April 20, 2022

Stefanie Casella, Planner
Portsmouth Planning Department
1 Junkins Avenue
Portsmouth, NH 03801

SUBJECT: Response to TAC comments
Site Plan Application for a Site Redevelopment
2255 Lafayette Road

Dear Stefanie:

Greenman-Pedersen, Inc. (GPI) is in receipt of the comments provided by the TAC members both in the email dated February 28, 2022 and at the March 1, 2022 TAC meeting, regarding the review of the above mentioned application. Our response to comments is as follows:

2255 Lafayette

Items to be addressed before Planning Board submittal:

1. *Domestic water service cannot come off fire service line.*
   Response: A new prototype building has been developed for the CommonMan Roadside and this has been reflected in the revised plans. The new building does not trip the threshold for needing a fire protection service.
2. *Show abandoning and capping of existing water service at the main if it is being replaced.*
   Response: According to the water department, the location of the existing water line is unknown; however, it is known that the service is a 1 1/4" copper line. As we don't know if this location will interfere with other proposed site features, we have proposed that the contractor locate and discontinue the service at the main and a new 2" service is installed.
3. *Include note at future Tesla and EV charging stations that parking will not be restricted to only Tesla or Electronic Vehicles.*
   Response: A note has been added to the Site Plan.
4. *Include no parking sign in access isle between the handicapped parking spaces.*
   Response: A sign has been added to the bollard.
5. *Fix note to the left of storm water storage unit on sheet 5.*
   Response: The note has been edited.
6. *Per City of Portsmouth storm water regulations stormwater treatment will be necessary for this site.*
   Response: The underground drainage system has been revised to include a Jellyfish stormwater treatment unit.
7. *Easement required to cross property behind this lot and connect into sewer main.*
   Response: A copy of the existing easement allowing the connection to the 30 ft easement to the rear of the property is included with this submission.
8. *Show detail on sewer service connection to the sewer main.*
   Response: A detail has been added.
9. *Include easement for water leak detection over water service.*

Response: The fire protection water line is no longer necessary for this development; therefore, it is our understanding that the easement is not required.

If you have any questions or need additional information, please feel free to contact me by phone at 603-374-7906 or by email to nduquette@gpinet.com.

Sincerely,

Nicole Duquette

Nicole Duquette, PE, LEED AP
Project Manager

enclosure(s)

Book 2162 Page 0119

STATUTE FORM OF QUITCLAIM DEED

BK2162 PG119

I ~~(We)~~, John E. Stef

of Portsmouth, New Hampshire

for consideration paid, grant to Erin Realty Corporation, a New Hampshire corporation with a principal place of business in Manchester, New Hampshire

of (mail address)

with quitclaim covenants

The right and easement to construct, maintain and repair a sewer pipe from property previously conveyed to the grantee by the grantor to the sewer line easement owned by the City of Portsmouth, which right and easement shall be located over the grantor's land in such place as is reasonable or necessary to install said sewer pipe, together with the right to enter upon the grantor's property for the purposes of maintaining or repairing said sewer pipe.

Grantor further agrees that no building will be constructed over said sewer easement, or in any manner to obstruct access to said easement.

No transfer stamps necessary.

AUG 14 3 23 PM '72
RECD ROCKINGHAM COUNTY REGISTRY OF DEEDS

I, ~~(We)~~, husband ~~wife~~ of said grantor(s), ~~release to said grantee all rights of curtesy dower and homestead and other interests therein.~~

Witness my hand and seal this 14 day of August 1972

In The Presence Of:

Witness — Grantor

Witness — Grantor — Affix Seals

Witness — Grantor

Witness — Grantor

STATE OF NEW HAMPSHIRE, Rockingham SS., August 14 1972.

Before me, the undersigned officer, personally appeared John E. Stef

known to me or satisfactorily proven to be the person whose name subscribed to the within instrument and acknowledged that he executed the same for the purposes therein contained.

Notary Public/Justice of the Peace

Nicole Duquette

From: Nicole Duquette
Sent: Monday, April 18, 2022 10:20 AM
To: Dave Desfosses
Subject: FW: 2255 Lafayette Rd-Portsmouth
Attachments: Permaliner Sectional Main Line Point Repair System.pdf

Hi Dave,
Below is the method Salem used to plug services at the main. This is what we are proposing for 2255 Lafayette Road.
Thanks,
nicole

GPI
Nicole I. Duquette, P.E., LEED AP
d 603.374.7906
An Equal Opportunity Employer

From: Berthiaume, Richard <rberthiaume@wrenvironmental.com>
Sent: Friday, April 8, 2022 3:39 PM
To: Nicole Duquette <nduquette@gpinet.com>
Subject: RE: 2255 Lafayette Rd-Portsmouth

Nicole:

The method Jim Brown from Salem was referring to is to install a Cured In Place Sectional spot repair liner in the interceptor main over the location of the service connection to be isolated. I've attached the product data sheet for the Permaliner Sectional Main Line Point Repair System that describes this repair method. You must locate both the upstream and downstream manholes of the target service to be isolated, get access to the manholes, measure the pipe inside diameter, clean the pipe, TV to locate the service, the spot repair is installed using a flexible packer plug 10 foot length to inflate a 7 foot x 12 inch? Repair sleeve over the service. The packer plug is inflated, expanded against the host pipe, the plug has a 2 inch flow thru tube to help maintain existing flow during the 4 to 5 hour curing time, or if existing flows are high they must be by-pass pumped during installation. The resulting sectional spot repair liner is centered over the service and extends 2 feet either side of the service.

We could work up a budget cost when appropriate.

Richard Berthiaume | Technician, Lead Project | Wind River Environmental
Dba: Eastern Pipe Service
2 Thibeault Drive, Bow, NH 03304
P: 603-623-7907
rberthiaume@wrenvironmental.com | easternpipeservice.com

EASTERN PIPE SERVICE
WIND RIVER ENVIRONMENTAL *A Wind River Environmental Company*

From: Nicole Duquette <nduquette@gpinet.com>
Sent: Friday, April 8, 2022 3:13 PM
To: Berthiaume, Richard <rberthiaume@wrenvironmental.com>
Subject: RE: 2255 Lafayette Rd-Portsmouth

Hi Richard,
Looking at ways to plug the existing service at the main in Portsmouth to avoid wetland impact. Jim Brown from Salem mentioned that Eastern Piping did that for some of the sewer service connections in the Tuscan Kitchen site where the pavement could not be removed. Could we do something similar at the Burger King site in Portsmouth? I can spec a new service in the upland to take its place.
Thanks,
nicole

GPI
Nicole I. Duquette, P.E., LEED AP
d 603.374.7906
An Equal Opportunity Employer

From: Berthiaume, Richard <rberthiaume@wrenvironmental.com>
Sent: Wednesday, March 30, 2022 7:33 AM
To: Nicole Duquette <nduquette@gpinet.com>
Subject: RE: 2255 Lafayette Rd-Portsmouth

Good Morning Nicole:

Sorry I was driving equipment up north and missed your e-mail from Monday. If you have any questions on the video for Burger King site on 2255 Lafayette Road feel free to call my cell 603-491-2992.

Thank You,

Richard Berthiaume | Technician, Lead Project | Wind River Environmental
Dba: Eastern Pipe Service
2 Thibeault Drive, Bow, NH 03304
P: 603-623-7907
rberthiaume@wrenvironmental.com | easternpipeservice.com

EASTERN PIPE SERVICE
WIND RIVER ENVIRONMENTAL *A Wind River Environmental Company*

From: Nicole Duquette <nduquette@gpinet.com>
Sent: Monday, March 28, 2022 3:54 PM
To: Berthiaume, Richard <rberthiaume@wrenvironmental.com>
Subject: 2255 Lafayette Rd-Portsmouth

HI Richard,
I was hoping you could call me regarding the former Burger King site on 2255 Lafayette Road in Portsmouth that you were just out at for our client. I am available for the rest of the day.
Thanks,
nicole

Nicole I. Duquette, LEED AP
Project Manager

44 Stiles Road, Salem, NH 03079
d 603.374.7906
nduquette@gpinet.com | www.gpinet.com

GPI

Engineering | Design | Planning | Construction Management

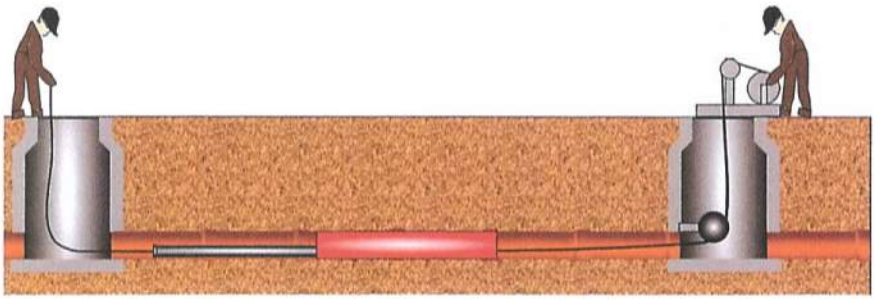
An Equal Opportunity Employer

EMPLOYER OF CHOICE

TOP WORK PLACES 2022 USA

Ambient or Heat Cure

SECTIONAL MAIN LINE POINT REPAIR™ SYSTEM



It is no longer necessary to reline a pipe from manhole-to-manhole in order to address one section of pipe. Now we can simply reline the area in need of repair. The Perma-Liner™ Point Repair System consists of a fiberglass reinforced Liner and Ambient Cured Resins. The Point Repair Kits are sold from 6" to 54" in diameter and 2' to 30' in length.

- No Excavation - Eliminates Disruptive Digging And Restoration
- Repairs 6" to 54" Diameter Pipelines
- 100% Solids Epoxy
- Reinforced Materials With A PU Coated Finish
- Total Time of Repair Is Only Hours Compared To Days
- As Many As 7 Repairs In A Single Day
- Exceeds ASTM F1216 Specifications
- Manufactured In Kit Form, No Measuring Or Waste
- In Most Cases, No Bypass Pumping Needed
- Reduces Job Costs - Labor, Equipment, Materials, Traffic Control, and Unforeseen Liabilities

Sectional Main Line Point Repair™ System

Sectional Point Repair Kits

500' Rope Reels

Bladder

500' Air Hose & Reel

Air Bottle

1-727-507-9749 Int'l

www.perma-liner.com

1-727-507-9849 Fax

Sectional Point Repair Technology

Perma-Liner Point Repair affords the contractor and customer several advantages over conventional pipe replacement and manhole-to-manhole pipe relining techniques. The contractor can make several structural repairs in the time normally taken to do one dig and replace repair. The repair is completed quickly, does not disrupt surface activities and is cost effective. It is no longer necessary to reline a pipe from manhole to manhole in order to repair one section of the pipe, now we can simply reline the area in need of repair.

The Perma-Liner Point Repair System consists of a fiberglass reinforced Liner and Ambient Cured Resins. The Point Repair Kits are sold from 4" to 60" in diameter and 2' to 30' in length. The Point Repair forms a structural, permanent waterproof repair which seals all types of pipe against infiltration and exfiltration. The finished repair is stronger than the original pipe. This repair has a superior bond to the existing pipe equally in wet or dry conditions and because the resin is 100% solids, there is no shrinkage and therefore no annular space between the pipe and repair that could cause leakage. The repair system can be used equally well in warm or cold climates.

Perma-Liner Industries, LLC Is The Technological Leader In CIPP Sectional Point Repairs!

Sectional Point Repair Specifications

The Perma-Liner Point Repair System uses new, reliable materials to meet our high standards and our customers' expectations. It is a technology that we continue to improve upon every passing year. Times have changed and so has the needs of our clients.

Prior to the development of the Perma-Liner Point Repair System, existing products were insufficient to meet the demands of the ever growing trenchless industry. We knew that the standards should be much higher – more accurate, strength and durability and user friendly.

Compare the processes, compare the resins. Compare independent 3rd party tests. Compare old inaccurate, single-source, wrap around mat based standards with accurate, up-to-date data supplied by Perma-Liner Industries, Inc.

Ask why Perma-Liner Industries, Inc. upgraded the old wrap around mat technology with new installation standards and resin specifications in order to assure a truly reliable Sectional Point Repair Cured-In-Place-Pipe (CIPP) solution for today's more corrosive environments. Ask why competitors did not.

Compare the results. You'll understand why Perma-Liner Industries, LLC. has installers in cities throughout the world installing thousands of sectional point repairs. You'll see that the Perma-Liner Sectional Point Repair isn't only an economical solution and a competitive solution among many; it's the superior solution, the No-Failure solution. Then ask whether you're willing to settle for anything less.

Advanced materials and superior technology is Perma-Liner!

SPECIFICATION FOR POINT REPAIR BY CURED-IN-PLACE-PIPE (CIPP)
FIBERGLASS REINFORCED FELT, PU/PVC COATED, RESIN IMPREGNATED

1.00 Intent

1.01 It is the intent of this Specification to provide for the reconstruction of short lengths of pipelines conduits by the installation of a resin-impregnated flexible tube which is inflated in a short length of the pipeline to form a hard, impermeable, corrosion resistant pipe within a pipe. When cured, the cured-in-place-pipe (CIPP) will be formed to the original conduit. This reconstruction process can be used in a variety of gravity applications such as sanitary sewers and storm sewers. The impermeable Cured-In-Place-Pipe (CIPP) should be continuos, tight-fitting, chemical resistant and air tight.

2.00 Prequalification

2.01 Only bids from prequalified products and contractors will be read. Bids submitted on products or from contractors that have not been prequalified will be returned unopened. The contractor and the proposed method of reconstruction shall be clearly and legibly identified on the bid envelope.

3.00 Materials

3.01 The tube should consist of layered non-woven flexible needled felt tube with an inner PU/PVC impermeable coating and additional layer of reinforced chopped fiberglass and felt. The reinforced fiberglass shall extend at least 3 inches on each side of the inner felt tube to form smooth transitions on each end of the point repair. The tube shall have an impermeable PU/PVC coating. This coating will form the inner layer of the finished pipe and is required for enhancement of corrosion, flow and abrasion properties. The tube shall be thermo-bonded to the prescribed circumference and length. It shall be capable of carrying resin, withstanding installation pressures and curing temperatures. The tube should be compatible with a non-styrene resin system. The tube should be thermo bonded to a size that, when istalled, will form to the internal circumference of the original pipe. Allowance should be made for circumferential stretching during installation.

3.02 Resin –The resin used shall be a high-grade 2-part, ambient cured, corrosion resistant formulation provided by Perma-Liner Industries, LLC. designed for the cured-in-place-pipe (CIPP). Only non-styrene resin formulations will be accepted. The point repair materials must meet or exceed the properties in Table 1.

4.00 Minimum Requirements

Table 1. Properties Shall Meet or Exceed The Following

	ASTM Test Method	Minimum Value
Flexural Strength	D790	4,500 psi
Flexural Modulus	D790	250,000 psi
Tensile Strength	D638	3,000 psi

4.01 The CIPP shall be designed with the minimum properties in Table 1, taking into consideration the condition of the existing pipe.

5.00 Installation

5.01 The tube shall be impregnated with the thermosetting two part resin.

5.02 The tube shall be properly oriented and loaded onto the Carrier Train for proper installation over the repair area.

5.03 The Carrier Train shall be pulled or winched to the damaged area and positioned by Closed Circuit TV camera guiding the installation. The installation shall follow the Manufacturers Process for inflation curing and stripping out.

6.00 Testing Requirements

6.01 Hydraulic Capacity- Calculations must support that the finished Cured-In-Place-Pipe (CIPP)
shall have at least 100% of the full flow capacity of the original host pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the original pipe material. A typical roughness coefficient for the CIPP shall be as verified by third part test data.

7.00 Inspection

7.01 The installation may be inspected visually if appropriate, or by closed-circuit television. Variations from true line and grade may be inherent because of the conditions of the original pipe.

7.02 The finished CIPP should be continuous over the length of the repair area plus one foot extending into structurally sound pipe.

8.00 Clean Up

8.01 Upon acceptance of the installation work and testing, the installer shall reinstate the project area affected by the operations.

9.00 Payment

9.01 Payment for the work included in this section will be in accordance with the prices set forth in the proposal for the quantity of work performed. Progress payments will be made monthly based on the work performed during that period.

End of specification.

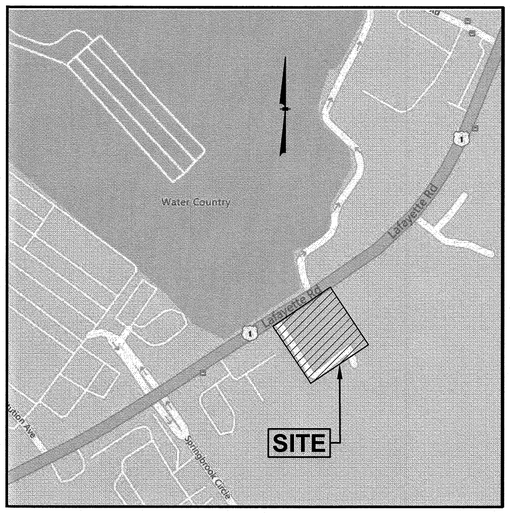
PROPOSED RETAIL MOTOR FUEL OUTLET
SITE REDEVELOPMENT PLANS

for

ASSESSORS MAP 272 LOT 3
2255 LAFAYETTE ROAD
PORTSMOUTH, NEW HAMPSHIRE

Prepared for:

GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH 03106



LOCATION MAP
(NOT TO SCALE)

INDEX TO DRAWINGS

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD
PORTSMOUTH, NH 03801

STATE OF NEW HAMPSHIRE
CORY N. MASON
No. 17099
LICENSED PROFESSIONAL ENGINEER
4/19/22

REVISIONS		
3	REV. SHEETS 4-8, 12, 14, TT, ADD SHEET 13	4/19/22
2	REV. SHEETS 2-9, 11, TT	3/22/22
1	REV. SHEET 4	2/9/22
NO.	REVISION	DATE

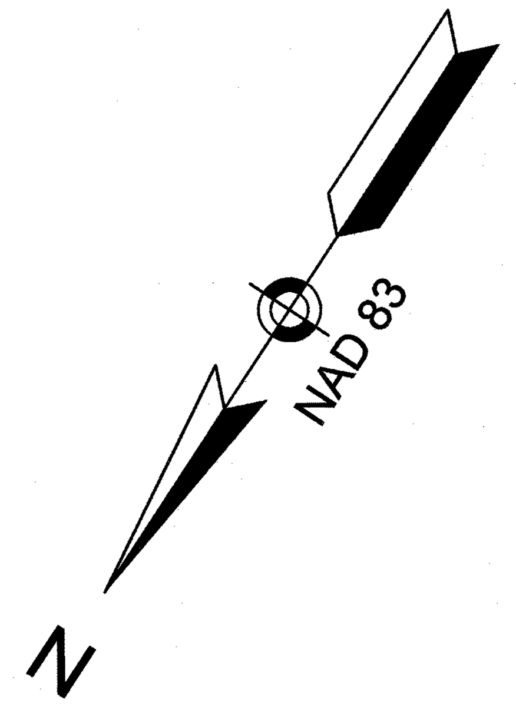
JANUARY 26, 2022

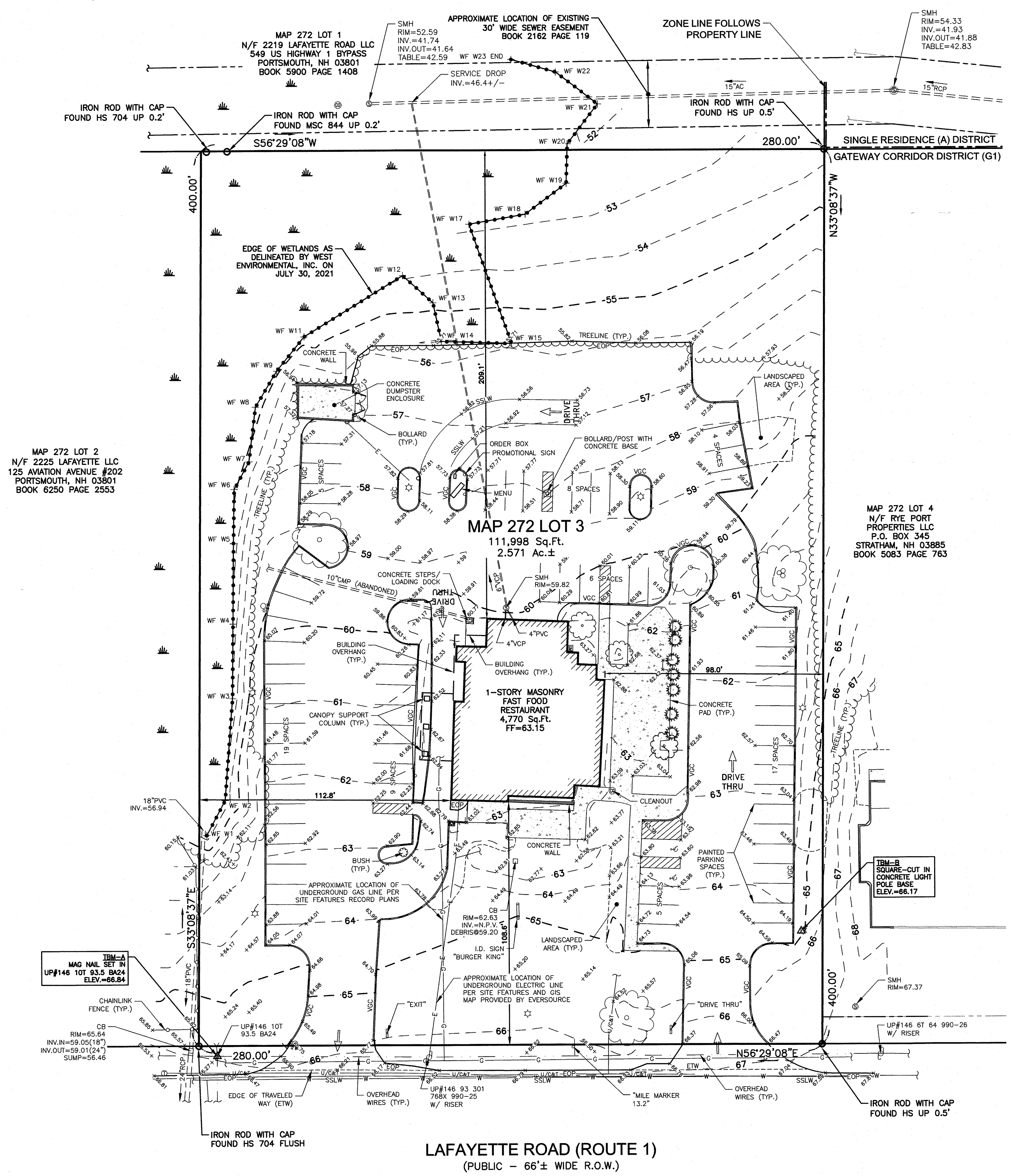
DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

TITLE SHEET

SCALE: NOT TO SCALE

PROJECT NO. NEX-2021163





LEGEND

VGC	VERTICAL GRANITE CURB
SSLW	SINGLE SOLID LINE WHITE
G	GAS LINE
U/CAT	UNDERGROUND COMM
W	WATER LINE
E	UNDERGROUND ELECTRIC
	CHAIN LINK FENCE
90	CONTOUR ELEVATION
	TREE
	UTILITY POLE
	GUY WIRE
	OVERHEAD WIRE
	TREELINE
	SIGN
+98.69	SPOT ELEVATION
	CATCH BASIN
	CLEANOUT
	SEWER MANHOLE
	TELEPHONE MANHOLE
	WATER SHUT OFF
	BOLLARD
GM	GAS METER
	LIGHT POLE
	WETLAND LINE
	EASEMENT LINE
	PROPERTY LINE
	ABUTTER PROPERTY LINE
	ZONE LINE

PLAN REFERENCES:

