine the rate of sediment accumulation. We recommend the Site Manager inspect the chambers a minimum of twice per year after becoming familiar with the system or more often if necessary based on the initial inspections. Inspection ports are brought to grade to allow The Site Manager to observe if the chambers are ponding or accumulating sediment. If sediment greater than 3-in. in depth is found, the row should be cleaned with high pressure water through a culvert cleaning nozzle. The use of CCTV inspection can be deployed through the inspection ports to determine if any sediment has accumulated. The Site Manager shall inspect the inlet and outlet pipes of the system to verify clogging and remove debris if necessary. If the chambers require service then The Site Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in cleaning underground chambers with a vacuum truck. All sediment and water retrieved from the chambers shall be disposed of by the hired company off-site in a legal manner. The Site Manager shall provide a written inspection report of which an example form is attached. A copy of the Cultec Maintenance and Inspection Guide for the CDS Unit is attached to this document for additional information and manufacturer recommendations.

Site Management

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

Record Keeping

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

Illicit Discharge Statement

Per Standard No. 10 of the MassDEP Stormwater Management Standards, there shall be no illicit discharges to the stormwater management system. The Property Manager is responsible for implementing the Operation and Maintenance Plan and overseeing activities at the facility to prevent illicit discharges to the drainage system from occurring. It is strictly prohibited to discharge any products or substances onto the ground surface or into any drainage structures, such as catch basin inlets, manholes, water quality units, forebays, basin or drainage outlets that would be a detriment to the environment.

Property Manager: _____ Date _____

Appendix

Example Inspection Schedule and Evaluation Checklist

BMP Location Plan

Snow Management Plan

Manufacturer's Maintenance Considerations for Snout®

Manufacturer's CDS Guide for Maintenance

Manufacturer's SFMH48 Stormfilter Guide for Maintenance

Cultec Chambers Operation & Maintenance Guide

Proposed Multi-Unit Residential Development

91 Beatrice Circle, Massachusetts

Stormwater Operation & Site Maintenance Plan

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

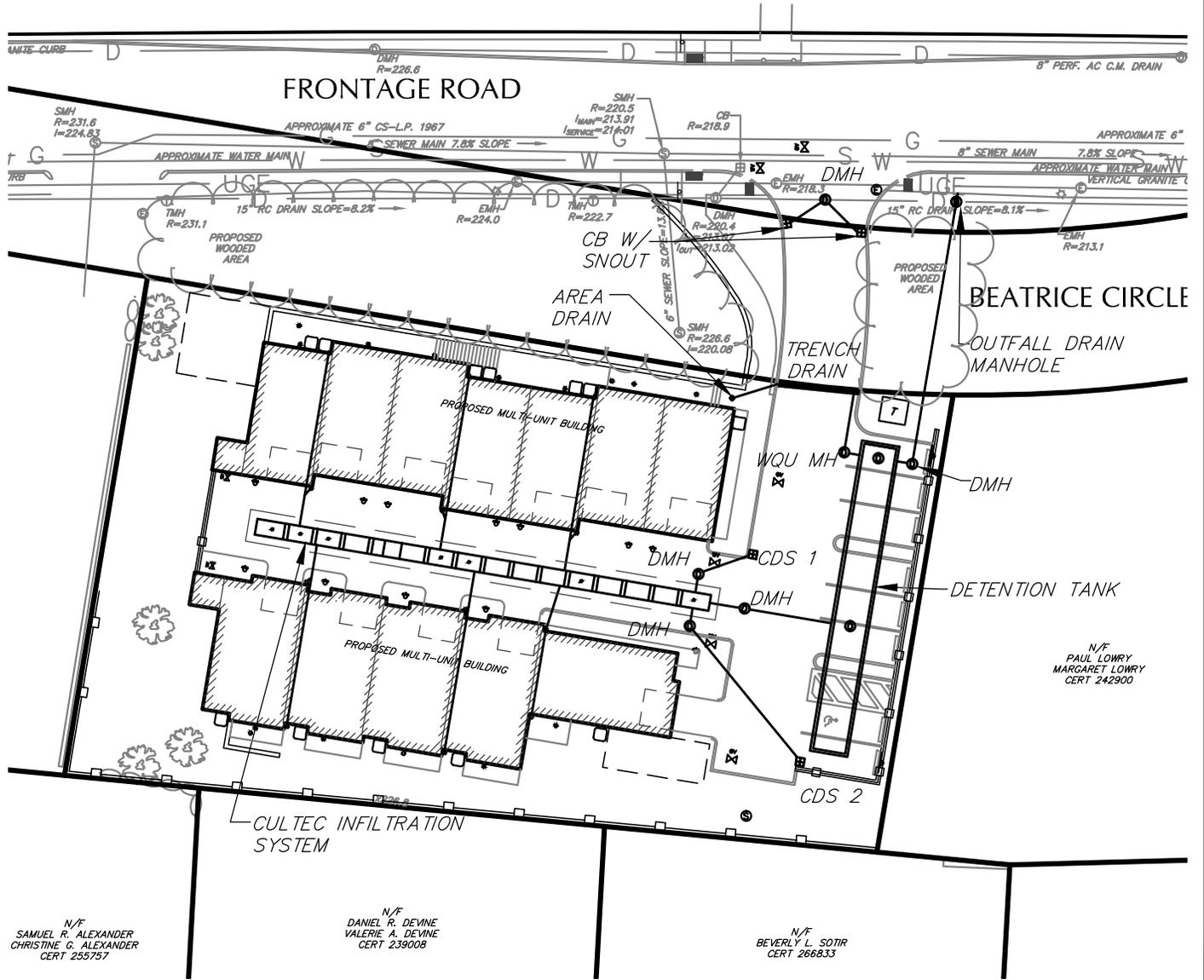
Best Management Practice	Inspection Frequency	Date Inspected	Contractor	Current Conditions and Minimum Maintenance / Repairs, if necessary	Completed Maintenance / Repair (i.e. date, contractor, tasks complete, etc...)
Pavement Sweeping	Biannual				
Catch Basin w/Snout®	Biannual				
CDS Unit	Biannual				
SFMH48 Stormfilter	Biannual				
Cultec Chambers	Biannual				
Parking Lot / Pavement / Walkways	Quarterly				
Retaining Walls	Biannual				
Vegetated Areas	Quarterly				
Overall Site Condition	Quarterly				

Property Manager: _____

Date _____



CONCORD TURNPIKE



N/F
SAMUEL R. ALEXANDER
CHRISTINE G. ALEXANDER
CERT 255757

N/F
DANIEL R. DEVINE
VALERIE A. DEVINE
CERT 239008

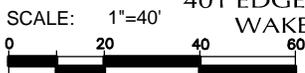
N/F
BEVERLY L. SOTIR
CERT 266833

N/F
PAUL LOWRY
MARGARET LOWRY
CERT 242900

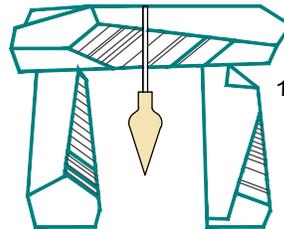
STORMWATER STRUCTURE
LOCATION SKETCH

FOR
91 BEATRICE CIRCLE
BELMONT, MA

PREPARED FOR: 91 BEATRICE CIRCLE LLC
c/o REGNANTE STERIO
401 EDGEWATER PL, SUITE 630
WAKEFIELD, MA 01880



DeCelle-Burke-Sala



1266 Furnace Brook Pkwy., #401
Quincy, MA 02169
(617) 405-5100 (O)
(617) 405-5101 (F)
www.decelle-burke-sala.com

& Associates, Inc.

DATE: JUNE 1, 2021

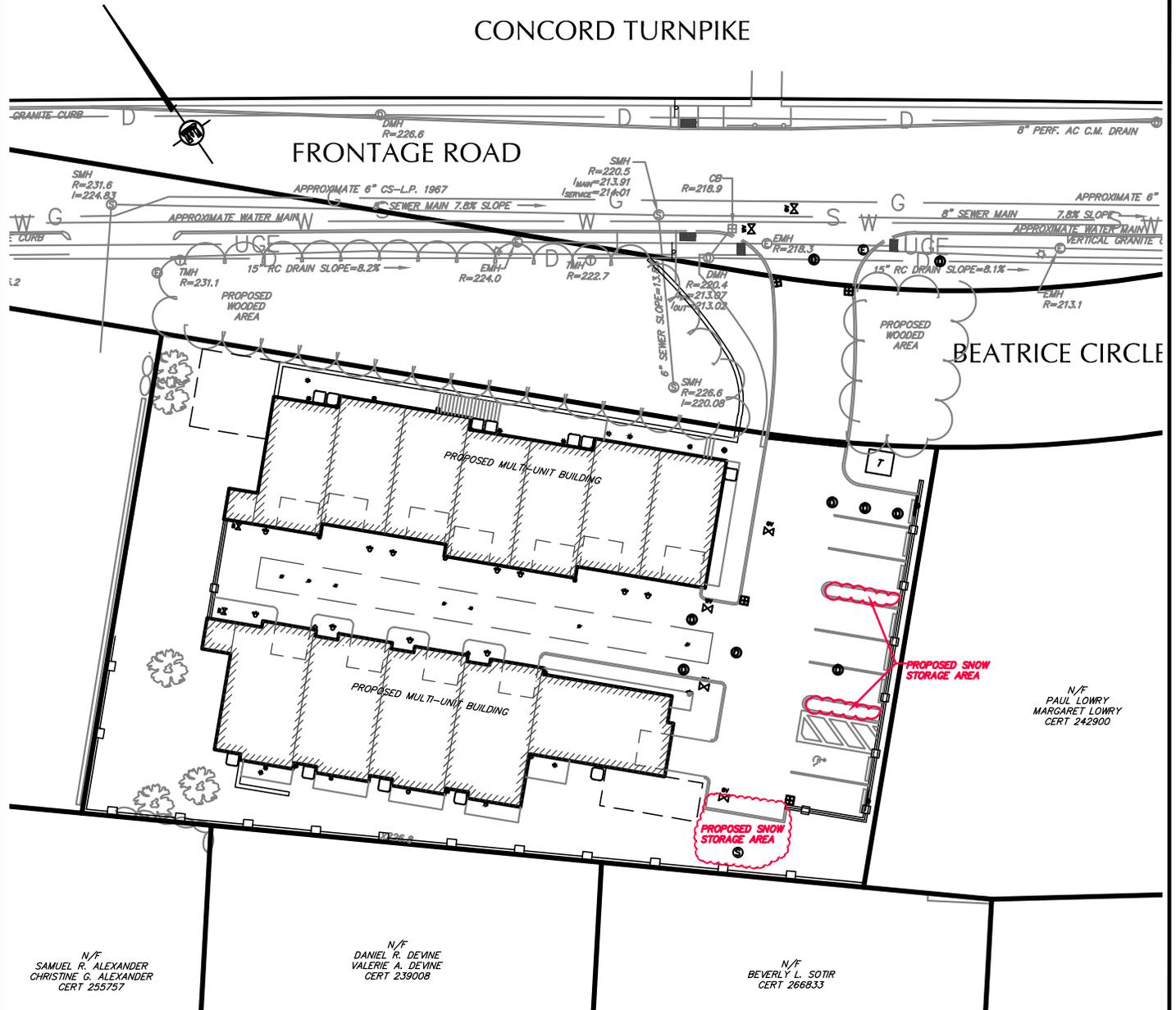
JOB NUMBER: 2019.056

SNOW MANAGEMENT NOTES:

1. PROPERTY MANAGER SHALL HIRE A CONTRACTOR IN GOOD STANDING TO PLOW SNOW INTO AREAS SHOWN ON SKETCH. IF SNOW VOLUME EXCEEDS THE PROPERTY'S CAPABILITY TO SAFELY STORE THE SNOW ON-SITE THE CONTRACTOR SHALL REMOVE THE SNOW FROM THE SITE AND DISPOSE OF IT IN A LEGAL MANNER.

2. CONTRACTOR SHALL NOT STOCKPILE BEHIND THE RETAINING WALLS NOR OFF LOCUS OF THE PROPERTY.

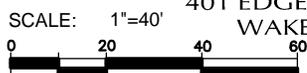
3. CONTRACTOR TO REMOVE ACCUMULATED SEDIMENT AFTER SNOW MELT AND DISPOSE OF SEDIMENT IN A LEGAL MANNER.



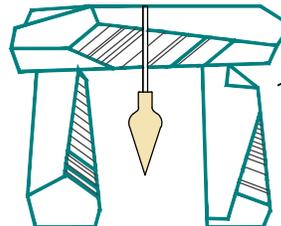
SNOW STORAGE SKETCH

FOR
91 BEATRICE CIRCLE
BELMONT, MA

PREPARED FOR: 91 BEATRICE CIRCLE LLC
c/o REGNANTE STERIO
401 EDGEWATER PL, SUITE 630
WAKEFIELD, MA 01880



DeCelle-Burke-Sala



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(617) 405-5101 (F)
www.decelle-burke-sala.com

& Associates, Inc.

DATE: JUNE 1, 2021

JOB NUMBER: 2019.056



Maintenance Considerations for SNOUT® Stormwater Quality Systems

Background:

The SNOUT system from Best Management Products, Inc. (BMP, Inc.) is based on a vented hood that can reduce floatable trash and debris, free oils, and other solids from stormwater discharges. In its most basic application, a SNOUT hood is installed over the outlet pipe of a catch basin or other stormwater quality structure with a deep sump (see Installation Drawing). The SNOUT forms a baffle that traps floatable debris and free oils on the surface, while permitting heavier solids and sediment to sink to the bottom of the sump. The clarified intermediate layer is forced out of the structure through the open bottom of the SNOUT by displacement from incoming flow. The resultant discharge contains considerably less unsightly trash and other gross pollutants, and can also offer reductions of free-oils and finer solids. To increase pollutant removal capabilities of the SNOUT system, various accessories are available. The most popular options include: the Bio-Skirt® for higher hydrocarbon capture and retention, the Stainless TrashScreen™ for Full Trash Capture and the Turbo Plate® for turbulence reduction and higher sediment capture.

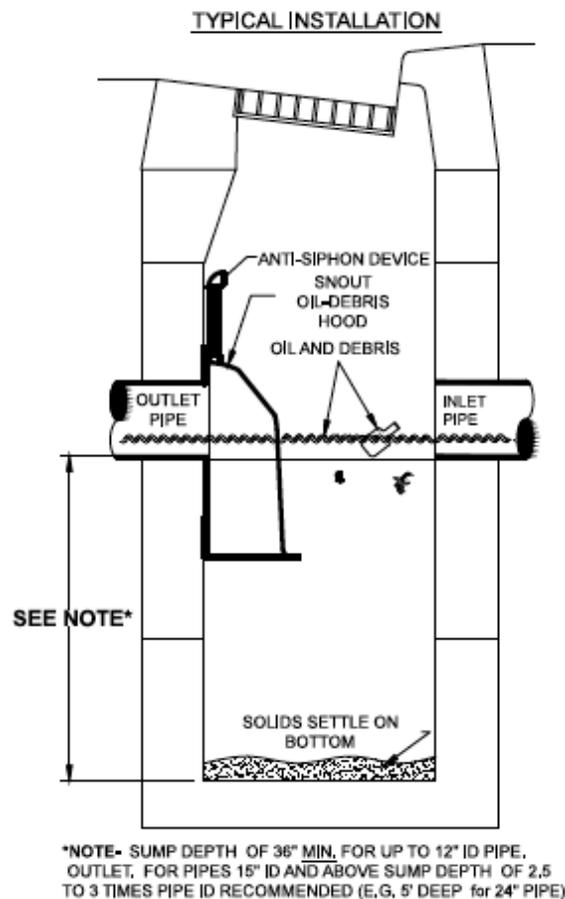
Maintenance Recommendations:

- Monthly monitoring for the first year of a new installation after the site has been stabilized is a recommended practice.
- Measurements should be taken after each rain event of .5 inches or more, or monthly, as determined by local weather conditions.
- Checking sediment depth and noting the surface pollutants in the structure will be helpful in planning maintenance.
- The pollutants collected in SNOUT equipped structures will consist of floatable debris and oils on the surface of the captured water, and grit and sediment on the bottom of the structure.
- It is best to schedule maintenance based on the solids collected in the sump.
- Optimally, the structure should be cleaned when the sump is half full (e.g. when 2 feet of material collects in a 4 foot sump, clean it out).
- Structures should also be cleaned if a spill or other incident causes a larger than normal accumulation of pollutants in a structure.
- Maintenance is best done with a vacuum truck.
- If Bio-Skirts are being used in the structure to enhance hydrocarbon capture, they should be checked on a monthly basis for the first year, and serviced or replaced when more than 2/3 of the boom is submerged, indicating a nearly saturated state. Assuming a typical pollutant-loading environment exists, Bio-Skirts should be serviced* annually or replaced as necessary.
- In the case of an oil spill, the structure should be checked and serviced and

- Bio-Skirts (if present) replaced or serviced immediately.
- All collected wastes must be handled and disposed of according to local environmental requirements.
- To maintain the SNOUT hoods, an annual inspection of the anti-siphon vent and access hatch are recommended. A simple flushing of the vent, or a gentle rodding with a flexible wire are all that's typically needed to maintain the anti-siphon properties. Opening and closing the access hatch once a year ensures a lifetime of trouble-free service.

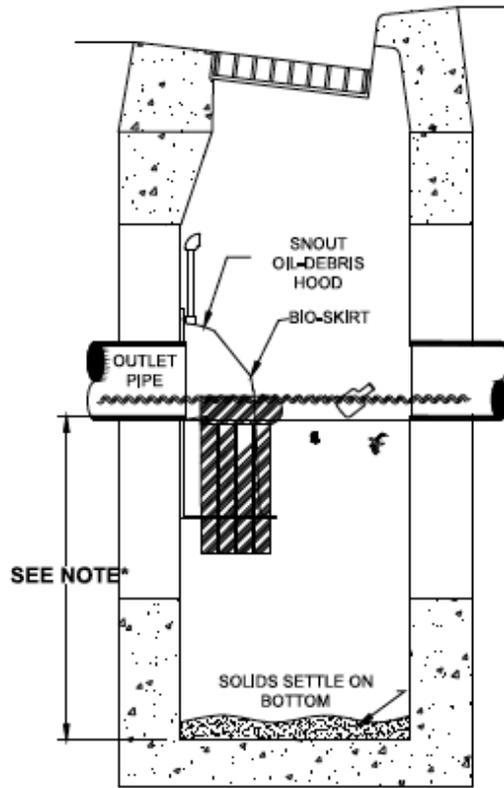
*To extend the service life of a Bio-Skirt, the unit may be "wrung out" to remove oils and washed in an industrial washing machine with warm water. The Bio-Skirt may then be re-deployed if the material maintains it's structural integrity. A maintained Bio-Skirt can last for several years. Each Bio-Skirt can hold about on gallon of oils.

SNOUT INSTALLATION:



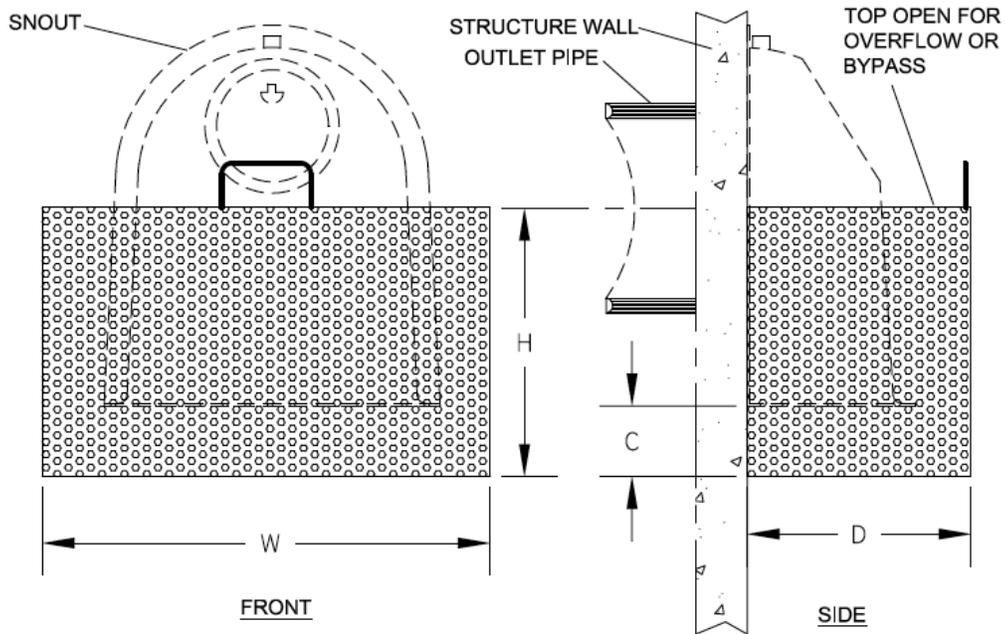
BIO-SKIRT INSTALLATION:

TYPICAL INSTALLATION



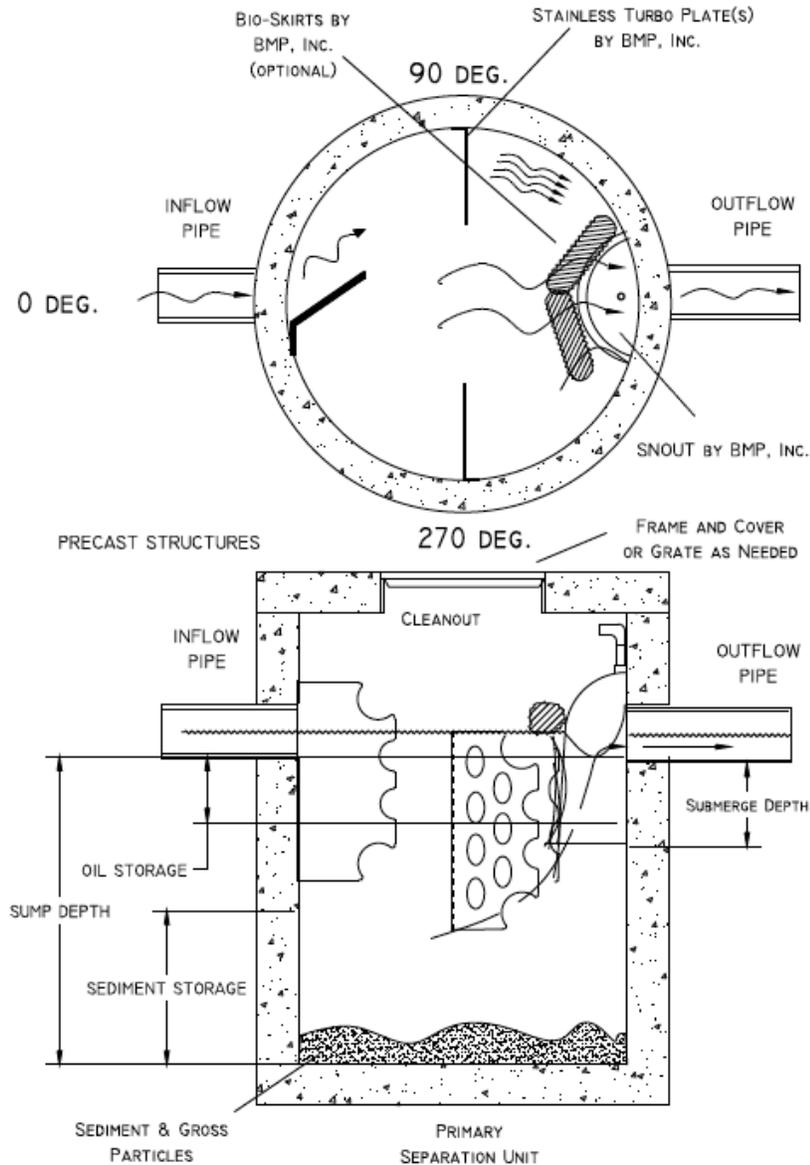
*NOTE- ATTACH BIO-SKIRT STRUCTURE WALL SUCH THAT IT IS APPROXIMATELY AT SAME ELEVATION AS STATIC WATER LEVEL

STAINLESS TRASHSCREEN INSTALLATION:



TURBO PLATE INSTALLATION:

SNOUT TURBO PLATE-OIL-GRIT SEPARATOR



Contact Information: Please contact T. J. Mullen at 800-504-8008, tjm@bmpinc.com or Matt White at 888-434-0277, mwhite@bmpinc.com for design assistance.

Website: www.bmpinc.com

The SNOUT, Bio-Skirt and TrashScreen are protected by: US Patents 6126817, 7857966, 7951294 and 8512556. More US patents are pending and BMP holds Canadian patents for much of the technology patented in the US. Canadian Patents numbers include 2285146, 2688012, 2690156 and 2740678. The SNOUT®, Bio-Skirt® Turbo Plate® and Stainless TrashScreen™ are trademarks of Best Management Products,

CDS[®] Inspection and Maintenance Guide – New Jersey



Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump. Refer to Table 1 for depth

from water surface to top of sediment pile for each model size indicating that maintenance is required.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile ¹		Sediment Storage Capacity	
	ft	m	ft	m	yd ³	m ³
CDS-3	3	0.9	3.0	0.9	0.5	0.4
CDS-4	4	1.2	3.0	0.9	0.9	0.7
CDS-5	5	1.5	3.25	1.0	1.5	1.1
CDS-6	6	1.8	4.0	1.2	2.1	1.6
CDS-7	7	2.1	4.75	1.4	2.9	2.2
CDS-8	8	2.4	5.5	1.7	3.7	2.8
CDS-10	10	3.0	7.0	2.1	5.8	4.4
CDS-12	12	3.4	8.5	2.6	8.4	6.4

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

¹ Distances from water surface to top of sediment pile are based on 75% of sump capacity being occupied.



Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

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Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, earth stabilization and stormwater treatment products. For information, visit www.ContechES.com or call 800.338.1122

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StormFilter Inspection and Maintenance Procedures



Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

1. Inspection

- Inspection of the vault interior to determine the need for maintenance.

2. Maintenance

- Cartridge replacement
- Sediment removal

Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.



In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements or a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..



Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

Warning: In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to whether or not maintenance is needed.

Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered)

1. Sediment loading on the vault floor.
 - a. If $>4''$ of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
 - a. If $>1/4''$ of accumulation, maintenance is required.
3. Submerged cartridges.
 - a. If $>4''$ of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
 - a. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
 - a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
 - a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
 - a. If pronounced scum line (say $\geq 1/4''$ thick) is present above top cap, maintenance is required.



Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

Important: If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

Warning: In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

Method 1:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

- B. Remove the used cartridges (up to 250 lbs. each) from the vault.



Important: Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

- C. Set the used cartridge aside or load onto the hauling truck.
- D. Continue steps a through c until all cartridges have been removed.

Method 2:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.
- B. Unscrew the cartridge cap.
- C. Remove the cartridge hood and float.
- D. At location under structure access, tip the cartridge on its side.
- E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.
- F. Set the empty, used cartridge aside or load onto the hauling truck.
- G. Continue steps a through e until all cartridges have been removed.

8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.



Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.



Inspection Report

Date: Personnel:

Location: _____ System Size: _____

System Type: Vault Cast-In-Place Linear Catch Basin Manhole Other

Sediment Thickness in Forebay: _____ Date: _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Estimated Flow from Drainage Pipes (if available): _____

Cartridges Submerged: Yes No Depth of Standing Water: _____

StormFilter Maintenance Activities (check off if done and give description)

Trash and Debris Removal: _____

Minor Structural Repairs: _____

Drainage Area Report _____

Excessive Oil Loading: Yes No Source: _____

Sediment Accumulation on Pavement: Yes No Source: _____

Erosion of Landscaped Areas: Yes No Source: _____

Items Needing Further Work: _____

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments:

Review the condition reports from the previous inspection visits.

StormFilter Maintenance Report

Date: _____ Personnel: _____

Location: _____ System Size: _____

System Type: Vault Cast-In-Place Linear Catch Basin Manhole Other

List Safety Procedures and Equipment Used: _____

System Observations

Months in Service: _____

Oil in Forebay (if present): Yes No

Sediment Depth in Forebay (if present): _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Drainage Area Report

Excessive Oil Loading: Yes No Source: _____

Sediment Accumulation on Pavement: Yes No Source: _____

Erosion of Landscaped Areas: Yes No Source: _____

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes No Details: _____

Replace Cartridges: Yes No Details: _____

Sediment Removed: Yes No Details: _____

Quantity of Sediment Removed (estimate?): _____

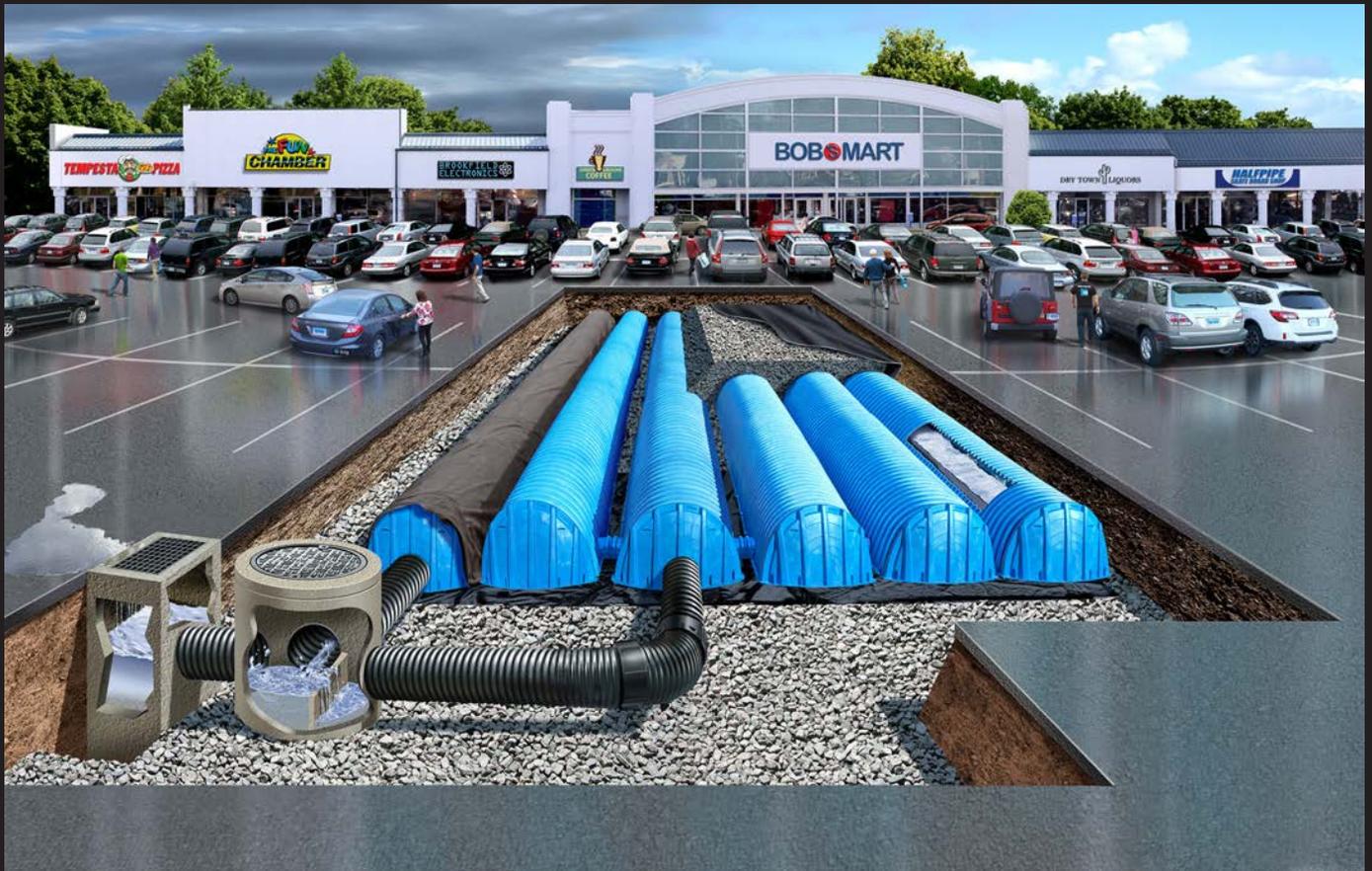
Minor Structural Repairs: Yes No Details: _____

Residuals (debris, sediment) Disposal Methods: _____

Notes:

CONTACTOR® & RECHARGER®

STORMWATER MANAGEMENT SOLUTIONS



OPERATION & MAINTENANCE GUIDELINES FOR CULTEC STORMWATER MANAGEMENT SYSTEMS



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Contact Information:

For general information on our other products and services, please contact our offices within the United States at (800)428-5832, (203)775-4416 ext. 202, or e-mail us at custservice@cultec.com.

For technical support, please call (203)775-4416 ext. 203 or e-mail tech@cultec.com.

Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

Doc ID: CLT057 01-20

January 2020

These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC. All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings. Actual designs may vary.

This manual contains guidelines recommended by CULTEC, Inc. and may be used in conjunction with, but not to supersede, local regulations or regulatory authorities. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Introduction

The CULTEC Subsurface Stormwater Management System is a high-density polyethylene (HDPE) chamber system arranged in parallel rows surrounded by washed stone. The CULTEC chambers create arch-shaped voids within the washed stone to provide stormwater detention, retention, infiltration, and reclamation. Filter fabric is placed between the native soil and stone interface to prevent the intrusion of fines into the system. In order to minimize the amount of sediment which may enter the CULTEC system, a sediment collection device (stormwater pretreatment device) is recommended upstream from the CULTEC chamber system. Examples of pretreatment devices include, but are not limited to, an appropriately sized catch basin with sump, pretreatment catchment device, oil grit separator, or baffled distribution box. Manufactured pretreatment devices may also be used in accordance with CULTEC chambers. Installation, operation, and maintenance of these devices shall be in accordance with manufacturer's recommendations. Almost all of the sediment entering the stormwater management system will be collected within the pretreatment device.