ROCKINGHAM COUNTY REGISTRY OF DEEDS

1) R.C.R.D. PLAN D-33166
2) R.C.R.D. PLAN D-37134
3) R.C.R.D. PLAN D-20705
4) R.C.R.D. PLAN D-15321
5) R.C.R.D. PLAN C-3702
6) R.C.R.D. PLAN C-7649
7) R.C.R.D. PLAN D-41895

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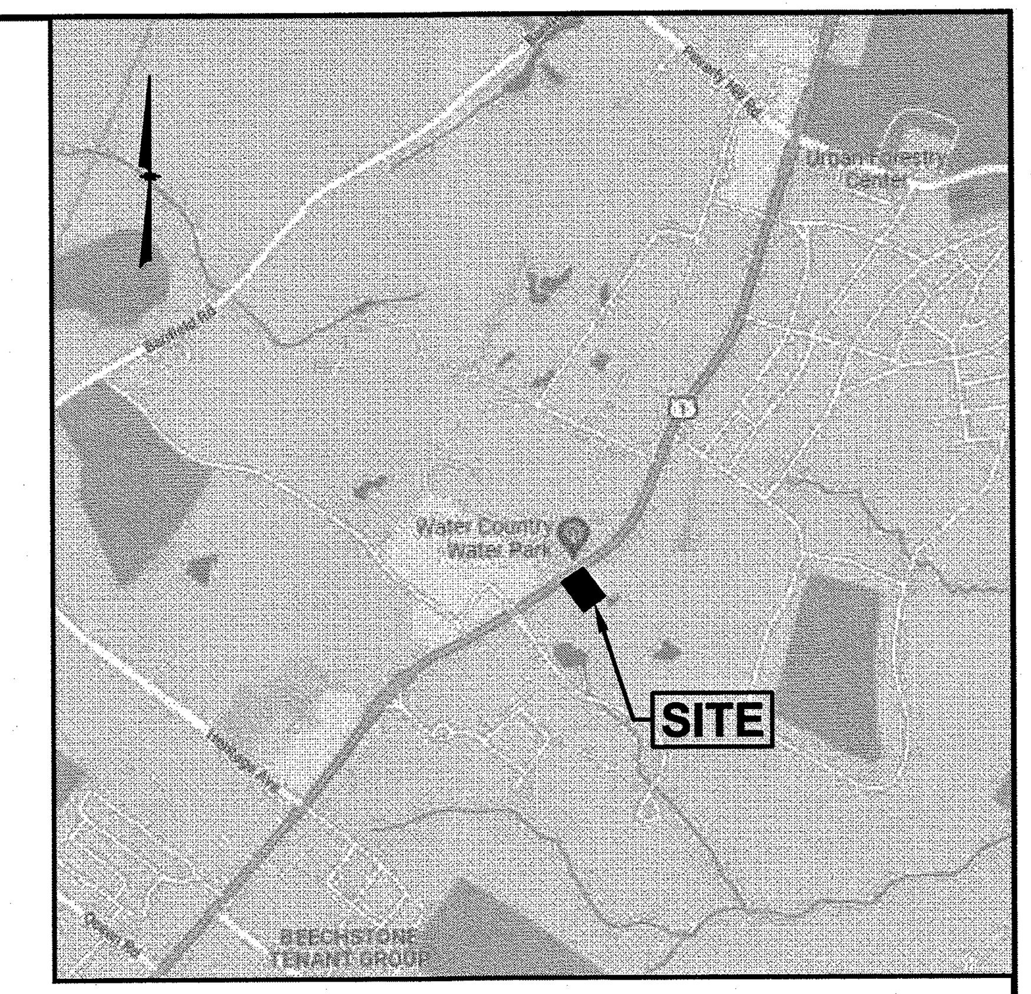
SCALE: 1" = 30'



LOCATION MAP

(NOT TO SCALE)

NOTES:

1) ZONE: GATEWAY CORRIDOR DISTRICT (G1)
   MIN. LOT SIZE: 1 ACRE
   SETBACKS:
   FRONT 70' TO 90' FROM CENTER OF LAFAYETTE RD
   SIDE 10 Ft.
   REAR 15 Ft.
   REFER TO THE CITY OF PORTSMOUTH ZONING ORDINANCE FOR VERIFICATION, ADDITIONAL RESTRICTIONS AND PERMITTED USES. THE ZONING INFORMATION SHOWN HEREON IS BASED ON A REVIEW OF THE PORTSMOUTH ZONING ORDINANCE.
2) THIS PLAN IS THE RESULT OF AN ON-THE-GROUND FIELD SURVEY PERFORMED BY THIS OFFICE BETWEEN AUGUST 10 AND NOVEMBER 3, 2021.
3) WETLAND FLAGS WERE DELINEATED BY WEST ENVIRONMENTAL, INC. ON JULY 30, 2021 AND LOCATED BY THIS OFFICE.
4) BEARINGS SHOWN HEREON ARE BASED ON NAD83 PER GPS OBSERVATIONS PERFORMED BY THIS OFFICE ON AUGUST 16, 2021.
5) ELEVATIONS SHOWN HEREON ARE BASED ON NAVD88 PER GPS OBSERVATIONS PERFORMED BY THIS OFFICE ON AUGUST 16, 2021.
6) LOCATION OF UNDERGROUND UTILITIES IS APPROXIMATE ONLY. ADDITIONAL UNDERGROUND UTILITIES OTHER THAN THOSE SHOWN MAY BE ENCOUNTERED. INVERTS ARE LISTED IN A CLOCKWISE DIRECTION ENDING WITH THE INVERT OUT (UNLESS OTHERWISE NOTED).
7) THE SURVEY TRACT IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA (100 YEAR FLOOD) PER FLOOD INSURANCE RATE MAP NUMBER 33015C0270F, WITH AN EFFECTIVE DATE OF JANUARY 29, 2021.
8) A TOTAL OF 73 (71 REGULAR, 2 ACCESSIBLE) CLEARLY IDENTIFIABLE PARKING SPACES WERE OBSERVED IN CONDUCTING THIS SURVEY.

WETLAND NOTES

WETLANDS WERE DELINEATED BY WEST ENVIRONMENTAL, INC. ON JULY 30, 2021 UTILIZING THE FOLLOWING STANDARDS:

1) US ARMY CORPS OF ENGINEERS INTERIM REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION, TECHNICAL REPORT ERDC/EL TR-09-19 (OCT 2009).
2) FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, A GUIDE FOR IDENTIFYING AND DELINEATING HYDRIC SOILS, VERSION 7.0. UNITED STATES DEPARTMENT OF AGRICULTURE (2010).
3) NORTH AMERICAN DIGITAL FLORA: NATIONAL WETLAND PLANT LIST, VERSION 2.2.1 (2009).
4) CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES. USFW MANUAL FWS/OBS-79/31 (1979).

STATE OF NEW HAMPSHIRE MARK WEST No. 010 CERTIFIED WETLAND SCIENTIST 1-25-22

OWNER OF RECORD:

MAP 272 LOT 3
MASTORAN RESTAURANTS, INC.
822 LEXINGTON STREET
WALTHAM, MA 02154
BOOK 3572 PAGE 199

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD
PORTSMOUTH, NH 03801

STATE OF NEW HAMPSHIRE LICENSED LAND SURVEYOR No. 838 DAVID R. JORDAN SIGNATURE 4/19/22

REVISIONS

NO.	REVISION	DATE
1	REVISE SEWER	3/22/22

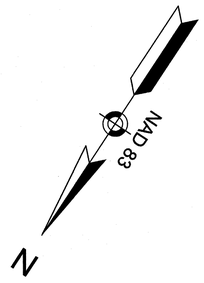
JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
AKC	DRJ

EXISTING CONDITIONS PLAN

SCALE: 1"=30'

PROJECT NO. NEX-2021163



LEGEND

VGC	VERTICAL GRANITE CURB
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W	WATER LINE
E	UNDERGROUND ELECTRIC
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	SIGN
X 98.69	SPOT ELEVATION
	CATCH BASIN
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S	SEWER MANHOLE
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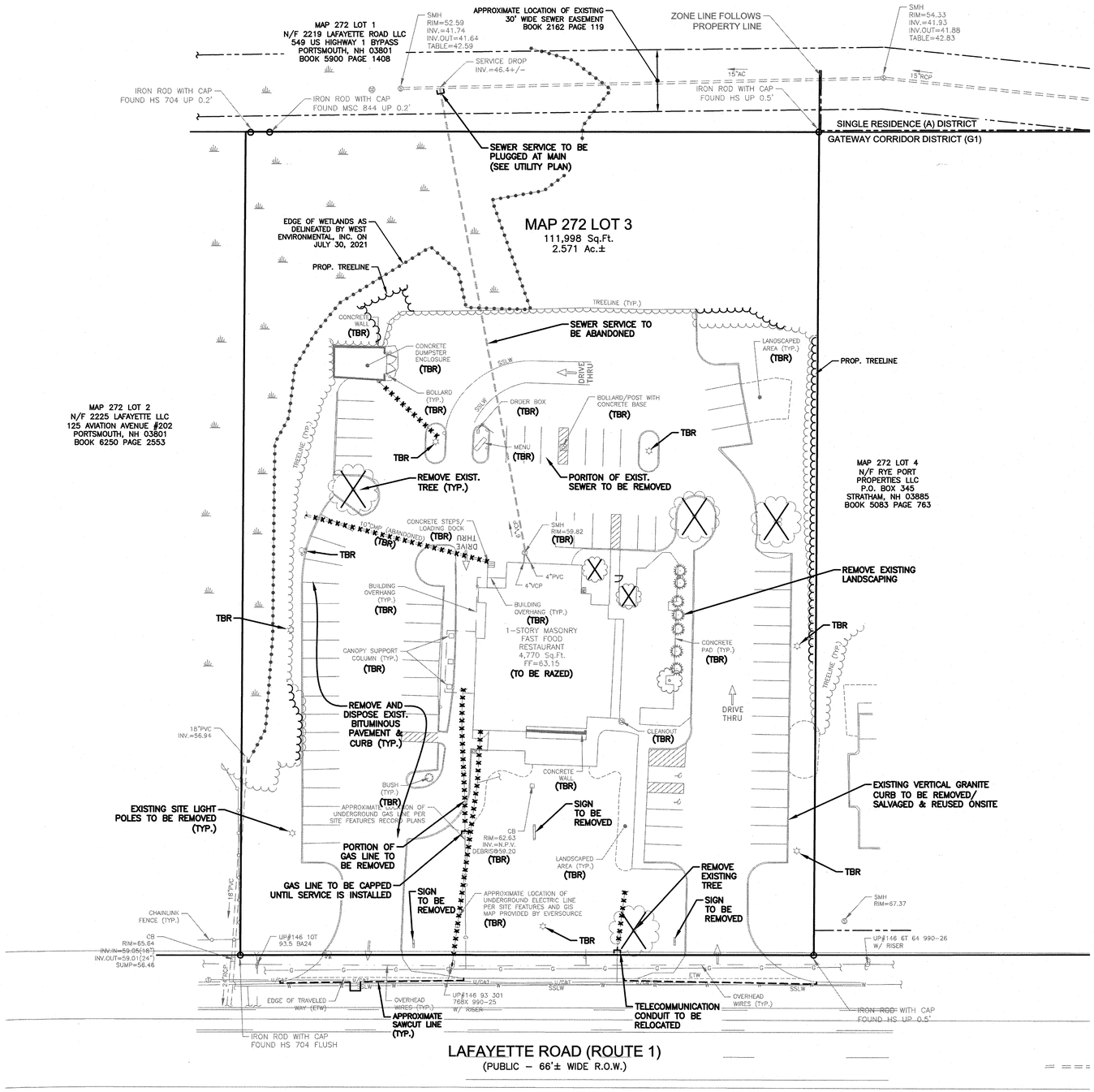
	WATER SHUT OFF
	BOLLARD
GM	GAS METER
	LIGHT POLE
	WETLAND LINE
	EASEMENT LINE
	PROPERTY LINE
	ABUTTER PROPERTY LINE
	ZONE LINE
TBR	TO BE REMOVED
XXXXXX	TO BE REMOVED



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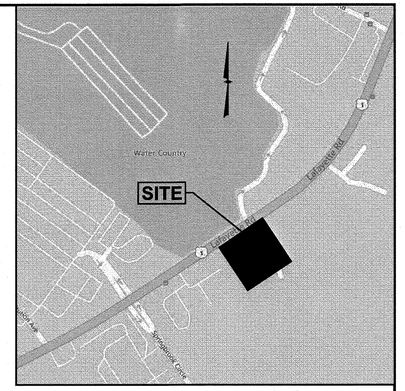
SCALE: 1" = 30'



LOCATION MAP

(NOT TO SCALE)

NOTES:

1) A DEMOLITION PERMIT MUST BE OBTAINED FROM THE CITY OF PORTSMOUTH PRIOR TO COMMENCEMENT OF WORK. ALL EXISTING UTILITY DISCONNECTIONS MUST BE COORDINATED WITH RESPECTIVE UTILITY COMPANIES.
2) ALL DEMOLITION ACTIVITIES ARE TO BE PERFORMED IN STRICT ADHERENCE TO ALL FEDERAL, STATE AND LOCAL REGULATIONS. CONTRACTOR TO INSTALL EROSION CONTROL DEVICES IN ACCORDANCE WITH EROSION AND SEDIMENT CONTROL PLAN PRIOR TO BEGINNING DEMOLITION ACTIVITIES.
3) PROCEED WITH DEMOLITION IN A SYSTEMATIC MANNER, FROM THE TOP OF THE STRUCTURE(S) TO THE GROUND.
4) DEMOLISH CONCRETE IN ALL SECTIONS
5) BREAK UP CONCRETE SLABS–ON–GRADE, UNLESS OTHERWISE DIRECTED BY THE CONSTRUCTION MANAGER.
6) CONDUCT ALL DEMOLITION OPERATIONS IN A MANNER THAT WILL PREVENT INJURY, DAMAGE TO STRUCTURES, ADJACENT BUILDINGS AND ALL PERSONS.
7) REFRAIN FROM USING EXPLOSIVES WITHOUT PRIOR WRITTEN CONSENT OF THE DEVELOPER AND APPLICABLE GOVERNMENTAL AUTHORITIES.
8) CONDUCT DEMOLITION SERVICES IN SUCH A MANNER TO INSURE MINIMUM INTERFERENCE WITH ROADS, STREETS, WALKS AND OTHER ADJACENT FACILITIES. DO NOT CLOSE OR OBSTRUCT STREETS, WALKS OR OTHER OCCUPIED FACILITIES WITHOUT PRIOR WRITTEN PERMISSION OF THE DEVELOPER AND APPLICABLE GOVERNMENTAL AUTHORITIES. PROVIDE ALTERNATIVE ROUTES AROUND CLOSED OR OBSTRUCTED TRAFFIC WAYS IF REQUIRED BY APPLICABLE GOVERNMENTAL REGULATIONS.
9) USE WATERING, TEMPORARY ENCLOSURES AND OTHER SUITABLE METHODS, AS NECESSARY TO LIMIT THE AMOUNT OF DUST AND DIRT RISING AND SCATTERING IN THE AIR. CLEAN ADJACENT STRUCTURE AND IMPROVEMENTS OF ALL DUST AND DEBRIS CAUSED BY THE DEMOLITION OPERATIONS. RETURN ALL ADJACENT AREAS TO THE CONDITIONS EXISTING PRIOR TO THE START OF WORK.
10) ACCOMPLISH AND PERFORM THE DEMOLITION IN SUCH A MANNER AS TO PREVENT THE UNAUTHORIZED ENTRY OF PERSONS AT ANY TIME.
11) COMPLETELY FILL BELOW GRADE AREAS AND VOIDS RESULTING FROM THE DEMOLITION OF STRUCTURES AND FOUNDATIONS WITH SOIL MATERIALS CONSISTING OF STONE, GRAVEL AND SAND, FREE FROM DEBRIS, TRASH, FROZEN MATERIALS, ROOTS AND OTHER ORGANIC MATTER. STONES USED WILL NOT BE LARGER THAT 6 INCHES IN DIMENSION. MATERIAL FROM DEMOLITION MAY NOT BE USED AS FILL. PRIOR TO PLACEMENT OF FILL MATERIALS, UNDERTAKE ALL NECESSARY ACTION IN ORDER TO INSURE THAT AREAS TO BE FILLED ARE FREE OF STANDING WATER, FROZEN MATERIAL, TRASH, DEBRIS. PLACE FILL MATERIALS LAYERS NOT EXCEEDING 6 INCHES IN LOOSE DEPTH AND COMPACT EACH LAYER AT PLACEMENT TO 95% OPTIMUM DENSITY, GRADE SURFACE TO MEET ADJACENT CONTOURS AND TO PROVIDE SURFACE DRAINAGE.
12) REMOVE FROM THE DESIGNATED SITE, AT THE EARLIEST POSSIBLE TIME, ALL DEBRIS RUBBISH, SALVAGEABLE ITEMS, HAZARDOUS AND COMBUSTIBLE SERVICES. REMOVED MATERIALS MAY NOT BE STORED, SOLD OR BURNED ON SITE. REMOVAL OF HAZARDOUS AND COMBUSTIBLE MATERIALS SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE PROCEDURES AS AUTHORIZED BY THE FIRE DEPARTMENT OR OTHER APPROPRIATE REGULATORY AGENCIES AND DEPARTMENTS.
13) DISCONNECT, SHUT OFF AND SEAL ALL UTILITIES SERVING THE STRUCTURE(S) TO BE DEMOLISHED BEFORE THE COMMENCEMENT OF THE DESIGNATED DEMOLITION. MARK FOR POSITION ALL UTILITY DRAINAGE AND SANITARY LINES AND PROTECT ALL ACTIVE LINES. CLEARLY IDENTIFY BEFORE THE COMMENCEMENT OF DEMOLITION SERVICES THE REQUIRED INTERRUPTION OF ACTIVE SYSTEMS THAT MAY AFFECT OTHER PARTIES, AND NOTIFY ALL APPLICABLE UTILITY COMPANIES TO INSURE THE CONTINUATION OF SERVICE.
14) PROTECT EXISTING DRAINAGE SYSTEM(S) AS NECESSARY TO PREVENT SEDIMENT FROM ENTERING DURING CONSTRUCTION. SEE DETAIL SHEETS FOR EROSION CONTROL DEVICES.
15) ALL WORK WITHIN ROADWAY RIGHT–OF–WAYS TO CONFORM TO CITY STANDARDS.
16) THE LIMITS OF WORK SHALL BE CLEARLY MARKED IN THE FIELD PRIOR TO THE START OF CONSTRUCTION OR SITE CLEARING.
17) IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO NOTIFY DIG SAFE (DIAL 811) 72 HOURS PRIOR TO ANY EXCAVATION ON THIS SITE. CONTRACTOR SHALL ALSO NOTIFY LOCAL WATER DEPARTMENT TO MARK OUT THEIR UTILITIES.
18) NOTES ON THIS PLAN THAT READ "TBR" REPRESENT FEATURES TO BE REMOVED. ANY FEATURES NOT LABELED "TBR" OR "TO BE REMOVED" SHALL BE CONSIDERED EXISTING TO REMAIN.
19) EXISTING WATER SERVICE LOCATION IS UNKNOWN. CONTRACTOR TO LOCATE AND DISCONTINUE SERVICE AT THE MAIN.

SEE EROSION & SEDIMENT CONTROL PLAN FOR CONSTRUCTION SEQUENCE, TEMPORARY EROSION CONTROL MEASURES, AND LOCATION OF EROSION CONTROL DEVICES. SEE LANDSCAPE PLAN FOR LIMITS OF CLEARING.

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GPI Engineering Design Planning Construction Management
603.883.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
GRANITE STATE
CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

STATE OF NEW HAMPSHIRE
CORY N. MASON
No.17099
LICENSED PROFESSIONAL ENGINEER
4/19/22

REVISIONS		
2	MISC. REVISIONS	4/19/22
1	REV. PER CITY COMMENTS	3/22/22
NO.	REVISION	DATE

JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

DEMOLITION PLAN

SCALE: 1"=30'

PROJECT NO. NEX-2021163

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SIGN KEY

SIGN I.D. NUMBER	TEXT/COLOR	SIZE/REMARKS
R1-1	STOP R/W	30" x 30" NEW SIGN WITH POST
R5-1	DO NOT ENTER R/W	30" x 30" NEW SIGN WITH POST
R7-8	RESERVED PARKING VAN ACCESSIBLE G/B/W	12" x 18" NEW SIGN WITH POST
R7-8A	VAN ACCESSIBLE G/W	6" X 12"

SITE COMPARISON TABLE

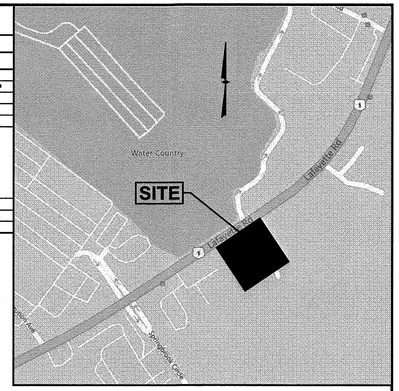
DESCRIPTION	EXISTING	PROPOSED
SURFACE PARKING & DRIVEWAY	59,940 SF	57,064 SF
OTHER IMPERVIOUS SURFACES	5,358 SF	5,750 SF
NUMBER OF PARKING SPACES	73	35
IMPERVIOUS AREA WITHIN WETLAND BUFFER	29,452 SF	20,328 SF

TABLE OF ZONING REGULATIONS - PORTSMOUTH, NH

ZONE: GATEWAY CORRIDOR (G1)

DESCRIPTION	REQUIRED	PROVIDED
MINIMUM LOT AREA	1 ACRE	2.57 ACRES
MINIMUM FRONT YARD BUILDING SETBACK	70' TO 90' FROM CENTER OF LAFAYETTE RD	120' (CANOPY), 204' (C-STORE) *
MINIMUM SIDE YARD BUILDING SETBACK	10'	63' (CANOPY), 89' (C-STORE)
MINIMUM REAR YARD BUILDING SETBACK	15'	173' (C-STORE)
PARKING DIMENSIONS	8.5'x19', 24' DRIVE AISLE	9'x19', 24' DRIVE AISLE
MINIMUM NUMBER PARKING SPACES	RETAIL = 4,555 SF x 1 SPACE/300 SF GFA = 15.18 SPACES RESTAURANT = 1,000 SF x 1 SPACE/100 SF = 10 SPACES RETAIL FUEL = 2 SPACES + 0 SF x 1 SPACE/400 SF GFA = 2 SPACES TOTAL SPACES REQUIRED = 28 SPACES	36 SPACES (14 PARKING SPACES + 12 PARKING SPACES/CHARGING STATION SPACES + 10 PARKING SPACES AT THE PUMPS) *
MAXIMUM COVERAGE	70%	555,660 SF/111,998 SF = 49.7%
MINIMUM OPEN SPACE	10%	56,338 SF/111,998 SF = 50.3%
MAXIMUM BUILDING HEIGHT	40 FT OR 3 STORIES	<40 FT, 1 STORY

* SEE NOTE 17



LOCATION MAP
(NOT TO SCALE)

LEGEND

- VGC — VERTICAL GRANITE CURB
- SSLW — SINGLE SOLID LINE WHITE
- G — GAS LINE
- U/G&T — UNDERGROUND COMM
- W — WATER LINE
- E — UNDERGROUND ELECTRIC
- CHAIN LINK FENCE
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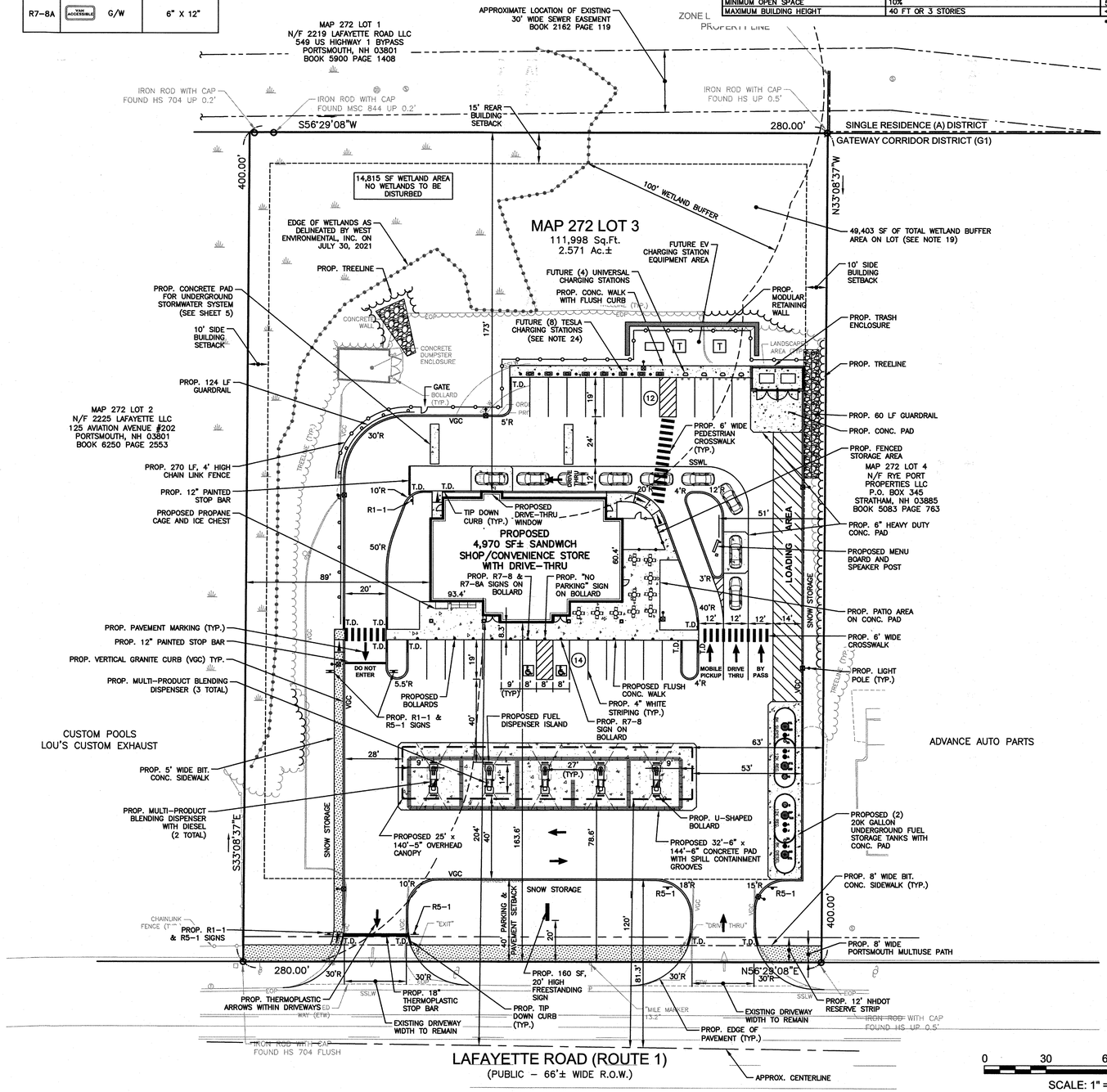
- UTILITY POLE
- GUY WIRE
- OVERHEAD WIRE
- TREELINE
- SIGN
- SPOT ELEVATION
- CATCH BASIN
- CLEANOUT
- SEWER MANHOLE
- TELEPHONE MANHOLE
- WATER SHUT OFF
- BOLLARD
- GM — GAS METER
- LIGHT POLE
- WETLAND LINE
- EASEMENT LINE
- PROPERTY LINE
- ABUTTER PROPERTY LINE
- ZONE LINE
- (1) — NUMBER OF PARKING SPACES



SCALE: 1" = 30'

NOTES:

1) TAX MAP 272 LOT 3

2) ZONING DISTRICT: GATEWAY CORRIDOR (G1)

3) LOT AREA = 111,988 Sq.Ft.
= 2.571 Ac.±

4) EXISTING USE: FAST FOOD RESTAURANT WITH DRIVE-THRU

PROPOSED USE: RETAIL MOTOR FUEL OUTLET WITH 5,555 SF CONVENIENCE STORE/SANDWICH SHOP WITH 6 SEATS INTERIOR & UP TO 40 EXTERIOR SEATS AND DRIVE-THRU AND 5 FUEL DISPENSER ISLANDS WITH OVERHEAD CANOPY.

5) ALL BUILDINGS AND SITE CONSTRUCTION SHALL COMPLY WITH THE RULES AND REGULATIONS OF THE AMERICANS WITH DISABILITIES ACT (ADA) AS REVISED IN 2010.

6) THE LOCATIONS OF EXISTING SUBSURFACE UTILITIES SHOWN ON THIS PLAN WERE COMPILED FROM AVAILABLE RECORD DRAWINGS AND ARE NOT WARRANTED TO BE CORRECT. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING SUBSURFACE UTILITIES PRIOR TO PERFORMING ANY WORK.

7) WRITTEN DIMENSIONS ON THIS PLAN TAKE PRECEDENCE OVER SCALED DIMENSIONS. THE CONTRACTOR SHALL USE CAUTION WHEN SCALING REPRODUCED PLANS. IN THE EVENT OF A CONFLICT BETWEEN THIS PLAN SET AND ANY OTHER DRAWINGS AND/OR SPECIFICATIONS, THE ENGINEER SHALL BE NOTIFIED BY THE CONTRACTOR.

8) THE CONTRACTOR SHALL CALL AND COORDINATE WITH DIGSAFE 811 PRIOR TO ANY EXCAVATION.

9) ALL CONSTRUCTION SHALL CONFORM TO THE APPLICABLE REGULATIONS AND STANDARDS OF THE CITY OF PORTSMOUTH AND THE STATE OF NEW HAMPSHIRE.

10) THE SITE IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA (100 YEAR FLOOD) PER FLOOD INSURANCE RATE MAP NUMBER 33015C0270F, WITH AN EFFECTIVE DATE OF JANUARY 29, 2021.

11) ALL CONSTRUCTION SHALL CONFORM TO THESE PLANS AND THE STANDARD CONSTRUCTION DRAWINGS AS SUPPLIED BY THE DEVELOPER.

12) A SIGN PERMIT SHALL BE OBTAINED PRIOR TO INSTALLATION.

13) PROPOSED SNOW STORAGE AREAS AS SHOWN. ANY EXCESS SNOW TO BE TRUCKED OFF-SITE.

14) THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE MEANS AND METHODS OF CONSTRUCTION AND FOR CONDITIONS AT THE SITE. THESE PLANS, PREPARED BY GREENMAN-PEDERSEN, INC., DO NOT EXTEND TO OR INCLUDE SYSTEMS PERTAINING TO THE SAFETY OF THE CONSTRUCTION CONTRACTOR OR THEIR EMPLOYEES, AGENTS OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. THE SEAL OF THE SURVEYOR AND/OR ENGINEER AS INCLUDED IN THE PLAN SET DOES NOT EXTEND TO ANY SUCH SAFETY SYSTEMS THAT MAY NOW OR HEREAFTER BE INCORPORATED INTO THESE PLANS. THE CONSTRUCTION CONTRACTOR SHALL PREPARE AND/OR OBTAIN THE APPROPRIATE SAFETY SYSTEMS WHICH MAY BE REQUIRED BY THE U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND/OR LOCAL REGULATIONS.

15) ALL UNDERGROUND STORAGE TANKS, PRODUCT PIPING AND VENT LINES SHALL COMPLY WITH CURRENT STATE AND E.P.A. REGULATIONS.

16) SELF-SERVICE APPROVAL IS REQUIRED FROM THE OFFICE OF THE STATE FIRE MARSHAL. SEE APPROVED FIRE SUPPRESSION PLAN FOR LAYOUT OF SPILL CONTAINMENT GROOVES (POSITIVE LIMING BARRIER).

17) RELIEF WAS GRANTED BY THE ZONING BOARD OF ADJUSTMENT ON FEBRUARY 15, 2022 TO ALLOW THE FOLLOWING:
- PARKING SPACES BETWEEN PRINCIPAL BUILDING AND ROAD (ZONING 10.1113.20)
- GREATER THAN 90' BUILDING SETBACK FROM LAFAYETTE ROAD (ZONING 10.5.B.22.40)
- LESS THAN 75% FRONT LOT LINE BUILDOUT (SECTION 10.5.B.33.20)
- MORE THAN ONE DRIVEWAY PER LOT (SECTION 10.1114.31)
- TO ALLOW A 160 SF FREESTANDING SIGN (SECTION 10.1251.20)

18) RELIEF IS REQUESTED FROM THE PLANNING BOARD TO ALLOW THE FOLLOWING:
- GREATER THAN ONE DRIVEWAY PER LOT. (SITE PLAN 3.3.2). EXISTING SITE HAS TWO DRIVEWAYS

19) A CONDITIONAL USE PERMIT IS REQUIRED FROM THE PLANNING BOARD TO ALLOW THE FOLLOWING:
- A WETLAND BUFFER DISTURBANCE OF 33,555 SF PER SECTION 10.241.23. THIS TOTAL INCLUDES DISTURBANCE REQUIRED TO REMOVE EXISTING DISTURBANCES AND RETURN THEM TO A MORE NATURAL STATE.
- A DRIVE-THRU FACILITY PER SECTION 10.440

20) APPROPRIATE EROSION CONTROL MEASURES (HAY BALES, SILT FENCE) SHALL BE INSTALLED PRIOR TO INITIATION OF ANY SITE WORK & SHALL BE MAINTAINED BY THE DEVELOPER UNTIL ADEQUATE VEGETATIVE COVER IS ESTABLISHED ON ALL GRADED AREAS. SEE EROSION & SEDIMENT CONTROL PLAN.

21) ELECTRIC CONDUIT TO BE INSTALLED FOR FUTURE CHARGING STATIONS.

22) ALL CONDITIONS ON THIS PLAN SHALL REMAIN IN EFFECT IN PERPETUITY PURSUANT TO THE REQUIREMENTS OF THE SITE PLAN REVIEW REGULATIONS.

23) PERMITS REQUIRED:
- NHDOT DRIVEWAY PERMIT
- USEPA NPDES CONSTRUCTION GENERAL PERMIT

24) PARKING AT CHARGING STATIONS SHALL NOT BE RESTRICTED TO ONLY ELECTRIC VEHICLES.

OWNER OF RECORD:

MAP 272 LOT 3
MASTORAN RESTAURANTS, INC.
822 LEXINGTON STREET
WALTHAM, MA 02154
BOOK 3572 PAGE 199

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

STATE OF NEW HAMPSHIRE – CORY N. MASON No.17099 – LICENSED PROFESSIONAL ENGINEER
4/19/22

REVISIONS		
3	MISC. REVISIONS	4/19/22
2	REV. PER CITY COMMENTS	3/22/22
1	REV. FOR SITE PLAN APPROVAL	2/9/22
NO.	REVISION	DATE

JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

SITE PLAN

SCALE: 1"=30'

PROJECT NO. NEX-2021163

4 OF 15

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DRAINAGE PIPE SCHEDULE

FROM: STRUCTURE NUMBER	PIPE SIZE (INCHES)	TYPE OF PIPE	APPROX. PIPE LENGTH (FEET)	SLOPE OF PIPE (FT./FT.)	TO: STRUCTURE NUMBER
CB-1	12	HDPE	51	0.011	DMH-1
CB-2	12	HDPE	139	0.005	CB-6
CB-3(FD)	12	HDPE	29	0.063	DET IN-1
CB-4(FD)	18	HDPE	81	0.005	DMH-2
CB-5	18	HDPE	70	0.005	CB-4(FD)
CB-6	15	HDPE	94	0.005	CB-5
DET OUT	24	HDPE	7	0.000	OCS-1
DMH-1	12	HDPE	66	0.014	CB-6
DMH-2	18	HDPE	29	0.032	DET IN-2
DMH-2	6	HDPE	10	0.010	OWS-IN
DMH-3	12	HDPE	30	0.010	CB-3(FD)
JELLYFISH OUT	18	HDPE	12	0.012	FES-1
OCS-1	18	HDPE	3	0.029	JELLYFISH IN
OWS-OUT	6	HDPE	7	0.013	DET IN-3

DRAINAGE STRUCTURES

CB-1
RIM=64.55
INV.OUT=61.05

CB-2
RIM=63.70
INV.OUT=60.10

CB-3(FD)
RIM=62.80
INV.IN=59.90(DMH-3)
INV.OUT=58.80

CB-4(FD)(DG)
RIM=61.70
INV.IN=58.05(CB-5)
INV.OUT=57.95

CB-5
RIM=63.05
INV.IN=58.65(CB-6)
INV.OUT=58.40

CB-6
RIM=63.90
INV.IN=59.40(CB-2)
INV.IN=59.50(DMH-1)
INV.OUT=59.15

DMH-1
RIM=65.30
INV.IN=60.50(CB-1)
INV.OUT=60.40

DMH-2
RIM=63.30
INV.IN=57.55(CB-4(FD))
INV.OUT=57.95 (18" BYPASS)
INV.OUT=57.45 (6" LOW FLOW)

DMH-3
RIM=64.00
INV.IN=59.25(RD)
INV.OUT=59.20

FES-1
INV.=56.25

4,000 GAL OIL/WATER SEPARATOR-1 (OWS-1)
RIM=63.75±
INV.IN=57.35
INV.OUT=57.10

UNDERGROUND DETENTION SYSTEM (UG DET)
36"ø SOLID (WT) PIPES
4 ROWS + 2 HEADERS
67.00'L x 19.25'W
S=0.000 FT/FT
INV.PIPE=57.00
INV'S.IN=57.00
INV.OUT=57.00
(SEE DETAIL)

OUTLET CONTROL STRUCTURE (OCS-1)
RIM=63.70
INV.IN=57.00
INV.OUT=57.00
(SEE DETAIL)

JELLYFISH FILTER
(CONTECH JFPD0806 OR APPROVED EQUAL)
RIM=62.00
INV.IN=56.90
INV.OUT=56.40
(SEE DETAIL)

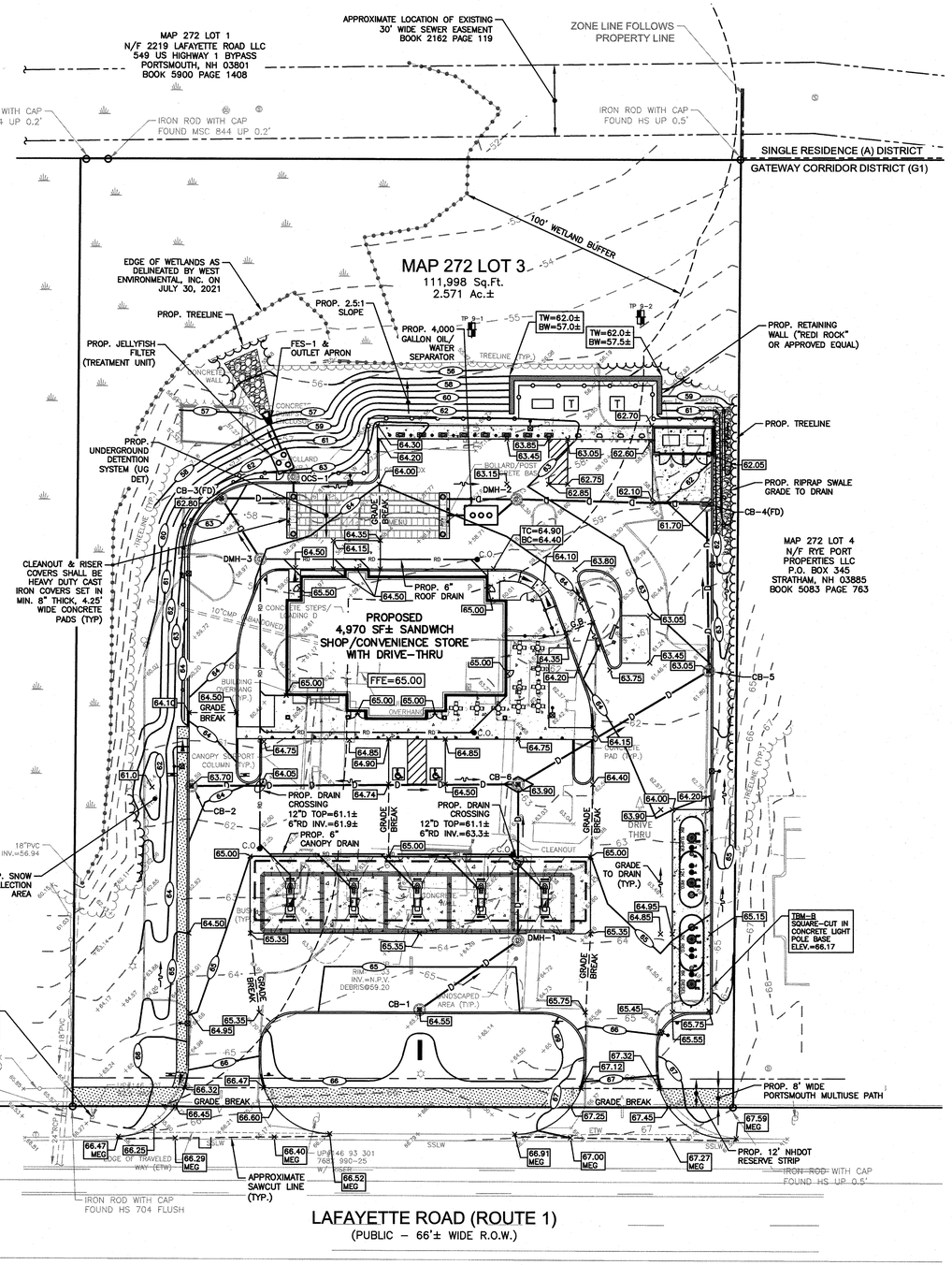
(FD) DENOTES FIRST DEFENSE FD-4HC HYRODYNAMIC PARTICLE SEPARATOR OR APPROVED EQUAL.

(WT) DENOTES WATERTIGHT PIPE JOINTS

(DG) DENOTES DOUBLE CATCH BASIN FRAME AND GRATE

LEGEND

- VGC — VERTICAL GRANITE CURB
- SSLW — SINGLE SOLID LINE WHITE
- G — GAS LINE
- U/GCAT — UNDERGROUND COMM
- W — WATER LINE
- E — UNDERGROUND ELECTRIC
- CHAIN LINK FENCE
- 90 — CONTOUR ELEVATION
- TREE
- UTILITY POLE
- GUY WIRE
- OVERHEAD WIRE
- TREELINE
- SIGN
- +98.98 — SPOT ELEVATION
- CATCH BASIN
- CLEANOUT
- S — SEWER MANHOLE
- T — TELEPHONE MANHOLE
- WATER SHUT OFF
- BOLLARD
- GM — GAS METER
- LIGHT POLE
- WETLAND LINE
- EASEMENT LINE
- PROPERTY LINE
- ABUTTER PROPERTY LINE
- ZONE LINE
- C.O. — PROP. CLEANOUT
- CB-1 — PROP. CATCH BASIN
- DMH-1 — PROP. DRAIN MANHOLE
- MEG — MEET EXISTING GRADE
- 331.25 — PROP. SPOT ELEVATION
- 100 — PROP. CONTOUR ELEVATION
- TW= — TOP OF WALL ELEV.
- BW= — BOTTOM OF WALL ELEV.
- G.B. — GRADE BREAK
- TP — TEST PIT



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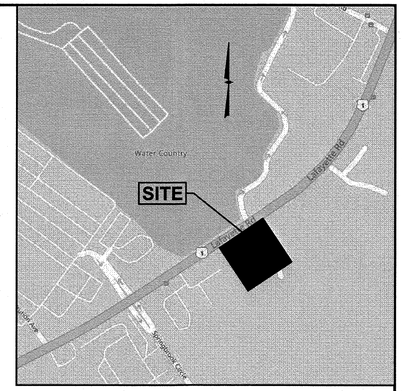
SCALE: 1" = 30'



LOCATION MAP
(NOT TO SCALE)

NOTES:

1) ALL SITE DRAINAGE PIPE SHALL BE CORRUGATED HIGH-DENSITY POLYETHYLENE PIPE WITH STANDARD JOINTS, DUAL-WALL, SMOOTH INTERIOR, AS MANUFACTURED BY ADS, INC., OR APPROVED EQUAL, UNLESS OTHERWISE NOTED ON PLAN. THE UNDERGROUND DETENTION SYSTEM SHALL HAVE WATER TIGHT JOINTS MEETING ASTM D3212 SPECIFICATIONS.
2) ALL ROOF AND CANOPY DRAIN PIPE SHALL BE 6" PVC (SDR-35).
3) ELEVATIONS ARE BASED ON NAVD88 DATUM.
4) ALL PROPOSED ELEVATIONS AS SHOWN ARE BOTTOM OF CURB ELEVATIONS, UNLESS OTHERWISE NOTED.
5) ANY UTILITY FIELD ADJUSTMENTS SHALL BE APPROVED BY THE ENGINEER OF RECORD AND COORDINATED WITH THE APPROPRIATE LOCAL UTILITY COMPANY.
6) THE LOCATIONS OF UNDERGROUND UTILITIES ARE APPROXIMATE ONLY. THE CONTRACTOR IS TO VERIFY EXACT LOCATION PRIOR TO CONSTRUCTION. THE CONTRACTOR IS TO NOTIFY THE DESIGN ENGINEER OF ANY DISCREPANCIES. CONSTRUCTION SHALL COMMENCE BEGINNING AT THE LOWEST INVERT (POINT OF CONNECTION) AND PROGRESS UP GRADIENT. PROPOSED INTERFACE POINTS (CROSSINGS) WITH EXISTING UNDERGROUND INSTALLATIONS SHALL BE FIELD VERIFIED BY TEST PIT PRIOR TO COMMENCEMENT OF CONSTRUCTION.
7) ALL CONSTRUCTION SHALL CONFORM TO MUNICIPAL DPW AND ALL APPLICABLE STATE AND FEDERAL STANDARDS.
8) THE CONTRACTOR SHALL CALL AND COORDINATE WITH DIG-SAFE (DIAL 811) PRIOR TO COMMENCING ANY EXCAVATION.
9) THIS SITE WILL REQUIRE A USEPA NPDES PERMIT FOR STORMWATER DISCHARGE FOR THE SITE CONSTRUCTION SINCE THE DISTURBANCE EXCEEDS ONE ACRE (ACTUAL DISTURBANCE = 75,000 SF±). THE CONSTRUCTION SITE OPERATOR SHALL DEVELOP AND IMPLEMENT A CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN (SWPPP), WHICH SHALL REMAIN ON SITE AND MADE ACCESSIBLE TO THE PUBLIC. A COMPLETED NOTICE OF TERMINATION (NOT) SHALL BE SUBMITTED TO NPDES PERMITTING AUTHORITY WITHIN 30 DAYS AFTER EITHER OF THE FOLLOWING CONDITIONS HAVE BEEN MET: FINAL STABILIZATION HAS BEEN ACHIEVED ON ALL PORTIONS OF THE SITE FOR WHICH THE PERMITTEE IS RESPONSIBLE; OR ANOTHER OPERATOR/PERMITTEE HAS ASSUMED CONTROL OVER ALL AREAS OF THE SITE THAT HAVE NOT BEEN FINALLY STABILIZED.
10) ANY UTILITIES TO BE TAKEN OUT OF SERVICE SHALL BE DISCONNECTED AS DIRECTED BY UTILITY COMPANY AND LOCAL DPW.
11) ALL TRAFFIC CONTROL AND TEMPORARY CONSTRUCTION SIGNAGE ARRANGEMENTS, ACCEPTABLE TO NHDOT AND THE CITY DEPARTMENT OF PUBLIC WORKS, SHALL BE EMPLOYED DURING OPERATIONS WITHIN THE PUBLIC RIGHT-OF-WAY.
12) ALL ADA ACCESSIBLE WALKWAYS CANNOT EXCEED 5% RUNNING SLOPE AND 2% CROSS SLOPE. RAMPS CANNOT EXCEED 8.33% RUNNING SLOPE AND 2% CROSS SLOPE, AND ACCESSIBLE PARKING STALLS AND ACCESS AISLES CANNOT EXCEED 2% SLOPE IN ANY DIRECTION. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES.
13) SEE UTILITY PLAN FOR DETAILED UTILITY LAYOUT.
14) ALL PROPOSED CATCH BASINS SHALL HAVE 4' SUMPS AND OUTLETS EQUIPPED WITH "ELIMINATOR" OIL HOODS OR APPROVED EQUAL.
15) ALL PIPE DATA IS CALCULATED TO CENTER OF STRUCTURE, TYP.
16) CONTRACTOR TO REFER TO THE INSPECTION & MAINTENANCE (I&M) MANUAL FOR STORMWATER MANAGEMENT SYSTEMS & SITE MAINTENANCE DURING AND AFTER CONSTRUCTION.
17) CONTRACTOR TO INSTALL RISER STRUCTURES AT EACH CORNER OF UNDERGROUND DETENTION SYSTEMS AND CLEANOUTS AT EACH END OF EACH ROW TO PROVIDE ACCESS POINTS FOR CLEANING AND MAINTENANCE.
- TOTAL RISERS PROPOSED = 4
- TOTAL CLEANOUTS PROPOSED = 4