Best Management Practices allow for the maintenance of the preliminary collection systems prior to feeding the CULTEC chambers. The pretreatment structures shall be inspected for any debris that will restrict inlet flow rates. Outfall structures, if any, such as outlet control must also be inspected for any obstructions that would restrict outlet flow rates. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Operation and Maintenance Requirements

I. Operation

CULTEC stormwater management systems shall be operated to receive only stormwater run-off in accordance with applicable local regulations. CULTEC subsurface stormwater management chambers operate at peak performance when installed in series with pretreatment. Pretreatment of suspended solids is superior to treatment of solids once they have been introduced into the system. The use of pretreatment is adequate as long as the structure is maintained and the site remains stable with finished impervious surfaces such as parking lots, walkways, and pervious areas are properly maintained. If there is to be an unstable condition, such as improvements to buildings or parking areas, all proper silt control measures shall be implemented according to local regulations.

II. Inspection and Maintenance Options

- A. The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream manhole or through the CULTEC StormFilter Unit (or other pretreatment device). CCTV inspection of this row can be deployed through this access port to determine if any sediment has accumulated in the inlet row.
- B. If the CULTEC bed is not equipped with an inspection port, then access to the inlet row will be through an upstream manhole or the CULTEC StormFilter.
 1. **Manhole Access**
This inspection should only be carried out by persons trained in confined space entry and sewer inspection services. After the manhole cover has been removed a gas detector must be lowered into the manhole to ensure that there are not high concentrations of toxic gases present. The inspector should be lowered into the manhole with the proper safety equipment as per OSHA requirements. The inspector may be able to observe sediment from this location. If this is not possible, the inspector will need to deploy a CCTV robot to permit viewing of the sediment.

2. StormFilter Access

Remove the manhole cover to allow access to the unit. Typically a 30-inch (750 mm) pipe is used as a riser from the StormFilter to the surface. As in the case with manhole access, this access point requires a technician trained in confined space entry with proper gas detection equipment. This individual must be equipped with the proper safety equipment for entry into the StormFilter. The technician will be lowered onto the StormFilter unit. The hatch on the unit must be removed. Inside the unit are two filters which may be removed according to StormFilter maintenance guidelines. Once these filters are removed the inspector can enter the StormFilter unit to launch the CCTV camera robot.

- C. The inlet row of the CULTEC system is placed on a polyethylene liner to prevent scouring of the washed stone beneath this row. This also facilitates the flushing of this row with high pressure water through a culvert cleaning nozzle. The nozzle is deployed through a manhole or the StormFilter and extended to the end of the row. The water is turned on and the inlet row is back-flushed into the manhole or StormFilter. This water is to be removed from the manhole or StormFilter using a vacuum truck.

III. Maintenance Guidelines

The following guidelines shall be adhered to for the operation and maintenance of the CULTEC stormwater management system:

- A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.
- B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.
- C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.
- D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

IV. Suggested Maintenance Schedules

A. Minor Maintenance

The following suggested schedule shall be followed for routine maintenance during the regular operation of the stormwater system:

Frequency	Action
Monthly in first year	Check inlets and outlets for clogging and remove any debris, as required.
Spring and Fall	Check inlets and outlets for clogging and remove any debris, as required.
One year after commissioning and every third year following	Check inlets and outlets for clogging and remove any debris, as required.

B. Major Maintenance

The following suggested maintenance schedule shall be followed to maintain the performance of the CULTEC stormwater management chambers. Additional work may be necessary due to insufficient performance and other issues that might be found during the inspection of the stormwater management chambers. (See table on next page)

	Frequency	Action
Inlets and Outlets	Every 3 years	<ul style="list-style-type: none"> Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	<ul style="list-style-type: none"> Check inlet and outlets for clogging and remove any debris as required.
CULTEC Stormwater Chambers	2 years after commissioning	<ul style="list-style-type: none"> Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	<ul style="list-style-type: none"> Clean stormwater management chambers and feed connectors of any debris. Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	<ul style="list-style-type: none"> Clean stormwater management chambers and feed connectors of any debris. Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. Attain the appropriate approvals as required. Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1 st year	<ul style="list-style-type: none"> Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	<ul style="list-style-type: none"> Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	<ul style="list-style-type: none"> Confirm that no unauthorized modifications have been performed to the site.

For additional information concerning the maintenance of CULTEC Subsurface Stormwater Management Chambers, please contact CULTEC, Inc. at 1-800-428-5832.

WQMP Operation & Maintenance (O&M) Plan

Project Name: _____

Prepared for:

Project Name: _____

Address: _____

City, State Zip: _____

Prepared on:

Date: _____

This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer’s maintenance requirements, permits, etc.

8.1.1 Project Information

Project name	
Address	
City, State Zip	
Site size	
List of structural BMPs, number of each	
Other notes	

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

Name of Person or HOA Property Manager	
Address	
City, State Zip	
Phone number	
24-Hour Emergency Contact number	
Email	

8.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in this document.

8.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. AutoCAD files and/or GIS coordinates of BMPs shall also be submitted to the City.

Appendix ____

BMP SITE PLAN

Site plan is preferred on minimum 11" by 17" colored sheets, as long as legible.

Minor Maintenance

Frequency		Action
Monthly in first year		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Month 1	Date:	
<input type="checkbox"/> Month 2	Date:	
<input type="checkbox"/> Month 3	Date:	
<input type="checkbox"/> Month 4	Date:	
<input type="checkbox"/> Month 5	Date:	
<input type="checkbox"/> Month 6	Date:	
<input type="checkbox"/> Month 7	Date:	
<input type="checkbox"/> Month 8	Date:	
<input type="checkbox"/> Month 9	Date:	
<input type="checkbox"/> Month 10	Date:	
<input type="checkbox"/> Month 11	Date:	
<input type="checkbox"/> Month 12	Date:	
Spring and Fall		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
One year after commissioning and every third year following		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Year 1	Date:	
<input type="checkbox"/> Year 4	Date:	
<input type="checkbox"/> Year 7	Date:	
<input type="checkbox"/> Year 10	Date:	
<input type="checkbox"/> Year 13	Date:	
<input type="checkbox"/> Year 16	Date:	
<input type="checkbox"/> Year 19	Date:	
<input type="checkbox"/> Year 22	Date:	

Major Maintenance

Frequency		Action
Inlets and Outlets	Every 3 years	
	Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.	
	Notes	
	<input type="checkbox"/> Year 1	Date:
	<input type="checkbox"/> Year 4	Date:
	<input type="checkbox"/> Year 7	Date:
	<input type="checkbox"/> Year 10	Date:
	<input type="checkbox"/> Year 13	Date:
	<input type="checkbox"/> Year 16	Date:
	<input type="checkbox"/> Year 19	Date:
	<input type="checkbox"/> Year 22	Date:
	Spring and Fall	
	Check inlet and outlets for clogging and remove any debris, as required.	
	Notes	
	<input type="checkbox"/> Spring	Date:
	<input type="checkbox"/> Fall	Date:
	<input type="checkbox"/> Spring	Date:
	<input type="checkbox"/> Fall	Date:
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
CULTEC Stormwater Chambers	2 years after commissioning	
	<input type="checkbox"/> Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.	
Notes		
<input type="checkbox"/> Year 2	Date:	

Major Maintenance

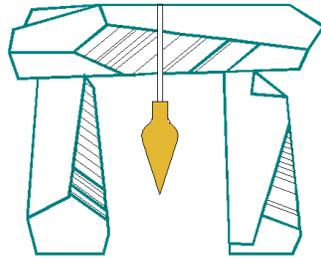
Frequency		Action
CULTEC Stormwater Chambers	9 years after commissioning every 9 years following	
	<ul style="list-style-type: none"> <input type="checkbox"/> Clean stormwater management chambers and feed connectors of any debris. <input type="checkbox"/> Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended. 	
	Notes	
	<input type="checkbox"/> Year 9	Date:
	<input type="checkbox"/> Year 18	Date:
	<input type="checkbox"/> Year 27	Date:
	<input type="checkbox"/> Year 36	Date:
	45 years after commissioning	
	<ul style="list-style-type: none"> <input type="checkbox"/> Clean stormwater management chambers and feed connectors of any debris. <input type="checkbox"/> Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. <input type="checkbox"/> Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. <input type="checkbox"/> Attain the appropriate approvals as required. <input type="checkbox"/> Establish a new operation and maintenance schedule. 	
	Notes	
<input type="checkbox"/> Year 45	Date:	



Major Maintenance

Frequency		Action	
Surrounding Site	Monthly in 1st year		
	<input type="checkbox"/> Check for depressions in areas over and surrounding the stormwater management system.		
	Notes		
	<input type="checkbox"/> Month 1	Date:	
	<input type="checkbox"/> Month 2	Date:	
	<input type="checkbox"/> Month 3	Date:	
	<input type="checkbox"/> Month 4	Date:	
	<input type="checkbox"/> Month 5	Date:	
	<input type="checkbox"/> Month 6	Date:	
	<input type="checkbox"/> Month 7	Date:	
	<input type="checkbox"/> Month 8	Date:	
	<input type="checkbox"/> Month 9	Date:	
	<input type="checkbox"/> Month 10	Date:	
	<input type="checkbox"/> Month 11	Date:	
	<input type="checkbox"/> Month 12	Date:	
	Spring and Fall		
	<input type="checkbox"/> Check for depressions in areas over and surrounding the stormwater management system.		
	Notes		
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	Yearly		
	<input type="checkbox"/> Confirm that no unauthorized modifications have been performed to the site.		
Notes			
<input type="checkbox"/> Year 1	Date:		
<input type="checkbox"/> Year 2	Date:		
<input type="checkbox"/> Year 3	Date:		
<input type="checkbox"/> Year 4	Date:		
<input type="checkbox"/> Year 5	Date:		
<input type="checkbox"/> Year 6	Date:		
<input type="checkbox"/> Year 7	Date:		

DeCelle-Burke-Sala



& Associates, Inc.

Erosion & Sedimentation Control Plan

for

91 Beatrice Circle

**A Proposed Multi-Unit Residential Development
in
Belmont, Massachusetts**

Prepared by:

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Revised June 1, 2021

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1.0 - Plan Objectives

- To protect abutting properties, public ways and drainage infrastructure from construction related pollutant impacts generated from land disturbance and construction activities;
- Control existing, and potential erosion, sediment transport and pollutant impact events by installing and maintaining construction related Best Management Practices (BMP's) to reduce and/or prevent the discharge of stormwater pollutants into wetland resources of the Commonwealth of Massachusetts;
- To protect surface stormwater quality, ground water quality, and minimize off-site sediment transport offsite during construction;
- To prevent local and off-site flooding by controlling peak rates and volumes of stormwater runoff during construction; and
- To eliminate illicit discharges to stormwater drainage systems that causes pollution during construction.

2.0 - Introduction

This Erosion and Sedimentation Control Plan (The “Plan”) has been devised for the construction of a new multi-unit residential development located at 91 Beatrice Circle in Belmont, Massachusetts. The purpose of the Plan is to protect the surrounding environment from contaminated stormwater during construction of the development. The stormwater will be treated before release and surfaces stabilized to minimize erosive events by implementing, installing and maintaining construction related Best Management Practices (BMP's) to reduce and/or prevent the discharge of stormwater pollutants into wetland resources of the Commonwealth of Massachusetts. The BMP's are described in the Stormwater Management Standards developed by the Massachusetts Department for Environmental Protection and it is our belief that short term construction related pollution prevention generated from this site can be achieved.

3.0 - Current Site Conditions

The project site is one parcel of land totaling 23,496 square feet of land designated as Map 51 Lot 36 with the Town of Belmont Assessors. The site is currently improved with a one and one-half story single-family home with driveway access off Frontage Road and is zoned Single Residence A. The residential building is approximately a 2,730 square foot (s.f.) footprint with a 456 s.f. single story detached garage. The driveway extends from Frontage Road to the garage and provides for additional on-site parking.

The Subject Property is bounded by single-family homes to the east, west and south. Frontage Road, also known as Hinckley Way, is located to the north of the Subject

Property. Frontage Road abuts Massachusetts' Route 2/Concord Turnpike. The Concord Turnpike is an eight-lane main thoroughfare providing service for commuter traffic for the City of Boston and the west and northwest communities of the Metro Boston region. Frontage Road is a one-way two lane road that travels east and provides access to the Concord Turnpike further east of the Subject Property. Frontage Road also delineates the municipal boundary between Arlington and Belmont and is part of the MBTA bus routes #62, 76, 78, and 84, providing service to the MBTA's Red Line in Cambridge, Massachusetts.

The Subject Property has mature landscaping around the home and along Frontage Road. The site has topography ranging in elevation from 236 on the west of the lot to elevation 218 on the east side of the lot. The majority of the lot surface topography rolls to the east and toward Frontage Road. Soils are mapped by the Natural Resources Conservation Service (NRCS) as a Charlton-Hollis Rock Complex consisting of shallow well-drained gravel and sand with ledge. Test pits were performed inconsistent with the Charlton Soil designation as no sand was found.

Public water and sewer with connections out to Frontage Road service the single-family home. Underground power and communications also service the home. There are no existing stormwater controls for the property. All existing stormwater flows over-ground to Frontage Road.

4.0 - Project Description

4.1 - Proposed Project

The proposed project is to demolish the existing building and all existing pavement on site and construct a multi-unit affordable residential development subject to the Massachusetts Chapter 40B Housing regulations. The project will consist of two new residential buildings, one townhouse style building with seven units and one townhouse style building with five units for a total of twelve dwelling units. Each building will be a slab-on-grade style building.

Each residential unit has a single car garage with access off a shared driveway that is centered between the buildings. The driveway is accessed from Frontage Road in a similar location to the existing driveway. The driveway also provides access to an eight (8) space surface parking lot providing a total of twenty (20) spaces for a parking ratio of 1.67. A six-foot wide pedestrian walkway extends up the driveway from Frontage Road and connects to a walkway for the townhouse building and to the main driveway to the development.

The grade on site shall be lowered to the proposed driveway elevation of 227 down to 225. Two retaining walls on either end of the site shall stabilize the site at a more level elevation for vehicular traffic and parking. A slab-on-grade construction has been chosen for the proposed buildings to minimize the amount of ledge removal required for the project.

New utilities will be brought on-site in the vicinity of the driveway from Frontage Road. New water supply, fire protection, sewage disposal, power, communications and gas shall be brought on the site underground. A 6" water supply pipe shall extend from the water main and provide individual domestic services for each townhouse unit and fire protection for each building. A new 6" PVC sewer pipe shall extend from the sewer main and connect to the proposed southerly building providing a separate service for each unit. The northerly building shall have a 6" PVC sewer service for each unit extended to a 6" PVC sewer line that connects to an existing sewer manhole that serviced the old home. The existing sewer connection from this manhole to the sewer main shall remain in service.

Currently no stormwater controls exist on the site. The proposed stormwater control system consists of a surface collection system that includes two water quality catch basins, two deep sump catch basins, an area drain, a trench drain, one water quality manhole, six drain manholes, an underground infiltration system and an underground detention tank. The underground infiltration system consists of a single row of sixteen (16) Cultec Recharger 280HD's and surrounding stone. The infiltration system has been designed to collect the roof runoff from the proposed building and a large portion of the driveway runoff. The infiltration system has been sized to meet the required recharge and water quality volumes as required. The underground infiltration system has a 10 inch HDPE overflow which connects to the underground detention system for the larger storm events. The underground detention system is an eight (8) foot wide by seventy-six (76) foot long by (6) foot high underground concrete box culvert. The box culvert has been designed to detain the stormwater onsite until it can be released in a controlled manner to reduce the peak runoff flows entering the Belmont drainage system. The box culvert has been designed with an outlet control structure that connects to the Belmont drainage system through the use of a proposed drain manhole in Frontage Road, The stormwater system as proposed meets MassDEP Stormwater Management Standards through the use of infiltration, detention and water quality BMP's.

5.0 - Erosion & Sedimentation Control Plan

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

5.1 - Major Construction Sequence for Site

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

- Place security fence around property to limit access and protect the public.
- Install silt sack in Frontage Road catch basin.
- Place stone apron at construction exit for site.
- Place erosion control barrier at limit of work where possible.
- Disconnect existing utility services and cut and cap the services at the main or source
- Raze existing buildings on-site.
- Remove pavement and dispose of material off-site
- Have a water truck on-site to minimize fugitive dust during the demolition process.
- Clear trees and grub site
- Remove stockpiled loam from site.
- Rough grade site. Remove excess material from the site
- Excavate for foundations. Remove excess soil material from excavation. If space becomes limited on-site, excess material shall be trucked off-site.
- Backfill and compact excavation as needed to construct foundation in accordance with the approved plans. Place excavated soils as backfill for foundation if possible to minimize stockpiled soils or have the unusable soils removed from the site.
- Begin vertical structural construction.
- Install catch basins, water quality unit and underground recharge structures for stormwater collection. Install silt sack once catch basins are installed.
- Tap existing sewer for sewer service and tap water service. Backfill excavation as soon as possible to minimize stockpiled soils.
- Install electrical and communication services. Backfill excavation as soon as possible to minimize stockpiled soils.
- Begin fine grade parking lot area and site.
- Place pavement binder for driveways.
- Place curbing around site.

- Pour concrete parking slab.
- Install final landscaping, including hydroseed, plantings, walkways and concrete pads.
- Final pave driveways.
- Clean up site.

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

- Clean pavement of sediment as needed.
- Replace erosion control barrier at limit of work as needed. Barrier to be inspected on a weekly basis and after every storm event.
- Empty silt sacks after each rain event. Catch basins and manholes to be cleaned once sediment occupies 1/2 the sump available. Structures to be inspected on a weekly basis.
- Any stockpiled soils to be covered to minimize fugitive dust and surrounded by an erosion control barrier to prevent off-site sediment transport.
- Maintain a covered dumpster on site to minimize wind blown debris from littering neighborhood and resource areas.
- Have a water truck onsite during the demolition and excavation for the project and during rough grading to minimize fugitive dust. Water truck to be on-site during sweeping of pavement once installed.

5.2 - Best Management Practices

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

5.2.1 - Perimeter Control / Limit of Work

The contractor shall install a six-foot high chain link temporary fence secured and set in the ground or set by the use of post anchors. The fence shall have a lockable gate at the site's construction entrance with visible contact information for the contractor secured to the gate. The fence shall have an erosion control sock installed and secured along the base of the fence base to assist in the capturing construction related sediment.

5.2.2 - Dumpster

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

5.2.3 - Silt Collection and Filter Bags

The contractor shall install filter sacks in all catch basins which may collect construction site stormwater runoff. The filter sacks will be inspected periodically for effectiveness and serviceability.

5.2.4 - Mechanical or Hand Sweeper

The contractor shall sweep the site by mechanical means or by hand to reduce the sediment build-up on-site. Prior to any site sweeping, water shall be applied to the surface. This will reduce the surrounding area becoming impacted from construction related offsite sediment pollution.

5.2.5 - Crushed Stone Construction Apron

A crushed stone apron shall be installed at the entrance to the site to assist in removing caked soil on construction vehicle tires. The apron shall be twenty five by twenty five foot wide. The contractor shall inspect the apron on a daily basis and supplement new stone as needed.

5.2.6 - Erosion Control Barrier

An erosion control barrier shall be installed at the downgradient limits of work and used around the site as needed. A barrier shall also be used around soil stockpiles and localized excavations on site. The barrier needs to be effective in controlling sediment transport and not becoming strained as the project moves forward. The contractor shall inspect the barrier weekly or after a large storm event to identify any stressed areas and replace the barrier as needed. The barrier can be one or many of several types, including but not limited to a staked and secure geotextile fabric, a geotextile erosion control sock, and sand bags are typical types of barriers. The barriers shall be installed as to not create runoff and create erosion along its edge.

5.2.7 - Dust Control

The use of a water truck or other method to spray water over the site during the dry season to minimize blown dust shall be implemented. The water shall not be excessively spread so erosive forces occur. Prior to any site sweeping, water shall be applied to the surface to minimize fugitive dust to abutting properties. The contractor shall sweep the pavement once installed and cover stockpiled soils as needed to minimize dust. The contractor shall take special notice of using water to minimize air born dust pollution specifically during the demolition, excavation, rough grading and pavement sweeping portions of the project operations.

5.2.8 - Disturbed Surface Maintenance

The contractor shall stabilize the ground surface as needed to prevent erosion. Stabilization of surfaces includes the placement of pavement, rip rap, wood bark mulch and the establishment of vegetated surfaces. Upon the completion of

construction of a particular phase, all surfaces should be stabilized even though it is apparent that future construction efforts will cause their disturbance. Vegetated cover should be established during the proper growing season and should be enhanced by soil adjustment for proper pH, nutrients and moisture content. Surfaces that are disturbed by erosion processes or vandalism should be stabilized as soon as possible. Areas where construction activities have permanently or temporarily ceased should be stabilized within 14 days from the date of last construction activity, except when construction activity will resume within 21 days (e.g., the total time period that construction activity is temporarily ceased is less than 21 days). Hydro-mulching of grass surfaces is recommended, especially if seeding of the surfaces is required outside the normal growing season. Mulching may be used for temporary stabilization. Haybale dikes or silt fences should be set where required to trap products of erosion and should be maintained on a continuing basis during the construction process. Wheel ruts should be filled in and graded to prevent concentration of stormwater runoff. Vehicle tracks leading downhill should be blocked during periods of intense precipitation by haybales, dikes or silt fences which should be constructed to entrap the sediment.

5.2.9 - Temporary Stormwater Controls

The contractor shall rough grade the site as to not concentrate the stormwater runoff and cause erosive forces. The contractor shall use a level spreader, earth berm, earth swale or other temporary stormwater control device to control construction site runoff and prevent the runoff from creating an erosive soil situation. The catch basins and manholes can be installed to assist in capturing the construction site runoff once installed but the tanks will need to be cleaned out of all sediment before connecting the tanks to the recharge system and final paving. The use of silt sacks on the catch basin will help minimize the cleaning of the sumps. The contractor shall sweep the pavement once installed as needed to minimize suspended solids in the stormwater.

5.2.10 - Snow

The contractor shall manage on-site snow and not impact any abutting property or right-of-way in a negative way from construction snow management operations. The contractor can stockpile snow and allow it to melt in a controlled manner without impacts to the abutters. If the snow volume exceeds the stockpile allowances available on-site the contractor shall remove it from the site and dispose of it in a legal manner.

5.2.11 - Material Management / Soil Stockpiles

The Contractor shall stockpile minimal amounts of soil for a short time frame. Soil stockpiles shall be located on-site and contained within the area as shown on the sketch. The stockpile will be covered to prevent dust pollution and ringed by erosion control barrier to prevent sediment transport. Soil proposed for removal from the site shall be excavated, stockpiled and placed in a truck for removal within 72 hours of collection. Other construction materials such as pipe, lumber, precast concrete, etc...

shall be placed in an on-site manageable stockpile area and used in a timely manner to prevent overstocking the site and making it difficult to work. Construction related deliveries and pickups deliveries shall be timed to avoid early morning and late evening travel trips.

5.2.12 Site Construction Inspection Log

The contractor shall utilize a site construction inspection log to assist in the successful implementation of this Erosion & Sedimentation Control Plan. The log provides a checklist for ongoing inspections and the potential for reminding the contractor to use alternative methods of sedimentation control and erosion prevention. An example of a Site Construction Inspection Log is attached to this plan.

Proposed Multi-Unit Residential Development

91 Beatrice Circle, Massachusetts

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Best Management Practice	Inspection Frequency	Date Inspected	Contractor	Current Conditions and Minimum Maintenance / Repairs, if necessary	Completed Maintenance / Repair (i.e. date, contractor, tasks complete, etc...)
Stone Apron	Weekly				
Erosion Control Barrier	Weekly				
Silt Sack	Weekly				
Temporary Erosion Control Measures	Weekly				
Material Stockpile Areas	Weekly				
Retaining Walls	Weekly				
Overall Site Condition	Weekly				

Property Manager: _____

Date _____

SECTION 4 - STORMWATER MANAGEMENT DATA

Checklist for Stormwater Report

Standard 3 Compliance

Standard 4 Compliance

Proprietary BMP Data

HydroCAD Calculations

2-Year

10-Year

25-Year

100-Year

Watershed Maps

Checklist for Stormwater Report



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.

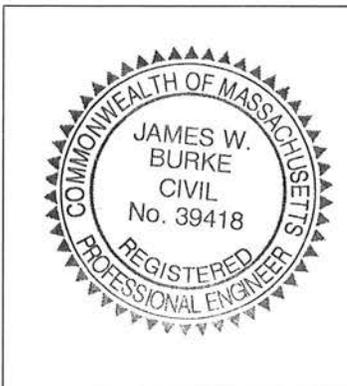
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



[Handwritten Signature] 6/6/21

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

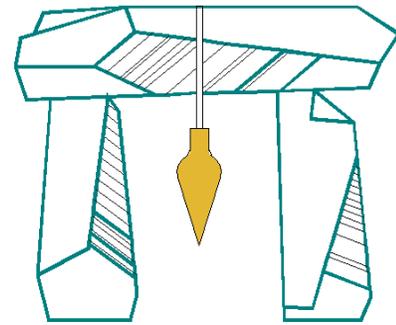
- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

Standard 3 Compliance

Calculation Sheet

DeCelle-Burke-Sala

Project: Proposed Site Plan
91 Beatrice Circle
Belmont, MA
 Client: 91 Beatrice Circle LLC
401 Edgewater Pl., Suite 630, Wakefield, MA
 Date: June 1, 2021



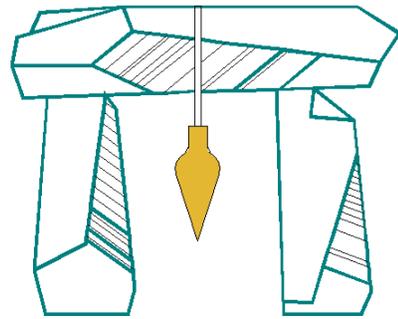
& Associates, Inc.

Standard 3 Compliance Infiltration System									
Step 1.									
Find: Recharge Volume Requirement									
Given: $R_v = (F \times \text{impervious area})$									
$A = 12,350$ s.f. impervious area $F = 0.6$ " for A-soils									
Solve: $R_v = 12,350$ s.f. x 0.6 "/12' = 617.50 c.f.									
Total Impervious Area = $16,138$ s.f.									
Collected Impervious Area = $12,350$ s.f.									
Adjustment Factor = 1.31									
Adjusted $R_v = 806.90$ c.f.									
Step 2.									
Select a 24-hour rainfall event that generates the R_v during the peak 2 hours. Use only the Site's impervious drainage area and the default NRCS Initial Abstraction of 0.25 and Type III storm. Set storm duration for 24 hours, but use a start time of 11 hours and an end time of 13 hours.									
Rainfall Depth Generating R_v 806.90 c.f. is 1.66 in.									
Step 3.									
Bottom area of infiltration system = length x width									
= 117 ft x 7.92 ft									
= 926.64 s.f.									

Calculation Sheet

DeCelle-Burke-Sala

Project: Proposed Site Plan
91 Beatrice Circle
Belmont, MA
 Client: 91 Beatrice Circle LLC
401 Edgewater Pl., Suite 630, Wakefield, MA
 Date: June 1, 2021



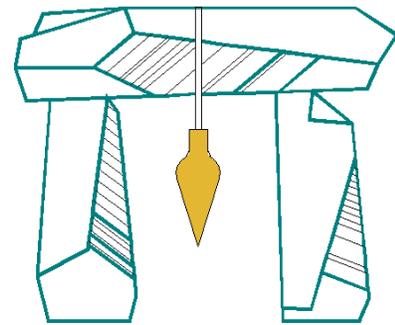
& Associates, Inc.

Step 4.	
Set exfiltration in HydroCAD to exfiltrate through the bottom only. Exfiltration rate to be the Rawls Rate based on the soil analysis.	
Step 5.	
Determine if recharge system can handle required recharge volume.	
Solve: See Attached HydroCAD	
Depth of Infiltration System below outlet=	2.37 ft.
Find: Depth of Rv within Infiltration System	
Peak Elevation - Bottom of Field = Corresponding Field Depth	
221.14 ft. -	219.80 ft. = 1.34 ft.
CHECKS OK	

Calculation Sheet

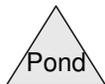
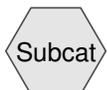
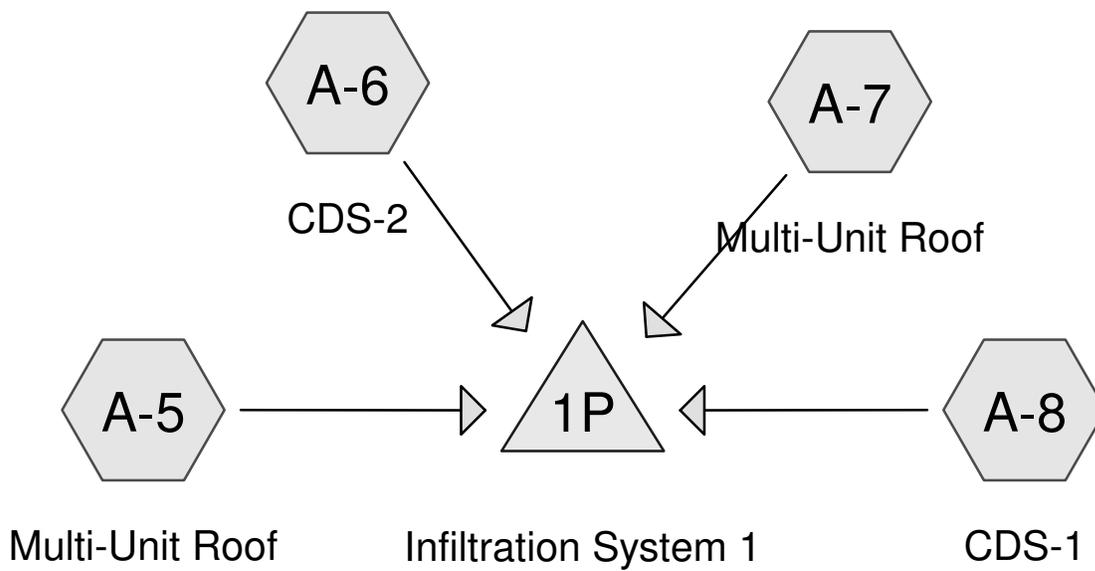
DeCelle-Burke-Sala

Project: Proposed Site Plan
91 Beatrice Circle
Belmont, MA
 Client: 91 Beatrice Circle LLC
401 Edgewater Pl., Suite 630, Wakefield, MA
 Date: June 1, 2021



& Associates, Inc.