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
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PREPARED FOR
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25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

STATE OF NEW HAMPSHIRE
CORY N. MASON No.17099
LICENSED PROFESSIONAL ENGINEER
4/19/22

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NO.	REVISION	DATE

JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

GRADING & DRAINAGE PLAN

SCALE: 1"=30'

PROJECT NO. NEX-2021163

5 OF 15

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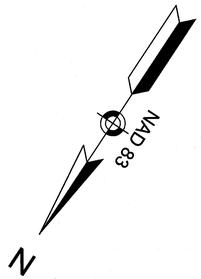

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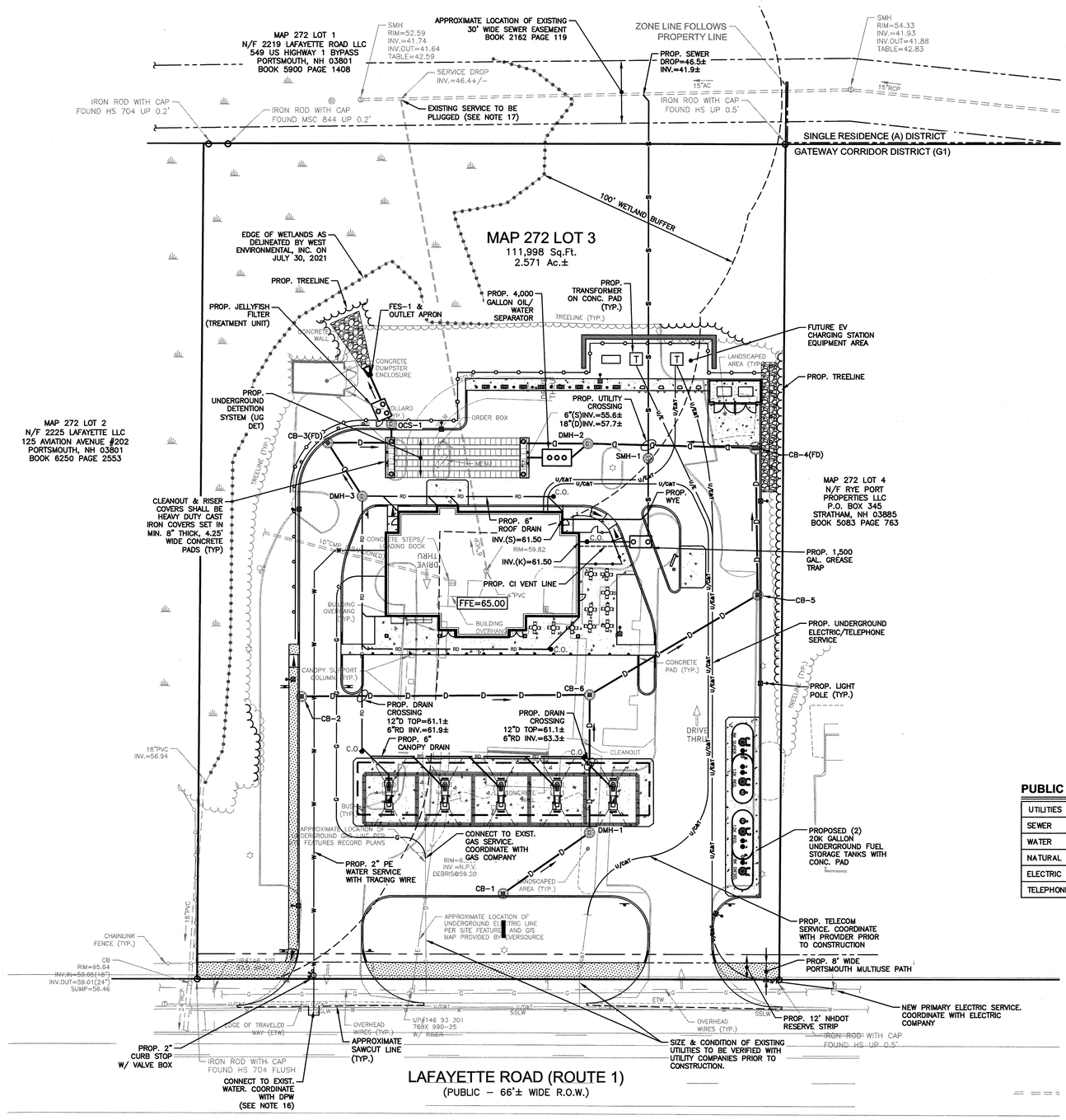
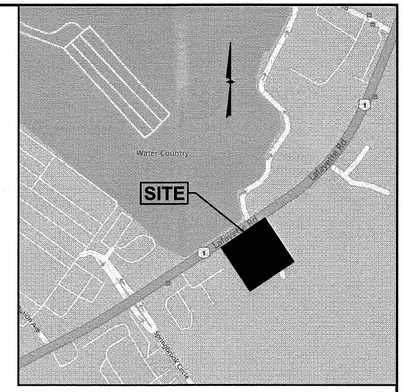
- DMH–1 — PROP. DRAIN MANHOLE
- SMH–1 — PROP. SEWER MANHOLE
- PROP. GATE VALVE



0 30 60 100

SCALE: 1" = 30'



LOCATION MAP

(NOT TO SCALE)

NOTES:

1) ALL SANITARY SEWER PIPE SHALL BE PVC (SDR–35), UNLESS OTHERWISE NOTED.
2) ALL WATER PIPE SHALL BE POLYETHYLENE, UNLESS OTHERWISE NOTED.
3) ANY UTILITY FIELD ADJUSTMENTS SHALL BE APPROVED BY THE ENGINEER OF RECORD AND COORDINATED WITH THE APPROPRIATE LOCAL UTILITY COMPANY.
4) THE LOCATIONS OF UNDERGROUND UTILITIES ARE APPROXIMATE ONLY. THE CONTRACTOR IS TO VERIFY EXACT LOCATION PRIOR TO CONSTRUCTION. THE CONTRACTOR IS TO NOTIFY THE DESIGN ENGINEER OF ANY DISCREPANCIES.
5) ALL CONSTRUCTION SHALL CONFORM TO MUNICIPAL DPW AND ALL APPLICABLE STATE AND FEDERAL STANDARDS.
6) THE CONTRACTOR SHALL CALL AND COORDINATE WITH DIG–SAFE (1–888–344–7233) PRIOR TO COMMENCING ANY EXCAVATION.
7) ALL WATER AND SEWER CONSTRUCTION SHALL CONFORM TO DEPARTMENT OF PUBLIC WORKS SPECIFICATIONS.
8) THIS SITE IS SERVED BY MUNICIPAL SEWER AND WATER.
9) ALL ELECTRIC, TELEPHONE AND CABLE TV LINES ARE TO BE UNDERGROUND AND INSTALLED IN CONFORMANCE WITH APPLICABLE UTILITY CO. SPECIFICATIONS.
10) ANY UTILITIES TO BE TAKEN OUT OF SERVICE SHALL BE DISCONNECTED AS DIRECTED BY UTILITY COMPANY AND LOCAL DPW.
11) ALL TRAFFIC CONTROL AND TEMPORARY CONSTRUCTION SIGNAGE ARRANGEMENTS, ACCEPTABLE TO NHDOT AND CITY DEPARTMENT OF PUBLIC WORKS, SHALL BE EMPLOYED DURING OPERATIONS WITHIN THE PUBLIC RIGHT–OF–WAY.
12) SEE GRADING & DRAINAGE PLAN FOR DETAILED DRAINAGE INFORMATION.
13) ELECTRICAL CONDUIT WITHIN 20' OF TANKS OR DISPENSERS MAY NEED TO BE RIGID METAL CONDUIT WITH CONCRETE ENCASEMENT. CONTRACTOR TO COORDINATE WITH UTILITY COMPANY AND/OR TOWN ELECTRICAL INSPECTOR AS REQUIRED.
14) REFER TO DETAIL SHEETS FOR ALL UTILITY AND DRAINAGE STRUCTURE DETAILS AND ADDITIONAL INFORMATION.
15) ELECTRIC CONDUIT TO BE PROVIDED FOR FUTURE EV CHARGING STATIONS.
16) EXISTING WATER SERVICE LOCATION IS UNKNOWN. CONTRACTOR TO LOCATE AND DISCONTINUE SERVICE AT THE MAIN.
17) CONTRACTOR TO CONTACT EASTERN PIPING TO PLUG THE SERVICE FROM THE MAIN WITHOUT DISTURBING THE WETLAND. AFTER PLUGGED, CONTRACTOR SHALL FILL THE EXISTING SERVICE WITH FLOWABLE FILL.

PUBLIC UTILITIES

UTILITIES		AVAILABLE
SEWER	CITY OF PORTSMOUTH PUBLIC WORKS DEPT., PETER RICE 603–427–1530	YES
WATER	CITY OF PORTSMOUTH PUBLIC WORKS DEPT., PETER RICE 603–427–1530	YES
NATURAL GAS	UNITIL, DAVE MACLEAN 603–294–5261	YES
ELECTRIC	EVERSOURCE, CASEY MCDONALD 603–519–0924	YES
TELEPHONE	CONSOLIDATED COMMUNICATIONS	YES

SEWER PIPE SCHEDULE

FROM: STRUCTURE NUMBER	PIPE SIZE (inches)	TYPE OF PIPE	APPROX. PIPE LENGTH (feet)	SLOPE OF PIPE (ft./ft.)	TO: STRUCTURE NUMBER
BLDG.	6	CI	20	0.056	GR. TRAP
GR. TRAP	6	PVC	35	0.081	SMH–1
BLDG.	6	PVC	41	0.062	WYE
SMH–1	6	PVC	178	0.052	SEWER MAIN

SEWER STRUCTURES

1,500 GAL. GREASE TRAP
RIM=64.10
INV.IN=60.10
INV.OUT=59.85

SMH–1 (DROP)
RIM=63.00
INV.IN=57.00
INV.OUT=55.70

PROP. WYE
INV.=58.95±

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

STATE OF NEW HAMPSHIRE – CORY N. MASON No.17099 – LICENSED PROFESSIONAL ENGINEER
4/19/22

REVISIONS		
2	MISC. REVISIONS	4/19/22
1	REV. PER CITY COMMENTS	3/22/22
NO.	REVISION	DATE

JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

UTILITY PLAN

SCALE: 1"=30'

PROJECT NO. NEX-2021163

6 OF 15

811 DigSafe MA-ME-NH-RI-VT

LEGEND

- VGC — VERTICAL GRANITE CURB
- SSLW — SINGLE SOLID LINE WHITE
- G — GAS LINE
- U/GAT — UNDERGROUND COMM
- W — WATER LINE
- E — UNDERGROUND ELECTRIC
- CHAIN LINK FENCE
- 90 — CONTOUR ELEVATION
- TREE
- UTILITY POLE
- GUY WIRE
- OVERHEAD WIRE
- TREELINE
- SIGN
- SPOT ELEVATION
- CATCH BASIN
- CLEANOUT
- SEWER MANHOLE
- TELEPHONE MANHOLE
- WATER SHUT OFF
- BOLLARD
- GM — GAS METER
- LIGHT POLE
- WETLAND LINE
- EASEMENT LINE
- PROPERTY LINE
- ABUTTER PROPERTY LINE
- ZONE LINE
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- DMH-1 — PROP. DRAIN MANHOLE
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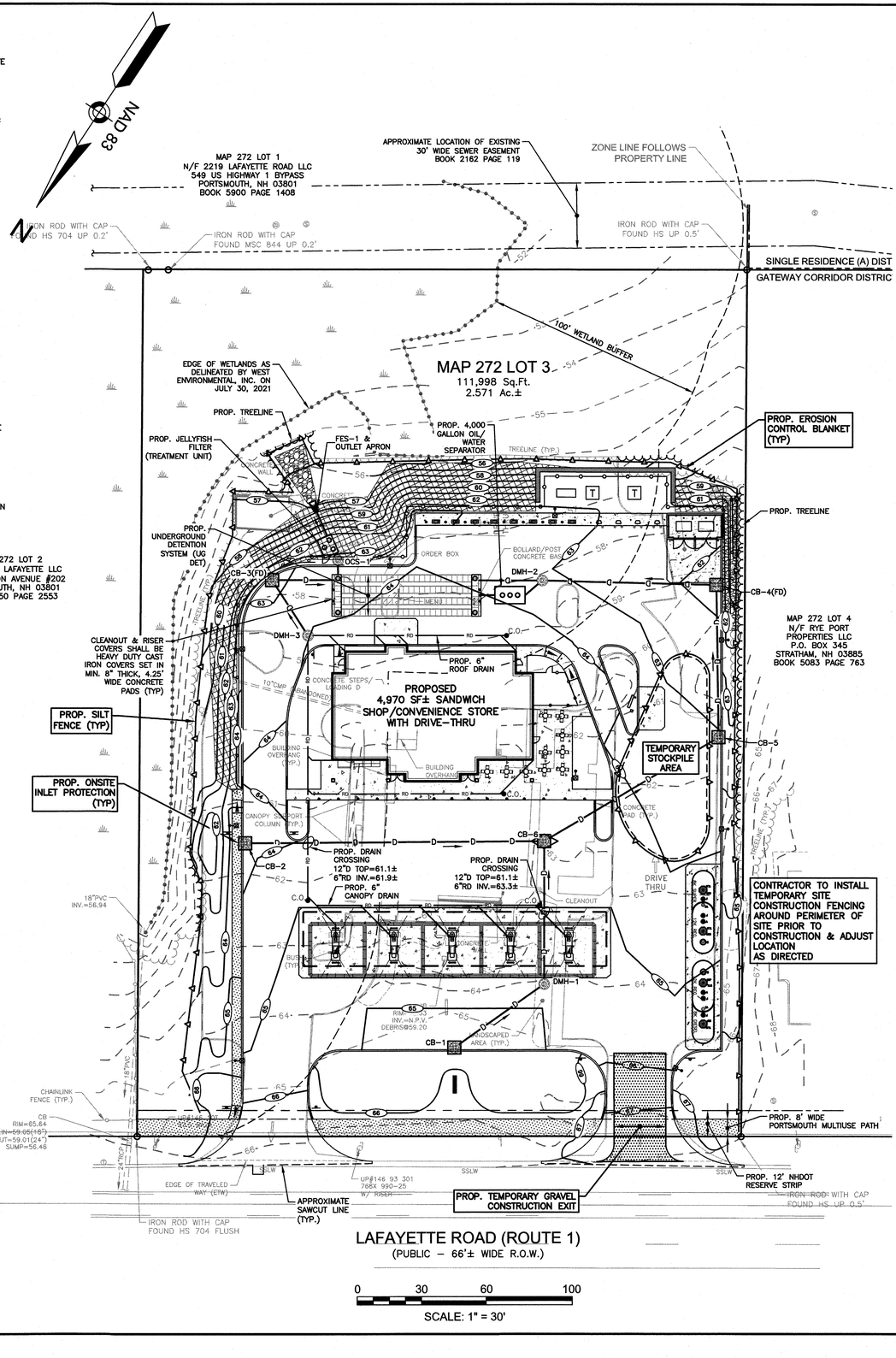
- PROP. SILT FENCE

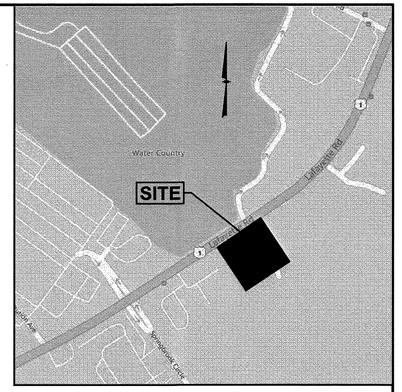


CONSTRUCTION SEQUENCE:

1) SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO ANY ON-SITE CONSTRUCTION AS SHOWN. ADDITIONAL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSTALLED AS SOON AS PRACTICAL.
2) REMOVE AND STOCKPILE SOIL AS REQUIRED. STOCKPILE SHALL BE SURROUNDED WITH HAYBALES TO PREVENT EROSION.
3) CONSTRUCT DRIVEWAYS AND PERFORM SITE GRADING.
4) INSTALL UNDERGROUND UTILITIES & DRAINAGE.
5) BEGIN TEMPORARY AND PERMANENT SEEDING AND MULCHING. ALL CUT AND FILL SLOPES SHALL BE SEEDED OR MULCHED IMMEDIATELY AFTER THEIR CONSTRUCTION.
6) DAILY, OR AS REQUIRED, CONSTRUCT, INSPECT, AND IF NECESSARY, RECONSTRUCT TEMPORARY BERMS, DRAINS, DITCHES, SILT FENCES, HAYBALES AND SEDIMENT TRAPS INCLUDING MULCHING AND SEEDING.
7) BEGIN EXCAVATION FOR AND CONSTRUCTION OF BUILDINGS.
8) FINISH PAVING ALL DRIVES AND PARKING AREAS. CLEAN ALL DRAINAGE STRUCTURES.
9) COMPLETE PERMANENT SEEDING AND LANDSCAPING.
10) AFTER GRASS HAS BEEN FULLY GERMINATED IN ALL SEEDED AREAS, REMOVE ALL TEMPORARY EROSION CONTROL MEASURES.

WINTER STABILIZATION NOTES:

MAINTENANCE REQUIREMENTS:
MAINTENANCE MEASURES SHOULD CONTINUE AS NEEDED THROUGHOUT CONSTRUCTION, INCLUDING THE OVER-WINTER PERIOD. AFTER EACH RAINFALL, SNOWSTORM, OR PERIOD OF THAWING AND RUNOFF, THE SITE CONTRACTOR SHOULD CONDUCT AN INSPECTION OF ALL INSTALLED EROSION CONTROL MEASURES AND PERFORM REPAIRS AS NEEDED TO INSURE THEIR CONTINUING FUNCTION. FOR ANY AREA STABILIZED BY TEMPORARY OR PERMANENT SEEDING PRIOR TO THE ONSET OF THE WINTER SEASON, THE CONTRACTOR SHOULD CONDUCT AN INSPECTION IN THE SPRING TO ASCERTAIN THE CONDITION OF VEGETATION COVER, AND REPAIR ANY DAMAGE AREAS OR BARE SPOTS AND RESEED AS REQUIRED TO ACHIEVE AN ESTABLISHED VEGETATIVE COVER (AT LEAST 85% OF AREA VEGETATED WITH HEALTHY, VIGOROUS GROWTH).
SPECIFICATIONS:
TO ADEQUATELY PROTECT WATER QUALITY DURING COLD WEATHER AND DURING SPRING RUNOFF, THE FOLLOWING STABILIZATION TECHNIQUES SHOULD BE EMPLOYED DURING THE PERIOD FROM OCTOBER 15TH THROUGH MAY 15TH.
1) THE AREA OF EXPOSED, UNSTABILIZED SOIL SHOULD BE LIMITED TO ONE ACRE AND SHOULD BE PROTECTED AGAINST EROSION BY THE METHODS DESCRIBED IN THIS SECTION PRIOR TO ANY THAW OR SPRING MELT EVENT. SUBJECT TO APPLICABLE REGULATIONS, THE ALLOWABLE AREA OF EXPOSED SOIL MAY BE INCREASED IF ACTIVITIES ARE CONDUCTED ACCORDING TO A WINTER CONSTRUCTION PLAN, DEVELOPED BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF NEW HAMPSHIRE OR A CERTIFIED PROFESSIONAL IN EROSION AND SEDIMENT CONTROL AS CERTIFIED BY THE CSPESC COUNCIL OF ENVIROCERT INTERNATIONAL, INC.
2) STABILIZATION AS FOLLOWS SHOULD BE COMPLETED WITHIN A DAY OF ESTABLISHING THE GRADE THAT IS FINAL OR THAT OTHERWISE WILL EXIST FOR MORE THAN 5 DAYS:
   A. ALL PROPOSED VEGETATED AREAS HAVING A SLOPE OF LESS THAN 15% WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15TH, OR WHICH ARE DISTURBED AFTER OCTOBER 15TH, SHOULD BE SEEDED AND COVERED WITH 3 TO 4 TONS OF HAY OR STRAW MULCH PER ACRE SECURED WITH ANCHORED NETTING, OR 2 INCHES OF EROSION CONTROL MIX (SEE DESCRIPTION OF EROSION CONTROL MIX BERMS FOR MATERIAL SPECIFICATION).
   B. ALL PROPOSED VEGETATED AREAS HAVING A SLOPE OF GREATER OOTHAN 15% WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15TH, OR WHICH ARE DISTURBED AFTER OCTOBER 15TH, SHOULD BE SEEDED AND COVERED WITH A PROPERLY INSTALLED AND ANCHORED EROSION CONTROL BLANKET OR WITH A MINIMUM 4 INCH THICKNESS OF EROSION CONTROL MIX, UNLESS OTHERWISE SPECIFIED BY THE MANUFACTURER. NOTE THAT COMPOST BLANKETS SHOULD NOT EXCEED 2 INCHES IN THICKNESS OR THEY MAY OVERHEAT.
3) ALL STONE-COVERED SLOPES MUST BE CONSTRUCTED AND STABILIZED BY OCTOBER 15.
4) INSTALLATION OF ANCHORED HAY MULCH OR EROSION CONTROL MIX SHOULD NOT OCCUR OVER SNOW OF GREATER THAN ONE INCH IN DEPTH.
5) ALL MULCH APPLIED DURING WINTER SHOULD BE ANCHORED (E.G., BY NETTING, TRACKING, WOOD CELLULOSE FIBER).
6) STOCKPILES OF SOIL MATERIALS SHOULD BE MULCHED FOR OVER WINTER PROTECTION WITH HAY OR STRAW AT TWICE THE NORMAL RATE OR WITH A FOUR-INCH LAYER OF EROSION CONTROL MIX. MULCHING SHOULD BE DONE WITHIN 24 HOURS OF STOCKING, AND RE-ESTABLISHED PRIOR TO ANY RAINFALL OR SNOWFALL. NO SOIL STOCKPILE SHOULD BE PLACED (EVEN COVERED WITH MULCH) WITHIN 100 FEET FROM ANY WETLAND OR OTHER WATER RESOURCE AREA.
7) FROZEN MATERIALS, (E.G., FROST LAYER THAT IS REMOVED DURING WINTER CONSTRUCTION), SHOULD BE STOCKPILED SEPARATELY AND IN A LOCATION THAT IS AWAY FROM ANY AREA NEEDING TO BE PROTECTED. STOCKPILES OF FROZEN MATERIAL CAN MELT IN THE SPRING AND BECOME UNWORKABLE AND DIFFICULT TO TRANSPORT DUE TO THE HIGH MOISTURE CONTENT IN THE SOIL.
8) INSTALLATION OF EROSION CONTROL BLANKETS SHOULD NOT OCCUR OVER SNOW OF GREATER THAN ONE INCH IN DEPTH OR ON FROZEN GROUND.
9) ALL GRASS-LINED DITCHES AND CHANNELS SHOULD BE CONSTRUCTED AND STABILIZED BY SEPTEMBER 1. ALL DITCHES OR SWALES WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15TH, OR WHICH ARE DISTURBED AFTER OCTOBER 15TH, SHOULD BE STABILIZED TEMPORARILY WITH STONE OR EROSION CONTROL BLANKETS APPROPRIATE FOR THE DESIGN FLOW CONDITIONS, AS DETERMINED BY A QUALIFIED PROFESSIONAL ENGINEER OR A CERTIFIED PROFESSIONAL IN EROSION AND SEDIMENT CONTROL AS CERTIFIED BY THE CSPESC COUNCIL OF ENVIROCERT INTERNATIONAL, INC. IF A STONE LINING IS NECESSARY, THE CONTRACTOR MAY NEED TO RE-GRADE THE DITCH AS REQUIRED TO PROVIDE ADEQUATE CROSS-SECTION AFTER ALLOWING FOR PLACEMENT OF THE STONE.
10) ALL STONE-LINED DITCHES AND CHANNELS MUST BE CONSTRUCTED AND STABILIZED BY OCTOBER 15.
11) AFTER OCTOBER 15, INCOMPLETE ROAD OR PARKING SURFACES, WHERE WORK HAS STOPPED FOR THE WINTER SEASON, SHALL BE PROTECTED WITH A MINIMUM OF 3 INCHES OF CRUSHED GRAVEL PER NHDOT ITEM 304.3.
12) SEDIMENT BARRIERS THAT ARE INSTALLED DURING FROZEN CONDITIONS SHOULD CONSIST OF EROSION CONTROL MIX BERMS, OR CONTINUOUS CONTAINED BERMS. SILT FENCES AND HAY BALES SHOULD NOT BE INSTALLED WHEN FROZEN CONDITIONS PREVENT PROPER EMBEDMENT OF THESE BARRIERS.