Step 6.									
Draw Down Time									
Find: $T = R_v / (K \times \text{Bottom Area})$									
Given: Bottom Area = 926.64 s.f. K = 2.41 in/hr									
Rv = 806.90 c.f.									
806.9 c.f. / ((2.41 in/hr / 12 in/ft) x 926.64 s									
= 4.3 hrs < 72 hrs CHECKS OK									
Rv (Required Recharge Volume)									
K (Hydraulic Conductivity-use Rawls Rate)									



Routing Diagram for Standard 3
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Standard 3

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
4,875	98	Paved parking (A-6, A-8)
7,475	98	Roofs (A-5, A-7)
12,350	98	TOTAL AREA

Standard 3

Type III 24-hr Standard 3 Rainfall=1.66"

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Page 3

Summary for Subcatchment A-5: Multi-Unit Roof

Runoff = 0.13 cfs @ 12.08 hrs, Volume= 233 cf, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr Standard 3 Rainfall=1.66"

Area (sf)	CN	Description
* 3,557	98	Roofs
3,557		100.00% Impervious Area

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

Summary for Subcatchment A-6: CDS-2

Runoff = 0.04 cfs @ 12.08 hrs, Volume= 74 cf, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr Standard 3 Rainfall=1.66"

Area (sf)	CN	Description
* 1,122	98	Paved parking
1,122		100.00% Impervious Area

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

Summary for Subcatchment A-7: Multi-Unit Roof

Runoff = 0.14 cfs @ 12.08 hrs, Volume= 257 cf, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr Standard 3 Rainfall=1.66"

Area (sf)	CN	Description
* 3,918	98	Roofs
3,918		100.00% Impervious Area

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

Standard 3

Type III 24-hr Standard 3 Rainfall=1.66"

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Summary for Subcatchment A-8: CDS-1

Runoff = 0.13 cfs @ 12.08 hrs, Volume= 246 cf, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr Standard 3 Rainfall=1.66"

Area (sf)	CN	Description
* 3,753	98	Paved parking
3,753		100.00% Impervious Area

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

Summary for Pond 1P: Infiltration System 1

Inflow Area = 12,350 sf, 100.00% Impervious, Inflow Depth > 0.79" for Standard 3 event
 Inflow = 0.44 cfs @ 12.08 hrs, Volume= 808 cf
 Outflow = 0.05 cfs @ 11.59 hrs, Volume= 344 cf, Atten= 88%, Lag= 0.0 min
 Discarded = 0.05 cfs @ 11.59 hrs, Volume= 344 cf
 Primary = 0.00 cfs @ 11.00 hrs, Volume= 0 cf

Routing by Sim-Route method, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
 Peak Elev= 221.14' @ 12.69 hrs Surf.Area= 926 sf Storage= 474 cf

Plug-Flow detention time= 19.1 min calculated for 342 cf (42% of inflow)
 Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	219.80'	825 cf	7.92'W x 117.00'L x 3.71'H Field A 3,435 cf Overall - 686 cf Embedded = 2,749 cf x 30.0% Voids
#2A	220.80'	686 cf	Cultec R-280HD x 16 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
		1,511 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	219.80'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	222.17'	10.0" Round Culvert L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 222.17' / 220.57' S= 0.0800 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.55 sf

Standard 3

Type III 24-hr Standard 3 Rainfall=1.66"

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Discarded OutFlow Max=0.05 cfs @ 11.59 hrs HW=219.81' (Free Discharge)

↑1=**Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 11.00 hrs HW=219.80' (Free Discharge)

↑2=**Culvert** (Controls 0.00 cfs)

Groundwater Mounding

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. **The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed** otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

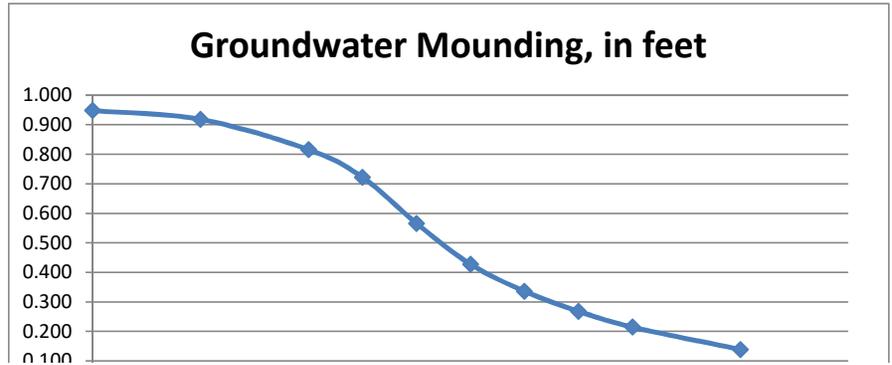
Input Values		use consistent units (e.g. feet & days or inches & hours)	Conversion Table	
			inch/hour	feet/day
4.1200	R	Recharge (infiltration) rate (feet/day)	0.67	1.33
0.210	Sy	Specific yield, Sy (dimensionless, between 0 and 1)		
48.20	K	Horizontal hydraulic conductivity, Kh (feet/day)*	2.00	4.00
58.500	x	1/2 length of basin (x direction, in feet)		
3.960	y	1/2 width of basin (y direction, in feet)	hours	days
1.000	t	duration of infiltration period (days)	36	1.50
20.000	hi(0)	initial thickness of saturated zone (feet)		
20.948	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)		
0.948	Δh(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)		

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

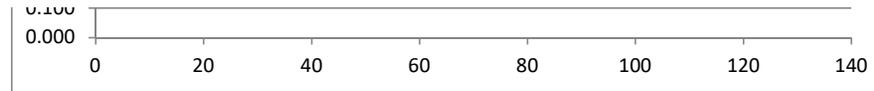
Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.948	0
0.918	20
0.816	40
0.722	50
0.566	60
0.427	70
0.336	80
0.268	90
0.215	100
0.139	120



Re-Calculate Now

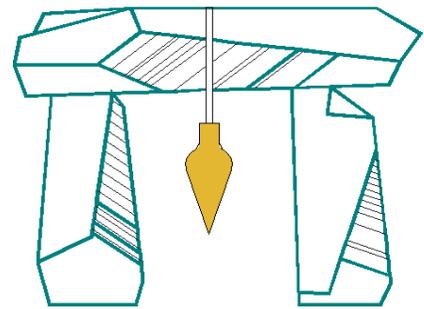


Disclaimer



This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Standard 4 Compliance



Project: **Proposed Site Plan**
 Location: **91 Beatrice Circle**
 Date: **6/1/2021**

Subject: **Total Suspended Solids Removal Calculations**

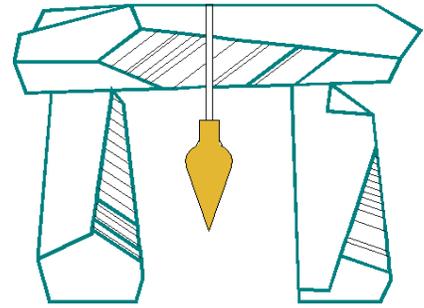
Infiltration System Treatment Train

Pretreatment TSS Calculation:

BMP	TSS Removal	Start Load	Amount Removed	Remaining Load
CDS 2015-4-C	50%	100%	50%	50%
Remaining Load		50%	0%	50%

Final TSS Removal Calculation:

BMP	TSS Removal	Start Load	Amount Removed	Remaining Load
Infiltration System	80%	100%	80%	20%
Remaining Load		20%	0%	20%



Project: **Proposed Site Plan**
Location: **91 Beatrice Circle**
Date: **6/1/2021**

Subject: **Total Suspended Solids Removal Calculations**

Detention System Treatment Train

BMP	TSS Removal	Start Load	Amount Removed	Remaining Load
Stormfilters by Contech	80%	100%	80%	20%
Remaining Load		20%	0%	20%

Proprietary BMP Data



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Nonpoint Pollution Control

Division of Water Quality

401-02B

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http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE

Governor

KIM GUADAGNO

Lt. Governor

BOB MARTIN

Commissioner

March 21, 2017

Derek M. Berg
Contech Engineered Solutions, LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: Revised MTD Lab Certification
Continuous Deflective Separator (CDS®) Stormwater Treatment Device by Contech Engineered
Solutions, LLC
On-line Installation

TSS Removal Rate 50%

Dear Mr. Berg:

This revised certification letter supersedes the Department's prior certification dated January 9, 2015. This revision was completed to reflect the updated Manufactured Treatment Device (MTD) scaling methodology as agreed upon by the manufacturers' working group on September 19, 2016. In part, the updated scaling for hydrodynamic MTDs is based on the depth of the reference (tested) MTD from the top of the false floor utilized during removal efficiency testing, not from the physical bottom of the unit. Based on the above decision, Table A-2 of the NJCAT Technology Verification report located at <http://www.njcat.org/uploads/newDocs/CDSVerificationReportFinal1.pdf> has been revised, and Table 1 noted below has been added.

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions, LLC has requested an MTD Laboratory Certification for the CDS® Stormwater Treatment Device.

The verification is subject to the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification

Appendix dated September 2014 (Revised January 2017) for this device is published online at <http://www.njcat.org/verification-process/technology-verification-database.html>.

The NJDEP certifies the use of the CDS® Stormwater Treatment Device by Contech Engineered Solutions, LLC at a TSS removal rate of 50% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.
2. The CDS® Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.
3. This CDS® Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.
4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.
5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the CDS® Stormwater Treatment Device. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at <http://www.conteches.com/products/stormwater-management/treatment/cds.aspx#1822141-technical-info> for any changes to the maintenance requirements.
6. Sizing Requirements:

The example below demonstrates the sizing procedure for the CDS®:

Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a CDS®. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:

time of concentration = 10 minutes
 $i=3.2$ in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
 $c=0.99$ (runoff coefficient for impervious)
 $Q=ciA=0.99 \times 3.2 \times 0.25=0.79$ cfs

Given the site runoff is 0.79 cfs and based on Table 1 below, the CDS® Model CDS-4 with an MTFR of 0.93 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and A-2.

Table 1 CDS Models

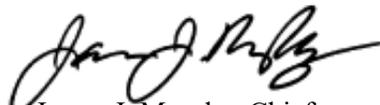
CDS Model	Manhole Diameter (ft.)	Treatment Chamber Depth (ft.)	MTFR (cfs)
CDS-3	3	3.50	0.52
CDS-4	4	3.50	0.93
CDS-5	5	3.75	1.5
CDS-6	6	4.50	2.1
CDS-7	7	5.25	2.8
CDS-8	8	6.00	3.7
CDS-10	10	7.50	5.8
CDS-12	12	9.00	8.4

- Treatment Chamber Depth is defined as the depth below the invert to the top of the false floor installed at 50% sediment depth.

A detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Mr. Shashi Nayak of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

c: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP – BNPC



State of New Jersey

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http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE

Governor

KIM GUADAGNO

Lt. Governor

BOB MARTIN

Commissioner

December 14, 2016

Derek M. Berg
Director - Stormwater Regulatory Management - East
Contech Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Laboratory Certification
Stormwater Management StormFilter® (StormFilter) by Contech Engineered Solutions LLC
Off-line Installation

TSS Removal Rate 80%

Dear Mr. Berg:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions LLC has requested a Laboratory Certification for the StormFilter System.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix for this device is published online at <http://www.njcat.org/verification-process/technology-verification-database.html>.

The NJDEP certifies the use of the StormFilter System by Contech Engineered Solutions LLC at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 2.12 gpm/sf of effective filtration treatment area.
2. The StormFilter System shall be installed using the same configuration as the unit tested by NJCAT, and sized in accordance with the criteria specified in item 6 below.
3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.
4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.
5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the StormFilter, which is attached to this document. However, it is recommended to review the maintenance website at <http://www.conteches.com/DesktopModules/Bring2mind/DMX/Download.aspx?EntryId=2813&PortalId=0&DownloadMethod=attachment> for any changes to the maintenance requirements.
6. Sizing Requirements:

The example below demonstrates the sizing procedure for a StormFilter System.

Example: A 0.25 acre impervious site is to be treated to 80% TSS removal using a StormFilter System. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

The calculation of the minimum number of cartridges for use in the StormFilter System is based upon both the MTFR and the maximum inflow drainage area. It is necessary to calculate the required cartridges using both methods and to rely on the method that results in the highest minimum number of cartridges determined by the two methods.

Inflow Drainage Area Evaluation:

The drainage area to the StormFilter System in this example is 0.25 acres. Based upon the information in Table 1 below, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the maximum drainage area:

1. Five (5) 12” cartridges,
2. Three (3) 18” cartridges, or
3. Two (2) 27” cartridges

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was determined based on the following:

time of concentration = 10 minutes
 $i=3.2$ in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
 $c=0.99$ (runoff coefficient for impervious)
 $Q=ciA=0.99 \times 3.2 \times 0.25 = 0.79$ cfs = 0.79×448.83 gpm = 354.58 gpm

Based on a flow rate of 354.58 gpm, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the MTR:

1. Thirty-six (36) 12” cartridges,
2. Twenty-four (24) 18” cartridges, or
3. Sixteen (16) 27” cartridges

The MTR Evaluation results will be used since that method results in the higher minimum number of cartridges determined by the two methods.

The sizing table corresponding to the available system models are noted below:

TABLE 1 STORMFILTER CARTRIDGE HEIGHTS AND NEW JERSEY TREATMENT CAPACITIES

StormFilter Cartridge Heights and New Jersey Treatment Capacities				
StormFilter Cartridge Height	Filtration Surface Area (sq.ft)	MTFR¹ (GPM)	Mass Capture Capacity (lbs)	Maximum Allowable Inflow Area² (acres)
Low Drop (12")	4.71	10	36.3	0.061
18"	7.07	15	54.5	0.09
27"	10.61	22.5	81.8	0.136

Notes:

1. MTFR calculated based on 4.72×10^{-3} cfs/sf (2.12 gpm/sf) of effective filtration treatment area.
2. Based upon the equation found in the NJDEP Filter Protocol Maximum Inflow Drainage Area (acres) = weight of TSS before 10% loss in MTFR (lbs)/600 lbs/acre of drainage area annually.

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of

indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Shashi Nayak of my office at (609) 633-7021.

Sincerely,

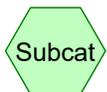
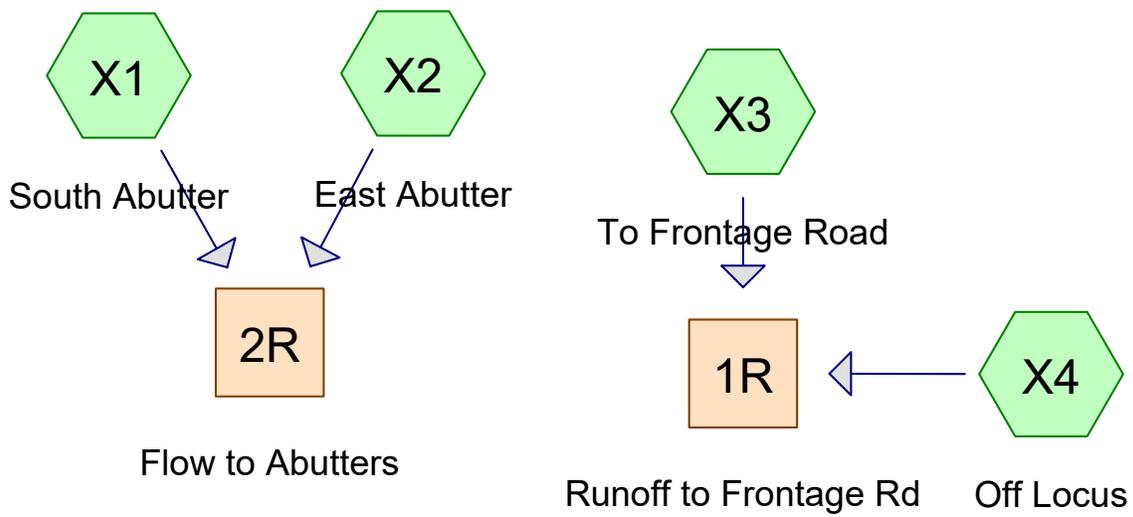
A handwritten signature in black ink, appearing to read "James J. Murphy".

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP - BNPC

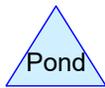
HydroCAD Calculations
Existing Conditions
2-Year
10-Year
25-Year
100-Year



Subcat



Reach



Pond



Link

Routing Diagram for Drainage Revised Layout 5-20-21
 Prepared by Decelle-Burke-Sala & Associates, Inc., Printed 6/2/2021
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Drainage Revised Layout 5-20-21

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Page 2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
18,952	39	>75% Grass cover, Good, HSG A (X1, X2, X3, X4)
4,565	98	Pavement (X2, X3, X4)
3,553	98	Roof (X1, X2, X3)
5,009	30	Woods, Good, HSG A (X2, X4)
32,079	53	TOTAL AREA

Drainage Revised Layout 5-20-21

Type III 24-hr 2-yr Rainfall=3.27"

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Page 3

Summary for Subcatchment X1: South Abutter

Runoff = 0.00 cfs @ 20.94 hrs, Volume= 12 cf, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

	Area (sf)	CN	Description
*	414	98	Roof
	7,367	39	>75% Grass cover, Good, HSG A
	7,781	42	Weighted Average
	7,367		94.68% Pervious Area
	414		5.32% Impervious Area

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

Summary for Subcatchment X2: East Abutter

Runoff = 0.04 cfs @ 12.15 hrs, Volume= 308 cf, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

	Area (sf)	CN	Description
*	1,494	98	Pavement
*	2,198	98	Roof
	5,727	39	>75% Grass cover, Good, HSG A
	1,663	30	Woods, Good, HSG A
	11,082	57	Weighted Average
	7,390		66.68% Pervious Area
	3,692		33.32% Impervious Area

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

Summary for Subcatchment X3: To Frontage Road

Runoff = 0.01 cfs @ 12.30 hrs, Volume= 117 cf, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Drainage Revised Layout 5-20-21

Type III 24-hr 2-yr Rainfall=3.27"

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	Area (sf)	CN	Description
*	370	98	Pavement
*	941	98	Roof
	3,323	39	>75% Grass cover, Good, HSG A
	4,634	56	Weighted Average
	3,323		71.71% Pervious Area
	1,311		28.29% Impervious Area

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

Summary for Subcatchment X4: Off Locus

Runoff = 0.02 cfs @ 12.34 hrs, Volume= 174 cf, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

	Area (sf)	CN	Description
*	2,701	98	Pavement
	2,535	39	>75% Grass cover, Good, HSG A
	3,346	30	Woods, Good, HSG A
	8,582	54	Weighted Average
	5,881		68.53% Pervious Area
	2,701		31.47% Impervious Area

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

Summary for Reach 1R: Runoff to Frontage Rd

Inflow Area = 13,216 sf, 30.36% Impervious, Inflow Depth = 0.26" for 2-yr event
Inflow = 0.03 cfs @ 12.33 hrs, Volume= 291 cf
Outflow = 0.03 cfs @ 12.34 hrs, Volume= 291 cf, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Flow to Abutters

Inflow Area = 18,863 sf, 21.77% Impervious, Inflow Depth = 0.20" for 2-yr event
Inflow = 0.04 cfs @ 12.15 hrs, Volume= 320 cf
Outflow = 0.04 cfs @ 12.16 hrs, Volume= 320 cf, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Drainage Revised Layout 5-20-21

Type III 24-hr 10-yr Rainfall=5.16"

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Summary for Subcatchment X1: South Abutter

Runoff = 0.02 cfs @ 12.36 hrs, Volume= 230 cf, Depth= 0.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

	Area (sf)	CN	Description
*	414	98	Roof
	7,367	39	>75% Grass cover, Good, HSG A
	7,781	42	Weighted Average
	7,367		94.68% Pervious Area
	414		5.32% Impervious Area

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

Summary for Subcatchment X2: East Abutter

Runoff = 0.31 cfs @ 12.10 hrs, Volume= 1,100 cf, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

	Area (sf)	CN	Description
*	1,494	98	Pavement
*	2,198	98	Roof
	5,727	39	>75% Grass cover, Good, HSG A
	1,663	30	Woods, Good, HSG A
	11,082	57	Weighted Average
	7,390		66.68% Pervious Area
	3,692		33.32% Impervious Area

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

Summary for Subcatchment X3: To Frontage Road

Runoff = 0.12 cfs @ 12.10 hrs, Volume= 434 cf, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Drainage Revised Layout 5-20-21

Type III 24-hr 10-yr Rainfall=5.16"

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	Area (sf)	CN	Description
*	370	98	Pavement
*	941	98	Roof
	3,323	39	>75% Grass cover, Good, HSG A
	4,634	56	Weighted Average
	3,323		71.71% Pervious Area
	1,311		28.29% Impervious Area

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

Summary for Subcatchment X4: Off Locus

Runoff = 0.18 cfs @ 12.11 hrs, Volume= 713 cf, Depth= 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

	Area (sf)	CN	Description
*	2,701	98	Pavement
	2,535	39	>75% Grass cover, Good, HSG A
	3,346	30	Woods, Good, HSG A
	8,582	54	Weighted Average
	5,881		68.53% Pervious Area
	2,701		31.47% Impervious Area

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

Summary for Reach 1R: Runoff to Frontage Rd

Inflow Area = 13,216 sf, 30.36% Impervious, Inflow Depth = 1.04" for 10-yr event
Inflow = 0.30 cfs @ 12.11 hrs, Volume= 1,148 cf
Outflow = 0.30 cfs @ 12.12 hrs, Volume= 1,148 cf, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Flow to Abutters

Inflow Area = 18,863 sf, 21.77% Impervious, Inflow Depth = 0.85" for 10-yr event
Inflow = 0.31 cfs @ 12.11 hrs, Volume= 1,330 cf
Outflow = 0.31 cfs @ 12.12 hrs, Volume= 1,330 cf, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Drainage Revised Layout 5-20-21

Type III 24-hr 25-yr Rainfall=6.34"

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Summary for Subcatchment X1: South Abutter

Runoff = 0.08 cfs @ 12.14 hrs, Volume= 477 cf, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

	Area (sf)	CN	Description
*	414	98	Roof
	7,367	39	>75% Grass cover, Good, HSG A
	7,781	42	Weighted Average
	7,367		94.68% Pervious Area
	414		5.32% Impervious Area

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

Summary for Subcatchment X2: East Abutter

Runoff = 0.52 cfs @ 12.10 hrs, Volume= 1,742 cf, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

	Area (sf)	CN	Description
*	1,494	98	Pavement
*	2,198	98	Roof
	5,727	39	>75% Grass cover, Good, HSG A
	1,663	30	Woods, Good, HSG A
	11,082	57	Weighted Average
	7,390		66.68% Pervious Area
	3,692		33.32% Impervious Area

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

Summary for Subcatchment X3: To Frontage Road

Runoff = 0.21 cfs @ 12.10 hrs, Volume= 695 cf, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

Drainage Revised Layout 5-20-21

Type III 24-hr 25-yr Rainfall=6.34"

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	Area (sf)	CN	Description
*	370	98	Pavement
*	941	98	Roof
	3,323	39	>75% Grass cover, Good, HSG A
	4,634	56	Weighted Average
	3,323		71.71% Pervious Area
	1,311		28.29% Impervious Area

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

Summary for Subcatchment X4: Off Locus

Runoff = 0.34 cfs @ 12.10 hrs, Volume= 1,169 cf, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

	Area (sf)	CN	Description
*	2,701	98	Pavement
	2,535	39	>75% Grass cover, Good, HSG A
	3,346	30	Woods, Good, HSG A
	8,582	54	Weighted Average
	5,881		68.53% Pervious Area
	2,701		31.47% Impervious Area

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

Summary for Reach 1R: Runoff to Frontage Rd

Inflow Area = 13,216 sf, 30.36% Impervious, Inflow Depth = 1.69" for 25-yr event
Inflow = 0.54 cfs @ 12.10 hrs, Volume= 1,864 cf
Outflow = 0.54 cfs @ 12.11 hrs, Volume= 1,864 cf, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Flow to Abutters

Inflow Area = 18,863 sf, 21.77% Impervious, Inflow Depth = 1.41" for 25-yr event
Inflow = 0.59 cfs @ 12.10 hrs, Volume= 2,219 cf
Outflow = 0.59 cfs @ 12.11 hrs, Volume= 2,219 cf, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

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Type III 24-hr 100-yr Rainfall=8.15"

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Summary for Subcatchment X1: South Abutter

Runoff = 0.25 cfs @ 12.11 hrs, Volume= 981 cf, Depth= 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

	Area (sf)	CN	Description
*	414	98	Roof
	7,367	39	>75% Grass cover, Good, HSG A
	7,781	42	Weighted Average
	7,367		94.68% Pervious Area
	414		5.32% Impervious Area

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

Summary for Subcatchment X2: East Abutter

Runoff = 0.90 cfs @ 12.09 hrs, Volume= 2,871 cf, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

	Area (sf)	CN	Description
*	1,494	98	Pavement
*	2,198	98	Roof
	5,727	39	>75% Grass cover, Good, HSG A
	1,663	30	Woods, Good, HSG A
	11,082	57	Weighted Average
	7,390		66.68% Pervious Area
	3,692		33.32% Impervious Area

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

Summary for Subcatchment X3: To Frontage Road

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 1,158 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

Drainage Revised Layout 5-20-21

Type III 24-hr 100-yr Rainfall=8.15"

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	Area (sf)	CN	Description
*	370	98	Pavement
*	941	98	Roof
	3,323	39	>75% Grass cover, Good, HSG A
	4,634	56	Weighted Average
	3,323		71.71% Pervious Area
	1,311		28.29% Impervious Area

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

Summary for Subcatchment X4: Off Locus

Runoff = 0.61 cfs @ 12.09 hrs, Volume= 1,986 cf, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

	Area (sf)	CN	Description
*	2,701	98	Pavement
	2,535	39	>75% Grass cover, Good, HSG A
	3,346	30	Woods, Good, HSG A
	8,582	54	Weighted Average
	5,881		68.53% Pervious Area
	2,701		31.47% Impervious Area

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

Summary for Reach 1R: Runoff to Frontage Rd

Inflow Area = 13,216 sf, 30.36% Impervious, Inflow Depth = 2.85" for 100-yr event
Inflow = 0.98 cfs @ 12.09 hrs, Volume= 3,144 cf
Outflow = 0.98 cfs @ 12.10 hrs, Volume= 3,144 cf, Atten= 0%, Lag= 0.6 min

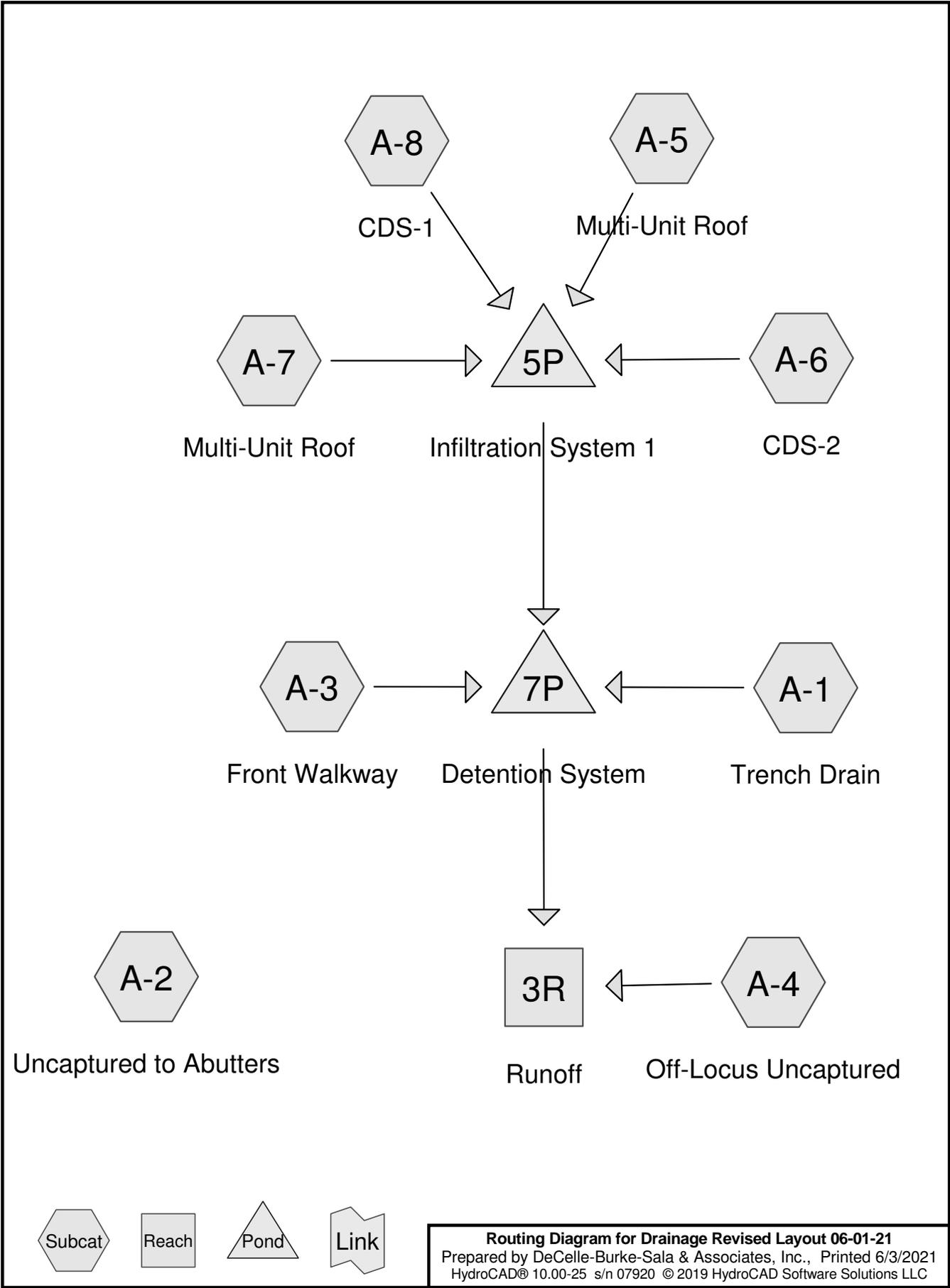
Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Flow to Abutters

Inflow Area = 18,863 sf, 21.77% Impervious, Inflow Depth = 2.45" for 100-yr event
Inflow = 1.15 cfs @ 12.10 hrs, Volume= 3,852 cf
Outflow = 1.15 cfs @ 12.11 hrs, Volume= 3,852 cf, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

HydroCAD Calculations
Proposed Conditions
2-Year
10-Year
25-Year
100-Year



Drainage Revised Layout 06-01-21

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Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
8,944	39	>75% Grass cover, Good, HSG A (A-1, A-2, A-3, A-4, A-8)
8,377	98	Paved parking (A-3, A-4, A-6, A-8)
2,626	98	Paved parking, HSG A (A-1)
7,475	98	Roofs (A-5, A-7)
282	98	Unconnected pavement, HSG A (A-2)
4,375	30	Woods, Good, HSG A (A-4)
32,079	72	TOTAL AREA

Drainage Revised Layout 06-01-21

Type III 24-hr 2-yr Rainfall=3.27"

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Summary for Subcatchment A-1: Trench Drain

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 596 cf, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
2,626	98	Paved parking, HSG A
218	39	>75% Grass cover, Good, HSG A
2,844	93	Weighted Average
218		7.67% Pervious Area
2,626		92.33% Impervious Area

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

Summary for Subcatchment A-2: Uncaptured to Abutters

Runoff = 0.00 cfs @ 23.34 hrs, Volume= 3 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Adj	Description
282	98		Unconnected pavement, HSG A
6,697	39		>75% Grass cover, Good, HSG A
6,979	41	40	Weighted Average, UI Adjusted
6,697			95.96% Pervious Area
282			4.04% Impervious Area
282			100.00% Unconnected

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

Summary for Subcatchment A-3: Front Walkway

Runoff = 0.05 cfs @ 12.09 hrs, Volume= 167 cf, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
* 880	98	Paved parking
271	39	>75% Grass cover, Good, HSG A
1,151	84	Weighted Average
271		23.54% Pervious Area
880		76.46% Impervious Area

Drainage Revised Layout 06-01-21

Type III 24-hr 2-yr Rainfall=3.27"

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

Summary for Subcatchment A-4: Off-Locus Uncaptured

Runoff = 0.01 cfs @ 12.39 hrs, Volume= 136 cf, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
* 2,622	98	Paved parking
1,585	39	>75% Grass cover, Good, HSG A
4,375	30	Woods, Good, HSG A
8,582	52	Weighted Average
5,960		69.45% Pervious Area
2,622		30.55% Impervious Area

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

Summary for Subcatchment A-5: Multi-Unit Roof

Runoff = 0.26 cfs @ 12.08 hrs, Volume= 900 cf, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
* 3,557	98	Roofs
3,557		100.00% Impervious Area

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

Summary for Subcatchment A-6: CDS-2

Runoff = 0.08 cfs @ 12.08 hrs, Volume= 284 cf, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Drainage Revised Layout 06-01-21

Type III 24-hr 2-yr Rainfall=3.27"

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Area (sf)	CN	Description
* 1,122	98	Paved parking
1,122		100.00% Impervious Area

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

Summary for Subcatchment A-7: Multi-Unit Roof

Runoff = 0.29 cfs @ 12.08 hrs, Volume= 992 cf, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
* 3,918	98	Roofs
3,918		100.00% Impervious Area

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

Summary for Subcatchment A-8: CDS-1

Runoff = 0.27 cfs @ 12.08 hrs, Volume= 888 cf, Depth= 2.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
* 3,753	98	Paved parking
173	39	>75% Grass cover, Good, HSG A
3,926	95	Weighted Average
173		4.41% Pervious Area
3,753		95.59% Impervious Area

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

Summary for Reach 3R: Runoff

Inflow Area = 25,100 sf, 73.62% Impervious, Inflow Depth > 0.51" for 2-yr event

Inflow = 0.03 cfs @ 12.45 hrs, Volume= 1,066 cf

Outflow = 0.03 cfs @ 12.46 hrs, Volume= 1,066 cf, Atten= 0%, Lag= 0.6 min

Drainage Revised Layout 06-01-21

Type III 24-hr 2-yr Rainfall=3.27"

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Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Pond 5P: Infiltration System 1

Inflow Area = 12,523 sf, 98.62% Impervious, Inflow Depth = 2.94" for 2-yr event
Inflow = 0.90 cfs @ 12.08 hrs, Volume= 3,064 cf
Outflow = 0.19 cfs @ 12.51 hrs, Volume= 3,064 cf, Atten= 79%, Lag= 25.4 min
Discarded = 0.05 cfs @ 10.61 hrs, Volume= 2,801 cf
Primary = 0.13 cfs @ 12.51 hrs, Volume= 262 cf

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 222.38' @ 12.51 hrs Surf.Area= 926 sf Storage= 1,132 cf

Plug-Flow detention time= 149.3 min calculated for 3,062 cf (100% of inflow)
Center-of-Mass det. time= 149.2 min (912.2 - 763.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	219.80'	825 cf	7.92'W x 117.00'L x 3.71'H Field A 3,435 cf Overall - 686 cf Embedded = 2,749 cf x 30.0% Voids
#2A	220.80'	686 cf	Cultec R-280HD x 16 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
		1,511 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	219.80'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	222.17'	10.0" Round Culvert L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 222.17' / 220.57' S= 0.0800 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.05 cfs @ 10.61 hrs HW=219.81' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.13 cfs @ 12.51 hrs HW=222.38' TW=214.11' (Dynamic Tailwater)

↑**2=Culvert** (Inlet Controls 0.13 cfs @ 1.23 fps)

Summary for Pond 7P: Detention System

Inflow Area = 16,518 sf, 95.99% Impervious, Inflow Depth = 0.74" for 2-yr event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 1,025 cf
Outflow = 0.03 cfs @ 13.74 hrs, Volume= 930 cf, Atten= 89%, Lag= 99.3 min
Primary = 0.03 cfs @ 13.74 hrs, Volume= 930 cf

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 214.43' @ 13.74 hrs Surf.Area= 608 sf Storage= 612 cf

Plug-Flow detention time= 280.8 min calculated for 930 cf (91% of inflow)

Drainage Revised Layout 06-01-21

Type III 24-hr 2-yr Rainfall=3.27"

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Center-of-Mass det. time= 239.3 min (1,031.5 - 792.2)

Volume	Invert	Avail.Storage	Storage Description
#1	213.42'	3,648 cf	8.00'W x 76.00'L x 6.00'H Prismaoid

Device	Routing	Invert	Outlet Devices
#1	Primary	213.42'	8.0" Round Culvert L= 67.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 213.42' / 208.90' S= 0.0675 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.35 sf
#2	Device 1	213.42'	1.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	215.08'	3.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	218.67'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.03 cfs @ 13.74 hrs HW=214.43' TW=0.00' (Dynamic Tailwater)

- ↑ **1=Culvert** (Passes 0.03 cfs of 1.09 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 4.73 fps)
- ↑ **3=Orifice/Grate** (Controls 0.00 cfs)
- ↑ **4=Orifice/Grate** (Controls 0.00 cfs)

Drainage Revised Layout 06-01-21

Type III 24-hr 10-yr Rainfall=5.16"

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Summary for Subcatchment A-1: Trench Drain

Runoff = 0.31 cfs @ 12.08 hrs, Volume= 1,032 cf, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
2,626	98	Paved parking, HSG A
218	39	>75% Grass cover, Good, HSG A
2,844	93	Weighted Average
218		7.67% Pervious Area
2,626		92.33% Impervious Area

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

Summary for Subcatchment A-2: Uncaptured to Abutters

Runoff = 0.01 cfs @ 12.42 hrs, Volume= 158 cf, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Adj	Description
282	98		Unconnected pavement, HSG A
6,697	39		>75% Grass cover, Good, HSG A
6,979	41	40	Weighted Average, UI Adjusted
6,697			95.96% Pervious Area
282			4.04% Impervious Area
282			100.00% Unconnected

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

Summary for Subcatchment A-3: Front Walkway

Runoff = 0.10 cfs @ 12.09 hrs, Volume= 328 cf, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
* 880	98	Paved parking
271	39	>75% Grass cover, Good, HSG A
1,151	84	Weighted Average
271		23.54% Pervious Area
880		76.46% Impervious Area

Drainage Revised Layout 06-01-21

Type III 24-hr 10-yr Rainfall=5.16"