LOCATION MAP
(NOT TO SCALE)

EROSION CONTROL NOTES:

1) THE EROSION CONTROL PROCEDURES SHALL CONFORM TO THE NH STORMWATER MANUAL, VOLUME 3, EROSION & SEDIMENT CONTROLS DURING CONSTRUCTION, DECEMBER 2008, OR LATEST EDITION.
2) DURING CONSTRUCTION AND THEREAFTER, EROSION CONTROL MEASURES ARE TO BE IMPLEMENTED AS NOTED: THE SMALLEST PRACTICAL AREA OF LAND SHOULD BE EXPOSED AT ANY ONE TIME DURING DEVELOPMENT. WHEN LAND IS EXPOSED DURING DEVELOPMENT, THE EXPOSURE SHOULD BE KEPT TO THE SHORTEST PRACTICAL PERIOD OF TIME AS APPROVED BY THE ENGINEER. LAND SHOULD NOT BE LEFT EXPOSED DURING THE WINTER MONTHS.
3) LIMIT OF MAXIMUM AREA OF EXPOSED SOIL AT ANY ONE TIME TO LESS THAN 5 ACRES. THE EXPOSED AREA THAT IS BEING ACTIVELY WORKED DURING WINTER IS TO BE LESS THAN 3 ACRES DURING THE WINTER SEASON.
4) ALL PERMANENT STORM WATER STRUCTURES SHALL BE STABILIZED PRIOR TO DIRECTING FLOW INTO THEM. AN AREA SHALL BE CONSIDERED STABLE IF ONE OF THE FOLLOWING HAS OCCURRED:
   A) BASE COURSE GRAVELS HAVE BEEN INSTALLED IN AREAS TO BE PAVED.
   B) A MINIMUM OF 85 PERCENT VEGETATED GROWTH HAS BEEN ESTABLISHED.
   C) A MINIMUM OF 3 INCHES OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIP-RAP HAS BEEN INSTALLED.
   D) OR, EROSION CONTROL BLANKETS HAVE BEEN PROPERLY INSTALLED.
5) SILT FENCE SHALL BE INSTALLED AND MAINTAINED DURING AND AFTER DEVELOPMENT TO REMOVE SEDIMENT FROM RUNOFF WATER AND FROM LAND UNDERGOING DEVELOPMENT. WHERE POSSIBLE, NATURAL DRAINAGE WAYS SHOULD BE UTILIZED AND LEFT OPEN TO REMOVE EXCESS SURFACE WATER. SILT FENCE TO BE MAINTAINED AND CLEANED UNTIL ALL SLOPES HAVE A HEALTHY STAND OF GRASS.
6) ALL DISTURBED AREAS AND SIDE SLOPES WHICH ARE FINISHED GRADED, WITH NO FURTHER CONSTRUCTION TO TAKE PLACE, SHALL BE LOAMED AND SEEDED WITHIN 72 HOURS AFTER FINAL GRADING. A MINIMUM OF 4" OF LOAM SHALL BE INSTALLED WITH NOT LESS THAN ONE POUND OF SEED PER 50 SQUARE YARDS OF AREA. THE SEED MIX SHALL BE AS DESIGNATED BELOW.
7) ANY DISTURBED AREAS WHICH ARE TO BE LEFT TEMPORARILY, AND WHICH WILL BE REGRADED LATER DURING CONSTRUCTION SHALL BE MACHINE HAY MULCHED AND SEEDED WITH RYE GRASS TO PREVENT EROSION. THE MAXIMUM LENGTH OF TIME FOR THE EXPOSURE OF DISTURBED SOILS SHALL BE 45 DAYS. HAY OR STRAW MULCH SHALL BE APPLIED TO ALL FRESHLY SEEDED AREAS AT THE RATE OF 2 TONS PER ACRE. BALES SHALL BE UNSPOILED, AIR DRIED, AND FREE FROM WEED, SEEDS AND ANY COARSE MATERIAL.
8) DURING GRADING OPERATIONS INSTALL HAY BALE BARRIERS ALONG TOE OF SLOPE OF FILL AREAS WHERE SHOWN. BARRIERS ARE TO BE MAINTAINED UNTIL DISTURBED AREAS ARE PAVED OR GRASSED.
9) THE FILL MATERIAL SHALL BE OF APPROVED SOIL TYPE FREE FROM STUMPS, ROOTS, WOOD, ETC. TO BE PLACED IN 12" LIFTS OR AS SPECIFIED. BULLDOZERS, TRUCKS, TRACTORS, OR ROLLERS MAY BE USED FOR COMPACTION BY ROUTING THE EQUIPMENT TO ALL AREAS OR EACH LAYER.
10) AVOID THE USE OF FUTURE OPEN SPACES (LOAM & SEED) WHEREVER POSSIBLE DURING CONSTRUCTION. CONSTRUCTION TRAFFIC SHALL USE THE ROADBEDS OF FUTURE ROADS.

TEMPORARY EROSION CONTROL MEASURES:

1) THE SMALLEST PRACTICAL AREA OF LAND SHALL BE EXPOSED AT ANY ONE TIME.
2) HAY BALE BARRIERS AND SEDIMENT CONTROL FENCE SHALL BE INSTALLED AS REQUIRED. BARRIERS AND FENCE ARE TO BE MAINTAINED AND CLEANED UNTIL ALL SLOPES HAVE A HEALTHY STAND OF GRASS.
3) BALED HAY AND MULCH SHALL BE MOWINGS OF ACCEPTABLE HERBACEOUS GROWTH, FREE FROM NOXIOUS WEEDS OR WOODY STEMS, AND SHALL BE DRY. NO SALT HAY SHALL BE USED.
4) FILL MATERIAL SHALL BE FREE FROM STUMPS, WOOD, ROOTS, ETC.
5) STOCKPILED MATERIALS SHALL BE PLACED ONLY IN AREAS SHOWN ON THE PLANS. STOCKPILES SHALL BE PROTECTED BY HAY BALE BARRIERS AND SEEDED TO PREVENT EROSION. THESE MEASURES SHALL REMAIN UNTIL ALL MATERIAL HAS BEEN PLACED OR DISPOSED OFF SITE.
6) ALL DISTURBED AREAS SHALL BE LOAMED AND SEEDED. A MINIMUM OF 4 INCHES OF LOAM SHALL BE INSTALLED WITH NOT LESS THAN ONE POUND OF SEED PER 50 SQUARE YARDS OF AREA.
7) SEED MIX SHALL BE EQUAL PARTS OF RED FESCUE (CREEPING), KENTUCKY BLUE GRASS, REDTOP, PERENNIAL RYEGRASS.
8) AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, THE TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED.
9) PAVED ROADWAYS MUST BE KEPT CLEAN AT ALL TIMES.
10) ALL CATCH BASIN INLETS WILL BE PROTECTED WITH INLET PROTECTION.
11) ALL STORM DRAINAGE OUTLETS WILL BE STABILIZED AND CLEANED AS REQUIRED, BEFORE THE DISCHARGE POINTS BECOME OPERATIONAL.
12) ALL DEWATERING OPERATIONS MUST DISCHARGE DIRECTLY INTO A SEDIMENT FILTER AREA.
13) TO PREVENT TRACKING OF SEDIMENT ONTO THE EXISTING ROADS, ALL CONSTRUCTION TRAFFIC CAN ONLY EXIT THE SITE OVER THE CONSTRUCTION ENTRANCES SHOWN ON THIS PLAN.

GPI
Engineering
Design
Planning
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603.893.0720 GPINET.COM
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44 Stiles Road, Suite One
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STATE OF NEW HAMPSHIRE – CORY N. MASON No.17099 – LICENSED PROFESSIONAL ENGINEER
4/19/22

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JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

EROSION & SEDIMENT CONTROL PLAN

SCALE: 1"=30'

PROJECT NO. NEX-2021163

811 DigSafe MA-ME-NH-RI-VT

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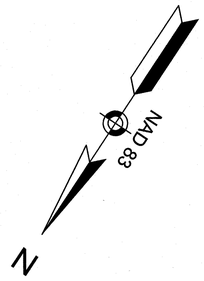
PLANTING SCHEDULE

PLANT	QNTY	BOTANICAL NAME	COMMON NAME	MIN. INSTALL SIZE	REMARKS
TREES					
GT	3	GLEDITSIA TRIACANTHOS 'SHADEMASTER'	SHADEMASTER HONEY LOCUST	2"–2 1/2" CAL., B&B	THORNLESS VARIETY
MG	1	MALUS 'SPRING SNOW'	SPRING SNOW CRABAPPLE	2"–2 1/2" CAL., B&B	
QR	4	QUERCUS ROBUR 'KINDRED SPIRIT'	KINDRED SPIRIT ENGLISH OAK	3"–3 1/2" CAL., B&B	
SHRUBS					
CS	5	CORNUS SERICEA 'ALLEMAN'S COMPACTA'	COMPACT REDTWIG DOGWOOD	18"–24"HT., 3 GAL.	
IG	19	ILEX GLABRA 'COMPACTA'	COMPACT INKBERRY	2'–3' HT., 3 GAL.	
PF	24	POTENTILLA FRUTICOSA 'GOLDSTAR'	GOLDSTAR POTENTILLA	18"–24"HT., 3 GAL.	
SJ	19	SPIREA JAPONICA 'MAGIC CARPET'	MAGIC CARPET SPIREA	15"–18" SPR., 3 GAL.	
TE	5	TAXUS X MEDIA 'EVER–LOW'	EVER–LOW YEW	18"–24" SPR., B&B	
PERENNIALS & GRASSES					
HD	40	HEMEROCALLIS 'STELLA DE ORO'	DWARF YELLOW DAYLILY	1 GAL.	
FE	22	FESTUCA GLAUCA 'ELIJAH BLUE'	ELIJAH BLUE FESCUE GRASS	1 GAL.	
PH	23	PENNISETUM ALOPECUROIDES 'HAMELN'	DWARF FOUNTAIN GRASS	1 GAL.	

(1) XX — PLANT QUANTITY / PLANT DESIGNATION

PROPOSED LANDSCAPE STONE WITH WEED BARRIER (SEE NOTES)



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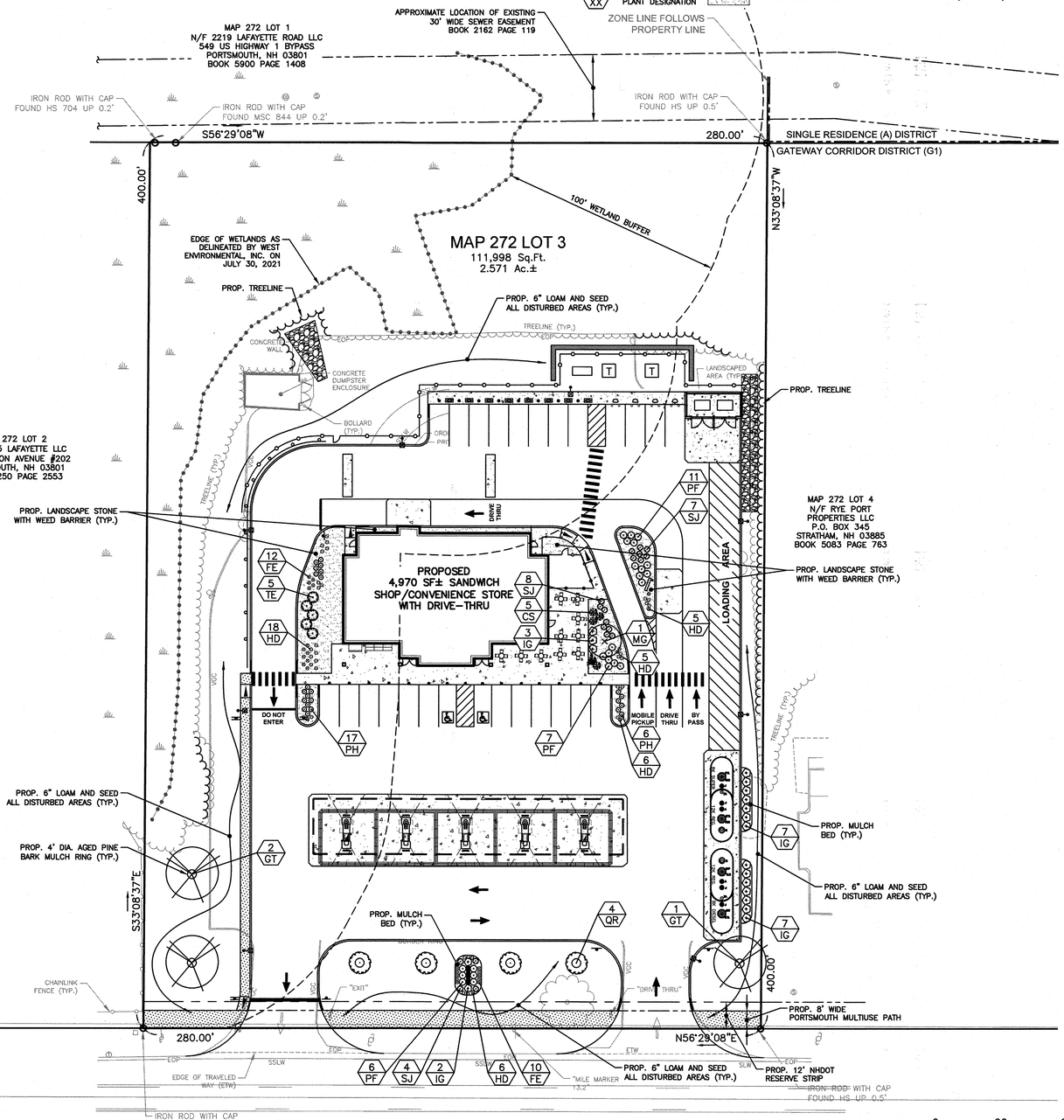

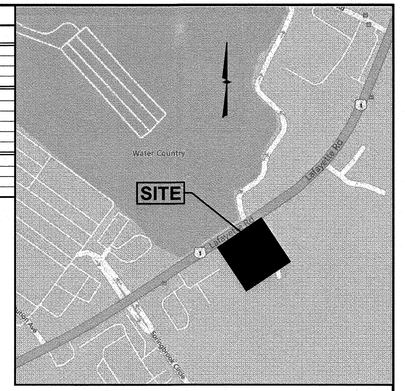

LOCATION MAP
(NOT TO SCALE)

NOTES:

1) ALL PLANT STOCK SHALL CONFORM TO ANSI Z260.1 – NURSERY STOCK, LATEST EDITION (AMERICAN ASSOCIATION OF NURSERYMEN, INC.).
2) A 4' DIA. TREE RING WITH 3" AGED PINE BARK MULCH TO BE INSTALLED AT BASE OF ALL TREES IN LAWN AREAS.
3) 3" AGED PINEBARK MULCH SHALL BE APPLIED TO ALL SHRUB AND GROUNDCOVER BEDS.
4) LANDSCAPE STONE SHALL BE TAN RIVERBED STONE. STONE SHALL BE (1½) INCHES IN DIAMETER AND APPLIED AT A THICKNESS OF (4) INCHES DEEP. ALL FINES SHALL BE SCREENED FROM THE AGGREGATE. THE MATERIAL SHALL BE FREE OF ORGANIC AND INORGANIC DEBRIS AND TRASH. SUBMIT SAMPLE IN A 5–GALLON BUCKET TO THE DEVELOPER FOR APPROVAL.
5) A WEED BARRIER (TY–PAR FABRIC OR APPROVED EQUAL) SHALL BE APPLIED TO ALL SHRUB AND GROUNDCOVER BEDS. INSTALL WEED BARRIER AS PER MANUFACTURERS RECOMMENDATIONS.
6) THE CONTRACTOR SHALL PROVIDE TESTING OF SOILS IN PLANTING LOCATIONS. THE CONTRACTOR SHALL PROVIDE TEST RESULTS AND RECOMMENDATIONS AS NECESSARY FOR SOIL AMENDMENT TO THE ENGINEER FOR THEIR APPROVAL. BACKFILL SHALL BE A BLEND OF ONE–PART LOAM BORROW, ONE PART ORGANIC MATERIAL AND TWO–PARTS EXISTING SUBSOIL.
7) ALL LANDSCAPED AREAS NOT PLANTED WITH TREES, SHRUBS OR GROUNDCOVER SHALL BE RESTORED WITH SEED AS INDICATED ON PLANS.
8) ALL SEED, SHRUB AND TREE AREAS SHALL RECEIVE 6" PH CORRECTED TOPSOIL. AFTER TOPSOIL IS SPREAD EVENLY OVER ENTIRE AREA, ALL CLODS, LUMPS, STONES AND OTHER DELETERIOUS MATERIAL SHALL BE RAKED UP AND REMOVED.
9) APPLICATION OF GRASS SEED, FERTILIZERS AND STRAW MULCH SHALL BE ACCOMPLISHED BY BROADCAST SEEDING OR HYDROSEEDING AT THE RATES OUTLINED BELOW:

LIMESTONE: 100 LBS./1,000 SQUARE FEET.
FERTILIZER: 500 LBS/ACRE OF 10–20–20 OR 1000 LBS/ACRE OF 5–10–10.
STRAW MULCH: APPROXIMATELY 3 TONS/ACRE

SEED MIX (SLOPES LESS THAN 4:1)	LBS/ACRE
CREEPING RED FESCUE	20
TALL FESCUE	15
PERENNIAL RYEGRASS	5
REDTOP	2
	42

SLOPE MIX (SLOPES GREATER THAN 4:1)	LBS/ACRE
CREEPING RED FESCUE	20
TALL FESCUE	20
BIRDSFOOT TREEFOIL	8
	48

10) FOR TEMPORARY EROSION CONTROL NOTES, SEE DETAIL SHEET.
11) NEWLY GRADED AREAS REQUIRING SLOPE PROTECTION OUTSIDE OF NORMAL SEEDING SEASON SHALL RECEIVE STRAW MULCH AT THE APPROXIMATE RATE OF NO MORE THAN 3 TONS PER ACRE.
12) ANY CHANGES IN PLANT LOCATIONS OR TYPES SHALL BE APPROVED BY THE DEVELOPER, LANDOWNER AND CITY PRIOR TO INSTALLATION.
13) CLEAR AND GRUB (TO LIMITS REQUIRED ON GRADING PLAN) TO REMOVE VEGETATION, TREES, ROCKS, DEBRIS, ROOTS, ETC. STUMPS SHALL BE REMOVED AND DISPOSED OF OFF SITE IN ACCORDANCE WITH STATE REGULATIONS. AFTER CLEARING, STRIP AND STOCKPILE ALL ON–SITE TOPSOIL FOR REUSE TO THE MAXIMUM EXTENT POSSIBLE.
14) FOR SEED AREAS USE EXISTING TOPSOIL, IF AVAILABLE, FOR A 4" DEPTH AND TOP DRESS WITH 2" OF SCREENED TOPSOIL, UNLESS OTHERWISE NOTED ON PLAN. ALL LOAM OR TOPSOIL IMPORTED OR RE–UTILIZED FROM ON SITE SHALL BE TESTED AND AMENDED AS DIRECTED BY DEVELOPER TO MEET MINIMUM REQUIREMENTS AND FREE FROM INVASIVE PLANTS.
15) PLANTINGS SHALL BE GUARANTEED BY THE CONTRACTOR FOR ONE YEAR AFTER WRITTEN ACCEPTANCE BY THE DEVELOPER.
16) EXPOSED SOILS SHALL BE SEEDED OR STRAW MULCHED WITHIN 72 HOURS OF FINAL GRADING.
17) ALL WORK SHALL BE COORDINATED WITH APPLICABLE EPA NPDES/SWPPP PERMIT WORK AS REQUIRED.
18) THE CONTRACTOR SHALL INSTALL AN IRRIGATION SYSTEM TO PROVIDE COMPLETE COVERAGE OF ALL SEED AREAS AND SHRUB BEDS SHOWN ON THIS PLAN. THE SYSTEM SHALL INCLUDE A TIMER AND SHALL BE INSTALLED IN ACCORDANCE WITH LOCAL CODES.