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

Summary for Subcatchment A-4: Off-Locus Uncaptured

Runoff = 0.15 cfs @ 12.11 hrs, Volume= 626 cf, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
* 2,622	98	Paved parking
1,585	39	>75% Grass cover, Good, HSG A
4,375	30	Woods, Good, HSG A
8,582	52	Weighted Average
5,960		69.45% Pervious Area
2,622		30.55% Impervious Area

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

Summary for Subcatchment A-5: Multi-Unit Roof

Runoff = 0.41 cfs @ 12.08 hrs, Volume= 1,459 cf, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
* 3,557	98	Roofs
3,557		100.00% Impervious Area

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

Summary for Subcatchment A-6: CDS-2

Runoff = 0.13 cfs @ 12.08 hrs, Volume= 460 cf, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Drainage Revised Layout 06-01-21

Type III 24-hr 10-yr Rainfall=5.16"

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Area (sf)	CN	Description
* 1,122	98	Paved parking
1,122		100.00% Impervious Area

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

Summary for Subcatchment A-7: Multi-Unit Roof

Runoff = 0.45 cfs @ 12.08 hrs, Volume= 1,607 cf, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
* 3,918	98	Roofs
3,918		100.00% Impervious Area

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

Summary for Subcatchment A-8: CDS-1

Runoff = 0.44 cfs @ 12.08 hrs, Volume= 1,498 cf, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
* 3,753	98	Paved parking
173	39	>75% Grass cover, Good, HSG A
3,926	95	Weighted Average
173		4.41% Pervious Area
3,753		95.59% Impervious Area

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

Summary for Reach 3R: Runoff

Inflow Area = 25,100 sf, 73.62% Impervious, Inflow Depth > 1.54" for 10-yr event

Inflow = 0.30 cfs @ 12.47 hrs, Volume= 3,228 cf

Outflow = 0.30 cfs @ 12.48 hrs, Volume= 3,228 cf, Atten= 0%, Lag= 0.6 min

Drainage Revised Layout 06-01-21

Type III 24-hr 10-yr Rainfall=5.16"

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Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Pond 5P: Infiltration System 1

Inflow Area = 12,523 sf, 98.62% Impervious, Inflow Depth = 4.81" for 10-yr event
Inflow = 1.44 cfs @ 12.08 hrs, Volume= 5,025 cf
Outflow = 1.12 cfs @ 12.15 hrs, Volume= 5,025 cf, Atten= 22%, Lag= 4.1 min
Discarded = 0.05 cfs @ 9.17 hrs, Volume= 3,450 cf
Primary = 1.07 cfs @ 12.15 hrs, Volume= 1,574 cf

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 222.86' @ 12.15 hrs Surf.Area= 926 sf Storage= 1,327 cf

Plug-Flow detention time= 120.7 min calculated for 5,023 cf (100% of inflow)
Center-of-Mass det. time= 120.7 min (874.1 - 753.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	219.80'	825 cf	7.92'W x 117.00'L x 3.71'H Field A 3,435 cf Overall - 686 cf Embedded = 2,749 cf x 30.0% Voids
#2A	220.80'	686 cf	Cultec R-280HD x 16 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
		1,511 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	219.80'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	222.17'	10.0" Round Culvert L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 222.17' / 220.57' S= 0.0800 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.05 cfs @ 9.17 hrs HW=219.81' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.07 cfs @ 12.15 hrs HW=222.86' TW=214.59' (Dynamic Tailwater)

↑**2=Culvert** (Inlet Controls 1.07 cfs @ 2.23 fps)

Summary for Pond 7P: Detention System

Inflow Area = 16,518 sf, 95.99% Impervious, Inflow Depth = 2.13" for 10-yr event
Inflow = 1.40 cfs @ 12.14 hrs, Volume= 2,934 cf
Outflow = 0.25 cfs @ 12.63 hrs, Volume= 2,602 cf, Atten= 82%, Lag= 29.1 min
Primary = 0.25 cfs @ 12.63 hrs, Volume= 2,602 cf

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 216.01' @ 12.63 hrs Surf.Area= 608 sf Storage= 1,572 cf

Plug-Flow detention time= 194.1 min calculated for 2,601 cf (89% of inflow)

Drainage Revised Layout 06-01-21

Type III 24-hr 10-yr Rainfall=5.16"

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Center-of-Mass det. time= 158.2 min (927.8 - 769.6)

Volume	Invert	Avail.Storage	Storage Description
#1	213.42'	3,648 cf	8.00'W x 76.00'L x 6.00'H Prismaoid

Device	Routing	Invert	Outlet Devices
#1	Primary	213.42'	8.0" Round Culvert L= 67.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 213.42' / 208.90' S= 0.0675 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.35 sf
#2	Device 1	213.42'	1.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	215.08'	3.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	218.67'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.25 cfs @ 12.63 hrs HW=216.01' TW=0.00' (Dynamic Tailwater)

- ↑ **1=Culvert** (Passes 0.25 cfs of 1.99 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 7.68 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.21 cfs @ 4.31 fps)
- ↑ **4=Orifice/Grate** (Controls 0.00 cfs)

Drainage Revised Layout 06-01-21

Type III 24-hr 25-yr Rainfall=6.34"

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Summary for Subcatchment A-1: Trench Drain

Runoff = 0.39 cfs @ 12.08 hrs, Volume= 1,308 cf, Depth= 5.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

Area (sf)	CN	Description
2,626	98	Paved parking, HSG A
218	39	>75% Grass cover, Good, HSG A
2,844	93	Weighted Average
218		7.67% Pervious Area
2,626		92.33% Impervious Area

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

Summary for Subcatchment A-2: Uncaptured to Abutters

Runoff = 0.05 cfs @ 12.28 hrs, Volume= 354 cf, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

Area (sf)	CN	Adj	Description
282	98		Unconnected pavement, HSG A
6,697	39		>75% Grass cover, Good, HSG A
6,979	41	40	Weighted Average, UI Adjusted
6,697			95.96% Pervious Area
282			4.04% Impervious Area
282			100.00% Unconnected

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

Summary for Subcatchment A-3: Front Walkway

Runoff = 0.14 cfs @ 12.09 hrs, Volume= 433 cf, Depth= 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

Area (sf)	CN	Description
* 880	98	Paved parking
271	39	>75% Grass cover, Good, HSG A
1,151	84	Weighted Average
271		23.54% Pervious Area
880		76.46% Impervious Area

Drainage Revised Layout 06-01-21

Type III 24-hr 25-yr Rainfall=6.34"

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

Summary for Subcatchment A-4: Off-Locus Uncaptured

Runoff = 0.29 cfs @ 12.10 hrs, Volume= 1,052 cf, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

Area (sf)	CN	Description
* 2,622	98	Paved parking
1,585	39	>75% Grass cover, Good, HSG A
4,375	30	Woods, Good, HSG A
8,582	52	Weighted Average
5,960		69.45% Pervious Area
2,622		30.55% Impervious Area

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

Summary for Subcatchment A-5: Multi-Unit Roof

Runoff = 0.51 cfs @ 12.08 hrs, Volume= 1,809 cf, Depth= 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

Area (sf)	CN	Description
* 3,557	98	Roofs
3,557		100.00% Impervious Area

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

Summary for Subcatchment A-6: CDS-2

Runoff = 0.16 cfs @ 12.08 hrs, Volume= 570 cf, Depth= 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

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Type III 24-hr 25-yr Rainfall=6.34"

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Area (sf)	CN	Description
* 1,122	98	Paved parking
1,122		100.00% Impervious Area

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

Summary for Subcatchment A-7: Multi-Unit Roof

Runoff = 0.56 cfs @ 12.08 hrs, Volume= 1,992 cf, Depth= 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

Area (sf)	CN	Description
* 3,918	98	Roofs
3,918		100.00% Impervious Area

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

Summary for Subcatchment A-8: CDS-1

Runoff = 0.55 cfs @ 12.08 hrs, Volume= 1,881 cf, Depth= 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.34"

Area (sf)	CN	Description
* 3,753	98	Paved parking
173	39	>75% Grass cover, Good, HSG A
3,926	95	Weighted Average
173		4.41% Pervious Area
3,753		95.59% Impervious Area

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

Summary for Reach 3R: Runoff

Inflow Area = 25,100 sf, 73.62% Impervious, Inflow Depth > 2.34" for 25-yr event

Inflow = 0.49 cfs @ 12.35 hrs, Volume= 4,900 cf

Outflow = 0.49 cfs @ 12.36 hrs, Volume= 4,900 cf, Atten= 0%, Lag= 0.6 min

Drainage Revised Layout 06-01-21

Type III 24-hr 25-yr Rainfall=6.34"

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Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Pond 5P: Infiltration System 1

Inflow Area = 12,523 sf, 98.62% Impervious, Inflow Depth = 5.99" for 25-yr event
Inflow = 1.78 cfs @ 12.08 hrs, Volume= 6,252 cf
Outflow = 1.60 cfs @ 12.13 hrs, Volume= 6,114 cf, Atten= 10%, Lag= 2.6 min
Discarded = 0.05 cfs @ 8.54 hrs, Volume= 3,622 cf
Primary = 1.55 cfs @ 12.13 hrs, Volume= 2,492 cf

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 223.14' @ 12.13 hrs Surf.Area= 926 sf Storage= 1,410 cf

Plug-Flow detention time= 109.9 min calculated for 6,114 cf (98% of inflow)
Center-of-Mass det. time= 95.7 min (845.4 - 749.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	219.80'	825 cf	7.92'W x 117.00'L x 3.71'H Field A 3,435 cf Overall - 686 cf Embedded = 2,749 cf x 30.0% Voids
#2A	220.80'	686 cf	Cultec R-280HD x 16 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
		1,511 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	219.80'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	222.17'	10.0" Round Culvert L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 222.17' / 220.57' S= 0.0800 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.05 cfs @ 8.54 hrs HW=219.81' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.55 cfs @ 12.13 hrs HW=223.14' TW=215.29' (Dynamic Tailwater)

↑**2=Culvert** (Inlet Controls 1.55 cfs @ 2.84 fps)

Summary for Pond 7P: Detention System

Inflow Area = 16,518 sf, 95.99% Impervious, Inflow Depth = 3.08" for 25-yr event
Inflow = 2.03 cfs @ 12.11 hrs, Volume= 4,233 cf
Outflow = 0.37 cfs @ 12.58 hrs, Volume= 3,849 cf, Atten= 82%, Lag= 28.2 min
Primary = 0.37 cfs @ 12.58 hrs, Volume= 3,849 cf

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 217.07' @ 12.58 hrs Surf.Area= 608 sf Storage= 2,222 cf

Plug-Flow detention time= 156.0 min calculated for 3,847 cf (91% of inflow)

Drainage Revised Layout 06-01-21

Type III 24-hr 25-yr Rainfall=6.34"

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Center-of-Mass det. time= 125.7 min (891.0 - 765.3)

Volume	Invert	Avail.Storage	Storage Description
#1	213.42'	3,648 cf	8.00'W x 76.00'L x 6.00'H Prismatoid

Device	Routing	Invert	Outlet Devices
#1	Primary	213.42'	8.0" Round Culvert L= 67.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 213.42' / 208.90' S= 0.0675 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.35 sf
#2	Device 1	213.42'	1.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	215.08'	3.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	218.67'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.37 cfs @ 12.58 hrs HW=217.07' TW=0.00' (Dynamic Tailwater)

- ↑ **1=Culvert** (Passes 0.37 cfs of 2.42 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.05 cfs @ 9.15 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.32 cfs @ 6.58 fps)
- ↑ **4=Orifice/Grate** (Controls 0.00 cfs)

Drainage Revised Layout 06-01-21

Type III 24-hr 100-yr Rainfall=8.15"

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Summary for Subcatchment A-1: Trench Drain

Runoff = 0.51 cfs @ 12.08 hrs, Volume= 1,733 cf, Depth= 7.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

Area (sf)	CN	Description
2,626	98	Paved parking, HSG A
218	39	>75% Grass cover, Good, HSG A
2,844	93	Weighted Average
218		7.67% Pervious Area
2,626		92.33% Impervious Area

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

Summary for Subcatchment A-2: Uncaptured to Abutters

Runoff = 0.18 cfs @ 12.11 hrs, Volume= 766 cf, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

Area (sf)	CN	Adj	Description
282	98		Unconnected pavement, HSG A
6,697	39		>75% Grass cover, Good, HSG A
6,979	41	40	Weighted Average, UI Adjusted
6,697			95.96% Pervious Area
282			4.04% Impervious Area
282			100.00% Unconnected

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

Summary for Subcatchment A-3: Front Walkway

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 598 cf, Depth= 6.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

Area (sf)	CN	Description
* 880	98	Paved parking
271	39	>75% Grass cover, Good, HSG A
1,151	84	Weighted Average
271		23.54% Pervious Area
880		76.46% Impervious Area

Drainage Revised Layout 06-01-21

Type III 24-hr 100-yr Rainfall=8.15"

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

Summary for Subcatchment A-4: Off-Locus Uncaptured

Runoff = 0.56 cfs @ 12.10 hrs, Volume= 1,829 cf, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

Area (sf)	CN	Description
*	2,622	98 Paved parking
	1,585	39 >75% Grass cover, Good, HSG A
	4,375	30 Woods, Good, HSG A
	8,582	52 Weighted Average
	5,960	69.45% Pervious Area
	2,622	30.55% Impervious Area

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

Summary for Subcatchment A-5: Multi-Unit Roof

Runoff = 0.65 cfs @ 12.08 hrs, Volume= 2,345 cf, Depth= 7.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

Area (sf)	CN	Description
*	3,557	98 Roofs
	3,557	100.00% Impervious Area

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

Summary for Subcatchment A-6: CDS-2

Runoff = 0.21 cfs @ 12.08 hrs, Volume= 740 cf, Depth= 7.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

Drainage Revised Layout 06-01-21

Type III 24-hr 100-yr Rainfall=8.15"

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Area (sf)	CN	Description
* 1,122	98	Paved parking
1,122		100.00% Impervious Area

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

Summary for Subcatchment A-7: Multi-Unit Roof

Runoff = 0.72 cfs @ 12.08 hrs, Volume= 2,583 cf, Depth= 7.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

Area (sf)	CN	Description
* 3,918	98	Roofs
3,918		100.00% Impervious Area

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

Summary for Subcatchment A-8: CDS-1

Runoff = 0.71 cfs @ 12.08 hrs, Volume= 2,470 cf, Depth= 7.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.15"

Area (sf)	CN	Description
* 3,753	98	Paved parking
173	39	>75% Grass cover, Good, HSG A
3,926	95	Weighted Average
173		4.41% Pervious Area
3,753		95.59% Impervious Area

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

Summary for Reach 3R: Runoff

Inflow Area = 25,100 sf, 73.62% Impervious, Inflow Depth > 3.67" for 100-yr event

Inflow = 0.87 cfs @ 12.48 hrs, Volume= 7,680 cf

Outflow = 0.87 cfs @ 12.49 hrs, Volume= 7,680 cf, Atten= 0%, Lag= 0.6 min

Drainage Revised Layout 06-01-21

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Type III 24-hr 100-yr Rainfall=8.15"

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Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Pond 5P: Infiltration System 1

Inflow Area = 12,523 sf, 98.62% Impervious, Inflow Depth = 7.80" for 100-yr event
Inflow = 2.29 cfs @ 12.08 hrs, Volume= 8,137 cf
Outflow = 2.03 cfs @ 12.13 hrs, Volume= 7,798 cf, Atten= 11%, Lag= 2.8 min
Discarded = 0.05 cfs @ 7.68 hrs, Volume= 3,821 cf
Primary = 1.98 cfs @ 12.13 hrs, Volume= 3,977 cf

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 223.50' @ 12.13 hrs Surf.Area= 926 sf Storage= 1,508 cf

Plug-Flow detention time= 94.5 min calculated for 7,798 cf (96% of inflow)
Center-of-Mass det. time= 69.3 min (815.1 - 745.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	219.80'	825 cf	7.92'W x 117.00'L x 3.71'H Field A 3,435 cf Overall - 686 cf Embedded = 2,749 cf x 30.0% Voids
#2A	220.80'	686 cf	Cultec R-280HD x 16 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
		1,511 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	219.80'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	222.17'	10.0" Round Culvert L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 222.17' / 220.57' S= 0.0800 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.05 cfs @ 7.68 hrs HW=219.81' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.98 cfs @ 12.13 hrs HW=223.50' TW=216.73' (Dynamic Tailwater)

↑**2=Culvert** (Inlet Controls 1.98 cfs @ 3.63 fps)

Summary for Pond 7P: Detention System

Inflow Area = 16,518 sf, 95.99% Impervious, Inflow Depth = 4.58" for 100-yr event
Inflow = 2.61 cfs @ 12.11 hrs, Volume= 6,308 cf
Outflow = 0.70 cfs @ 12.49 hrs, Volume= 5,851 cf, Atten= 73%, Lag= 22.9 min
Primary = 0.70 cfs @ 12.49 hrs, Volume= 5,851 cf

Routing by Sim-Route method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 218.78' @ 12.49 hrs Surf.Area= 608 sf Storage= 3,261 cf

Plug-Flow detention time= 133.1 min calculated for 5,851 cf (93% of inflow)

Drainage Revised Layout 06-01-21

Type III 24-hr 100-yr Rainfall=8.15"

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Center-of-Mass det. time= 107.2 min (869.1 - 762.0)

Volume	Invert	Avail.Storage	Storage Description
#1	213.42'	3,648 cf	8.00'W x 76.00'L x 6.00'H Prismaoid

Device	Routing	Invert	Outlet Devices
#1	Primary	213.42'	8.0" Round Culvert L= 67.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 213.42' / 208.90' S= 0.0675 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.35 sf
#2	Device 1	213.42'	1.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	215.08'	3.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	218.67'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.70 cfs @ 12.49 hrs HW=218.78' TW=0.00' (Dynamic Tailwater)

- ↑ **1=Culvert** (Passes 0.70 cfs of 2.98 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.06 cfs @ 11.11 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.45 cfs @ 9.11 fps)
- ↑ **4=Orifice/Grate** (Weir Controls 0.20 cfs @ 1.10 fps)

Rational Method Pipe Calculations

Project: Proposed Multi-Unit Development
 91 Beatrice Circle, Belmont, MA
Client: 91 Beatrice Circle LLC
Date: 6/1/21

Prepared by: DeCelle-Burke-Sala & Associates, Inc.
 1266 Furnace Brook Parkway, Suite 401
 Quincy MA 02169
 617-405-5100



RATIONAL METHOD FOR PIPE SIZING
 DRAINAGE CALCULATIONS FOR A 2-YEAR STORM, CHEZY-MANNING'S FORMULA, N=0.011, HDPE/PVC PIPE
 Using IDF Curve Map for Boston, MA

STRUCTURE	DESC.	AREA	"C"	CA	(min.)		I	Q	L	S	DIA.	QFULL	VFULL	Q/	V/	V	D/V	
from	to	(acres)		(acres)	PIPE	Tc	(in/hr)	(cfs)	(ft)	(ft/ft)	(in.)	(cfs)	(ft/s)	QFULL	VFULL	(ft/s)	(min.)	
A-8	CDS 1	PAVE	0.09	0.90	0.08													
		GRASS	0.00	0.35	0.00													
CDS 1	DMH 1		0.09	0.89	0.08		6.03	4.00	0.33	12	0.010	10	2.60	4.76	0.13	0.67	3.19	0.06
DMH 1	INFIL		0.09	0.888	0.08	0.06	6.10	4.00	0.33	3	0.030	10	4.50	8.25	0.07	0.52	4.29	0.01
A-6	CDS 2	PAVE	0.03	0.90	0.02													
		GRASS	0.00	0.35	0.00													
CDS 2	DMH 2		0.03	0.90	0.02		5.69	4.10	0.10	40	0.015	10	3.18	5.83	0.03	0.43	2.51	0.27
DMH 2	INFIL		0.03	0.9	0.02	0.27	5.96	4.10	0.10	3	0.030	10	4.50	8.25	0.02	0.38	3.13	0.02
A-3	AD	PAVE	0.02	0.90	0.02													
		GRASS	0.01	0.35	0.00													
AD	TD		0.03	0.77	0.02		5.89	4.05	0.08	12	0.010	10	2.60	4.76	0.03	0.43	2.05	0.10
A-1	TD	PAVE	0.06	0.90	0.05													
		GRASS	0.01	0.35	0.00													
TD	WQU		0.09	0.83	0.08		5.00	4.30	0.33	14	0.014	10	3.07	5.63	0.11	0.61	3.44	0.07
WQU	DETEN.		0.09	0.833	0.08	0.07	5.07	4.30	0.33	3	0.010	10	2.60	4.76	0.13	0.67	3.19	0.02
INFIL	DETEN.								0.08	34	0.020	10	3.67	6.73	0.02	0.38	2.56	0.22
DETEN	DMH 5								0.02	70	0.068	10	6.77	12.41	0.00	0.17	2.05	0.57

Project: Proposed Multi-Unit Development
 91 Beatrice Circle, Belmont, MA
Client: 91 Beatrice Circle LLC
Date: 6/1/21

Prepared by: DeCelle-Burke-Sala & Associates, Inc.
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 617-405-5100



RATIONAL METHOD FOR PIPE SIZING
 DRAINAGE CALCULATIONS FOR A 25-YEAR STORM, CHEZY-MANNING'S FORMULA, N=0.011, HDPE/PVC PIPE

STRUCTURE	DESC.	AREA	"C"	CA	(min.)		I	Q	L	S	DIA.	QFULL	VFULL	Q/	V/	V	D/V	
from	to	(acres)		(acres)	PIPE	Tc	(in/hr)	(cfs)	(ft)	(ft/ft)	(in.)	(cfs)	(ft/s)	QFULL	VFULL	(ft/s)	(min.)	
A-8	CDS 1	PAVE	0.09	0.90	0.08													
		GRASS	0.00	0.35	0.00													
CDS 1	DMH 1		0.09	0.88	0.08		5.04	6.56	0.52	12	0.010	10	2.60	4.76	0.20	0.78	3.71	0.05
DMH 1	INFIL		0.09	0.876	0.08	0.05	5.09	6.55	0.52	3	0.030	10	4.50	8.25	0.12	0.65	5.36	0.01
A-6	CDS 2	PAVE	0.03	0.90	0.02													
		GRASS	0.00	0.35	0.00													
CDS 2	DMH 2		0.03	0.90	0.02		5.00	6.57	0.15	40	0.015	10	3.18	5.83	0.05	0.45	2.62	0.25
DMH 2	INFIL		0.03	0.9	0.02	0.25	5.25	6.52	0.15	3	0.030	10	4.50	8.25	0.03	0.42	3.46	0.01
A-3	AD	PAVE	0.02	0.90	0.02													
		GRASS	0.01	0.35	0.00													
AD	TD		0.03	0.77	0.02		5.00	6.57	0.13	12	0.010	10	2.60	4.76	0.05	0.45	2.14	0.09
A-1	TD	PAVE	0.06	0.90	0.05													
		GRASS	0.01	0.35	0.00													
TD	WQU		0.09	0.83	0.08		5.00	6.57	0.50	14	0.014	10	3.07	5.63	0.16	0.70	3.94	0.06
WQU	DETEN.		0.09	0.833	0.08	0.06	5.06	6.56	0.50	3	0.010	10	2.60	4.76	0.19	0.73	3.48	0.01
INFIL	DETEN.								1.45	34	0.020	10	3.67	6.73	0.39	0.92	6.19	0.09
DETEN	DMH 5								0.41	70	0.068	10	6.77	12.41	0.06	0.48	5.96	0.20

Project: Proposed Multi-Unit Development
 91 Beatrice Circle, Belmont, MA
Client: 91 Beatrice Circle LLC
Date: 6/1/21

Prepared by: DeCelle-Burke-Sala & Associates, Inc.
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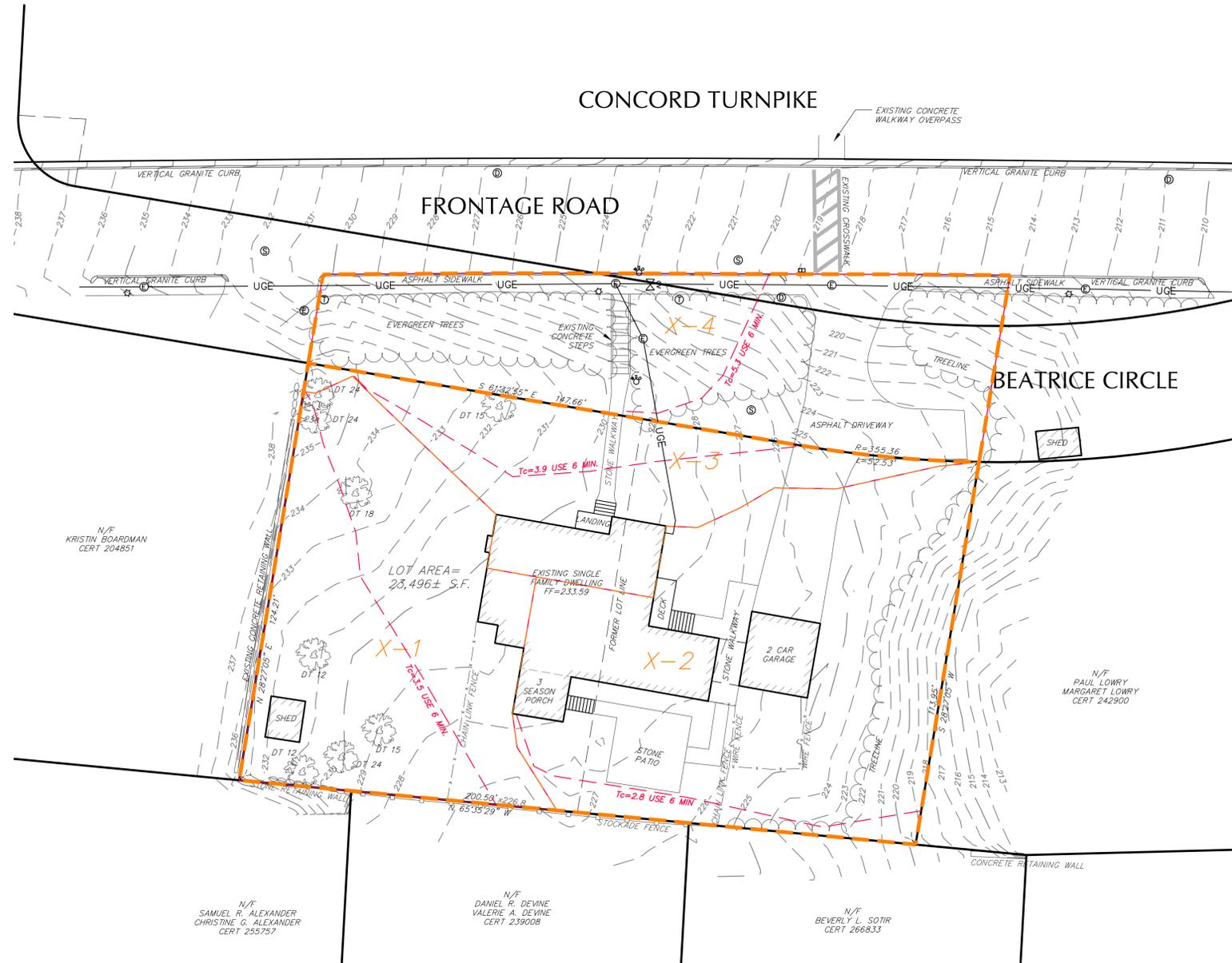


RATIONAL METHOD FOR PIPE SIZING
 DRAINAGE CALCULATIONS FOR A 100-YEAR STORM, CHEZY-MANNING'S FORMULA, N=0.011, HDPE/PVC PIPE
 Using IDF Curve Map for Boston, MA

STRUCTURE	DESC.	AREA	"C"	CA	(min.)		I	Q	L	S	DIA.	QFULL	VFULL	Q/	V/	V	D/V	
from	to	(acres)		(acres)	PIPE	Tc	(in/hr)	(cfs)	(ft)	(ft/ft)	(in.)	(cfs)	(ft/s)	QFULL	VFULL	(ft/s)	(min.)	
A-8	CDS 1	PAVE	0.09	0.90	0.08													
		GRASS	0.00	0.35	0.00													
CDS 1	DMH 1		0.09	0.88	0.08		5.00	7.30	0.58	12	0.010	10	2.60	4.76	0.22	0.80	3.81	0.05
DMH 1	INFIL		0.09	0.876	0.08	0.05	5.05	7.30	0.58	3	0.030	10	4.50	8.25	0.13	0.67	5.52	0.01
A-6	CDS 2	PAVE	0.03	0.90	0.02													
		GRASS	0.00	0.35	0.00													
CDS 2	DMH 2		0.03	0.90	0.02		5.00	7.30	0.17	40	0.015	10	3.18	5.83	0.05	0.45	2.62	0.25
DMH 2	INFIL		0.03	0.9	0.02	0.25	5.25	7.30	0.17	3	0.030	10	4.50	8.25	0.04	0.42	3.46	0.01
A-3	AD	PAVE	0.02	0.90	0.02													
		GRASS	0.01	0.35	0.00													
AD	TD		0.03	0.77	0.02		5.00	7.30	0.15	12	0.010	10	2.60	4.76	0.06	0.48	2.28	0.09
A-1	TD	PAVE	0.06	0.90	0.05													
		GRASS	0.01	0.35	0.00													
TD	WQU		0.09	0.83	0.08		5.00	7.30	0.56	14	0.014	10	3.07	5.63	0.18	0.72	4.06	0.06
WQU	DETEN.		0.09	0.833	0.08	0.06	5.06	7.30	0.56	3	0.010	10	2.60	4.76	0.21	0.79	3.76	0.01
INFIL	DETEN.								1.89	34	0.020	10	3.67	6.73	0.51	1.00	6.73	0.08
DETEN	DMH 5								0.72	70	0.068	10	6.77	12.41	0.11	0.61	7.57	0.15



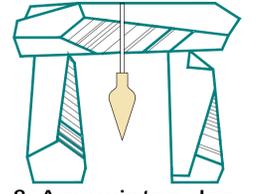
DESCRIPTION	X-1	X-2	X-3	X-4	TOTAL
PAVEMENT	0 S.F.	1,494 S.F.	370 S.F.	2,701 S.F.	4,565 S.F.
ROOF	414 S.F.	2,198 S.F.	941 S.F.	0 S.F.	3,553 S.F.
LAWN	7,367 S.F.	5,727 S.F.	3,323 S.F.	2,535 S.F.	18,952 S.F.
WOODS	0 S.F.	1,663 S.F.	0 S.F.	3,346 S.F.	5,009 S.F.
TOTAL	7,781 S.F.	11,082 S.F.	4,634 S.F.	8,582 S.F.	32,079 S.F.



LEGEND:

- EXISTING:**
- LOCUS PROPERTY LINE
 - TREE LINE
 - SEWER MANHOLE (SMH)
 - DRAIN MANHOLE (DMH)
 - CATCH BASIN (CB)
 - STONEWALL
 - GAS VALVE
 - WATER VALVE
 - WATER SERVICE
 - HYDRANT
 - UTILITY POLE
 - NOW OR FORMERLY
 - DRAIN PIPE
 - WATER MAIN
 - GAS SERVICE
 - UNDERGROUND POWER
 - OVERHEAD WIRES
 - SEWER MAIN
 - LANDSCAPED AREA
 - GRADE
 - SPOT GRADE
 - CHAIN LINK FENCE
 - STOCKADE FENCE
 - TEST PIT
 - HAND HOLES FOR UTILITIES
 - LIGHT POLE
 - FIRST FLOOR

DeCelle-Burke-Sala



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JAMES W BURKE, P.E.

GENERAL NOTES:

1. LOCUS: ASSESSORS MAP 51 BLOCK LOT 36
- RECORD OWNER: COMPREHENSIVE LAND HOLDINGS
 DEED REFERENCE: CERTIFICATE #271959
 PLAN REFERENCE: LC PLAN 2367-12
2. ELEVATIONS REFER TO NAVD-88.
3. EXISTING UTILITIES WHERE SHOWN IN THE DRAWINGS ARE FROM SURFACE OBSERVATION AND RECORD INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY LOCATING AND COORDINATING THE PROPOSED CONSTRUCTION ACTIVITY WITH DIG-SAFE AND THE APPLICABLE UTILITY COMPANIES AND MAINTAINING THE EXISTING UTILITY SYSTEM IN SERVICE. DIG-SAFE SHALL BE NOTIFIED PER THE STATE OF MASSACHUSETTS STATUTE CHAPTER 82, SECTION 409 AT TEL. 1-888-344-7233. THE ENGINEER DOES NOT GUARANTEE THEIR ACCURACY OR THAT ALL UTILITIES AND SUBSURFACE STRUCTURES ARE SHOWN. LOCATIONS AND ELEVATIONS OF UNDERGROUND UTILITIES WERE TAKEN FROM RECORD PLANS. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION, AND INVERTS OF UTILITIES AND STRUCTURES AS REQUIRED PRIOR TO THE START OF CONSTRUCTION.
4. THE LOT SHOWN DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD ZONE AS DELINEATED ON FIRM 25017C-00416E, DATED JUNE 4, 2010.
5. PARCEL IS ZONED SR-A.

PROJECT TITLE & LOCATION:

SITE PLAN
91 BEATRICE CIRCLE
BELMONT, MASS.

PLAN TITLE:

EXISTING WATERSHED

PREPARED FOR:

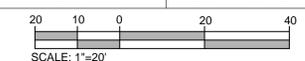
91 BEATRICE CIRCLE LLC
c/o REGNANTE STERIO
401 EDGEWATER PL, SUITE 630
WAKEFIELD, MA 01880

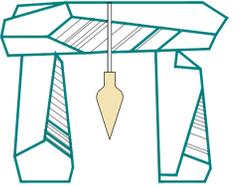
DATE: NOVEMBER 4, 2020

REVISED: APRIL 19, 2021

REVISED: JUNE 1, 2021

JOB NUMBER: 19.085 SHEET 1 OF 2





& Associates, Inc.
 1266 Furnace Brook Parkway #401
 Quincy, MA 02169
 617-405-5100(o) 617-405-5101(f)
 www.decelle-burke-sala.com



JAMES W BURKE, P.E.

GENERAL NOTES:

- LOCUS: ASSESSORS MAP 51 BLOCK LOT 36
 RECORD OWNER: COMPREHENSIVE LAND HOLDINGS
 DEED REFERENCE: CERTIFICATE #271959
 PLAN REFERENCE: LC PLAN 2367-12
- ELEVATIONS REFER TO NAVD-88.
- EXISTING UTILITIES WHERE SHOWN IN THE DRAWINGS ARE FROM SURFACE OBSERVATION AND RECORD INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY LOCATING AND COORDINATING THE PROPOSED CONSTRUCTION ACTIVITY WITH DIG-SAFE AND THE APPLICABLE UTILITY COMPANIES AND MAINTAINING THE EXISTING UTILITY SYSTEM IN SERVICE.
 DIG-SAFE SHALL BE NOTIFIED PER THE STATE OF MASSACHUSETTS STATUTE CHAPTER 82, SECTION 409 AT TEL: 1-888-344-7233. THE ENGINEER DOES NOT GUARANTEE THE ACCURACY OF ANY UTILITIES AND SUBSURFACE STRUCTURES ARE SHOWN. LOCATIONS AND ELEVATIONS OF UNDERGROUND UTILITIES WERE TAKEN FROM RECORD PLANS. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION, AND INVERTS OF UTILITIES AND STRUCTURES AS REQUIRED PRIOR TO THE START OF CONSTRUCTION.
- THE LOT SHOWN DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD ZONE AS DELINEATED ON FIRM 25017C-00416E, DATED JUNE 4, 2010.
- PARCEL IS ZONED SR-A.

PROJECT TITLE & LOCATION:

SITE PLAN
 91 BEATRICE CIRCLE
 BELMONT, MASS.

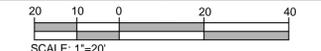
PLAN TITLE:

PROPOSED WATERSHED

PREPARED FOR:
 91 BEATRICE CIRCLE LLC
 c/o REGNANTE STERIO
 401 EDGEWATER PL, SUITE 630
 WAKEFIELD, MA 01880

DATE: NOVEMBER 4, 2020
REVISED: APRIL 19, 2021
REVISED: JUNE 1, 2021

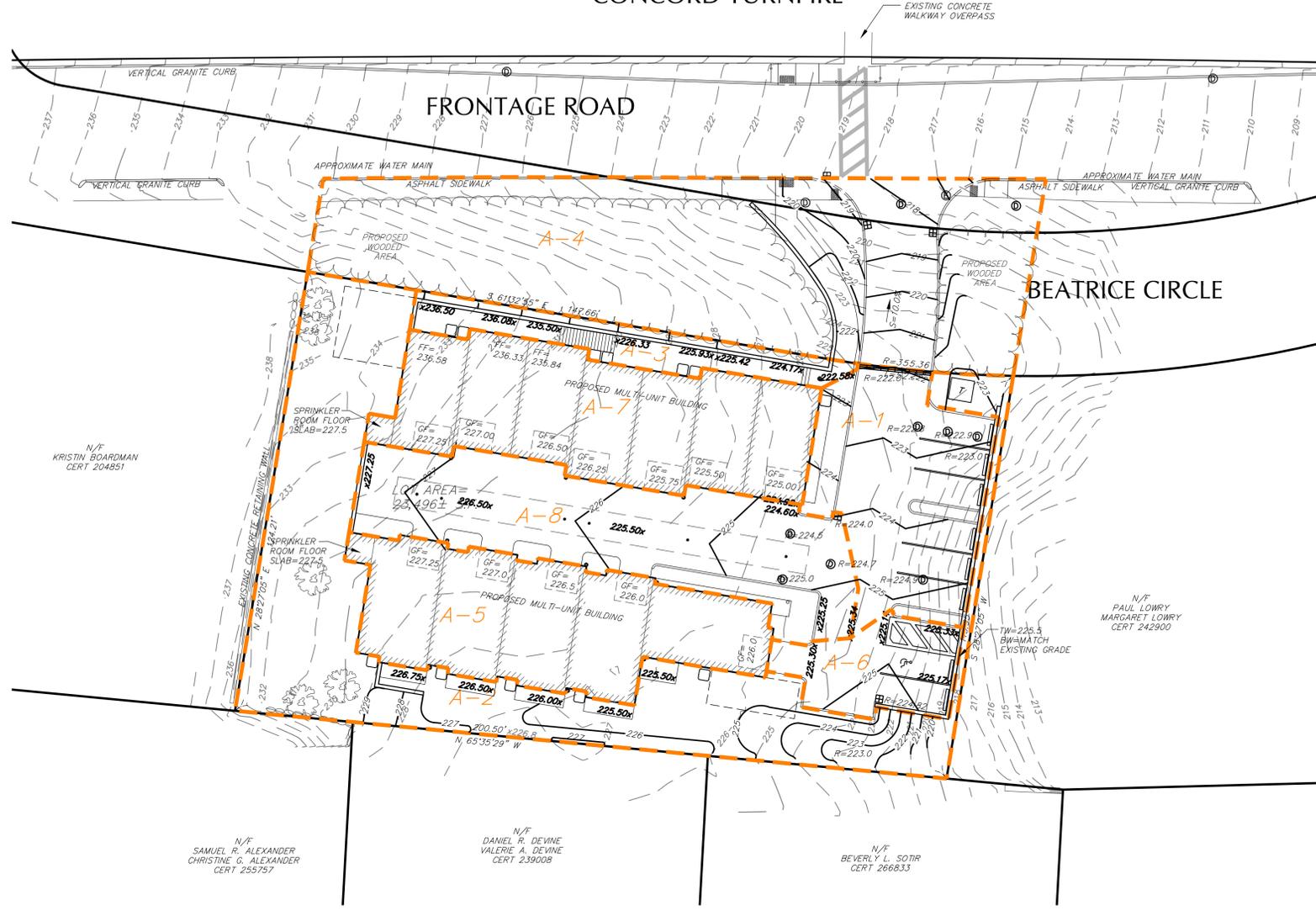
JOB NUMBER: 19.085 **SHEET** 2 OF 2



DESCRIPTION	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	TOTAL
PAVEMENT	2,626 S.F.	282 S.F.	880 S.F.	2,622 S.F.	0 S.F.	1,122 S.F.	0 S.F.	3,753 S.F.	11,285 S.F.
ROOF	0 S.F.	0 S.F.	0 S.F.	0 S.F.	3,557 S.F.	0 S.F.	3,918 S.F.	0 S.F.	7,475 S.F.
LAWN	218 S.F.	6,697 S.F.	271 S.F.	1,585 S.F.	0 S.F.	0 S.F.	0 S.F.	173 S.F.	8,944 S.F.
WOODS	0 S.F.	0 S.F.	0 S.F.	4,375 S.F.	0 S.F.	0 S.F.	0 S.F.	0 S.F.	4,375 S.F.
TOTAL	2,844 S.F.	6,979 S.F.	1,151 S.F.	8,582 S.F.	3,557 S.F.	1,122 S.F.	3,918 S.F.	3,926 S.F.	32,079 S.F.



CONCORD TURNPIKE



LEGEND:

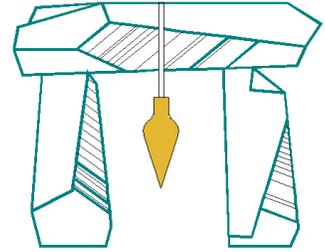
- | | | |
|------------------|----------------------------|------------------|
| EXISTING: | | PROPOSED: |
| | - LOCUS PROPERTY LINE | |
| | - TREE LINE | |
| | - SEWER MANHOLE (SMH) | |
| | - DRAIN MANHOLE (DMH) | |
| | - CATCH BASIN (CB) | |
| | - STONEWALL | |
| | - GAS VALVE | |
| | - WATER VALVE | |
| | - WATER SERVICE | |
| | - HYDRANT | |
| | - UTILITY POLE | |
| | - NOW OR FORMERLY | |
| | - DRAIN PIPE | |
| | - WATER MAIN | |
| | - GAS SERVICE | |
| | - UNDERGROUND POWER | |
| | - OVERHEAD WIRES | |
| | - SEWER MAIN | |
| | - LANDSCAPED AREA | |
| | - SPOT GRADE | |
| | - CHAIN LINK FENCE | |
| | - CHAIN LINK FENCE | |
| | - TEST PIT | |
| | - HAND HOLES FOR UTILITIES | |
| | - LIGHT POLE | |
| | - FIRST FLOOR | |
| | - TOP OF FOUNDATION | |
| | - GARAGE FLOOR | |
| | - EROSION CONTROL | |

June 1, 2021

Mr. Nicholas Iannuzzi, Chair
Belmont Zoning Board of Appeals
455 Concord Avenue
Belmont, MA 02478

Re: **Peer Review Response**
91 Beatrice Circle
Belmont, MA

DeCelle-Burke-Sala



& Associates, Inc.

Dear Mr. Chair & Board of Appeals Members:

DeCelle-Burke-Sala & Associates, Inc. (DBS) is in receipt of the Stormwater Peer Review Letter prepared by Weston & Sampson Engineers, Inc. (W&S) dated May 5, 2021 regarding the proposed residential development project located at 91 Beatrice Circle. The proposed project has had some architectural revisions since the last submission and the Site Plan has been revised accordingly. A revised Engineering Report and Site Plan dated June 1, 2021 have been submitted with this letter. The revised Site Plan and Engineering Report have been prepared to satisfy all of the previous comments and concerns along with the current comments and concerns set forth by Weston and Sampson.

DBS has prepared this written response to each remaining item listed in the W&S letter. With this being the second set of response comments from W&S, DBS has removed the comments that were previously satisfied. W&S's initial comments are in plain text, and DBS's first responses are in bold text. W&S's second comments are underlined in plain text, and DBS's second responses are underlined in bold text. DBS's responses are as follows:

Engineering Report

Section 1 – Project Narrative

Stormwater Management -

2. DBS states “Despite the soil mapping calling for “A” soils (Charlton) DBS calculated land coverage numbers (CN) using Hydrologic Group “C” soils based upon soil evaluations performed within the vicinity of the project.”
 - a. Weston & Sampson does not agree with this assumption. DBS stated in their existing conditions summary that on-site test pits were used to confirm the Natural Resources Conservation Service (NRCS) mapping. Test pit logs included on the Existing Conditions Plan (Sheet 2 of 8) of the Site Plans identify parent soils as “Fine Loamy Sand”. The NRCS classification for Charlton and the Rawls Rate soil classifications summarized in the Massachusetts Stormwater Handbook state that Loamy Sand is HSG A. HydroCAD modeling and recharge volume calculations should be updated for this site based on an existing conditions soil classification of HSG A.

DeCelle-Burke-Sala & Associates, Inc.
1266 Furnace Brook Pkwy., #401 Quincy, MA 02169
PH: 617-405-5100 FX: 617-405-5101

DBS Response: DBS has revised the HydroCAD analysis to use HSG-A soils as requested by W&S. The revised stormwater management calculations are included in the Revised Engineering Report.

W&S: Although DBS has updated the soil classifications from HSG-C to HSG-A, they have also revised the curve number (CN) for ground cover, changing woods from good to fair, and grass from >75% cover to fair cover. We recommend that these cover types be changed back to model good conditions for woods and grass as part of the existing condition model. They should also be the same for Pre- and Post- calculations.

DBS Response: Curve numbers have been revised in the HydroCAD model to keep consistency between Pre- and Post- calculations. DBS has revised the model to reflect good conditions for woods and grass.

Section 4 – Stormwater Management Data Stormwater Checklist

18. Standard 3

b. The required 44% TSS pretreatment is not met. The drainage manhole should not be used for 25% credit since it is not an off-line structure.

DBS Response: DBS has included a Contech CDS unit designed to remove 50% of the TSS generated from the 100 year event flow of 2.79 cfs. DBS used this value despite direct connections of roof runoff to the infiltration system which would reduce this flow. We believe the TSS reduction of 50% to be conservative for this structure. With a treatment train of the hooded deep sump catch basins and the CDS Unit providing the 50% a TSS pretreatment value of 62% is met exceeding the 44% requirement. CDS design materials are included in the revised Engineering Report. This unit's effectiveness for yearly statistical TSS removal is 93% effective.

W&S: Acknowledged, however, the CONTECH Hydrodynamic Separation Product Calculator has a pipe size of 12 inches, and the design is noted to be at 10 inches. Please confirm a pipe size of 10 inches does impact the calculations or revise the design to 12 inches.

DBS Response: The stormwater system has been revised significantly and now includes (2) two Contech CDS2015-4-C units which provide 50% TSS removal and have been sized to handle the required water quality flow as specified in the Engineering Report. The stormwater system also includes a Contech Stormfilter system which provides 80% TSS removal and has also been sized to provide the required water quality flow treatment as shown in the Engineering Report. The pipe sizes have been specified on the plans and the NJCAT approval data has been included in the Engineering Report.

e. A mounding analysis is missing and should be submitted by DBS for review.

DBS Response: **A mounding analysis is provided for review.**

W&S: Acknowledged, however the input values for the model need to be revised. The recharge infiltration rate should be equal to the exfiltration rate of the model (2.41 in/hr or 4.82 ft/day), and the specific yield does not reflect the stated parent soil type. Also, the saturated thickness should be indicative of the groundwater profile above ledge/refusal.

DBS Response: A revised mounding analysis is provided for review. The infiltration rate has been revised to a rate of 4.12 ft/day. This value was calculated by taking the discarded volume infiltrated during the 100-yr storm (3,821 cf) and dividing it by the area of the system (927 sf). The revised specific yield of 0.21 was chosen based on the present fine loamy sand on-site. The horizontal hydraulic conductivity of 48.2 ft/day was calculated by multiplying the infiltration rate (4.82 ft/day) by 10 as directed by the Hantush method Groundwater Mounding spreadsheet attached. As for the saturate thickness it was estimated using local wells in the area. No groundwater evidence was

found and the presence of ledge is not indicative of saturated thickness. It is our belief that the two feet to depth of ledge will be sufficient to provide the necessary recharge capabilities for the project as no evidence of groundwater appears on-site.

HydroCAD Model

20. Existing Conditions at the site is modeled showing all stormwater flow off-site to the east.

- a. Existing topography at the site suggests that stormwater flows off-site to three different areas; off-site to the south (northwest corner, southeast to the corner of the stone patio), a small segment along the north flows down the site driveway to Frontage Road, and the remaining runoff flows off-site to the east. DBS shall update their existing conditions model and confirm that post-development peak discharge rates to the east remain below existing peak discharge rates.

DBS Response: The existing conditions model has been revised to include the three areas requested by W&S. Calculations attached confirm post-development peak discharge rates are below pre-development peak discharge rates for all three model points.

W&S: Although DBS has updated the watershed areas, they have reduced the curve number (CN) for ground cover, changing woods from good to fair, and grass from >75% cover to fair. We recommend that these cover types be changed back to model good conditions for woods and grass.

DBS Response: Curve numbers have been revised in the HydroCAD model to keep consistency between Pre- and Post- calculations. DBS has revised the model to reflect good conditions for woods and grass.

21. The proposed conditions HydroCAD model combines all runoff flow to one “reach”. This does not accurately model the post development off-site discharge to the east, the towns MS4 storm sewer system, and overland flow toward Frontage Road. There appears to be an increase in impervious surface directed toward Frontage Road for the post-development conditions. DBS should update their proposed conditions model.

DBS Response: The proposed conditions model has been updated confirming the reduced post-development peak discharge rates to the east, to the town’s MS4 system and to Frontage Road. There is no post-development increase of impervious area to Frontage Road, in fact there is a reduction. The model has been revised to compare the flows pre- and post-development to the three separate watershed areas.

W&S: Acknowledged, however this analysis should be confirmed once other comments in this review have been updated.

DBS Response: The proposed HydroCAD analysis has been updated to reflect the revised drainage system and is included in the revised Engineering Report.

22. DBS shall also compare pre- and post-development discharge volumes for the 2-, 10-, 25-, and 100-year 24-hour storm events to comply with the Town of Belmont Stormwater Management and Erosion Control

DBS Response: Pre- and post-development discharge volumes for the 2-, 10-, 25- and 100-year 24-hour storm events have been tabulated for the Board’s review. The tabulation shows a stormwater volume net reduction from the site.

W&S: Acknowledged, however this analysis should be confirmed once other comments in this review have been updated.

DBS Response: Pre- and post-development discharge volumes for the 2, 10, 25 and 100-year 24-hour storm events have been revised and included in the attached Engineering Report.

Rules and Regulations Section III.E.3.

23. It is recommended that a separate outfall structure/pipe is provided for the proposed infiltration system. This would allow for easier access and maintenance of the system as well as separation of inlet and outlet flows.

DBS Response: A proposed outlet control structure manhole has been added to provide for easier access and inspection to the outfall structure.

W&S: Acknowledged, however it is unclear to W&S why an additional chamber was added to the design instead of a single outlet pipe to the drainage manhole. We question if a 30" HDPE chamber can be cut into a 48" drainage manhole (from a constructability standpoint).

The available storage listed for Pond 1P in the HydroCAD model is incorrect. This should be corrected to reflect the proposed system. Additionally, the flood elevation for the 100-year storm event should be demonstrated to be contained within the proposed system.

DBS Response: The stormwater system has been revised and the infiltration chambers include a 10" HDPE outlet which ties into a separate drain manhole. The Infiltration system has been designed to infiltrate the required recharge volume and then overflow to an underground detention tank where the peak flows are reduced through an outlet control structure.

24. DBS shall include an analysis to confirm the Town of Belmont's MS4 system can handle the additional load of the proposed development and submit required documentation to comply with Town of Belmont Stormwater Management and Erosion Control Rules and Regulations Section III.E.4.

DBS Response: DBS has determined that the peak flow and volume of stormwater runoff from this site is reduced and the water quality has substantially improved. DBS can state and has shown by calculation that the Town of Belmont's MS4 system is well protected from any negative stormwater impacts from this project by reducing peak flow, reducing stormwater volume and by improving off-site stormwater quality from this property.

W&S: Acknowledged, however this analysis should be confirmed once other comments in this review have been updated. Additionally, if the MS4 system within Frontage Road is under MassDOT control, the applicant should indicate how a new connection will be permitted. In our experience this is difficult to do.

DBS Response: Based on our research it is our opinion that access to Frontage Road and the drainage system is controlled by the Town of Belmont.

25. A pipe analysis should be provided to confirm the capacity for a 25-year storm, and adequate self-cleansing velocities of the pipes for the 2-year storm.

DBS Response: See pipe analysis calculations attached.

W&S: A minor editorial comment, the labeling for the catch basins should be updated to match with the Site Plan drawings and HydroCAD model. A6 connects to CB2, and A8 connects to CB1. It appears from the calculations that self-cleansing velocities (2.0 fps) will not be achieved for the CB2 connection during a 2-year storm event. Modifications to the design should be considered.

DBS Response: The pipe analysis has been revised to reflect the redesign in the drainage system. Rational Method calculations have been provided for the 25-Year Storm Event to show that the proposed pipes are capable of handling the proposed flows. Also Rational method calculations for the 2-Year Storm Event have been provided to show that an adequate self-cleansing velocity of 2.0 fps is achieved. The calculations are included in Engineering Report.

Proposed Site Plan

27. Distance between the proposed infiltration structure and building foundations measures approximately 5 1/2 feet.
- b. The Structural BMP Specifications for the Massachusetts Stormwater Handbook requires a minimum horizontal distance of 10 feet between an infiltration structure and building foundations.

DBS Response: It is our belief that the vertical and horizontal setbacks of the underground HDPE recharge system can be constructed safely and all long and short term related concerns regarding this foundation setback can be addressed through proper design and construction. The long term concern of flooding living space for this project is negated due to the slab-on-grade construction. The underground recharge structure is below the slab elevations. In addition, structural foundation concerns can be eliminated by designing and constructing the building footings to allow groundwater to move freely without supporting soil movement. This can be accomplished because the system is being constructed together and will work together for the long term. Short term construction related impacts can be eliminated by using proper construction and excavation techniques along with necessary geotechnical material or soil required to fully support the building in the environment proposed. A geotechnical foundation design will be submitted with the building permit application.

W&S: As noted in comment 18.e, a revised mounding analysis needs to be provided. The current design shows mounding of groundwater within the region of the foundations of the buildings. If the designer does not want to adhere to the recommended 10 foot separation, then we recommend that a geotechnical analysis of the proposed design be performed as part of the ZBA application process. The analysis should provide recommendations for the foundation/slab support with the proposed groundwater conditions. Additionally, the designer should indicate how groundwater migration to the utility trenches proposed along the infiltration system will be prevented.

DBS Response: The infiltration system has been revised to increase the separation from the system to the building. The closest point between the building foundation and the surrounding stone is 8.0 feet and the closest point between the building foundation and the Cultec chambers is 10.0 feet.

Groundwater migration to the utility trenches is to be controlled by installing low permeability trench plugs during the backfill process of the utility trenches along the infiltration system. This is the process of installing bentonite clay dams along the utility pipe to decrease the permeability of the utility trench. A detail has been included in the site plan.

28. Three test pits were performed on-site with two test pits having refusal at elevations 219.7 and 217.67.
- c. The proposed infiltration structure has a proposed bottom elevation of 219. The minimum separation distance of 2 feet between the bottom of an infiltration structure and bedrock/groundwater is not met. It is recommended that the infiltration design be evaluated and changed as necessary to meet the minimum separation distance. Additionally, it is recommended in the Massachusetts Stormwater Handbook that a minimum of three test holes be performed in the bottom of the proposed infiltration area. We recommend additional testing is provided prior to the start of construction. If conditions deviate from assumptions provided in the design, then the Applicant should submit a revised design for review and comment.

DBS Response: Additional soil tests will be performed to better assess the depth to bedrock upon the demolition of the existing home. The applicant is prepared to remove bedrock to allow for the proper separation of the infiltration structure.

W&S: Without this existing condition information known now, we are unable to confirm the assumptions and input parameters used in the stormwater modeling. Our concern is that if conditions differ from what is assumed, the required redesign needed to comply with MA Stormwater Standards would be significant and possibly not feasible given the constraints of the current design. There appears to be areas available for testing within the proposed infiltration basin limits but outside of the existing foundations.

DBS Response: Six additional soil test pits were conducted on May 12, 2021. The additional test pit data can be found on sheet 2 of the site plan.

31. Invert elevations of the gutter drain system from the dwellings to the infiltration structure should be added to the Site Plan. It should be confirmed that the proposed roof and gutter system will convey all runoff to the underground system. A detail of the connections to the infiltration structures should also be added to the Site Plan.

DBS Response: Invert elevations of the roof drains are on the site plan and confirmation made that the system will convey all runoff to the underground system. A profile view of the Cultec Recharger structure showing invert elevations is provided on the Site Plan.

W&S: We suggest a detail showing the connection of the roof drain lines into the side of the Cultec chamber is provided. The size of the drain line should be confirmed if there are connection restrictions. Additionally, the storm event that can be conveyed by a 6 inch line proposed for Units 1-8 should be confirmed.

DBS Response: The Cultec detail has been revised to include the inlet pipes shown entering the side of the chamber with the drain pipe sizes labeled. Each 6" PVC roof drain only handles a small portion of the each roof and is capable of handling large storm events.

33. Based on installation guidelines for the CULTEC Recharger 330XLHD, the minimum cover for paved surfaces is 16 inches to the bottom of the pavement surface, and 18 inches to finish grade for unpaved surfaces. Additionally, the maximum cover for paved surfaces should be provided. The detail should be updated to be consistent with manufacturer requirements.

DBS Response: The Cultec Recharger 330XLHD detail has been updated to be consistent with manufacturer requirements.

W&S: The detail does not appear to be updated to reflect DBS's response. Please confirm and/or update the detail to show the correct minimum cover required per the manufacturer's installation guidelines.

DBS Response: The infiltration system is now proposed to be Cultec Recharger 280HD chambers and the details provided have been created to match the specifications set forth by the manufacturers.

34. Detail for pre-cast concrete catch basin is shown with an 8" PVC pipe. Standard practice for all new drain lines is 12". We recommend the detail and network piping get updated to at least 12" minimum.

DBS Response: The pre-cast concrete catch basin detail has been revised to specify a 10" HDPE pipe, consistent with the pipe sizes specified on the site plan. The 10" pipe is more than sufficient to handle the flows generated from this site. Please see the Rational Method Pipe Sizing Calculations included in the revised Engineering Report

W&S: We acknowledge that calculations show 10" pipes could convey a 25-year storm event. However, for minimum cost, industry standard 12" piping would be a better conveyance system for larger storm events.

DBS Response: DBS has provided Rational Method calculations for the 100-Year Storm event showing that the 10" HDPE provides more than the necessary capacity to handle it. We believe that 12" piping is over-sized for the project as they inhibit self-cleaning velocities for low flow storms in the pipe.

36. The proposed access driveway design for the project appears to have more pavement generating runoff toward Frontage Road. The design has a crowned roadway 20' wide at over 14% grade and no stormwater inlets at its intersection. This design could lead to increased runoff toward Frontage Road.

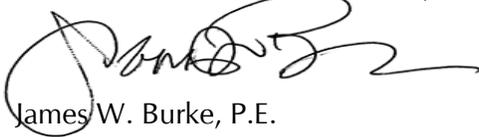
DBS Response: We revised the watershed maps and HydroCAD calculations at the request of WES and based on the calculations the stormwater flow is reduced to Frontage Road for all storms. It is true the total impervious areas for these watersheds contributing to Frontage Road has increased by 321 s.f. when comparing pre- and post-construction numbers. However, the overall post-construction watershed area contributing to Frontage Road has decreased by 2,124 s.f. The design detains enough of the sub-watershed to reduce the stormwater flow off-site. Please also note that the off locus post-construction impervious area has decreased by 128 s.f. located within the Beatrice Circle road layout.

W&S: Although the total impervious surface directed toward Frontage Road has been reduced, the drainage conveyance pattern has been changed. The existing condition allows for a large portion of the driveway to send runoff easterly before Frontage Road. The design proposes a crown in the driveway which will create gutter flow on the western side of the driveway. This flow will then have to cross the driveway entrance at Frontage Road which could be a concern for icing. We recommend the installation of a catch basin at this location to prevent the water from crossing the driveway at the entrance. If under MassDOT control, this intersection may need further review.

DBS Response: Catch basins are proposed to be installed to capture runoff from the driveway going towards Frontage Road. The catch basins are proposed to be tied into the Town Drainage System using a proposed drain manhole connection.

It is our hope that the plan revisions and supplemental information attached addresses W&S concerns. We look forward to presenting these revisions to the Board at the next scheduled hearing.

Sincerely,
DeCelle-Burke-Sala & Associates, Inc.



James W. Burke, P.E.

PROPOSED SITE PLAN

91 BEATRICE CIRCLE BELMONT, MASSACHUSETTS

NOVEMBER 4, 2020



LOCUS AERIAL

IMAGE FROM 2020 GOOGLE MAP DATA

APPLICANT

91 BEATRICE CIRCLE LLC
c/o REGNANTE STERIO
401 EDGEWATER PL, SUITE 630
WAKEFIELD, MA 01880

LEGAL

REGNANTE STERIO, LLP
401 EDGEWATER PLACE SUITE 630
WAKEFIELD, MA 01880

ARCHITECT

EMBARC STUDIO
60 K STREET
BOSTON, MA 02127

TRAFFIC

MDM TRANSPORTATION
CONSULTANTS, INC.
20 LORD ROAD SUITE 280
MARLBOROUGH, MA 01752

CIVIL/SURVEY

DECILLE-BURKE-SALA & ASSOCIATES, INC.
1266 FURNACE BROOK PARKWAY
SUITE 401
QUINCY, MA 02169

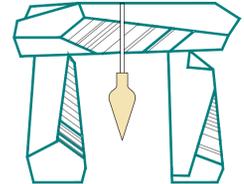
SHEETS

- 1 COVER SHEET
- 2 EXISTING CONDITIONS
- 3 DEMOLITION
- 4 PROPOSED LAYOUT
- 5 PROPOSED GRADING
- 6 PROPOSED UTILITIES
- 7 SEWER PROFILE
- 8 PROPOSED DRAINAGE
- 9 CONSTRUCTION DETAILS
- 10 CONSTRUCTION DETAILS
- 11 CONSTRUCTION DETAILS



NO.	DATE	COMMENT
1	4/19/2021	PEER REVIEW COMMENTS
2	6/1/2021	REVISED SITE DESIGN/PEER REVIEW





& Associates, Inc.
 1266 Furnace Brook Parkway #401
 Quincy, MA 02169
 617-405-5100 (o) 617-405-5101 (f)
 www.decelle-burke-sala.com



CLAUDIO SALA, PLS

- GENERAL NOTES:**
- LOCUS: ASSESSORS MAP 51 BLOCK LOT 36
 RECORD OWNER: COMPREHENSIVE LAND HOLDINGS
 DEED REFERENCE: CERTIFICATE #271959
 PLAN REFERENCE: LC PLAN 2367-12
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 - THE LOT SHOWN DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD ZONE AS DELINEATED ON FIRM 25017C-00416E, DATED JUNE 4, 2010.
 - PARCEL IS ZONED SR-A.

PROJECT TITLE & LOCATION:

PROPOSED SITE PLAN
 91 BEATRICE CIRCLE
 BELMONT, MASS.

PLAN TITLE:

EXISTING CONDITIONS

PREPARED FOR:

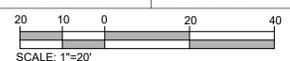
91 BEATRICE CIRCLE LLC
 c/o REGNANTE STERIO
 401 EDGEWATER PL, SUITE 630
 WAKEFIELD, MA 01880

DATE: NOVEMBER 4, 2020

REVISED: APRIL 19, 2021

REVISED: JUNE 1, 2021

JOB NUMBER: 19.085 SHEET 2 OF 11



SOIL TEST PIT DATA:

DATE: 12/5/2019
 TEST BY: KAMERON CAMPBELL, SE #14227

TEST PIT 1	GRD. EL. 225.0	GW. EL. NGWO
0"	FILL, SANDY LOAM, 10YR3/2 Granular, Very Friable	
10"	FILL, SANDY LOAM, 10YR3/4 Massive, Friable	
48"	Apb, SANDY LOAM, 10YR3/2 Granular, Very Friable	
54"	Bw, SANDY LOAM, 10YR4/6 Massive, Friable	
88"	R, Ledge	

TEST PIT 2	GRD. EL. 224.7	GW. EL. NGWO
0"	FILL, SANDY LOAM, 10YR3/2 Granular, Very Friable	
11"	FILL, SANDY LOAM, 10YR3/4 Massive, Friable	
41"	Apb, SANDY LOAM, 10YR3/2 Granular, Very Friable	
50"	Bw, SANDY LOAM, 7.5YR4/4 Massive, Friable	
60"	R, Ledge	

TEST PIT 3	GRD. EL. 229.8	GW. EL. NGWO
0"	FILL, SANDY LOAM, 10YR3/3 Granular, Very Friable	
12"	Bw, SANDY LOAM, 10YR4/6 Massive, Friable	
37"	C ₃ FINE LOAMY SAND, 5Y5/2 Massive, Friable Some gravel	
77"	C ₂₈ FINE LOAMY SAND, 5Y5/2 Massive, Firm Very gravelly	
99"	R, Ledge	

DATE: 05/12/2021
 TEST BY: KAMERON CAMPBELL, SE #14227

TEST PIT 4	GRD. EL. 223.5	GW. EL. NGWO
0"	FILL, SANDY LOAM, 10YR3/2 Massive, Very Friable	
10"	FILL, SANDY LOAM, 2.5Y4/2 Massive, Friable	
36"	Apb, SANDY LOAM, 10YR3/2 Massive, Very Friable	
42"	Bw, SANDY LOAM, 10YR4/6 Massive, Friable	
69"	C, SANDY LOAM, 5Y4/2 Massive, Friable Gravelly(±30%) Cobbles(±10%)	
110"	R, Ledge	

TEST PIT 5	GRD. EL. 230.3	GW. EL. NGWO
0"	Ap, SANDY LOAM, 10YR3/2 Granular, Very Friable	
12"	Bw, SANDY LOAM, 10YR4/6 Massive, Friable	
35"	C ₂₈ SANDY LOAM, 5Y4/2 Massive, Firm Gravelly(±30%) Cobbles(±10%), Soil friable once removed from wall face	
71"	R, Ledge	

SOIL TEST PIT DATA:

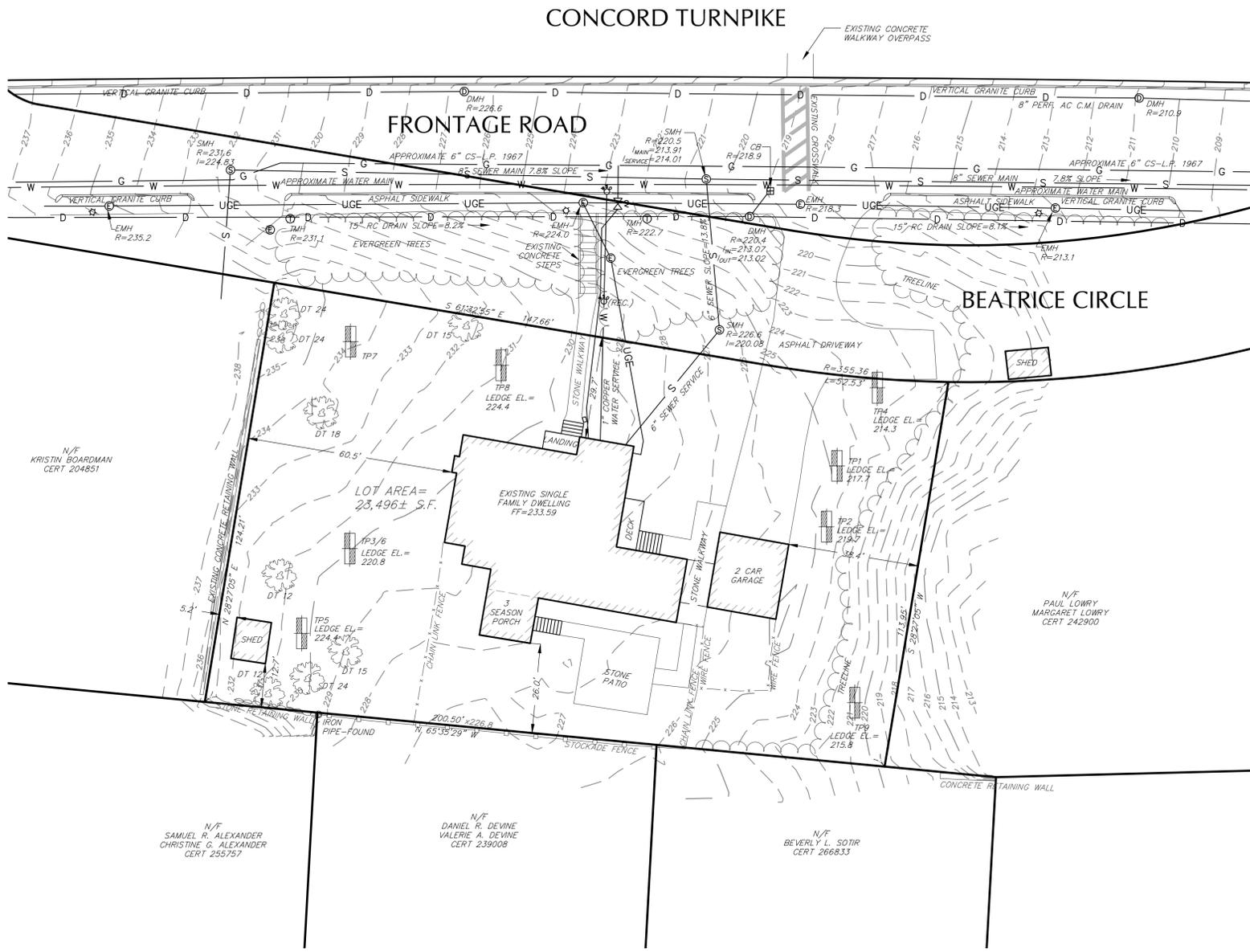
TEST PIT 6	GRD. EL. 229.8	GW. EL. NGWO
0"	Ap, SANDY LOAM, 10YR3/2 Granular, Very Friable	
12"	Bw, SANDY LOAM, 10YR4/6 Massive, Friable	
42"	C ₃ SANDY LOAM, 5Y4/2 Massive, Friable Gravelly(±30%) grittier than C ₂	
72"	C ₂₈ SANDY LOAM, 5Y4/2 Massive, Firm Very gravelly(±40%) Cobbles(±10%) Soil friable once removed from wall face	
107"	R, Ledge	

TEST PIT 7	GRD. EL. 234.2	GW. EL. NGWO
0"	FILL, SANDY LOAM, 10YR3/2 Massive, Very Friable	
10"	FILL, SAND 2.5Y6/6 Single Grained, Loose	
34"	Apb, SANDY LOAM, 5Y4/2 Massive, Very Friable	
37"	Bw, SANDY LOAM, 10YR4/6 Massive, Friable	
72"	C, SANDY LOAM, 5Y4/2 Massive, Friable Gravelly(±30%) Cobbles(±10%)	
144"	R, Ledge	

TEST PIT 8	GRD. EL. 231.0	GW. EL. NGWO
0"	FILL, SANDY LOAM, 10YR3/2 Massive, Very Friable	
24"	Apb, SANDY LOAM, 10YR3/4 Massive, Very Friable	
30"	Bw, SANDY LOAM, 7.5YR4/4 Massive, Friable	
79"	R, Ledge	

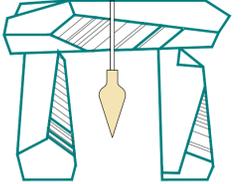
TEST PIT 9	GRD. EL. 220.8	GW. EL. NGWO
0"	Ap, SANDY LOAM, 10YR3/2 Granular, Very Friable	
12"	Bw, SANDY LOAM, 10YR5/4 Massive, Friable	
32"	C, SANDY LOAM, 5Y5/2 Massive, Friable Gravelly(±30%) Cobbles(±10%)	
60"	R, Ledge	

*No groundwater or any signs of groundwater observed in any of the test pits performed.