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GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
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STATE OF NEW HAMPSHIRE
CORY N. MASON No.17099
LICENSED PROFESSIONAL ENGINEER
4/19/22

REVISIONS		
2	MISC. REVISIONS	4/19/22
1	REV. PER CITY COMMENTS	3/22/22
NO.	REVISION	DATE

JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
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LANDSCAPE PLAN

SCALE: 1"=30'

PROJECT NO. NEX-2021163

8 OF 15

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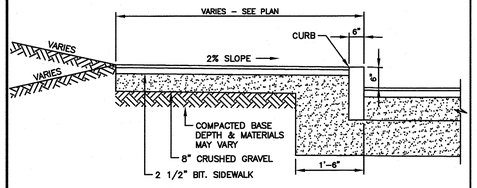
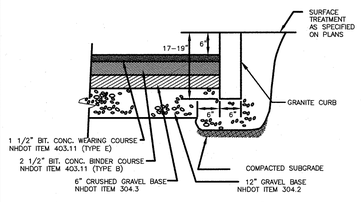
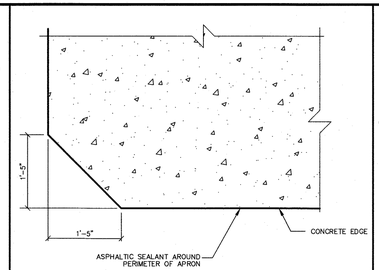


BITUMINOUS CONCRETE SIDEWALK
NOT TO SCALE



PAVEMENT AND VERTICAL GRANITE CURB SECTION ON-SITE
NOT TO SCALE



DISPENSER APRON CHAMFER DETAIL
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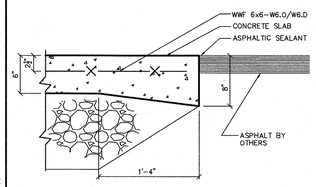

DISPENSER APRON EDGE DETAIL
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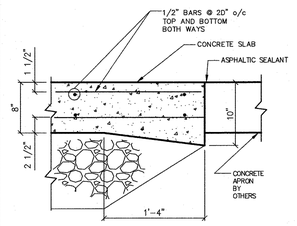
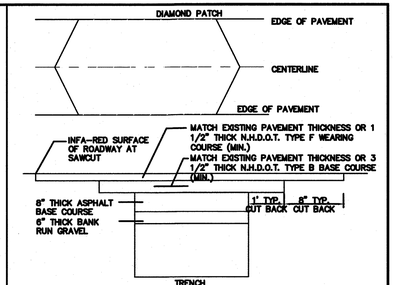


TANK APRON EDGE DETAIL
NOT TO SCALE



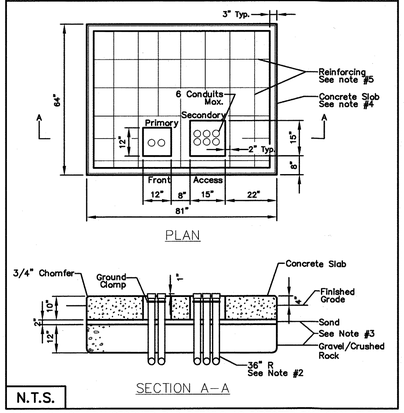
TYPICAL PAVEMENT REPAIR DETAIL
NOT TO SCALE

TRANSFORMER PAD NOTES

NOTES:

1) THIS STANDARD COVERS SPECIFICATIONS FOR THE CONSTRUCTION OF A CONCRETE FOUNDATION FOR PAD–MOUNTED TRANSFORMER.
2) INSTALL CONDUIT AS SHOWN BEFORE SLAB IS POURED. USE 36" RADIUS BENDS, WITH COUPLINGS, NIPPLES AND BUSHINGINGS AS REQUIRED. BENDS FOR PRIMARY CABLES SHALL BE GALVANIZED STEEL. TERMINATIONS OF CONDUITS SHALL BE LOCATED AS SHOWN IN SECTION A–A. THE NIPPLE AND BUSHING SHALL BE INSTALLED AFTER THE TRANSFORMER IS PLACED AND BEFORE THE CABLES ARE PULLED.
3) GRAVEL AND SAND SHALL BE PLACED AS SHOWN IN SECTION A–A; THE GRAVEL BEING COMPACTED AND THE SAND THOROUGHLY WETTED JUST BEFORE PLACING THE CONCRETE.
4) CONCRETE TO CONFORM TO GS 0211 OF LATEST DATE, (MIX M–4) FOR READY MIX CONCRETE. ALL EXPOSED EDGES TO HAVE A 3/4" CHAMFER.
5) REINFORCING TO BE #4 GRADE 60 BARS AND SHALL CONFORM TO ASTM STANDARD A–615 OF LATEST DATE. REINFORCING ROD TO BE LOCATED IN CENTER OF THE SLAB, WITH A MINIMUM OF 2" CLEARANCE FROM FACE OF CONCRETE.
6) GROUND GRID TO BE INSTALLED AS PER GS 2586.

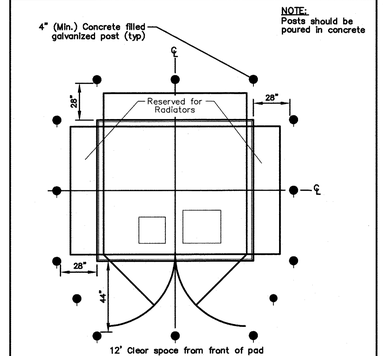
TRANSFORMER PAD DETAIL



N.T.S.

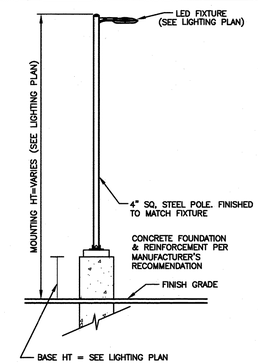
NOTE: REVISE TRANSFORMER PAD DETAILS AS DIRECTED BY LOCAL ELECTRIC COMPANY

TRANSFORMER PROTECTION DETAIL



N.T.S.

TRANSFORMER PAD DETAILS
NOT TO SCALE



LIGHT FIXTURE DETAIL
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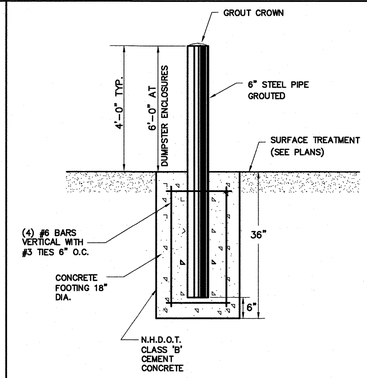

BOLLARD DETAIL
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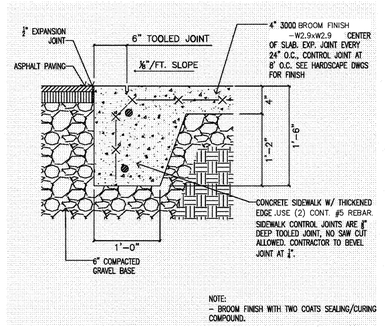
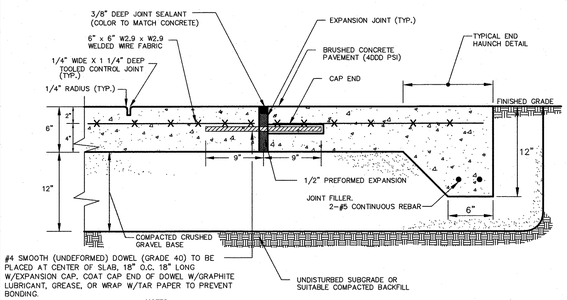
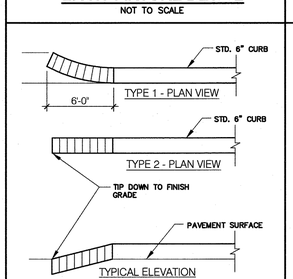


FLUSH CONCRETE SIDEWALK/PARKING DETAIL
NOT TO SCALE

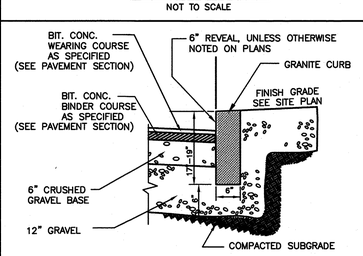


NOTES:
1. MAINTAIN 2" CLEARANCE (TYP) BETWEEN ALL CONCRETE EDGES AND WIRE FABRIC, DOWEL, OR REBAR.
2. CONTROL JOINTS TO BE LOCATED 5 FT. ON CENTER OR AS SHOWN ON ARCHITECTURAL PLANS.
3. EXPANSION JOINTS TO BE LOCATED 25 FT. ON CENTER.
4. WELDED WIRE FABRIC SHALL BE LAPSED A MINIMUM OF 2 WIRE SPACES.

6" HEAVY DUTY CONCRETE PAD DETAILS
NOT TO SCALE

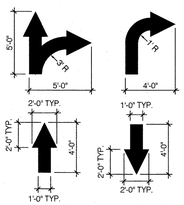


TYPICAL TIP DOWN CURB DETAIL
NOT TO SCALE



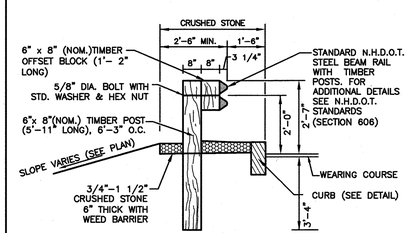
VERTICAL GRANITE CURB
NOT TO SCALE

NOTE: SAWCUT 1' OFF FACE OF CURB WHERE INSTALLED IN EXISTING PAVEMENT. PATCH PAVEMENT TO MATCH EXISTING THICKNESS.

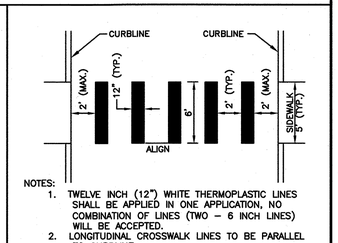


ALL PAVEMENT MARKINGS TO BE WHITE PAVEMENT PAINT, UNLESS STATED OTHERWISE.

ON-SITE PAVEMENT MARKING DETAILS
NOT TO SCALE

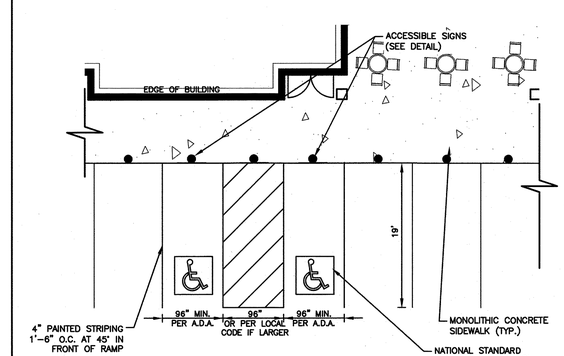


GUARD RAIL DETAIL
NOT TO SCALE



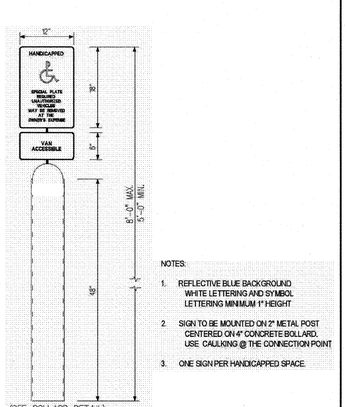
NOTES:
1. TWELVE INCH (12") WHITE THERMOPLASTIC LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO – 6 INCH LINES) WILL BE ACCEPTED.
2. LONGITUDINAL CROSSWALK LINES TO BE PARALLEL TO CURBLINE.
3. ALL LONGITUDINAL CROSSWALK LINES TO BE THE SAME LENGTH AND PROPERLY ALIGNED.

CROSSWALK
NOT TO SCALE



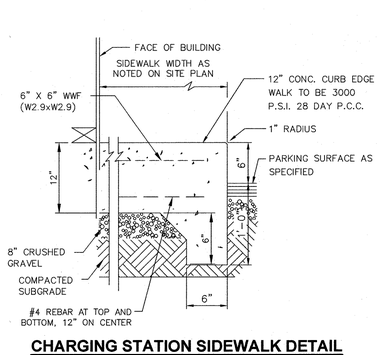
NOTE:
1) ACCESSIBLE RAMP SHALL HAVE A NON–SLIP CONCRETE SURFACE.

ACCESSIBLE PARKING STALLS
NOT TO SCALE



NOTES:
1. REFLECTIVE BLUE BACKGROUND. WHITE LETTERING AND SYMBOL. LETTERING MINIMUM 1" HEIGHT
2. SIGN TO BE MOUNTED ON 2" METAL POST CENTERED ON 4" CONCRETE BOLLARD. USE CAULKING @ THE CONNECTION POINT
3. ONE SIGN PER HANDICAPPED SPACE.

ACCESSIBLE SIGN DETAIL
NOT TO SCALE



CHARGING STATION SIDEWALK DETAIL
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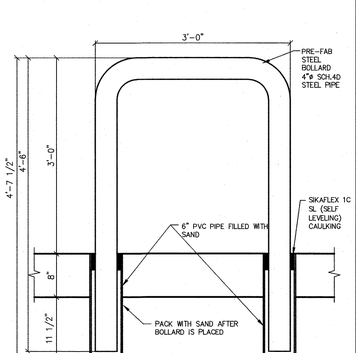

TYPICAL U–SHAPED BOLLARD
NOT TO SCALE

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman–Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

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STATE OF NEW HAMPSHIRE
CORY N. MASON No.17099
LICENSED PROFESSIONAL ENGINEER
4/19/22

REVISIONS		
1	REV. PER CITY COMMENTS	3/22/22
NO	REVISION	DATE

JANUARY 26, 2022

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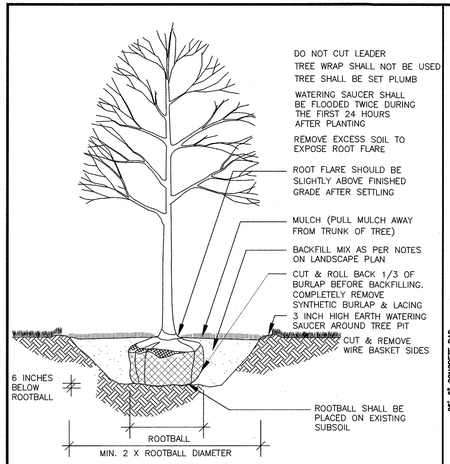
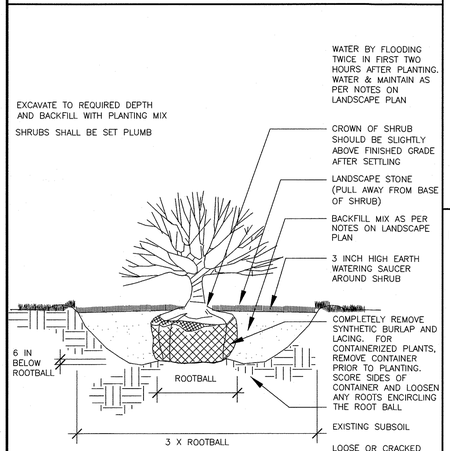
DETAIL SHEET

SCALE: NOT TO SCALE
PROJECT NO. NEX-2021163



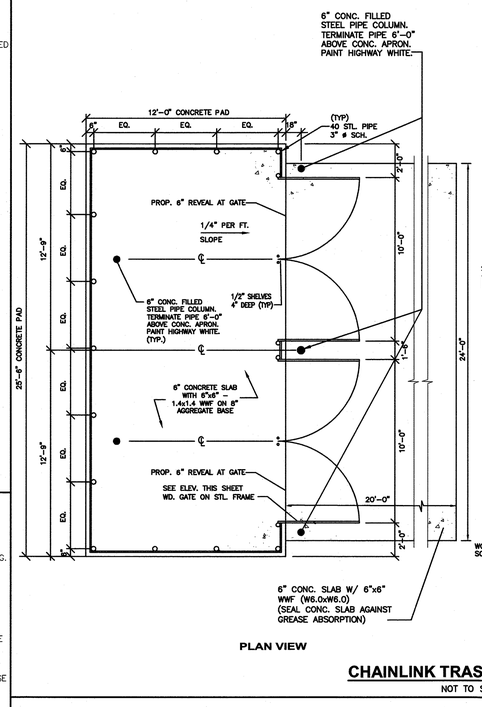
TYPICAL TREE PLANTING

NOT TO SCALE



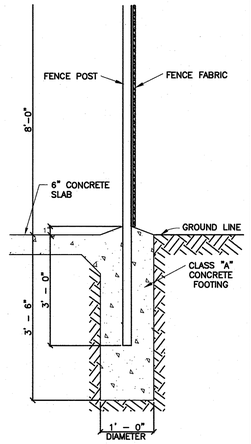
TYPICAL SHRUB PLANTING

NOT TO SCALE



CHAINLINK TRASH ENCLOSURE

NOT TO SCALE



TRASH ENCLOSURE FENCE DETAIL

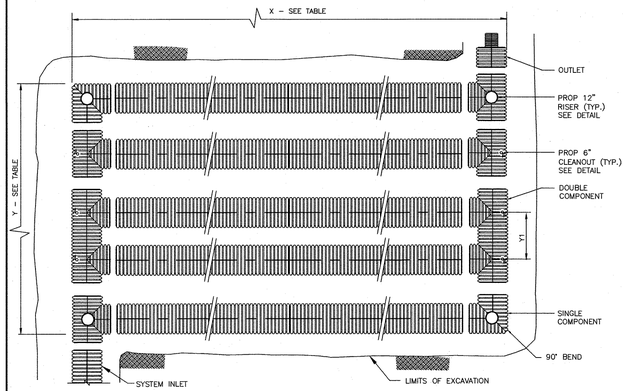
NOT TO SCALE

FENCE NOTES:

1) FENCE FABRIC SHALL BE STANDARD 2" CHAIN LINK GALVANIZED MESH WITH PRIVACY SLATS (FOREST GREEN).
2) ALL POSTS SHALL BE GALVANIZED SCHEDULE 40 STEEL PIPE.
3) ALL LINE POSTS TO BE 2.375" O.D. PIPE. MAXIMUM SPACING TO BE 10' ON CENTER.
4) ALL END AND CORNER POSTS TO BE 2.875" O.D. PIPE.
5) ALL TOP AND MIDDLE RAILS TO BE 1.66" O.D. PIPE.
6) ALL FITTINGS AND ACCESSORIES SHALL BE GALVANIZED.

DETENTION SYSTEM NOTES:

1) ALL SITE DRAINAGE PIPE SHALL BE CORRUGATED HIGH-DENSITY POLYETHYLENE PIPE, DUAL WALL, SMOOTH INTERIOR AS MANUFACTURED BY ADS, INC., OR APPROVED EQUAL, UNLESS OTHERWISE NOTED ON PLAN.
2) CONTRACTOR SHOULD CONFIRM SYSTEM PARTS AND OBTAIN SHOP DRAWINGS FROM MANUFACTURER. SUBSTITUTIONS AND SHOP DRAWINGS SHOULD BE APPROVED BY THE ENGINEER.
3) PARTS SPECIFICATIONS SHOWN ARE AS PROVIDED BY ADS, INC., OR APPROVED EQUAL. ANY CHANGES TO THESE SPECIFICATIONS SHOULD BE APPROVED BY DESIGN ENGINEER FOR PERFORMANCE.



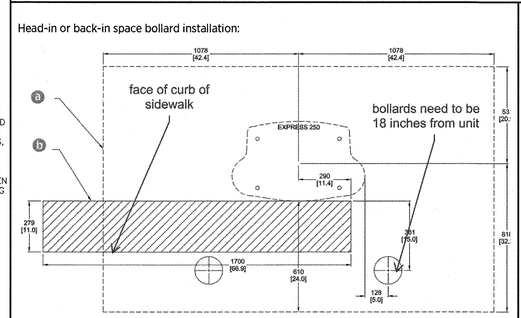
NOTE: FOR ADDITIONAL DETAILS, SEE ADS STD-702 & STD-703.

UNDERGROUND STORMWATER DETENTION SYSTEM TABLE					
UG DETENTION SYSTEM	LENGTH (X)	WIDTH (Y)	SPACING (Y1) (O.C. TYP.) *	PIPE SIZE (INCHES) SOLID	INV. PIPE ELEV. (A)	# PIPE ROWS
UG-DET	67'	19.25'	63"	36"SOLID(WT)	57.00	4

* SEE TYPICAL CROSS SECTIONS BELOW
WT = WATERTIGHT JOINTS

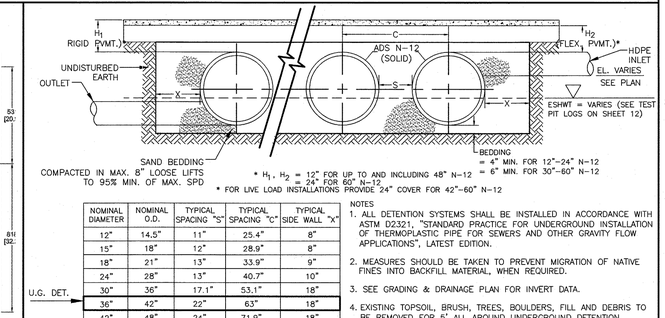
TYPICAL UNDERGROUND DETENTION SYSTEM LAYOUT

NOT TO SCALE



EV CHARGING STATION DETAIL

NOT TO SCALE



NOMINAL DIAMETER	NOMINAL O.D.	TYPICAL SPACING "S"	TYPICAL SPACING "C"	TYPICAL SIDE WALL "X"
12"	14.5"	11"	25.4"	8"
15"	18"	12"	28.9"	8"
18"	21"	13"	33.9"	9"
24"	28"	13"	40.7"	10"
30"	36"	17.1"	53.1"	18"
36"	42"	22"	63"	18"
42"	48"	24"	71.9"	18"

NOTES
1. ALL DETENTION SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST EDITION.
2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.
3. SEE GRADING & DRAINAGE PLAN FOR INVERT DATA.
4. EXISTING TOPSOIL, BRUSH, TREES, BOULDERS, FILL AND DEBRIS TO BE REMOVED FOR 5' ALL AROUND UNDERGROUND DETENTION SYSTEM DOWN TO NATIVE MATERIAL. BACKFILL WITH STONE BEDDING MATERIAL (CLASS 1A OR 1B).

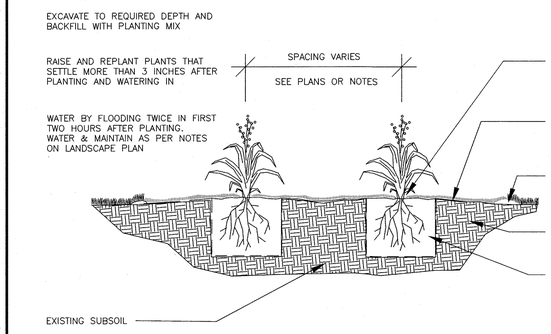
TYPICAL UNDERGROUND DETENTION SYSTEM CROSS SECTION

NOT TO SCALE

Table 5-2
Classes of Embedment and Backfill Materials

Class	Description	Notation	ASTM D2487 Description	AASHTO M43 Notation	Min. Compaction Required (Std Proctor Density) [4] %	ASTM D2321 [1] Percentage Passing Sieve Sizes 1 ½ in. (40mm)	No. 4 (4.75mm)	No. 200 (0.075mm)	Atterberg Limits LL	PI	Coefficients Uniformity, Cu	Curvature, Cc
IA [2]	Open-graded, clean manufactured aggregates	N/A	Angular crushed stone or rock, crushed gravel, crushed slag; large voids with little or no fines	5 or 56	Dumped to Slight	100%	≤10%	<5%	Non Plastic		N/A	
IB	Dense-graded clean manufactured processed aggregates	N/A	Angular crushed stone or other Class IA material and stone/sand mixtures with gradations selected to minimize migration of adjacent soils; little or no fines			100%	≤50%	<5%	Non Plastic			
II	Clean, coarse-grained soils	GW	Well-graded gravel, gravel-sand mixtures; little or no fines	57 & 67	Moderate (85%)	100%	<50% of "Coarse Fraction"	<5%	Non Plastic		>4	1 to 3
		GP	Poorly-graded gravels, gravel-sand mixtures; little or no fines								<4	<1 or >3
		SW	Well-graded sands, gravelly sands; little or no fines				>50% of "Coarse Fraction"				>6	1 to 3
		SP	Poorly-graded sands, gravelly sands; little or no fines								<6	<1 or >3
	Coarse-Grained Soils, borderline clean to w/fines	GW-GC, SP-SM	Sands and gravels which are borderline between clean and with fines	N/A		100%	Varies	5% to 12%	Non Plastic		Same as for GW, GP, SW and SP	
III	Coarse-grained soils with fines	GM	Silty gravels, gravel-sand-silt mixtures	Gravel & sand w/fines >10% fines	Moderate to High (90%)	100%	<50% of "Coarse Fraction"	12% to 50%	N/A	<4 or <"A" Line	N/A	
		GC	Clayey gravels, gravel-sand-clay mixtures							>7 & >"A" Line		
		SM	Silty sands, sand-silt mixtures				>50% of "Coarse Fraction"			<4 or <"A" Line		
		SC	Clayey sands, sand-clay mixtures							>7 & >"A" Line		
IVA [3]	Inorganic fine-grained soils	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, silts with slight plasticity	N/A	N/R	100%	100%	>50%	<50	<4 or <"A" Line	N/A	
		CL	Inorganic clays of low to medium plasticity; gravelly, sandy, or silty clays; lean clays	N/A						>7 & >"A" Line		
IVB	Inorganic fine-grained soils	MH	Inorganic silts, micaceous or diatmaceous fine sandy or silty soils, elastic silts	N/A	N/R	100%	100%	>50%	>50	<"A" Line	N/A	
		CH	Inorganic clays of high plasticity, fat clays	N/A						>"A" Line		
V	Organic soils or Highly organic soils	OL	Organic silts and organic silty clays of low plasticity	N/A	N/R	100%	100%	>50%	<50	<4 or <"A" Line	N/A	
		OH	Organic clays of medium to high plasticity, organic silts	N/A					>50	>"A" Line		
		PT	Peat and other high organic soils	N/A								

Notes:
1) Refer to ASTM D2321 for more complete soil descriptions.
2) Class IVA material has limited applications and can be difficult to place and compact; use ONLY with the approval of a soil expert. Contact ADS for additional information regarding suitability of this backfill material.
3) N/R indicates that use of this material and/or compaction level is not recommended by ASTM D2321 for the backfill envelope.
4) When using open-graded material, additional precaution must be taken to reduce or eliminate the risk of migration of fines from adjacent material. Refer to ASTM D2321 for more complete information.