LEGEND:

- EXISTING:**
- LOCUS PROPERTY LINE
 - TREE LINE
 - SEWER MANHOLE (SMH)
 - DRAIN MANHOLE (DMH)
 - CATCH BASIN (CB)
 - STONEWALL
 - GAS VALVE
 - WATER VALVE
 - WATER SERVICE
 - HYDRANT
 - UTILITY POLE
 - NOW OR FORMERLY
 - DRAIN PIPE
 - WATER MAIN
 - GAS SERVICE
 - UNDERGROUND POWER
 - OVERHEAD WIRES
 - SEWER MAIN
 - LANDSCAPED AREA
 - SPOT GRADE
 - CHAIN LINK FENCE
 - STOCKADE FENCE
 - TEST PIT
 - HAND HOLES FOR UTILITIES
 - LIGHT POLE
 - FIRST FLOOR



JAMES W BURKE, P.E.

GENERAL NOTES:

- LOCUS: ASSESSORS MAP 51 BLOCK LOT 36
RECORD OWNER: COMPREHENSIVE LAND HOLDINGS
DEED REFERENCE: CERTIFICATE #271959
PLAN REFERENCE: LC PLAN 2367-12
- ELEVATIONS REFER TO NAVD-88.
- EXISTING UTILITIES WHERE SHOWN IN THE DRAWINGS ARE FROM SURFACE OBSERVATION AND RECORD INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY LOCATING AND COORDINATING THE PROPOSED CONSTRUCTION ACTIVITY WITH DIG-SAFE AND THE APPLICABLE UTILITY COMPANIES AND MAINTAINING THE EXISTING UTILITY SYSTEM IN SERVICE.
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- PARCEL IS ZONED SR-A.

PROJECT TITLE & LOCATION:

PROPOSED SITE PLAN
91 BEATRICE CIRCLE
BELMONT, MASS.

PLAN TITLE:

DEMOLITION

PREPARED FOR:

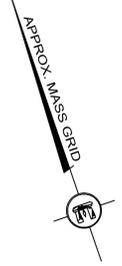
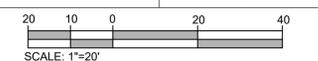
91 BEATRICE CIRCLE LLC
c/o REGNANTE STERIO
401 EDGEWATER PL, SUITE 630
WAKEFIELD, MA 01880

DATE: NOVEMBER 4, 2020

REVISED: APRIL 19, 2021

REVISED: JUNE 1, 2021

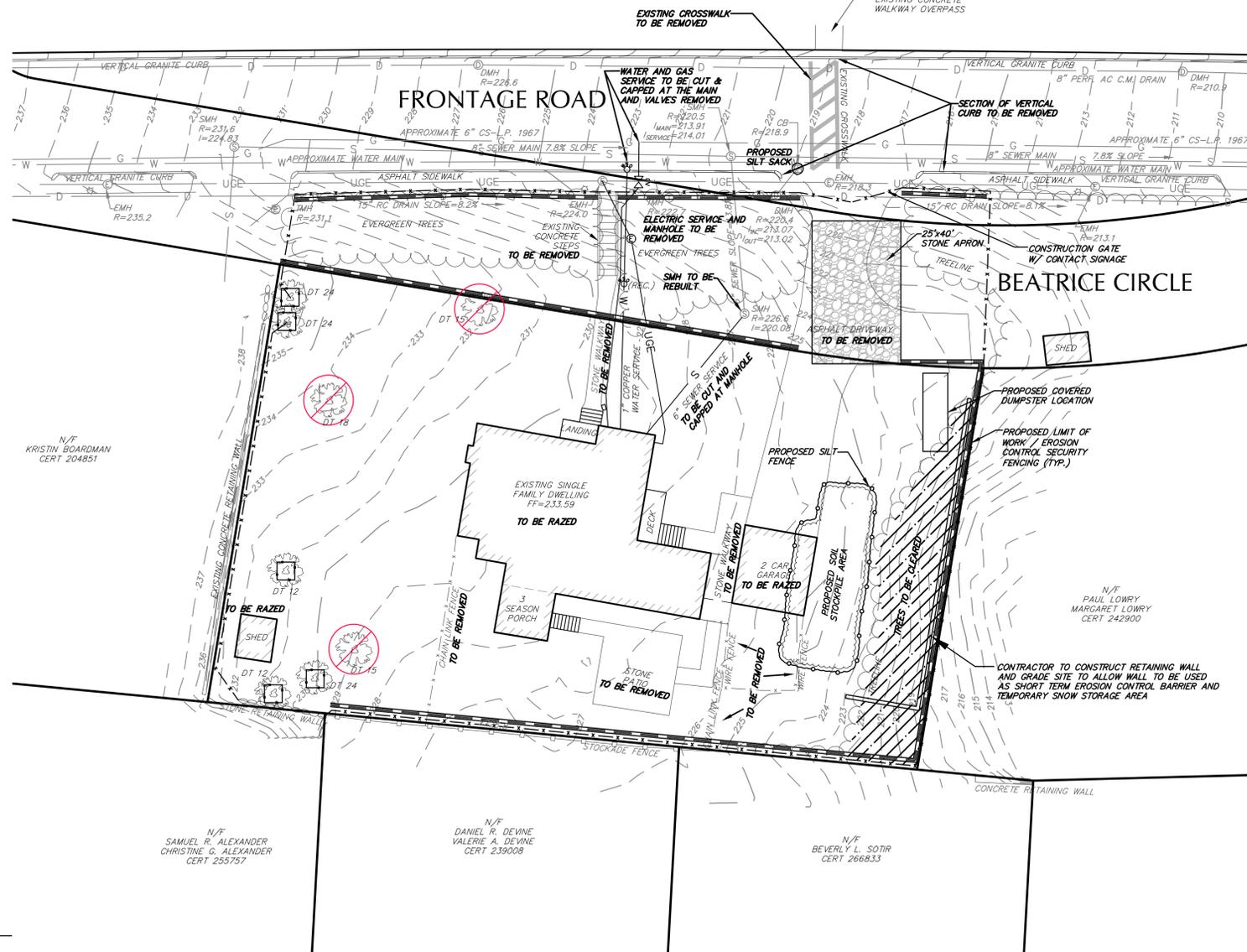
JOB NUMBER: 19.085 SHEET 3 OF 11



CONCORD TURNPIKE

FRONTAGE ROAD

BEATRICE CIRCLE



DEMOLITION & CONSTRUCTION NOTES:

- THE CONTRACTOR SHALL PLACE A 6' HIGH TEMPORARY SAFETY FENCE AND EROSION CONTROL MEASURES AS SHOWN ON THE PLAN AROUND THE SITE PRIOR TO THE DEMOLITION ON SITE.
- A WATER TRUCK SHALL BE ON-SITE DURING THE DEMOLITION AND SITE WORK PROCESS TO MINIMIZE FUGITIVE DUST.
- A CRUSHED STONE APRON SHALL BE CONSTRUCTED AS SHOWN TO MINIMIZE TRUCK TIRES LEAVING SEDIMENT ON THE ROADWAYS.
- A COVERED DUMPSTER SHALL BE KEPT ON-SITE TO ELIMINATE ANY WIND BLOWN DEBRIS FROM BECOMING LITTER IN THE NEIGHBORHOOD.
- ALL DEMOLITION DEBRIS SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN A LEGAL MANNER.
- CONTRACTOR TO GRADE THE SITE AND USE TEMPORARY EROSION CONTROL BARRIERS PARALLEL WITH SITE CONTOURS TO MINIMIZE CHANNELIZING SURFACE RUNOFF. THE SITE AND THE CRUSHED STONE APRON SHALL BE GRADED TO PREVENT ANY CHANNELIZED RUNOFF FROM FLOWING OFF SITE.
- CONTRACTOR IS RESPONSIBLE TO CONTROL THE ON-SITE STORMWATER USING BEST MANAGEMENT PRACTICES TO PREVENT EROSION AND FLOODING IMPACTS.
- CONTRACTOR TO MANAGE ON-SITE SNOW BY STOCKPILING SNOW ALLOWING IT TO MELT IN A CONTROLLED MANNER WITHOUT IMPACTS TO THE ADJACENTS. IF THE SNOW VOLUME EXCEEDS THE STOCKPILE ALLOWANCE VOLUME THE CONTRACTOR SHALL REMOVE IT FROM THE SITE AND DISPOSE OF IT IN A LEGAL MANNER.
- CONSTRUCTION HOURS SHALL BE FROM 7:00AM TO 5:00PM MONDAY THROUGH FRIDAY, 8:00AM TO 4:00PM ON SATURDAYS. ALL CONSTRUCTION AND DELIVERIES ARE PROHIBITED SUNDAYS UNLESS APPROVED BY THE BUILDING COMMISSIONER.

LEGEND:

EXISTING:	PROPOSED:

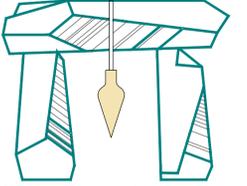
N/F
SAMUEL R. ALEXANDER
CHRISTINE G. ALEXANDER
CERT 255757

N/F
DANIEL R. DEVINE
VALERIE A. DEVINE
CERT 239008

N/F
BEVERLY L. SOTIR
CERT 266833

N/F
PAUL LOWRY
MARGARET LOWRY
CERT 242900

N/F
KRISTIN BOARDMAN
CERT 204851



JAMES W BURKE, P.E.

GENERAL NOTES:

- LOCUS: ASSESSORS MAP 51 BLOCK LOT 36
- RECORD OWNER: COMPREHENSIVE LAND HOLDINGS
 DEED REFERENCE: CERTIFICATE #271959
 PLAN REFERENCE: LC PLAN 2367-12
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- THE LOT SHOWN DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD ZONE AS DELINEATED ON FIRM 25017C-00416E, DATED JUNE 4, 2010.
- PARCEL IS ZONED SR-A.
- FOR PROPOSED BUILDING DIMENSIONS SEE ARCHITECTS PLAN BY EM&B&C.

PROJECT TITLE & LOCATION:

PROPOSED SITE PLAN
 91 BEATRICE CIRCLE
 BELMONT, MASS.

PLAN TITLE:

PROPOSED LAYOUT

PREPARED FOR:

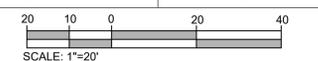
91 BEATRICE CIRCLE LLC
 c/o REGNANTE STERIO
 401 EDGEWATER PL, SUITE 630
 WAKEFIELD, MA 01880

DATE: NOVEMBER 4, 2020

REVISED: APRIL 19, 2021

REVISED: JUNE 1, 2021

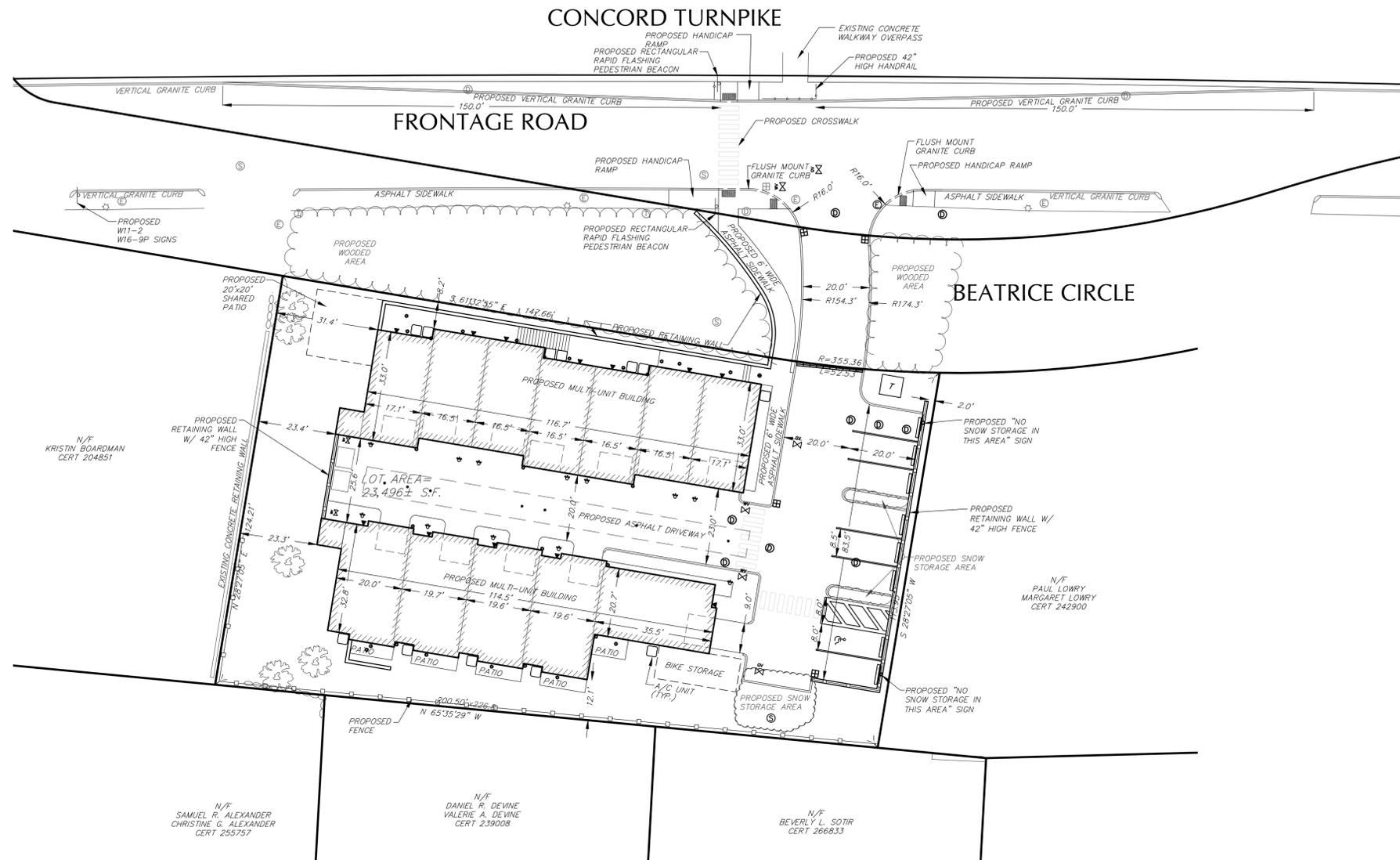
JOB NUMBER: 19.085 SHEET 4 OF 11



ZONING DISTRICT: SR-A			
DIMENSIONAL REQUIREMENTS	EXISTING	PROPOSED	PROPOSED
MINIMUM LOT AREA (SQ.FT.)	25,000	23,496	23,496
MINIMUM FRONTAGE (FT.)	125	200	200
MAX. BUILDING HEIGHT (FT.)	36		
MIN. SETBACKS (FT.)			
FRONT	30	29.7'	8.2'
SIDE	15	38.4'	23.3'
REAR	40	26.0'	12.1'
MAXIMUM LOT COVERAGE	20%	14.5%	29.9%
MINIMUM OPEN SPACE	50%	81.4%	54.5%

LEGEND:

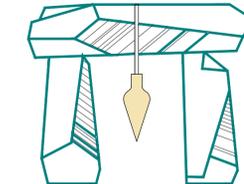
EXISTING:		PROPOSED:
	- LOCUS PROPERTY LINE	
	- TREE LINE	
	- SEWER MANHOLE (SMH)	
	- DRAIN MANHOLE (DMH)	
	- CATCH BASIN (CB)	
	- STONEWALL	
	- GAS VALVE	
	- WATER VALVE	
	- WATER SERVICE	
	- HYDRANT	
	- UTILITY POLE	
	- NOW OR FORMERLY	
	- DRAIN PIPE	
	- WATER MAIN	
	- GAS SERVICE	
	- UNDERGROUND POWER	
	- OVERHEAD WIRES	
	- SEWER MAIN	
	- LANDSCAPED AREA	
	- SPOT GRADE	
	- CHAIN LINK FENCE	
	- CHAIN LINK FENCE	
	- TEST PIT	
	- HAND HOLES FOR UTILITIES	
	- LIGHT POLE	
	- FIRST FLOOR	
	- TOP OF FOUNDATION	
	- GARAGE FLOOR	
	- SECOND FLOOR	



APPROX. MASS GRID



DeCelle-Burke-Sala



& Associates, Inc.
 1266 Furnace Brook Parkway #401
 Quincy, MA 02169
 617-405-5100(o) 617-405-5101(f)
 www.decelle-burke-sala.com

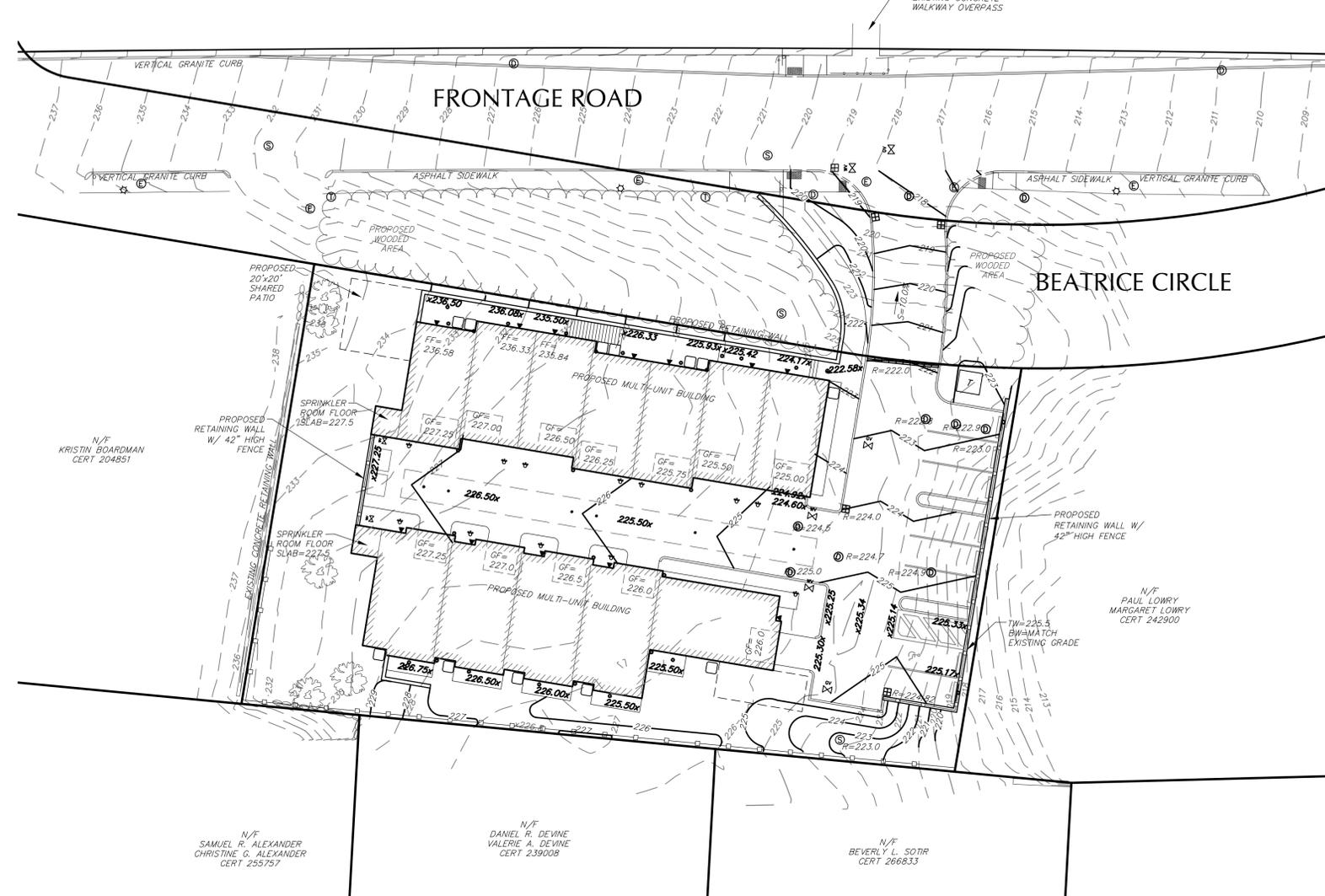


JAMES W BURKE, P.E.

GENERAL NOTES:

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 RECORD OWNER: COMPREHENSIVE LAND HOLDINGS
 DEED REFERENCE: CERTIFICATE #271959
 PLAN REFERENCE: LC PLAN 2367-12
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- PARCEL IS ZONED SR-A.

CONCORD TURNPIKE



LEGEND:

EXISTING:	PROPOSED:

PROJECT TITLE & LOCATION:

PROPOSED SITE PLAN
 91 BEATRICE CIRCLE
 BELMONT, MASS.

PLAN TITLE:

PROPOSED GRADING

PREPARED FOR:

91 BEATRICE CIRCLE LLC
 c/o REGNANTE STERIO
 401 EDGEWATER PL, SUITE 630
 WAKEFIELD, MA 01880

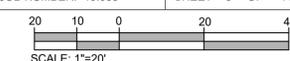
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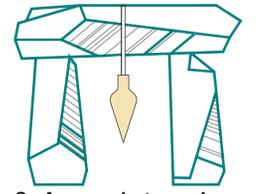
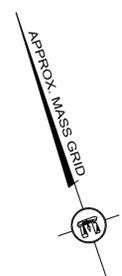
REVISED: APRIL 19, 2021

REVISED: JUNE 1, 2021

JOB NUMBER: 19.085

SHEET 5 OF 11



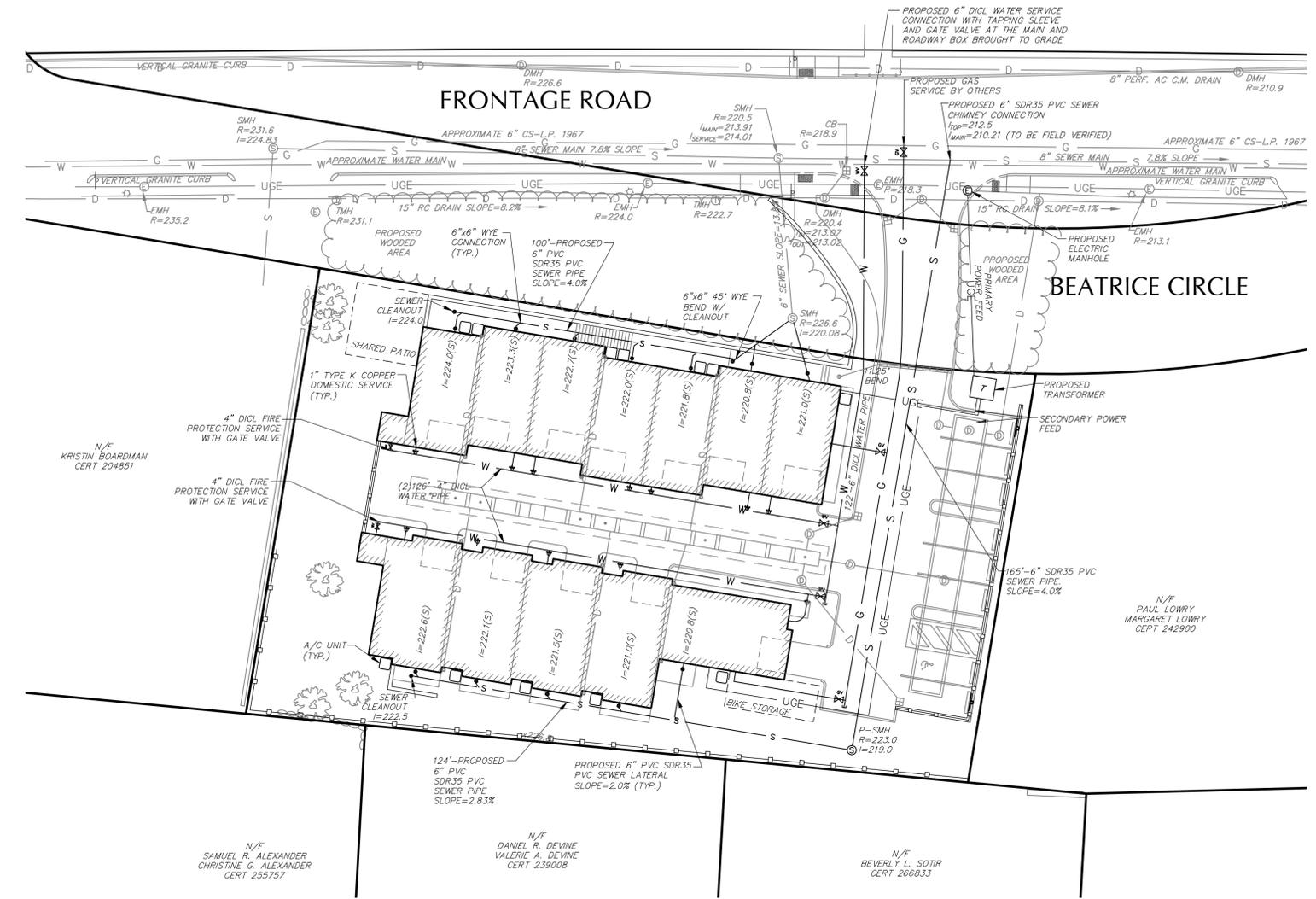


JAMES W BURKE, P.E.

CONCORD TURNPIKE

FRONTAGE ROAD

BEATRICE CIRCLE



DRAINAGE NOTES:

1. ALL WATER SERVICES LESS THAN OR EQUAL TO 2" IN SIZE SHALL BE CONSTRUCTED OF TYPE K COPPER PIPING. ALL WATER SERVICES GREATER THAN 2" IN SIZE SHALL BE CONSTRUCTED OF CONCRETE LINED DUCTILE IRON PIPE.
2. ALL SEWER PIPES SHOULD BE CONSTRUCTED OF 6" SDR35 PVC AND HAVE A MINIMUM SLOPE OF 2.0% AND A MAXIMUM SLOPE OF 8.0%.
3. A MINIMUM OF 18 INCHES OF VERTICAL SEPARATION SHALL BE PROVIDED BETWEEN ALL SEWER AND WATER CROSSINGS. IF 18" OF VERTICAL SEPARATION CANNOT BE OBTAINED THEN THE SEWER LINE SHALL BE ENCASED IN 6" OF CONCRETE FOR A MINIMUM OF 10' ON EITHER SIDE OF THE CROSSING.
4. ALL WATER SERVICES SHALL HAVE A MINIMUM COVER OF 4'-6".
5. ALL SEWER PIPES SHALL HAVE A MINIMUM COVER OF 4'-0".
6. ALL DRAIN PIPES SHALL HAVE A MINIMUM DEPTH OF 2'-0".
7. ALL UTILITIES SHALL BE AS-BUILT BY A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR PRIOR TO BEING BACKFILLED.
8. A BENTONITE DAM SHALL BE PLACED EVERY 20' WITHIN THE EXCAVATION OF THE WATER SERVICES ALONG THE INFILTRATION SYSTEM TO MITIGATE THE FLOW OF GROUNDWATER THROUGH THE UTILITY TRENCH. (SEE DETAIL PROVIDED)

ANTICIPATED SEWER FLOW:

- (4) 4-BEDROOM UNITS
- (8) 3-BEDROOM UNITS
- TOTAL= 40 BEDROOMS
- 110 GPD/BEDROOM X 40 BEDROOMS = 4,400 GPD

LEGEND:

EXISTING:	PROPOSED:
N/F	N/F
FF	FF
TOF	TOF
GF	GF
	SF
	I=220.0(S)
	I=220.0(D)

GENERAL NOTES:

1. LOCUS: ASSESSORS MAP 51 BLOCK LOT 36
- RECORD OWNER: COMPREHENSIVE LAND HOLDINGS
 DEED REFERENCE: CERTIFICATE #271959
 PLAN REFERENCE: LC PLAN 2367-12
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5. PARCEL IS ZONED SR-A.

PROJECT TITLE & LOCATION:

PROPOSED SITE PLAN
 91 BEATRICE CIRCLE
 BELMONT, MASS.

PLAN TITLE:

PROPOSED UTILITIES

PREPARED FOR:

91 BEATRICE CIRCLE LLC
 c/o REGNANTE STERIO
 401 EDGEWATER PL, SUITE 630
 WAKEFIELD, MA 01880

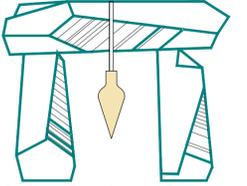
DATE: NOVEMBER 4, 2020

REVISED: APRIL 19, 2021

REVISED: JUNE 1, 2021

JOB NUMBER: 19.085 SHEET 6 OF 11



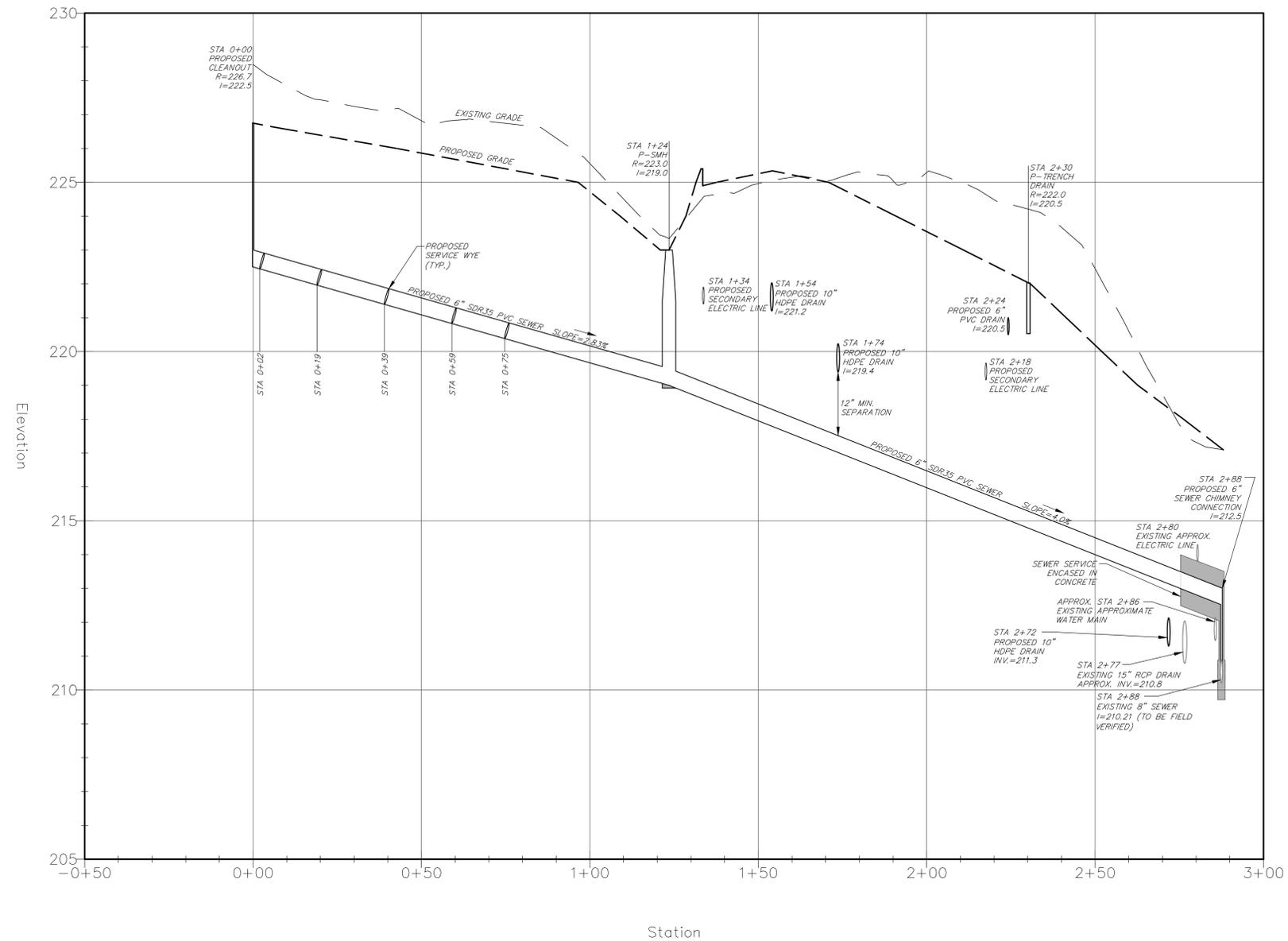


JAMES W BURKE, P.E.

GENERAL NOTES:

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Proposed Sewer Alignment Profile



HORIZONTAL SCALE: 1"=20'
 VERTICAL SCALE: 1"=2'

EXISTING:		PROPOSED:	
	- LOCUS PROPERTY LINE		- SEWER MANHOLE (SMH)
	- TREE LINE		- DRAIN MANHOLE (DMH)
	- CATCH BASIN (CB)		- STONEWALL
	- GAS VALVE		- WATER VALVE
	- WATER SERVICE		- HYDRANT
	- UTILITY POLE		- SEWER PIPE
	- NOW OR FORMERLY		- WATER MAIN
	- DRAIN PIPE		- GAS SERVICE
	- WATER MAIN		- UNDERGROUND POWER
	- GAS SERVICE		- OVERHEAD WIRES
	- UNDERGROUND POWER		- SEWER MAIN
	- OVERHEAD WIRES		- LANDSCAPED AREA
	- SEWER MAIN		- SPOT GRADE
	- LANDSCAPED AREA		- CHAIN LINK FENCE
	- GRADE		- CHAIN LINK FENCE
	- SPOT GRADE		- TEST PIT
	- CHAIN LINK FENCE		- HAND HOLES FOR UTILITIES
	- CHAIN LINK FENCE		- LIGHT POLE
	- TEST PIT		- FIRST FLOOR
	- HAND HOLES FOR UTILITIES		- TOP OF FOUNDATION
	- LIGHT POLE		- GARAGE FLOOR
	- FIRST FLOOR		- SECOND FLOOR
	- TOP OF FOUNDATION		- SEWER INVERT
	- GARAGE FLOOR		- DRAIN INVERT
	- SECOND FLOOR		
	- SEWER INVERT		
	- DRAIN INVERT		

PROJECT TITLE & LOCATION:

PROPOSED SITE PLAN
 91 BEATRICE CIRCLE
 BELMONT, MASS.

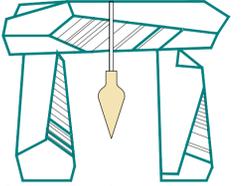
PLAN TITLE:
 PROPOSED SEWER PROFILE

PREPARED FOR:
 91 BEATRICE CIRCLE LLC
 c/o REGNANTE STERIO
 401 EDGEWATER PL, SUITE 630
 WAKEFIELD, MA 01880

DATE: NOVEMBER 4, 2020
 REVISED: APRIL 19, 2021
 REVISED: JUNE 1, 2021

JOB NUMBER: 19.085 SHEET 7 OF 11





JAMES W BURKE, P.E.

GENERAL NOTES:

- LOCUS: ASSESSORS MAP 51 BLOCK LOT 36
- RECORD OWNER: COMPREHENSIVE LAND HOLDINGS
 DEED REFERENCE: CERTIFICATE #271959
 PLAN REFERENCE: LC PLAN 2367-12
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- EXISTING UTILITIES WHERE SHOWN IN THE DRAWINGS ARE FROM SURFACE OBSERVATION AND RECORD INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY LOCATING AND COORDINATING THE PROPOSED CONSTRUCTION ACTIVITY WITH DIG-SAFE AND THE APPLICABLE UTILITY COMPANIES AND MAINTAINING THE EXISTING UTILITY SYSTEM IN SERVICE.
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- PARCEL IS ZONED SR-A.

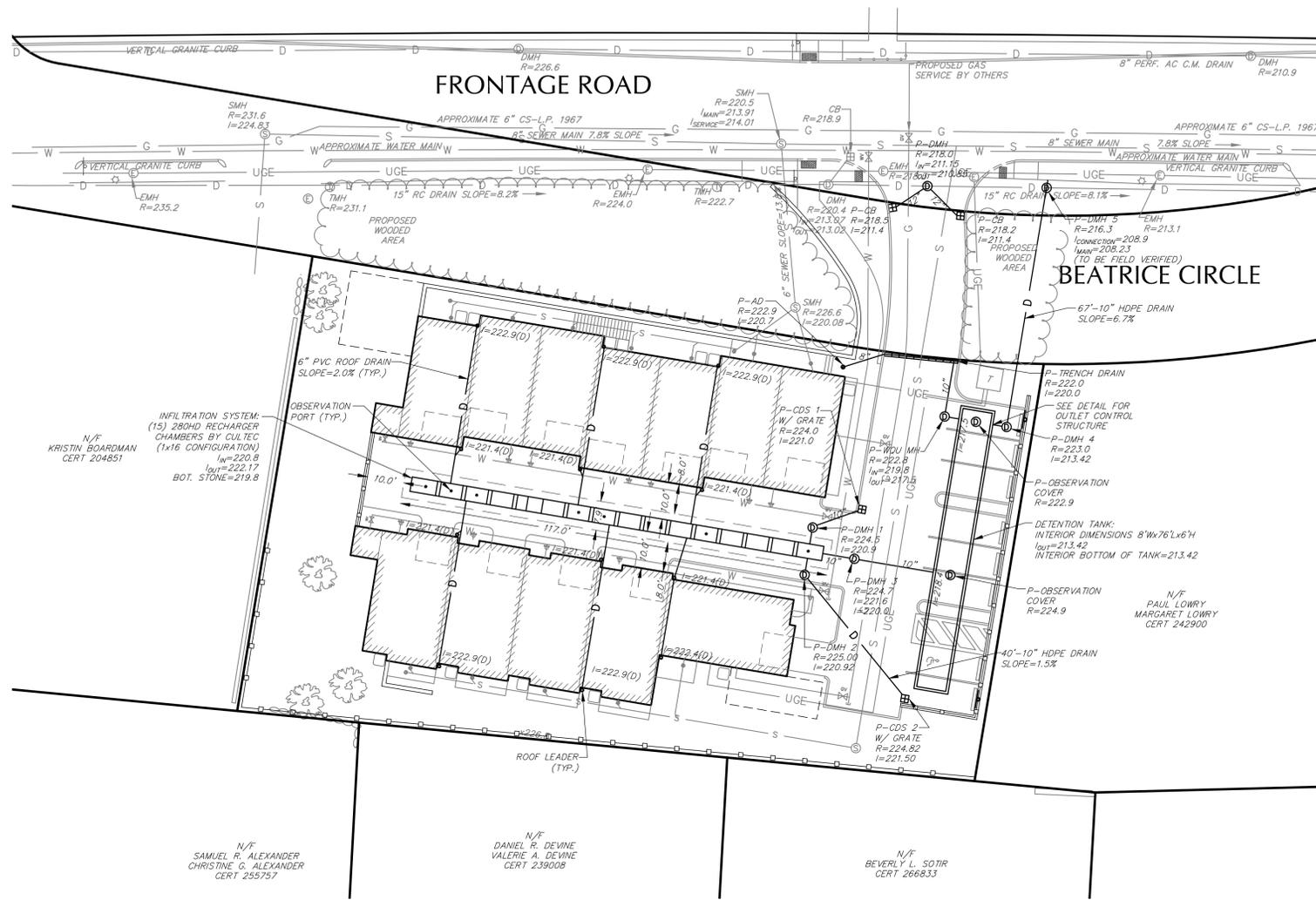
DRAINAGE NOTES:

- ALL DRAIN PIPES GREATER THAN OR EQUAL TO 10" IN SIZE SHALL BE CONSTRUCTED OF HDPE. ALL DRAIN PIPES LESS THAN 10" IN SIZE SHALL BE CONSTRUCTED OF SCHEDULE 40 PVC.
- ALL DRAIN PIPES SHOULD HAVE A MINIMUM SLOPE OF 1.0% AND A MAXIMUM SLOPE OF 8.0%.
- A MINIMUM OF 12 INCHES OF VERTICAL SEPARATION SHALL BE PROVIDED BETWEEN ALL UTILITY CROSSINGS.
- THE EXCAVATION FOR THE PROPOSED INFILTRATION SYSTEM SHALL BE INSPECTED AND SIGNED OFF BY THE DESIGN ENGINEER PRIOR TO THE INSTALLATION OF THE STRUCTURES.
- SILT SACKS SHALL BE INSTALLED IN THE CATCH BASINS AND TRENCH DRAIN AFTER THEY HAVE BEEN CONSTRUCTED TO PREVENT ANY CONSTRUCTION RELATED DEBRIS FROM ENTERING THE DRAINAGE SYSTEM.
- ALL DRAINAGE STRUCTURES AND PIPES SHALL BE FLUSHED AND CLEANED PRIOR TO CONNECTING THEM TO THE PROPOSED INFILTRATION AND DETENTION SYSTEMS.
- THE DRAINAGE STRUCTURES AND PIPING SHALL BE AS-BUILT BY A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR PRIOR TO BEING BACKFILLED.

CONCORD TURNPIKE

FRONTAGE ROAD

BEATRICE CIRCLE



LEGEND:

EXISTING:		PROPOSED:
	- LOCUS PROPERTY LINE	
	- TREE LINE	
	- SEWER MANHOLE (SMH)	
	- DRAIN MANHOLE (DMH)	
	- CATCH BASIN (CB)	
	- STONEWALL	
	- GAS VALVE	
	- WATER VALVE	
	- WATER SERVICE	
	- HYDRANT	
	- UTILITY POLE	
	- NOW OR FORMERLY	
	- DRAIN PIPE	
	- WATER MAIN	
	- GAS SERVICE	
	- UNDERGROUND POWER	
	- OVERHEAD WIRES	
	- SEWER MAIN	
	- LANDSCAPED AREA	
	- GRADE	
	- SPOT GRADE	
	- CHAIN LINK FENCE	
	- CHAIN LINK FENCE	
	- TEST PIT	
	- HAND HOLES FOR UTILITIES	
	- LIGHT POLE	
	- FIRST FLOOR	
	- TOP OF FOUNDATION	
	- GARAGE FLOOR	
	- SECOND FLOOR	
	- SEWER INVERT	
	- DRAIN INVERT	

PROJECT TITLE & LOCATION:

PROPOSED SITE PLAN
 91 BEATRICE CIRCLE
 BELMONT, MASS.

PLAN TITLE:

PROPOSED UTILITIES

PREPARED FOR:

91 BEATRICE CIRCLE LLC
 c/o REGNANTE STERIO
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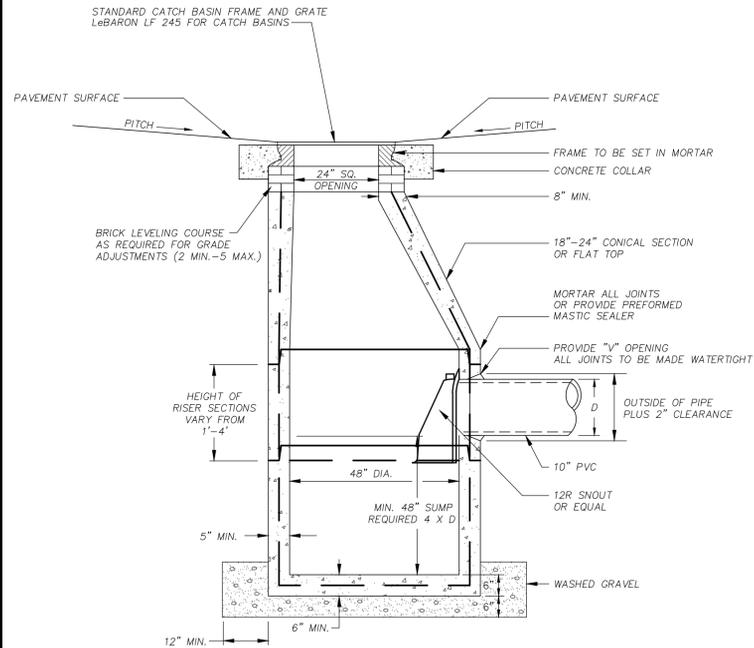
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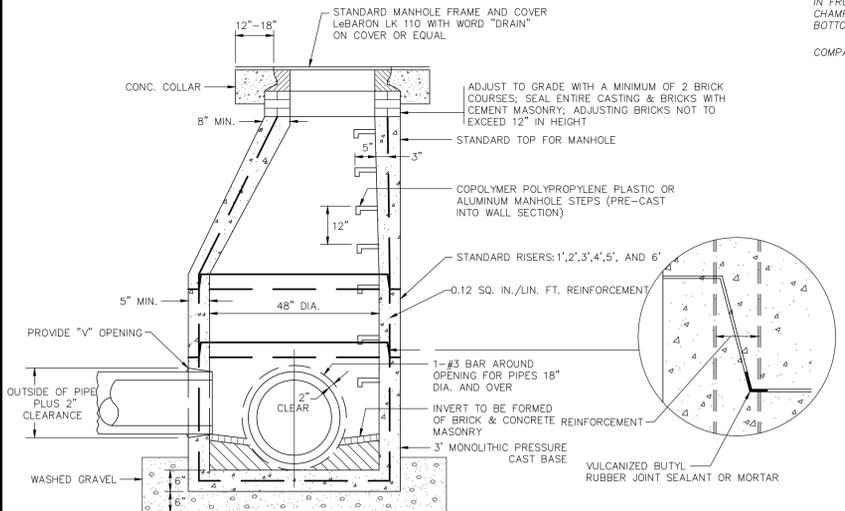
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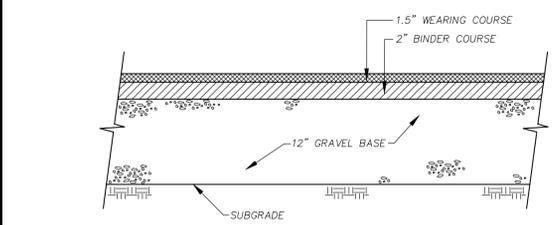




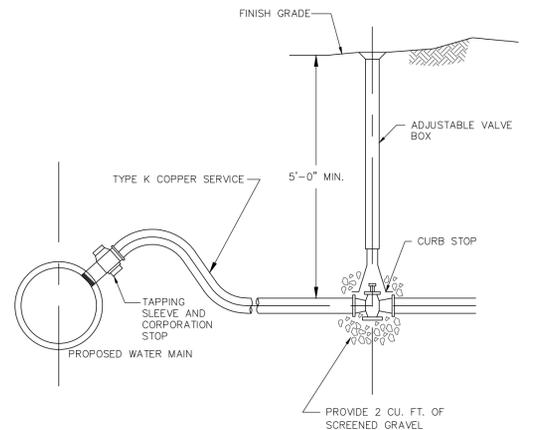
PRECAST CONCRETE CATCH BASIN
NOT TO SCALE



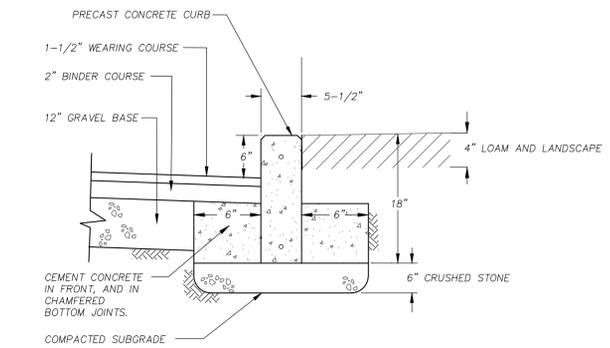
STANDARD PRE-CAST DRAIN MANHOLE
NOT TO SCALE



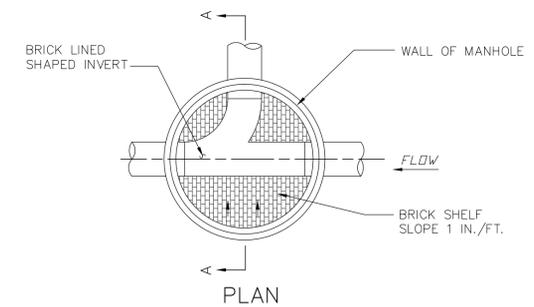
PAVEMENT SECTION
NOT TO SCALE



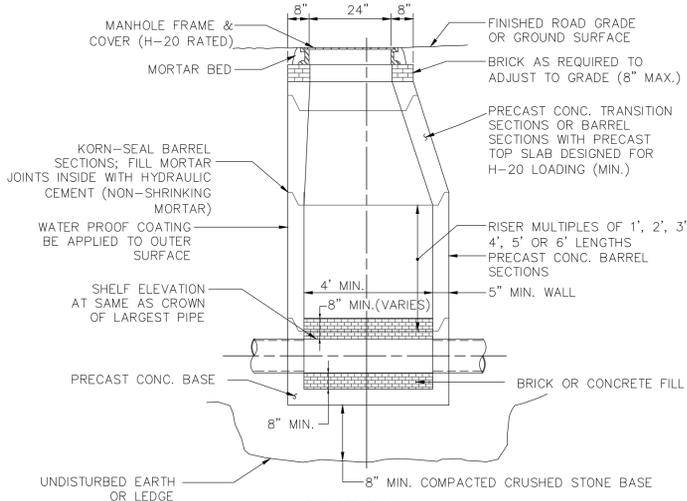
1 inch WATER SERVICE CONNECTION
NOT TO SCALE



PRECAST CONCRETE CURB
NOT TO SCALE

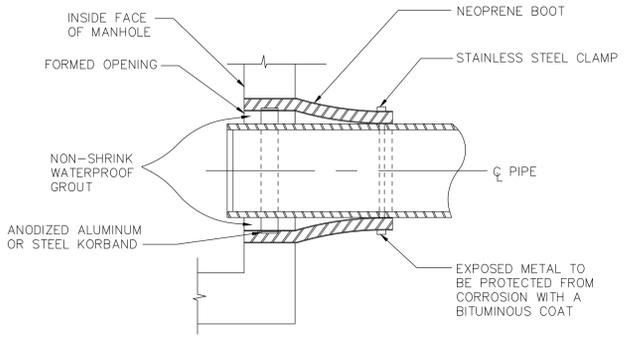


PLAN

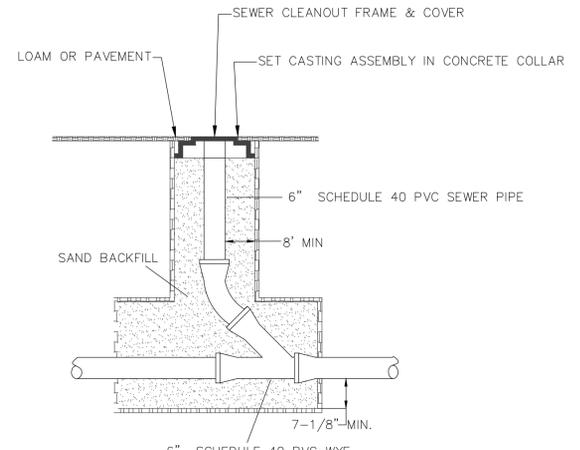


SECTION

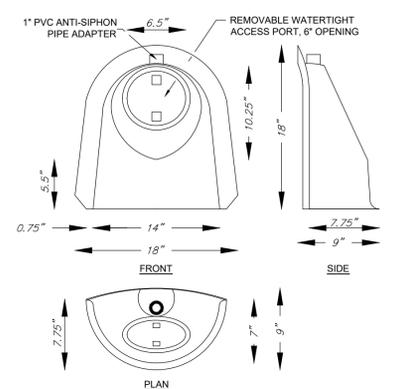
TYPICAL PRECAST SEWER MANHOLE
NOT TO SCALE



NEOPRENE BOOT CONNECTION
NOT TO SCALE

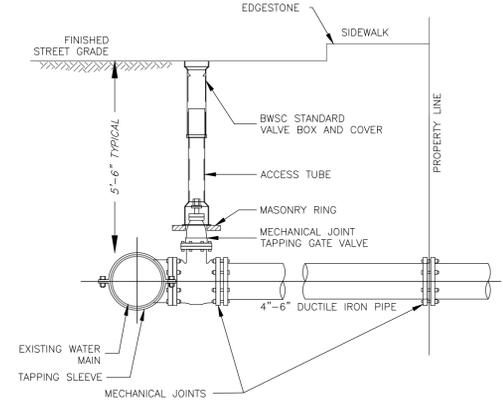


SEWER CLEANOUT
NOT TO SCALE

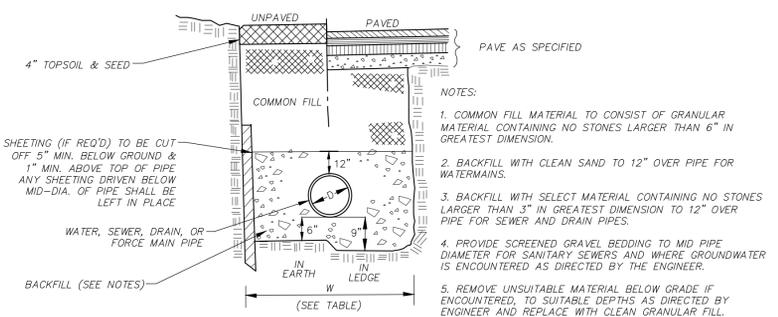


12R SNOOT
NOT TO SCALE

NOTES:
- CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BEAR ON UNDISTURBED EARTH.
- USE RESTRAINED JOINT FITTINGS OR TIE RODS WHERE CONCRETE THRUST BLOCK IS UNACCEPTABLE.
- SIZE OF BLOCK OR MEGALUG TO BE DESIGNED FOR SPECIFIC CONDITIONS.



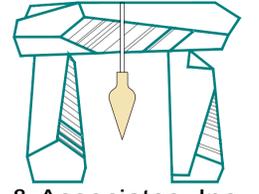
4-6 inch WATER SERVICE CONNECTION
NOT TO SCALE



NOTES:
1. ALL TRENCH CONSTRUCTION TO CONFORM TO APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
2. COMPACT FILL AND TAMP PIPE TO 93% MAX. DENSITY UNLESS OTHERWISE SPECIFIED.

DIAMETER OF PIPE	TRENCH WIDTH	
	UNSHEETED	W SHEETED
1" TO 12"	3'	4'
14" TO 24"	4'	5'
30" TO 36"	5'	6'

TYPICAL TRENCH SECTIONS
NOT TO SCALE



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PROPOSED SITE PLAN
91 BEATRICE CIRCLE
BELMONT, MASS.

PLAN TITLE:

CONSTRUCTION DETAILS

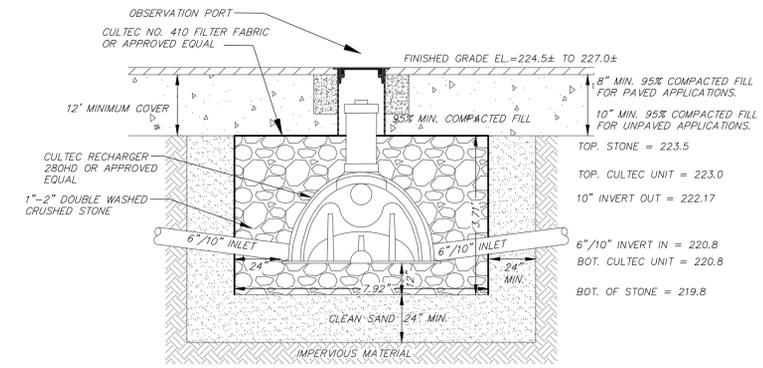
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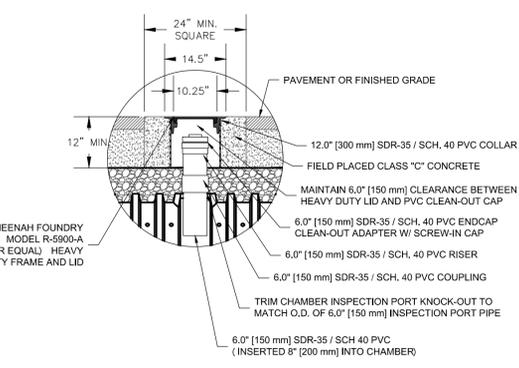
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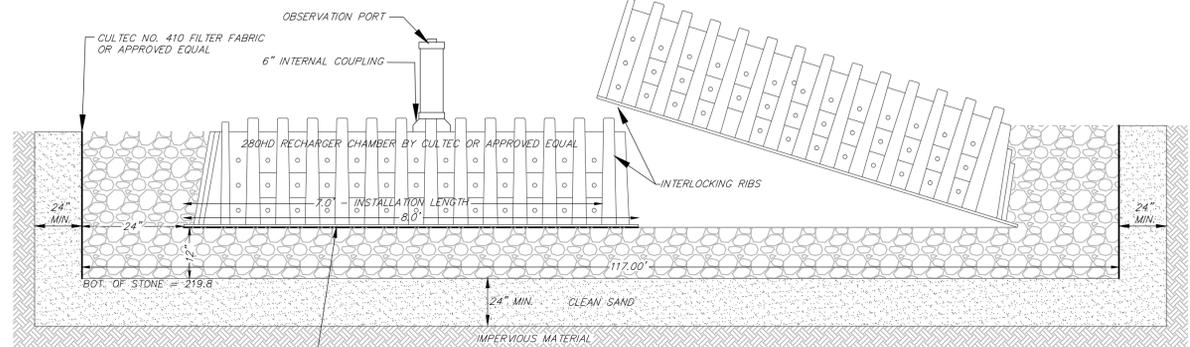
REVISED: JUNE 1, 2021



NOTES:
14" MINIMUM COVER OVER CHAMBERS REQUIRED FROM TOP OF CHAMBER TO BOTTOM OF PAVEMENT FOR PAVED APPLICATIONS.
16" MINIMUM COVER OVER CHAMBERS REQUIRED FROM TOP OF CHAMBER TO BOTTOM OF LOAM FOR UNPAVED APPLICATIONS.
CULTEC NO. 410 FABRIC OR APPROVED EQUAL TO BE LAID ON TOP AND SIDES OF SURROUNDING STONE.
CULTEC NO. 4800 WOVEN GEOTEXTILE TO BE PLACED AT THE BOTTOM OF THE CHAMBER BENEATH EACH INLET AND TO EXTEND A MINIMUM OF 10" PAST THE INLET.
ALL LEDGE TO BE REMOVED WITHIN 2" OF THE BOTTOM AND SIDES OF STONE AND 5" OF THE SIDE STONE AND BACKFILLED WITH CLEAN SAND.



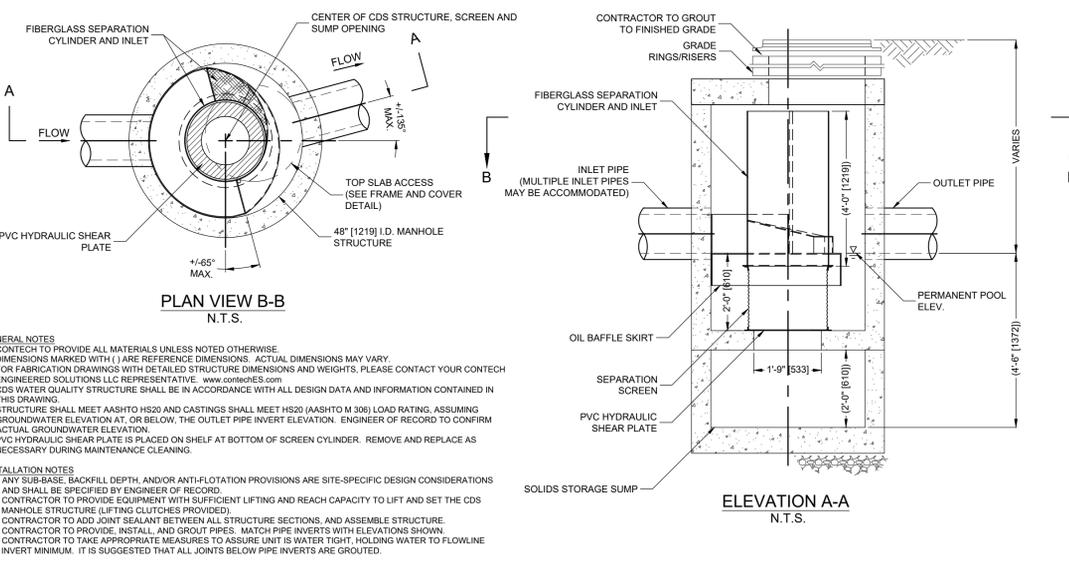
INSPECTION PORT UNDER PAVEMENT
NOT TO SCALE



OBSERVATION PORT INSTALLATION NOTES:
CONTRACTOR TO CUT 6" HOLE AT TOP OF CHAMBER IN THE CENTER OF THE UNIT.
INSERT A 6" INTERNAL COUPLING INTO INSPECTION PORT OPENING.
USE A 6" SCH.40 PVC PIPE TO BRING INSPECTION PORT TO WITHIN 6" OF FINISHED GRADE.
INSTALL A 6" SCH.40 END CAP OR PLUG.
BACKFILL IN ACCORDANCE WITH SPECIFICATIONS.

CULTEC CHAMBER INSTALLATION NOTES:
CONTRACTOR TO INSTALL CULTEC CHAMBERS IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
CULTEC NO. 410 FILTER FABRIC OR APPROVED EQUAL TO BE PLACED OVER THE TOP OF THE DRAINAGE SYSTEM PRIOR TO BACKFILL.
CONTRACTOR TO REMOVE ALL LOAM, SUBSOIL AND ALL DELETERIOUS MATERIAL FROM EXCAVATION PRIOR TO PLACEMENT OF THE STONE BED.

CULTEC CHAMBER TYPICAL PROFILE
NOT TO SCALE

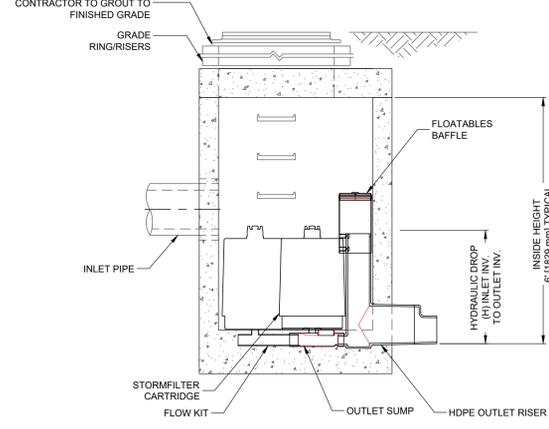
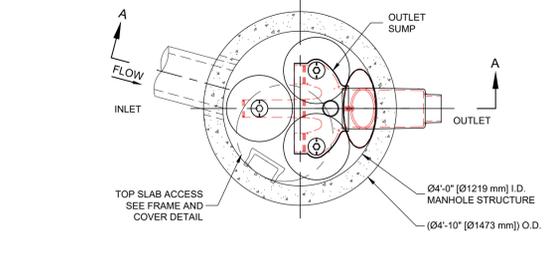


CDS2015-4-C BY CONTECH STANDARD DETAIL
NOT TO SCALE

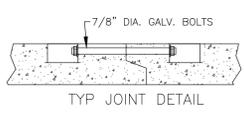
STORMFILTER DESIGN NOTES

STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD MANHOLE STYLE IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (3). VOLUME SYSTEM IS ALSO AVAILABLE WITH MAXIMUM 3 CARTRIDGES.
Ø48" MANHOLE STORMFILTER. PEAK HYDRAULIC CAPACITY IS 1.0 CFS. IF THE SITE CONDITIONS EXCEED 1.0 CFS AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

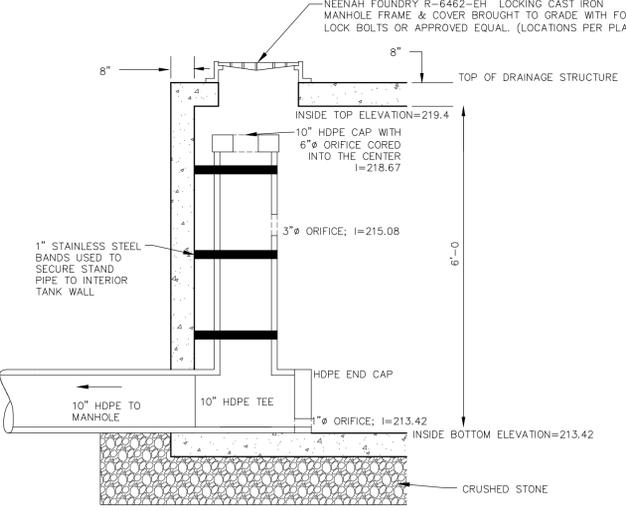
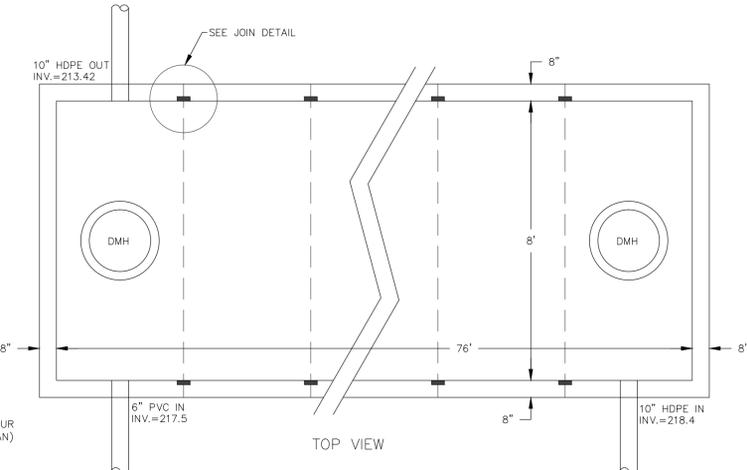
CARTRIDGE SELECTION	18"	24"
CARTRIDGE HEIGHT	18"	24"
RECOMMENDED HYDRAULIC DROP (H)	2.3'	2.3'
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/sf	1 gpm/sf
CARTRIDGE FLOW RATE (gpm)	15	7.5



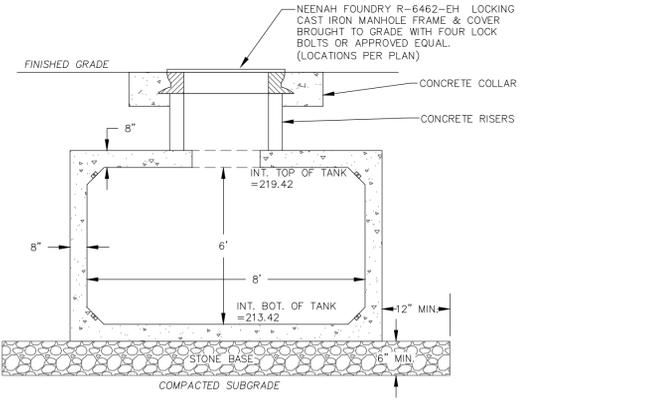
SFMH48 STORMFILTER WATER QUALITY UNIT
BY CONTECH STANDARD DETAIL
NOT TO SCALE



NOTES:
1. CONCRETE: 5000 PSI MINIMUM AFTER 28 DAYS
2. DESIGN PER ASTM C1433 BOX CULVERT
3. ALL REINFORCEMENT PER ASTM A615
4. DESIGNED FOR AASHTO HS-20 LOADING WITH 12" MIN TO 108" MAX COVER OVER CULVERT



OUTLET CONTROL STRUCTURE FOR TANK
NOT TO SCALE



DeCelle-Burke-Sala
& Associates, Inc.
1266 Furnace Brook Parkway #401
Quincy, MA 02169
617-405-5100 (c) 617-405-5101 (f)
www.decelle-burke-sala.com



JAMES W. BURKE, P.E.