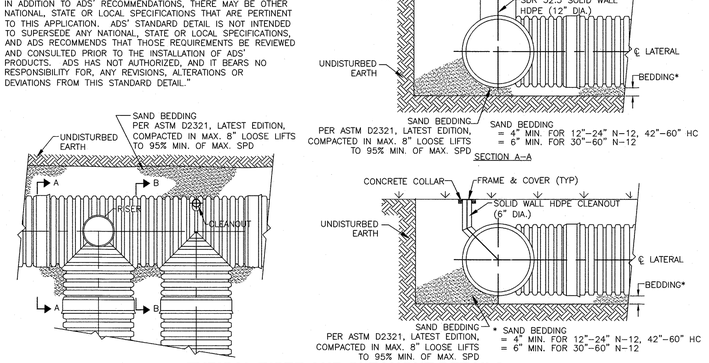


TYPICAL PERENNIAL PLANTING

NOT TO SCALE

ADS STANDARD DETAILS DISCLAIMER

ADVANCED DRAINAGE SYSTEMS, INC. ("ADS") HAS PREPARED THIS STANDARD DETAIL TO DEMONSTRATE ADS' RECOMMENDED INSTALLATION OF ITS PRODUCTS FOR THE DEPICTED APPLICATION. IN ADDITION TO ADS' RECOMMENDATIONS, THERE MAY BE OTHER NATIONAL, STATE OR LOCAL SPECIFICATIONS THAT ARE PERTINENT TO THIS APPLICATION. ADS' STANDARD DETAIL IS NOT INTENDED TO SUPERSEDE ANY NATIONAL, STATE OR LOCAL SPECIFICATIONS, AND ADS RECOMMENDS THAT THOSE REQUIREMENTS BE REVIEWED AND CONSULTED PRIOR TO THE INSTALLATION OF ADS' PRODUCTS. ADS HAS NOT AUTHORIZED, AND IT BEARS NO RESPONSIBILITY FOR, ANY REVISIONS, ALTERATIONS OR DEVIATIONS FROM THIS STANDARD DETAIL."



TYPICAL RISER AND CLEANOUT DETAILS

NOT TO SCALE

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

STATE OF NEW HAMPSHIRE
CORY N. MASON No.17099 LICENSED PROFESSIONAL ENGINEER
4/19/22

REVISIONS		
NO.	REVISION	DATE

JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

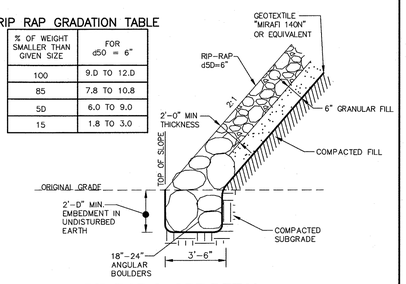
DETAIL SHEET

SCALE: NOT TO SCALE

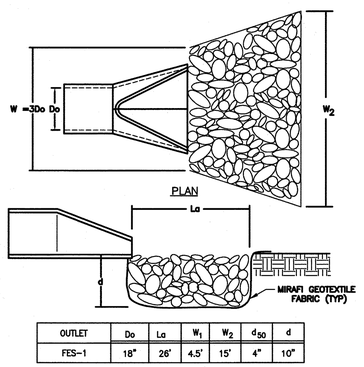
PROJECT NO. NEX-2021163

RIP RAP GRADATION TABLE

% OF WEIGHT SMALLER THAN GIVEN SIZE	FOR d50 = 6"
100	9.0 TO 12.0
85	7.8 TO 10.8
50	6.0 TO 9.0
15	1.8 TO 3.0



RIP RAP SLOPE DETAIL
NOT TO SCALE



OUTLET	Do	La	W_1	W_2	d_{50}	d
FES-1	18"	26'	4.5'	15'	4"	10"

*PLACE OUTLET APRON STONE ON ENTIRE SEDIMENT FOREBAY BOTTOM. SEE GRADING & DRAINAGE PLAN.

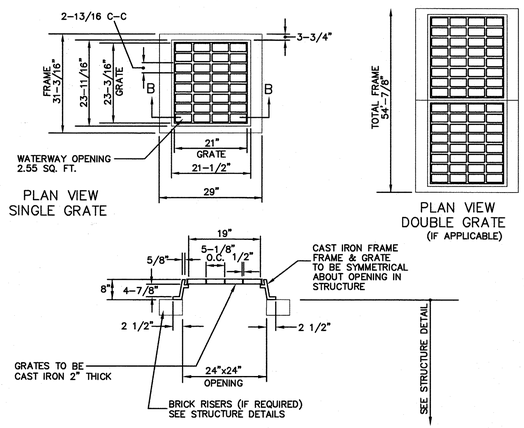
ROCK RIP-RAP GRADATION

% OF WEIGHT SMALLER THAN THE GIVEN SIZE	SIZE OF STONE IN INCHES
100	4.5 TO 6.0
85	3.9 TO 5.4
50	3.0 TO 4.5
15	0.9 TO 1.5

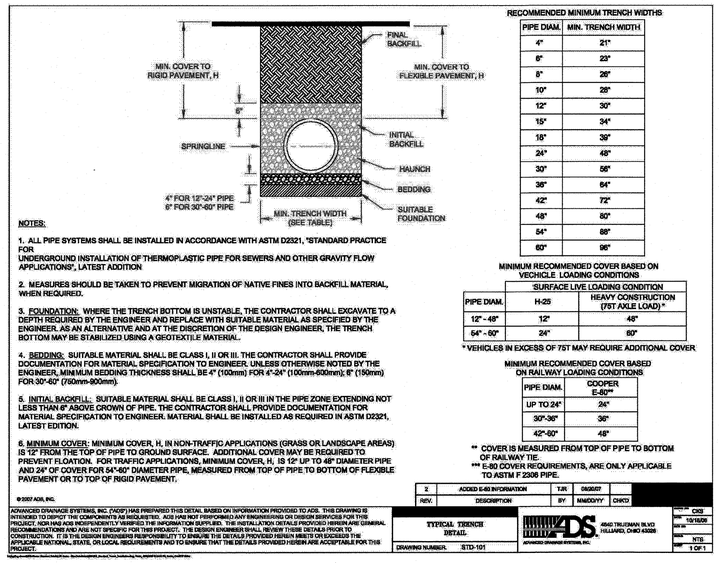
FORMULAS USED (REFERENCE NHDES STORMWATER MANUAL, VOL. 2, PAGE 174)

CONSTRUCTION NOTES:
1. THE SUBGRADE FOR THE FILTER MATERIAL, GEOTEXTILE FABRIC, AND RIP-RAP SHALL BE PREPARED TO THE LINES AND GRADES SHOWN ON THE PLANS.
2. THE ROCK OR GRAVEL USED FOR FILTER OR RIP-RAP SHALL CONFORM TO THE SPECIFIED GRADATION.
3. GEOTEXTILE FABRICS SHALL BE PROTECTED FROM PUNCTURE OR TEARING DURING THE PLACEMENT OF THE ROCK RIP-RAP. DAMAGED AREAS IN THE FABRIC SHALL BE REPAIRED BY PLACING A PIECE OF FABIC OVER THE DAMAGED AREA OR BY COMPLETE REPLACEMENT OF THE FABRIC. ALL OVERLAPS REQUIRED FOR REPAIRS OR JOINING TWO PIECES OF FABRIC SHALL BE A MINIMUM OF 12 INCHES.
4. STONE FOR THE RIP-RAP MAY BE PLACED BY EQUIPMENT AND SHALL BE CONSTRUCTED TO THE FULL LAYER THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO PREVENT SEGREGATION OF THE STONE SIZES.
5. THE MEDIAN STONE DIAMEMETER FOR THE RIP-RAP APRON IS d50. FIFTY PERCENT BY WEIGHT OF THE RIP-RAP MIXTURE SHALL BE SMALLER THAN THE MEDIAN STONE SIZE. THE LARGEST STONE SIZE IN THE MIXTURE SHALL BE 1.5 d50.

OUTLET PROTECTION-FLAT DETAIL
NOT TO SCALE



FRAME AND GRATE - TYPE B
NOT TO SCALE



RECOMMENDED MINIMUM TRENCH WIDTHS

PIPE DIAM.	MIN. TRENCH WIDTH
4"	21"
6"	23"
8"	26"
10"	28"
12"	30"
15"	34"
18"	39"
24"	48"
30"	56"
36"	64"
42"	72"
48"	80"
54"	88"
60"	96"

MINIMUM RECOMMENDED COVER BASED ON VECHICLE LOADING CONDITIONS

PIPE DIAM.	SURFACE LIVE LOADING CONDITION H-25	HEAVY CONSTRUCTION (75T AXLE LOAD)*
12" - 48"	12"	48"
54" - 60"	24"	60"

* VEHICLES IN EXCESS OF 75T MAY REQUIRE ADDITIONAL COVER

MINIMUM RECOMMENDED COVER BASED ON RAILWAY LOADING CONDITIONS

PIPE DIAM.	COOPER E-80**
UP TO 24"	24"
30"-36"	36"
42"-60"	48"

** COVER IS MEASURED FROM TOP OF PIPE TO BOTTOM OF RAILWAY TIE.
*** E-80 COVER REQUIREMENTS, ARE ONLY APPLICABLE TO ASTM F 2306 PIPE.

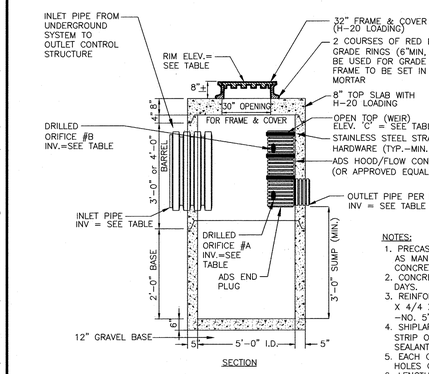
NOTES:
1. ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST ADDITION
2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.
3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
4. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER, UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm); 6" (150mm) FOR 30"-60" (750mm-900mm).
5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.
6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS 12" UP TO 48" DIAMETER PIPE AND 24" OF COVER FOR 54"-60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

ADVANCED DRAINAGE SYSTEMS, INC. ("ADS") HAS PREPARED THIS DETAIL BASED ON INFORMATION PROVIDED TO ADS. THIS DRAWING IS INTENDED TO DEPICT THE COMPONENTS AS INDICATED. ADS HAS NOT PERFORMED ANY ENGINEERING OR DESIGN SERVICES FOR THIS PROJECT, NOR HAS ADS INDEPENDENTLY VERIFIED THE INFORMATION SUPPLIED. THE INSTALLATION DETAILS PROVIDED HEREIN ARE GENERAL RECOMMENDATIONS AND ARE NOT SPECIFIC FOR THIS PROJECT. THE DESIGN ENGINEER SHALL REVIEW THESE DETAILS PRIOR TO CONSTRUCTION. IT IS THE DESIGN ENGINEERS RESPONSIBILITY TO ENSURE THE DETAILS PROVIDED HEREIN MEETS OR EXCEEDS THE APPLICABLE NATIONAL, STATE, OR LOCAL REQUIREMENTS AND TO ENSURE THAT THE DETAILS PROVIDED HEREIN ARE ACCEPTABLE FOR THIS PROJECT.

REV.	DESCRIPTION	BY	DATE	CHK'D
2	ADDED E-80 INFORMATION	YJK	09/05/07	

TYPICAL TRENCH DETAIL — DRAWING NUMBER: STD-101 — ADS, 4640 TRUEMAN BLVD HILLIARD, OHIO 43026 — CAD: CM3 — DATE: 10/18/05 — SCALE: NTS — SHEET: 1 OF 1

HDPE PIPE TRENCH
NOT TO SCALE

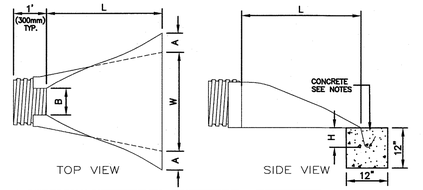


SECTION

NOTES:
1. PRECAST CONCRETE MAN HOLE AS MANUFCTURED BY SUPERIOR CONCRETE OR APPROVED EQUAL.
2. CONCRETE: 4,000 PSI AFTER 28 DAYS.
3. REINFORCING: H-20 LOADING, 4 X 4/4 X 4 W.W.M. SLAB TOP -NO. 5'S @ 8" O.C.
4. SHIPLAP JOINTS SEALED WITH 1 STRIP OF 1" DIA BUTYL RUBBER SEALANT.
5. EACH CASTING TO HAVE LIFTING HOLES CAST IN.
6. LENGTH AND DIAMETER OF TEE VARIES WITH PIPE.

OUTLET CONTROL STRUCTURE TABLE								
OCS	RIM	ORIFICE	SIZE (IN.)	ELEV.	INV.IN (SIZE)	INV.IN (ELEV)	INV.OUT (SIZE)	INV.OUT (ELEV)
#1	63.70	A	5" DIA. x3	57.00	24"	57.00	18"	57.00
		B	5" DIA. x2	57.50				
		C	18" DIA.	59.00				

PRECAST CONCRETE OUTLET CONTROL STRUCTURE (OCS) FOR UNDERGROUND SYSTEMS
NOT TO SCALE



	DIMENSIONS, INCHES (mm)						
PIPE DIAMETER	PART NO.	A, ±1 (25)	B MAX	H, ±1 (25)	L, ±1/2 (13)	W, ±2 (50)
12", 15" (300,375)	1210 NP	6.5 (165)	10 (254)	6.5 (165)	25 (635)	29 (736)
18" (450)	1810 NP	7.5 (190)	15 (380)	6.5 (168)	32 (812)	35 (690)
24" (600)	2410 NP	7.5 (190)	18 (450)	6.5 (165)	36 (900)	45 (1140)
30" (750)	3010 NP	10.5 (266)	NA	7.0 (176)	53 (1346)	68 (1725)
36" (900)	3610 NP	10.5 (266)	NA	7.0 (176)	53 (1346)	68 (1725)

CONSTRUCTION SPECIFICATIONS:

PREPARE BEDDING:
BACKFILL MATERIAL AROUND THE END SECTION MAY BE THE SAME AS THE MATERIAL AROUND THE PIPE, PLACE A FEW INCHES OF BACKFILL MATERIAL IN THE TRENCH OR DITCH WHERE THE END SECTION WILL BE PLACED. COMPACT AND CONTOUR THIS BEDDING MATERIAL TO GENERALLY MATCH THE END SECTION, EXCAVATE AN AREA IN THE BEDDING WHERE TOE TROUGH WILL SEAT SO THAT THE END SECTION WILL BE LEVEL WITH THE BOTTOM OF THE TRENCH OR DITCH IN THE FINISHED INSTALLATION.

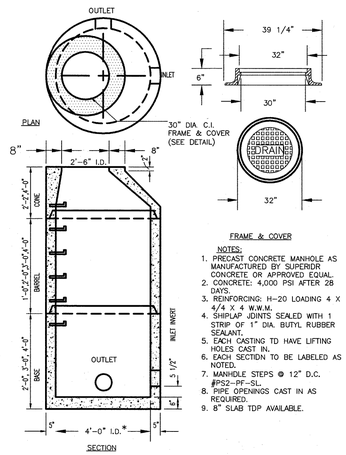
PLACE END SECTION OF PIPE:
OPEN THE END SECTION COLLAR AND SEAT IT OVER THE TWO PIPE CONNECTIONS. ONCE THE END SECTION IS POSITIONED, CHECK TO MAKE SURE THAT THE INVERT DF THE END SECTION MATCHES THE INVERT OF THE PIPE AND THAT THE END SECTION IS LEVEL WITH THE TRENCH OR DITCH BOTTOM.

SECURE THE END SECTION:
SLIP THE STAINLESS STEEL ROD THROUGH THE PRE-DRILLED HOLES AT THE TOP OF THE COLLAR. THE ROD SHOULD BE BETWEEN THE CROWNS OF THE TWO PIPE CONNECTIONS. PLACE A WASHER ON EITHER END OF THE ROD. PLACE A NUT ON EITHER END OF THE ROD AND TIGHTEN WITH A WRENCH.

SECURE THE TOE TROUGH:
TO PREVENT WASHOUTS FROM HIGH VELOCITY FLOW, IT IS RECOMMENDED THAT THE TROUGH BE SECURED WITH CONCRETE. POUR CONCRETE IN THE TROUGH UP TO THE LEVEL OF THE TRENCH OR DITCH BOTTOM AND ALONG THE ENTIRE LENGTH OF THE TROUGH.

FINISH BACKFILL:
SHOVEL BACKFILL AROUND THE END SECTION IN 6 TO 9 INCH LAYERS EQUALLY DN BDTH SIDES, KNIFING IT TO ELIMINATE VOIDS. TAMP WITH A SMALL-FACED COMPACTOR OR OTHER EQUIPMENT SUITABLE FOR SMALL AREAS. CONTINUE PLACING, KNIFING, AND COMPACTING BACKFILL LAYERS TO THE TDP OF THE END SECTION TO SEAT IT WELL INTO THE BACKFILL.

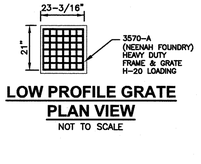
FLARED END SECTION HIGH DENSITY POLYETHYLENE (HDPE)
NOT TO SCALE



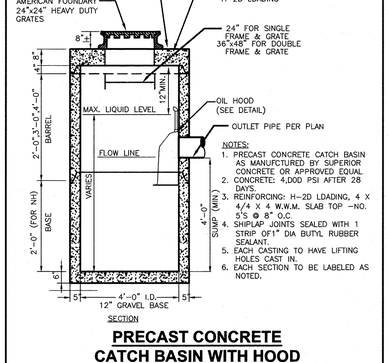
FRAME & COVER

NOTES:
1. PRECAST CONCRETE MANHOLE AS MANUFACTURED BY SUPERIOR CONCRETE OR APPROVED EQUAL.
2. CONCRETE: 4,000 PSI AFTER 28 DAYS.
3. REINFORCING: H-20 LOADING 4 X 4/4 X 4 W.W.M.
4. SHIPLAP JOINTS SEALED WITH 1 STRIP OF 1" DIA. BUTYL RUBBER SEALANT.
5. EACH CASTING TO HAVE LIFTING HOLES CAST IN.
6. EACH SECTION TO BE LABELED AS NOTED.
7. MANHOLE STEPS @ 12" D.C. #PS2-PF-SL.
8. PIPE OPENINGS CAST IN AS REQUIRED.
9. 8" SLAB TDP AVAILABLE.

PRECAST CONCRETE DRAIN MANHOLE
MAXIMUM PIPE DIAMETER 30"
NDT TO SCALE

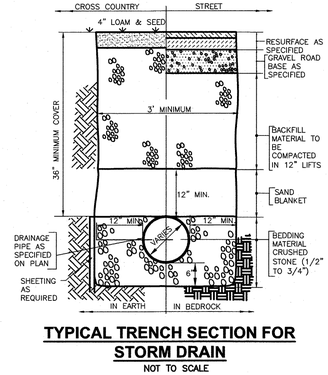


LOW PROFILE GRATE PLAN VIEW
NOT TO SCALE

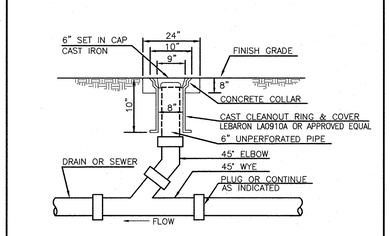


NOTES:
1. PRECAST CONCRETE CATCH BASIN AS MANUFCTURED BY SUPERIOR CONCRETE OR APPROVED EQUAL.
2. CONCRETE: 4,000 PSI AFTER 28 DAYS.
3. REINFORCING: H-20 LOADING, 4 X 4/4 X 4 W.W.M. SLAB TOP -NO. 5'S @ 8" O.C.
4. SHIPLAP JOINTS SEALED WITH 1 STRIP OF1" DIA BUTYL RUBBER SEALANT.
5. EACH CASTING TO HAVE LIFTING HOLES CAST IN.
6. EACH SECTION TO BE LABELED AS NOTED.