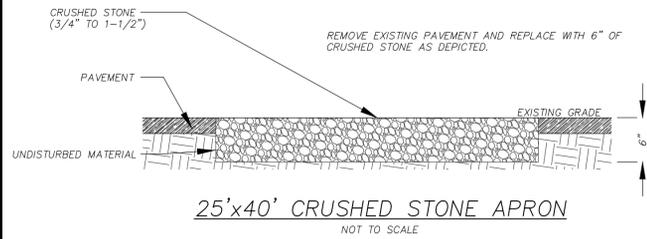
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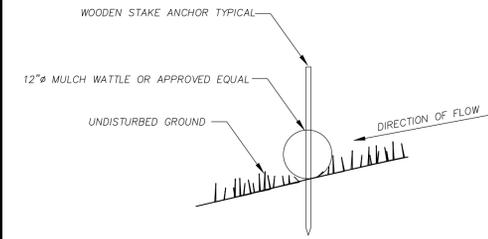
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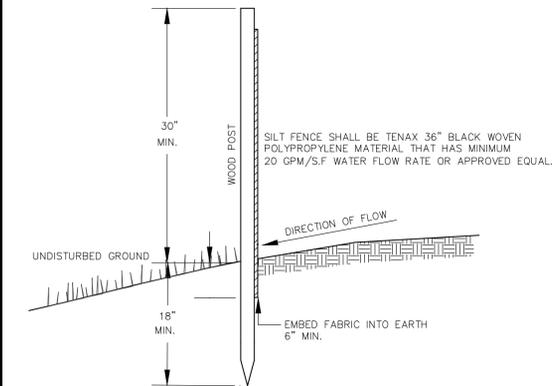
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JOB NUMBER: 19.085 **SHEET** 10 OF 11



25'x40' CRUSHED STONE APRON
NOT TO SCALE



MULCH WATTLE OR EQUIVALENT
NOT TO SCALE



SPECIFICATIONS & INSTALLATION

FABRIC SHALL CONSIST OF WOVEN POLYPROPYLENE, 36\"/>

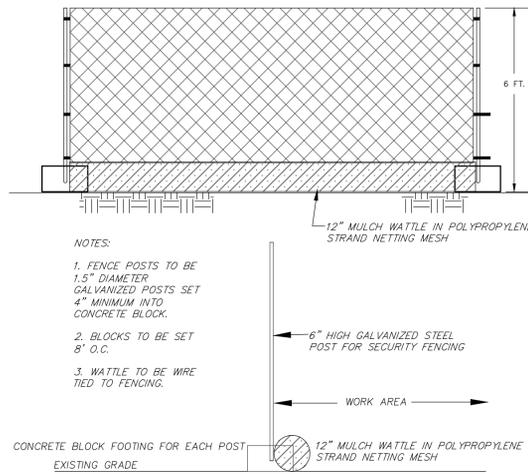
WOOD POSTS SHALL BE OF SOUND HARDWOOD, FORTY EIGHT INCHES (48\"/>

POSTS SHALL BE POSITIONED VERTICALLY AT A DISTANCE NOT TO EXCEED TEN FEET (10') ON CENTER FOR THE ENTIRE LENGTH OF THE SILT FENCE.

SOIL SHALL BE TRENCHED TO ALLOW SIX INCHES (6\") OF THE SILT FENCE FABRIC TO FALL BELOW GRADE. POSTS SHALL BE DRIVEN A MINIMUM OF EIGHTEEN INCHES (18\") BELOW NATURAL GRADE TO ALLOW SIX INCHES (6\") OF MATERIAL TO EXTEND INTO THE TRENCH. TRENCH SHALL BE BACKFILLED TO ORIGINAL GRADE, LEAVING A MINIMUM OF SIX INCHES (6\") OF FABRIC BELOW FINISH GRADE. IF THE SILT FENCE IS INSTALLED ON A SLOPE, THE POSTS SHALL BE POSITIONED ON THE DOWNWARD SIDE. IF THE SILT FENCE IS INSTALLED ON A LEVEL SITE, THE POSTS SHALL BE INSTALLED TO THE OUTSIDE OF THE WORK SITE.

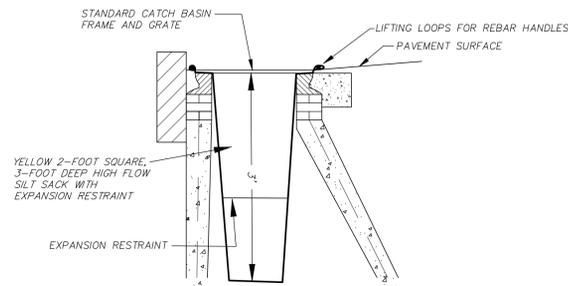
CONNECTION/JOINING OF SILT FENCES SHALL BE COMPLETED BY TIGHTLY OVERLAPPING THE ENDS OF THE ROLLS A MINIMUM OF TWELVE INCHES (12\") OR BY OVERLAPPING THE END POSTS AND SECURING THE TWO POSTS TOGETHER TIGHTLY WITH PLASTIC WIRE TIES AND/OR STEEL BAILING WIRE.

SILT FENCE DETAIL FOR TEMPORARY SOIL STOCKPILE AREA
N.T.S.

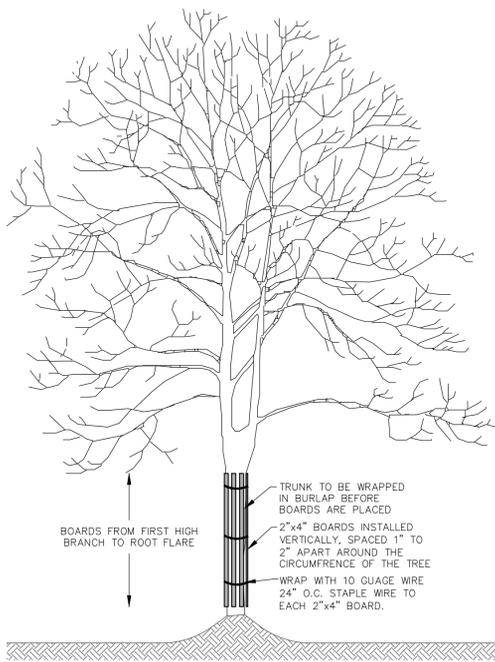


- NOTES:
1. FENCE POSTS TO BE 1.5\"/>
 2. BLOCKS TO BE SET 8\"/>
 3. WATTLE TO BE WIRE TIED TO FENCING.

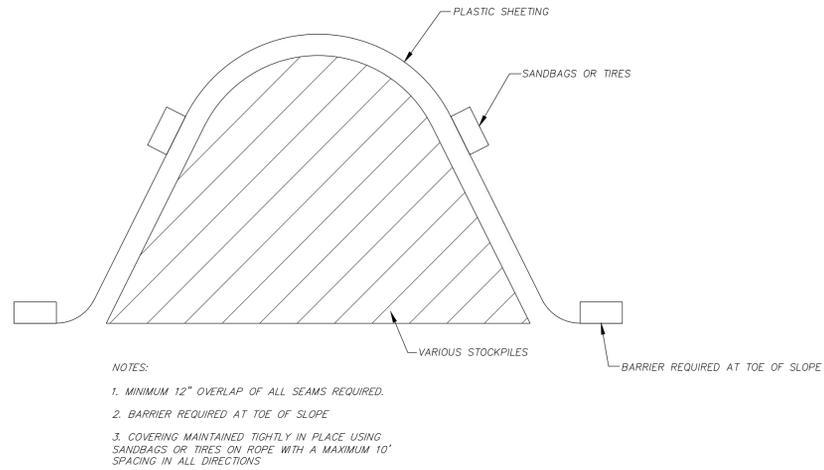
SECURITY FENCING W/ EROSION CONTROL
N.T.S.



CATCH BASIN SILT SACK
N.T.S.

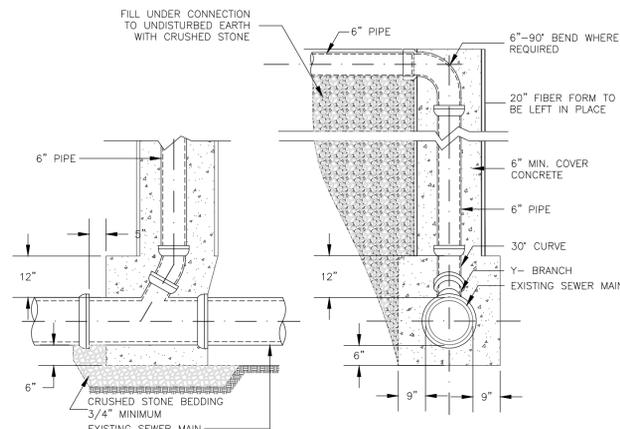


TREE PROTECTION DETAIL
NOT TO SCALE

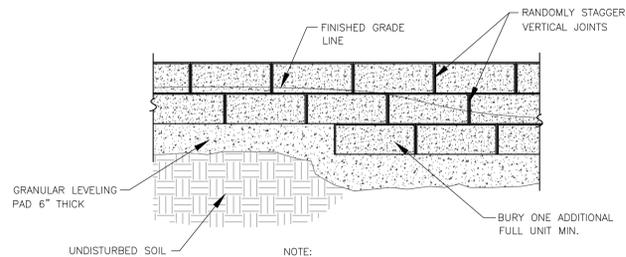


- NOTES:
1. MINIMUM 12\"/>
 2. BARRIER REQUIRED AT TOE OF SLOPE
 3. COVERING MAINTAINED TIGHTLY IN PLACE USING SANDBAGS OR TIRES ON ROPE WITH A MAXIMUM 10' SPACING IN ALL DIRECTIONS.

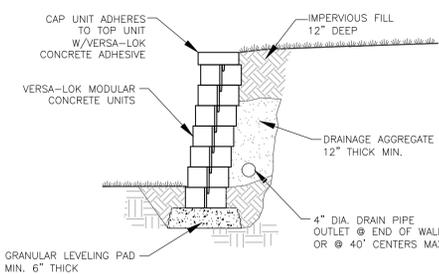
PLASTIC SHEETING OVER STOCKPILED MATERIALS
N.T.S.



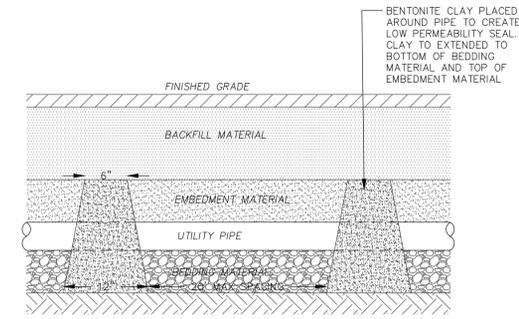
SEWER CHIMNEY CONNECTION
N.T.S.



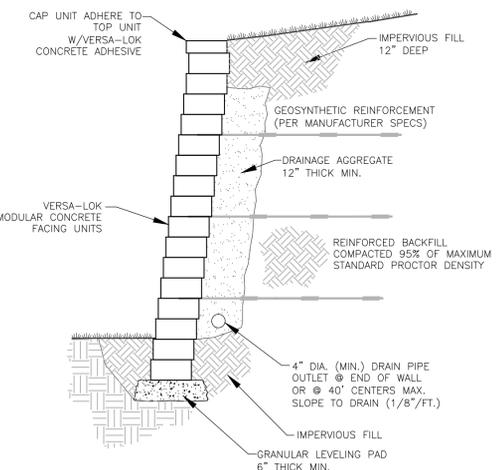
STEPPING BASE DETAIL
NOT TO SCALE



TYPICAL SECTION-UNREINFORCED RETAINING WALL
NOT TO SCALE



LOW PERMEABILITY TRENCH PLUG
N.T.S.



TYPICAL SECTION-REINFORCED RETAINING WALL
NOT TO SCALE

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1266 Furnace Brook Parkway #401
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www.decelle-burke-sala.com



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PLAN REFERENCE: LC PLAN 2367-12
 2. ELEVATIONS REFER TO NAVD-88.
 3. EXISTING UTILITIES WHERE SHOWN IN THE DRAWINGS ARE FROM SURFACE OBSERVATION AND RECORD INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY LOCATING AND COORDINATING THE PROPOSED CONSTRUCTION ACTIVITY WITH DIG-SAFE AND THE APPLICABLE UTILITY COMPANIES AND MAINTAINING THE EXISTING UTILITY SYSTEM IN SERVICE. DIG-SAFE SHALL BE NOTIFIED PER THE STATE OF MASSACHUSETTS STATUTE CHAPTER 82, SECTION 409 AT TEL. 1-888-344-7233. THE ENGINEER DOES NOT GUARANTEE THEIR ACCURACY OR THAT ALL UTILITIES AND SUBSURFACE STRUCTURES ARE SHOWN. LOCATIONS AND ELEVATIONS OF UNDERGROUND UTILITIES WERE TAKEN FROM RECORD PLANS. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION, AND INVERTS OF UTILITIES AND STRUCTURES AS REQUIRED PRIOR TO THE START OF CONSTRUCTION.
 4. THE LOT SHOWN DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD ZONE AS DELINEATED ON FIRM 25017C-00416E, DATED JUNE 4, 2010.
 5. PARCEL IS ZONED SR-A.

PROJECT TITLE & LOCATION:

PROPOSED SITE PLAN
91 BEATRICE CIRCLE
BELMONT, MASS.

PLAN TITLE:
CONSTRUCTION DETAILS

PREPARED FOR:
91 BEATRICE CIRCLE LLC
c/o REGNANTE STERIO
401 EDGEWATER PL, SUITE 630
WAKEFIELD, MA 01880

DATE: NOVEMBER 4, 2020
REVISED: APRIL 19, 2021
REVISED: JUNE 1, 2021

91 BEATRICE CIRCLE

BELMONT, MA 02478

JUNE 3, 2021

COMPREHENSIVE PERMIT RESUBMISSION



91 BEATRICE CIRCLE		
UNITS	COUNT	SF
FOUR-STORY TOWNHOUSE	7	2,115 SF TYP*
THREE-STORY TOWNHOUSE	5	2,065 SF TYP*
PARKING		
SURFACE PARKING	8	
GARAGE PARKING	12	
TOTAL PARKING	20	
PARKING RATIO	1.67	

*INCLUDES UNIT GARAGE

PROJECT DESCRIPTION

THE PROPOSED PROJECT AT 91 BEATRICE CIRCLE WILL REPLACE AN EXISTING RESIDENTIAL STRUCTURE AND ACCESSORY BUILDINGS WITH A MULTI-FAMILY TOWNHOUSE DEVELOPMENT CONSISTING OF (12) RENTAL UNITS

THE STRUCTURES WILL CONSIST OF A FRONT ROW OF (7) 4-STORY TOWNHOUSES AND A REAR ROW OF (5) 3-STORY TOWNHOUSES WITH A GARAGE ACCESS VEHICLE DRIVE AISLE AT THE CENTER. THE UNITS WILL BE SLAB ON GRADE WITH A DEDICATED PARKING SPACE AND LAUNDRY INCLUDED WITHIN THE INDIVIDUAL UNITS. (8) ADDITIONAL SURFACE PARKING SPACES ARE ALSO INCLUDED ON SITE.

SHEET LIST

ARCHITECTURAL

- A000 COVER SHEET
- A010 ARCHITECTURAL SITE PLAN
- A030 SITE SECTIONS
- A101 FIRST FLOOR PLAN
- A102 SECOND FLOOR PLAN
- A103 THIRD FLOOR PLAN
- A201 EXTERIOR ELEVATIONA
- A202 EXTERIOR ELEVATIONS

CIVIL

- 1 COVER SHEET
- 2 EXISTING CONDITIONS
- 3 DEMOLITION
- 4 PROPOSED LAYOUT
- 5 PROPOSED GRADING
- 6 PROPOSED UTILITIES
- 7 SEWER PROFILE
- 8 PROPOSED DRAINAGE
- 9 CONSTRUCTION DETAILS
- 10 CONSTRUCTION DETAILS
- 11 CONSTRUCTION DETAILS

LANDSCAPE

- L1 LANDSCAPE PLAN
- L2 PLANT MATERIALS
- L3 PLANTING PLAN

ARCHITEC
EMBARC

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BOSTON, MA 02127
O: 617.766.8330
www.embarstudio.com

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CAMBRIDGE, MA 02141

CONSULTANTS

CIVIL
DeCELLE-BURKE-SALA &
ASSOCIATES
1286 FURNACE BROOK PARKWAY, #401
QUINCY, MA 02169
617.405.5100

LANDSCAPE ARCHITECT
VERDANT

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BROOKLINE, MA 02446
617.735.1180

91 BEATRICE CIRCLE
BELMONT, MA 02478

COMPREHENSIVE PERMIT RESUBMISSION

REVISIONS

MARK	ISSUE	DATE

DRAWING INFORMATION

ISSUE: COMPREHENSIVE PERMIT
RESUBMISSION
DATE: JUNE 3, 2021
PROJECT #: 20004
SCALE: 1/8" = 1'-0"

DRAWING TITLE

COVER SHEET

DRAWING NUMBER

A000

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 COMPREHENSIVE PERMIT RESUBMISSION

REVISIONS

MARK	ISSUE	DATE

DRAWING INFORMATION
 ISSUE: COMPREHENSIVE PERMIT
 DATE: RESUBMISSION
 PROJECT #: 20004
 SCALE: 1" = 20'-0"

DRAWING TITLE
**ARCHITECTURAL
 SITE PLAN**

DRAWING NUMBER
A010
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1 SITE SECTION - N TO S
1" = 10'-0"



2 SITE SECTION - W TO E
1" = 10'-0"

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REVISIONS

MARK	ISSUE	DATE

DRAWING INFORMATION
 ISSUE: COMPREHENSIVE PERMIT
 RESUBMISSION 4
 DATE: JUNE 5, 2021
 PROJECT #: 20004
 SCALE: 1" = 10'-0"

DRAWING TITLE
SITE SECTIONS

DRAWING NUMBER
A030
copyright: EMBARC STUDIO, LLC

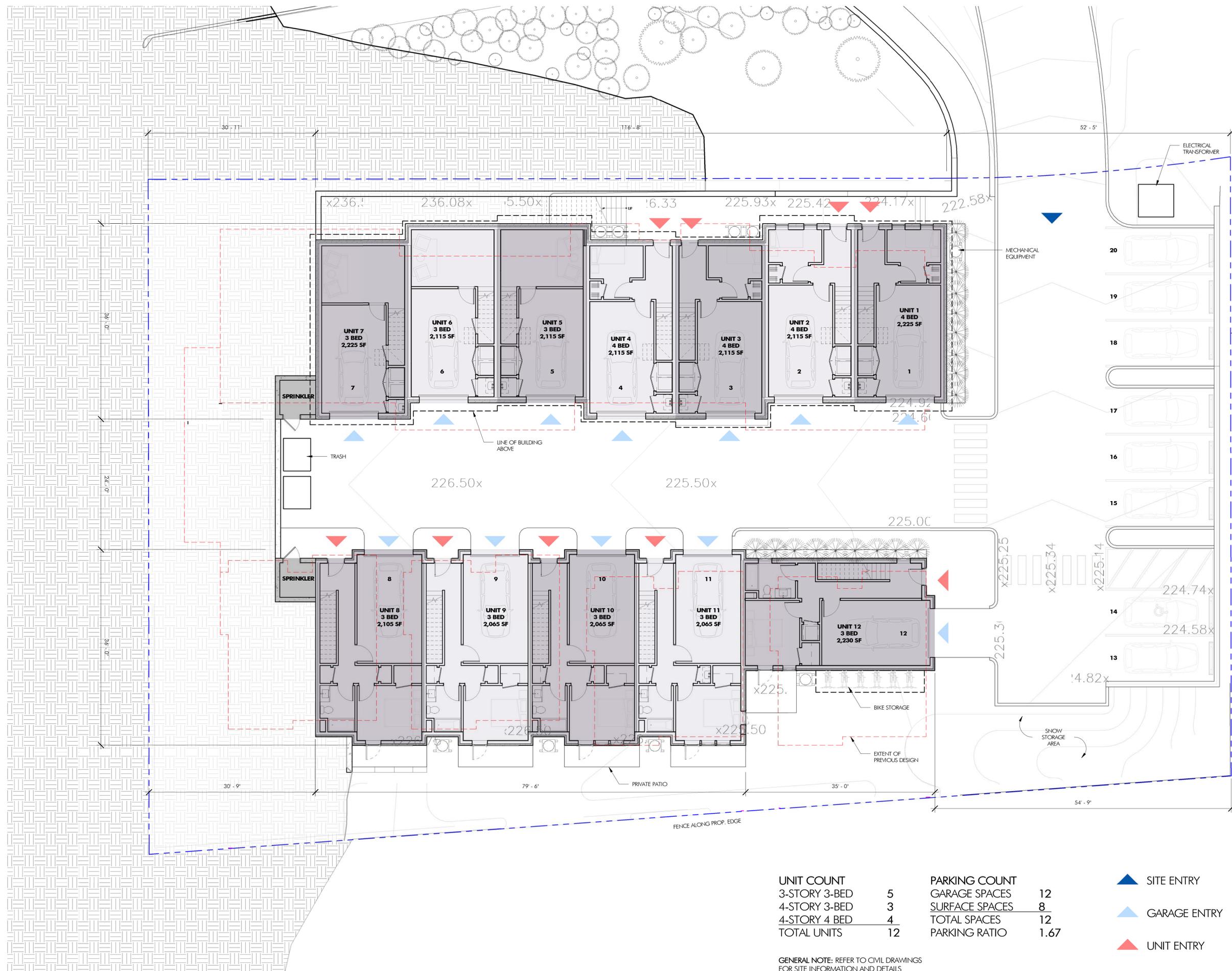
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MARK	ISSUE	DATE

ISSUE:	COMPREHENSIVE PERMIT RESUBMISSION 4
DATE:	JUNE 3, 2021
PROJECT #:	20004
SCALE:	1/8" = 1'-0"

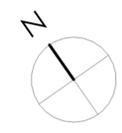
FIRST FLOOR
PLAN

A101



UNIT COUNT		PARKING COUNT	
3-STORY 3-BED	5	GARAGE SPACES	12
4-STORY 3-BED	3	SURFACE SPACES	8
4-STORY 4-BED	4	TOTAL SPACES	12
TOTAL UNITS	12	PARKING RATIO	1.67

- ▲ SITE ENTRY
- ▲ GARAGE ENTRY
- ▲ UNIT ENTRY



GENERAL NOTE: REFER TO CIVIL DRAWINGS
FOR SITE INFORMATION AND DETAILS

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COMPREHENSIVE PERMIT RESUBMISSION

REVISIONS

MARK	ISSUE	DATE

DRAWING INFORMATION

ISSUE: COMPREHENSIVE PERMIT
RESUBMISSION
DATE: JUNE 3, 2021
PROJECT #: 20004
SCALE: 1/8" = 1'-0"

DRAWING TITLE

SECOND FLOOR
PLAN

DRAWING NUMBER

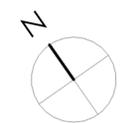
A102

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▲ GARAGE ENTRY

▲ UNIT ENTRY



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REVISIONS

MARK	ISSUE	DATE

DRAWING INFORMATION

ISSUE: COMPREHENSIVE PERMIT
RESUBMISSION
DATE: JUNE 3, 2021
PROJECT #: 20004
SCALE: 1/8" = 1'-0"

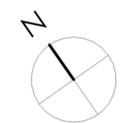
DRAWING TITLE

THIRD FLOOR
PLAN

DRAWING NUMBER

A103

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COMPREHENSIVE PERMIT RESUBMISSION

REVISIONS

MARK	ISSUE	DATE

DRAWING INFORMATION

ISSUE: COMPREHENSIVE PERMIT
RESUBMISSION 4
DATE: JUNE 3, 2021
PROJECT #: 20004
SCALE: 1/8" = 1'-0"

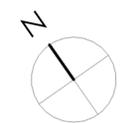
DRAWING TITLE

FOURTH FLOOR
PLAN

DRAWING NUMBER

A104

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2 NORTH ELEVATION (FOUR STORY TOWNHOUSE)
1/8" = 1'-0"



4 WEST ELEVATION (FOUR STORY TOWNHOUSE)
1/8" = 1'-0"



1 SOUTH ELEVATION (FOUR STORY TOWNHOUSE)
1/8" = 1'-0"



3 EAST ELEVATION (FOUR STORY TOWNHOUSE)
1/8" = 1'-0"

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COMPREHENSIVE PERMIT RESUBMISSION

REVISIONS

MARK	ISSUE	DATE

DRAWING INFORMATION

ISSUE: COMPREHENSIVE PERMIT
RESUBMISSION 4
DATE: JUNE 3, 2021
PROJECT #: 20004
SCALE: 1/8" = 1'-0"

DRAWING TITLE

EXTERIOR
ELEVATIONS

DRAWING NUMBER

A201

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REVISIONS

MARK	ISSUE	DATE

DRAWING INFORMATION

ISSUE: COMPREHENSIVE PERMIT RESUBMISSION
DATE: JUNE 3, 2021
PROJECT #: 20004
SCALE: 1/8" = 1'-0"

DRAWING TITLE

EXTERIOR ELEVATIONS

DRAWING NUMBER

A202



2 NORTH ELEVATION (THREE STORY TOWNHOUSE)
1/8" = 1'-0"



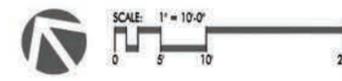
3 WEST ELEVATION (THREE STORY TOWNHOUSE)
1/8" = 1'-0"



1 SOUTH ELEVATION (THREE STORY TOWNHOUSE)
1/8" = 1'-0"



4 EAST ELEVATION (THREE STORY TOWNHOUSE)
1/8" = 1'-0"





Columnar Sweet Gum



Pillar Pin Oak



Green Giant Red Cedar



Red Oak



Pennsylvania Carex



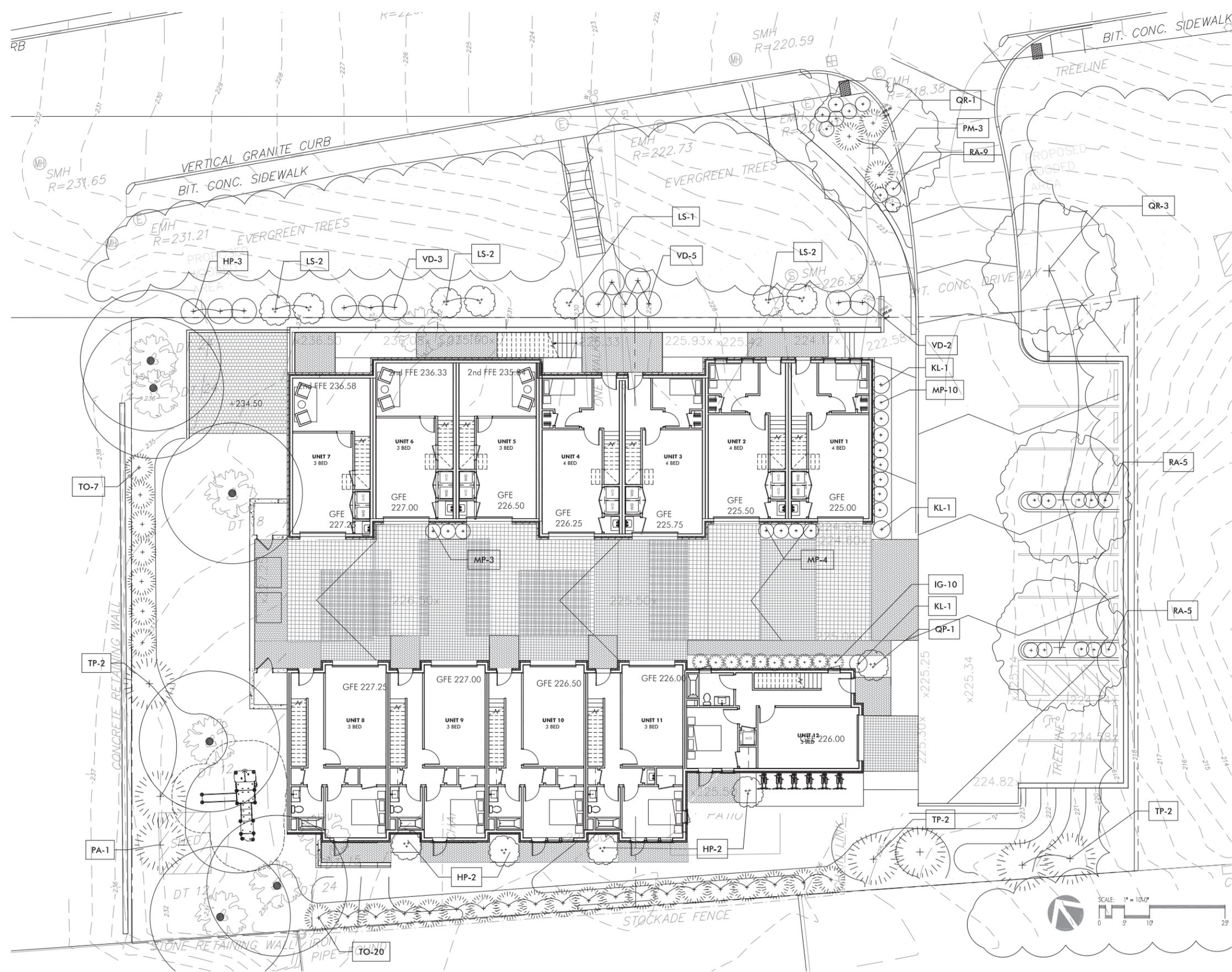
Vinca



Rhododendron



Mountain Laurel



PROPOSED PLANT LIST					
SYMB	LATIN NAME	COMMON NAME	SIZE	NOTES	
TREES					
PA 1	<i>Picea abies</i>	Norway Spruce	7-8' ht.	b&b	
TP 5	<i>Thuja plicata</i> 'Green Giant'	Green Giant Western Red Cedar	7-8' ht.	b&b	
TO 27	<i>Thuja occidentalis</i> 'Emerald Green'	Emerald Green Arborvitae	7-8' ht.	b&b	
LS 7	<i>Liquidambar styraciflua</i> 'Slend. Silhouette'	Slender Silhouette Sweetgum	2-2.5" cal.	b&b	
QP 1	<i>Quercus palustris</i> 'Green Pillar'	Green Pillar Pin Oak	3-3.5" cal.	b&b	
QR 4	<i>Quercus rubra</i>	Red Oak	2-2.5" cal.	b&b	
SHRUBS					
HP 7	<i>Hydrangea paniculata</i> 'Grandiflora'	Pee Gee Hydrangea	7 gal.		
IG 10	<i>Ilex glabra</i> 'Densa'	Inkberry	5 gal.		
KL 3	<i>Kalmia latifolia</i>	Mountain Laurel	24" ht.		
MP 14	<i>Myrica pennsylvanica</i>	Northern Bayberry	24-36" ht.		
PM 3	<i>Pinus mugo</i> 'Pumila'	Dwarf Mugo Pine	5 gal.		
RA 19	<i>Rhus aromatica</i> 'Lo Gro'	Lo Gro Sumac	5 gal.		
VD 10	<i>Virburnum dentatum</i>	Arrowwood Viburnum	36" ht.	5 gal.	
PERENNIALS & GRASSES					
cp 110	<i>Carex pennsylvanica</i>	Pennsylvania Carex	2" plug	12" o.c	
ls 46	<i>Liriope spicata</i>	Lilyturf	2 gal		
vm 209	<i>Vinca minor</i>	Myrtle	2 gal		