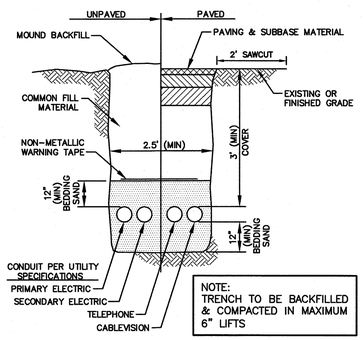
PRECAST CONCRETE CATCH BASIN WITH HOOD
NOT TO SCALE



TYPICAL TRENCH SECTION FOR STORM DRAIN
NOT TO SCALE



TYPICAL CLEANOUT
NOT TO SCALE



NOTE:
TRENCH TO BE BACKFILLED & COMPACTED IN MAXIMUM 6" LIFTS

UTILITY TRENCH
NOT TO SCALE

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
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25 SPRINGER ROAD
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PROPOSED RETAIL MOTOR FUEL OUTLET
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STATE OF NEW HAMPSHIRE — CORY N. MASON No.17099 LICENSED PROFESSIONAL ENGINEER — 4/19/22

REVISIONS		
1	REV. PER CITY COMMENTS	3/22/22
NO.	REVISION	DATE

JANUARY 26, 2022

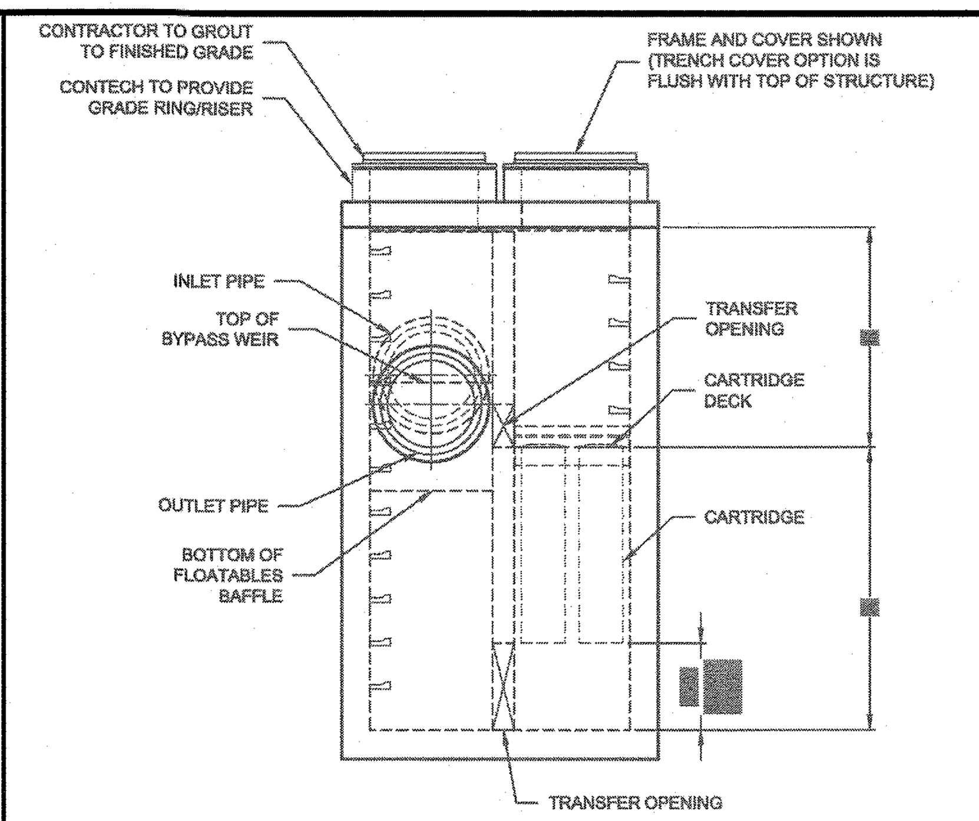
DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

DETAIL SHEET

SCALE: NOT TO SCALE

PROJECT NO. NEX-2021163

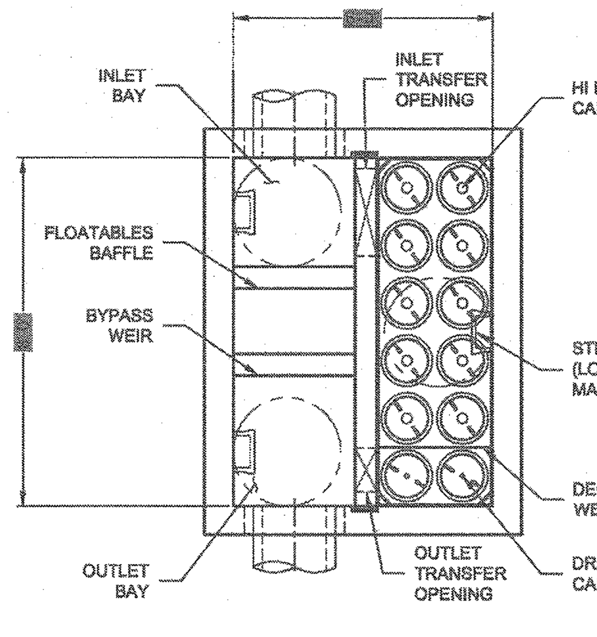
11 OF 15



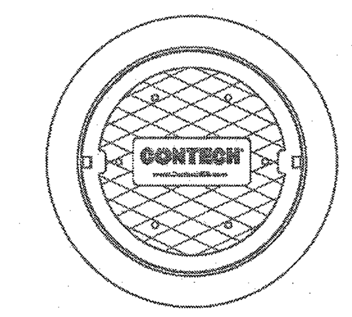
ELEVATION VIEW

GENERAL NOTES:
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS REPRESENTATIVE. www.ContechES.com
3. JELLYFISH WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO HS-20 OR PER APPROVING JURISDICTION REQUIREMENTS, WHICHEVER IS MORE STRINGENT, ASSUMING EARTH COVER OF 0' - 10', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE CONTECH LOGO.
5. STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-857, ASTM C-918, AND AASHTO LOAD FACTOR DESIGN METHOD.
6. OUTLET PIPE INVERT IS EQUAL TO THE CARTRIDGE DECK ELEVATION.
7. THE OUTLET PIPE DIAMETER FOR NEW INSTALLATIONS IS RECOMMENDED TO BE ONE PIPE SIZE LARGER THAN THE INLET PIPE AT EQUAL OR GREATER SLOPE.
8. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE.
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT).
D. CARTRIDGE INSTALLATION, BY CONTECH, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE JELLYFISH UNIT IS CLEAN AND FREE OF DEBRIS. CONTACT CONTECH TO COORDINATE CARTRIDGE INSTALLATION WITH SITE STABILIZATION.



PLAN VIEW
(TOP SLAB NOT SHOWN FOR CLARITY)



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

JELLYFISH DESIGN NOTES	
JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE LENGTH AND THE NUMBER OF CARTRIDGES. THE STANDARD PEAK DIVERSION STYLE WITH PRECAST TOP SLAB IS SHOWN. ALTERNATE OFFLINE VAULT AND/OR SHALLOW ORIENTATIONS ARE AVAILABLE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD	
CARTRIDGE SELECTION	
CARTRIDGE LENGTH	40"
OUTLET INVERT TO STRUCTURE INVERT (A)	5'-4"
FLOW RATE HI-FLO / DRAINDOWN (CFS) (PER CART)	0.133 / 0.067
MAX. TREATMENT (CFS)	1.47
DECK TO INSIDE TOP (MIN) (B)	4.00

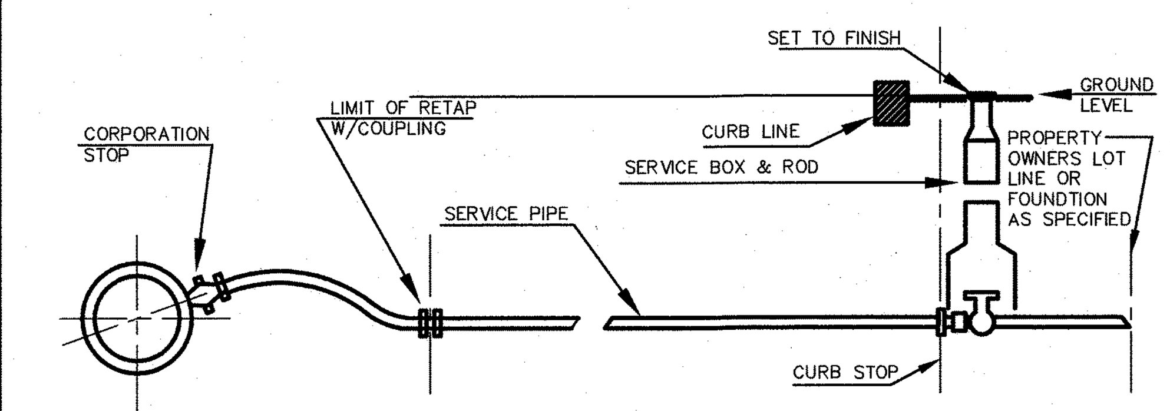
SITE SPECIFIC DATA REQUIREMENTS	
STRUCTURE ID	JF-1
WATER QUALITY FLOW RATE (cfs)	0.80
PEAK FLOW RATE (cfs)	5.20
RETURN PERIOD OF PEAK FLOW (yrs)	50
# OF CARTRIDGES REQUIRED (HF / DD)	4/1
CARTRIDGE LENGTH	54"

Jellyfish® Filter

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

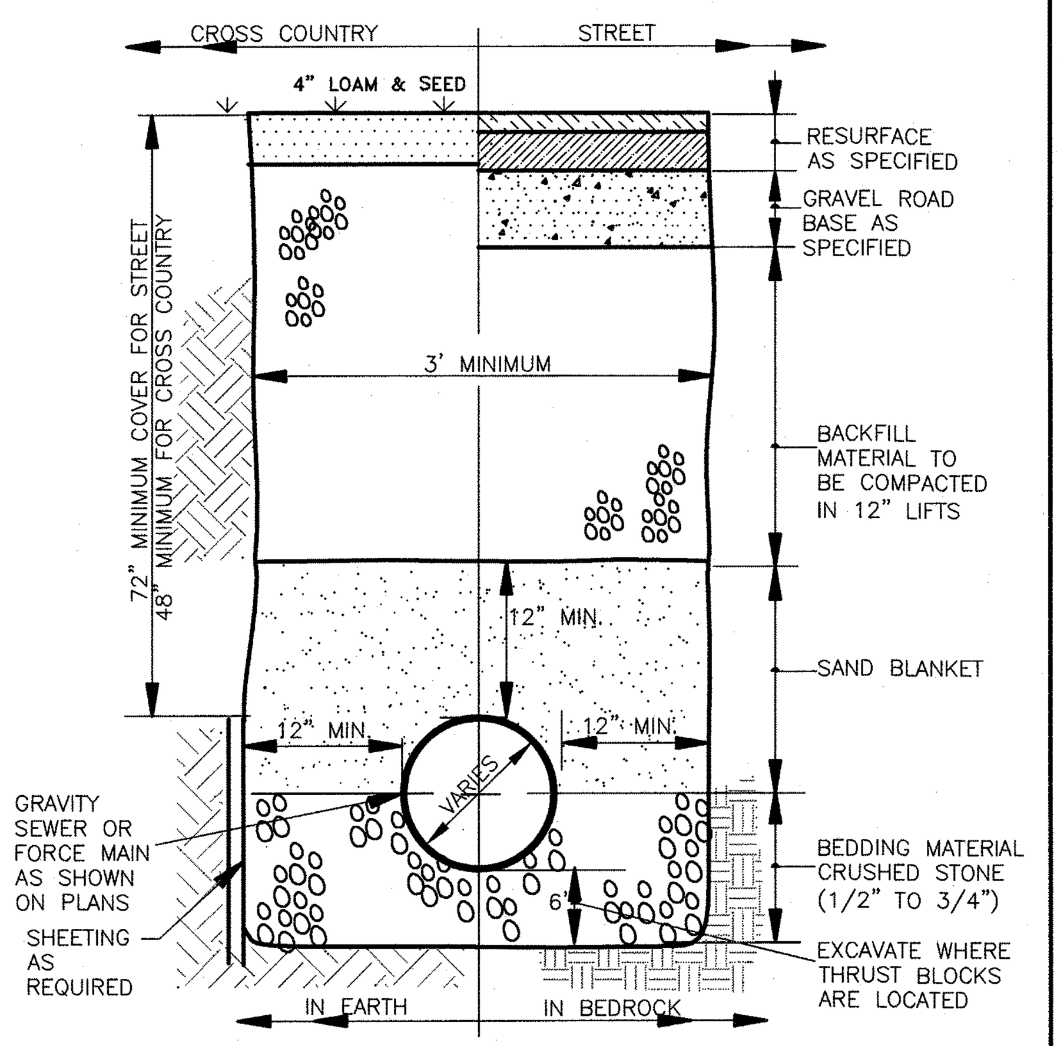
JELLYFISH JFPD0806
STANDARD DETAIL
PEAK DIVERSION CONFIGURATION

JELLYFISH FILTER DETAIL



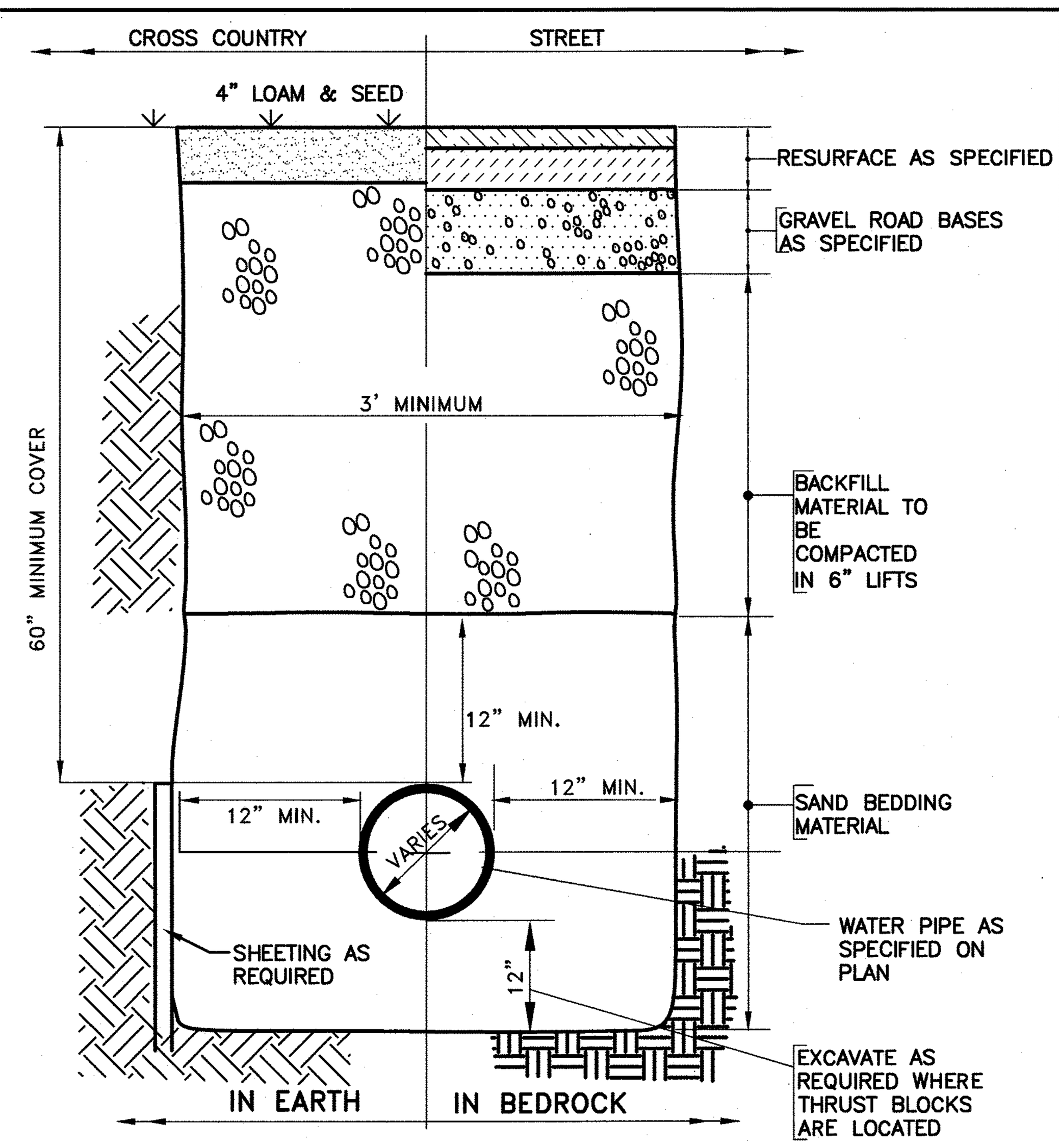
TYPICAL WATER SERVICE CONNECTION

NOT TO SCALE



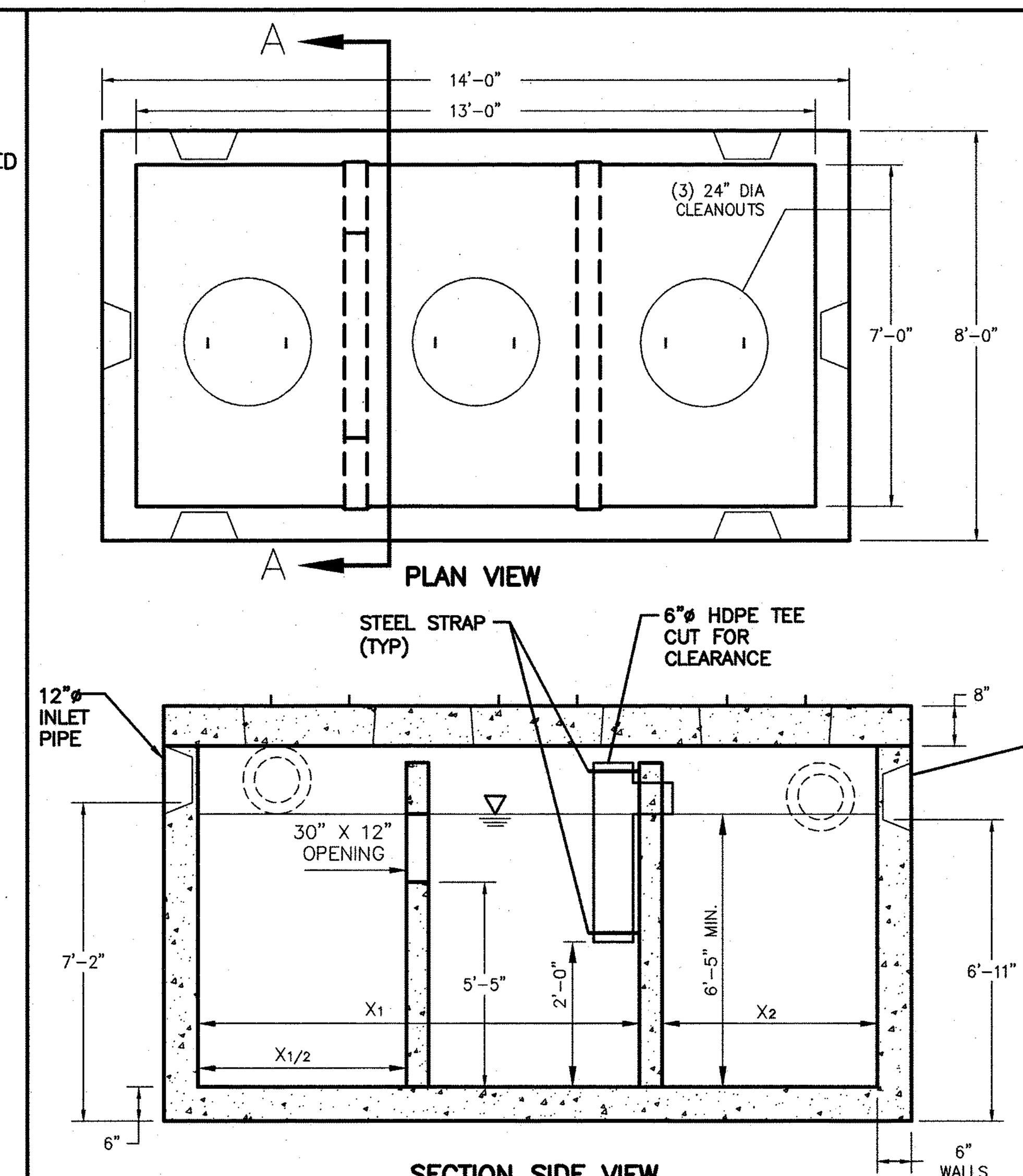
TYPICAL TRENCH SECTION FOR SANITARY SEWER SERVICE

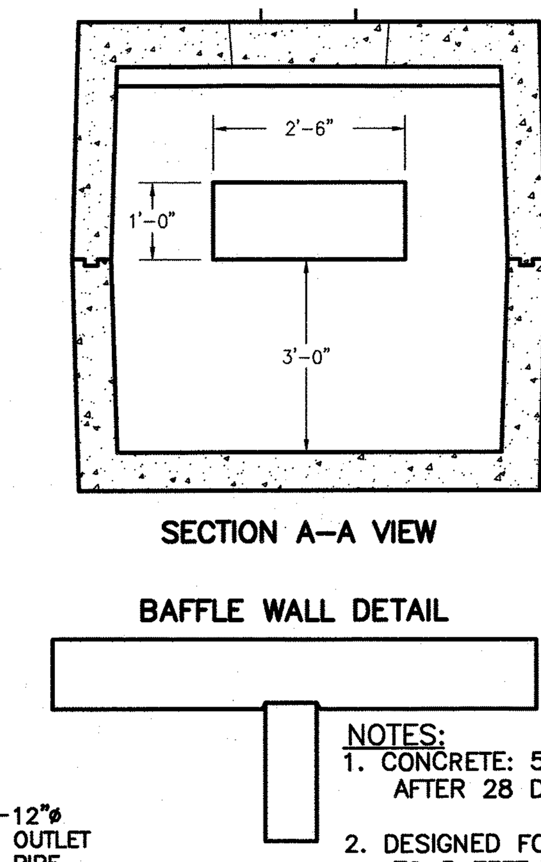
NOT TO SCALE



TYPICAL TRENCH SECTION FOR WATER SERVICE

NOT TO SCALE

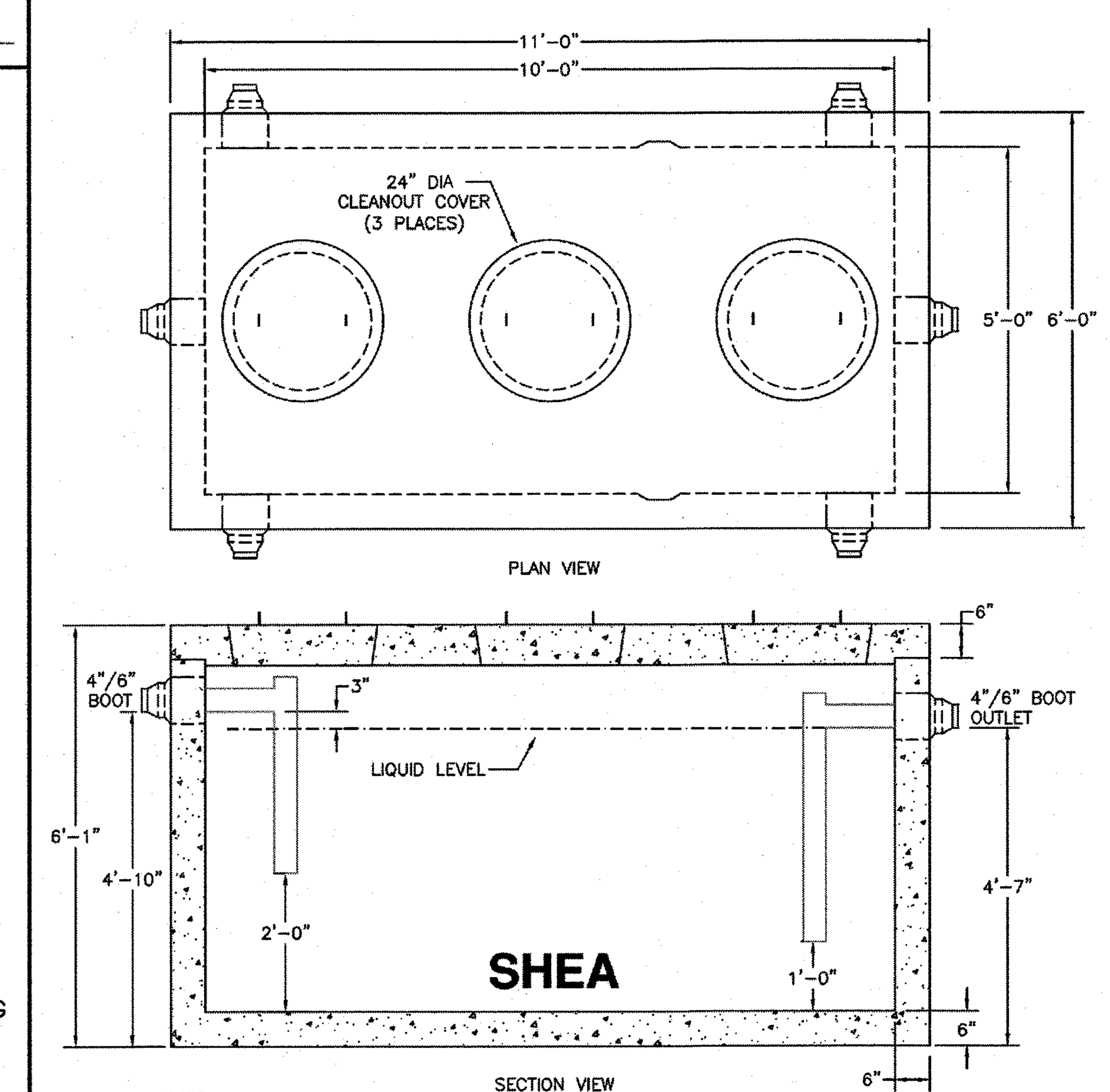




NOTES:
1. CONCRETE: 5,000 PSI MINIMUM AFTER 28 DAYS.
2. DESIGNED FOR H-20 LOADING. 1 TO 5 FEET OF COVER.
3. TONGUE & GROOVE JOINT SEALED WITH BUTYL RESIN.
4. FIRST & SECOND CHAMBER SIZING BASED ON NHDES CRITERIA OF 400 CF/ACRE OF IMPERVIOUS AREA:
O/W SEP #1: IMP. AREA = 1.03 Ac.
400 CF/Ac. x 1.03 Ac.= 412 CF
X1 = 412 CF/(6'-5" x 7') = 9'-2"
X2 = 3'-6"
5. CONTRACTOR TO SUBMIT SHOP DRAWING FOR APPROVAL.

4,000 GAL. OIL/WATER SEPARATOR DETAIL (OWS-1)

NOT TO SCALE

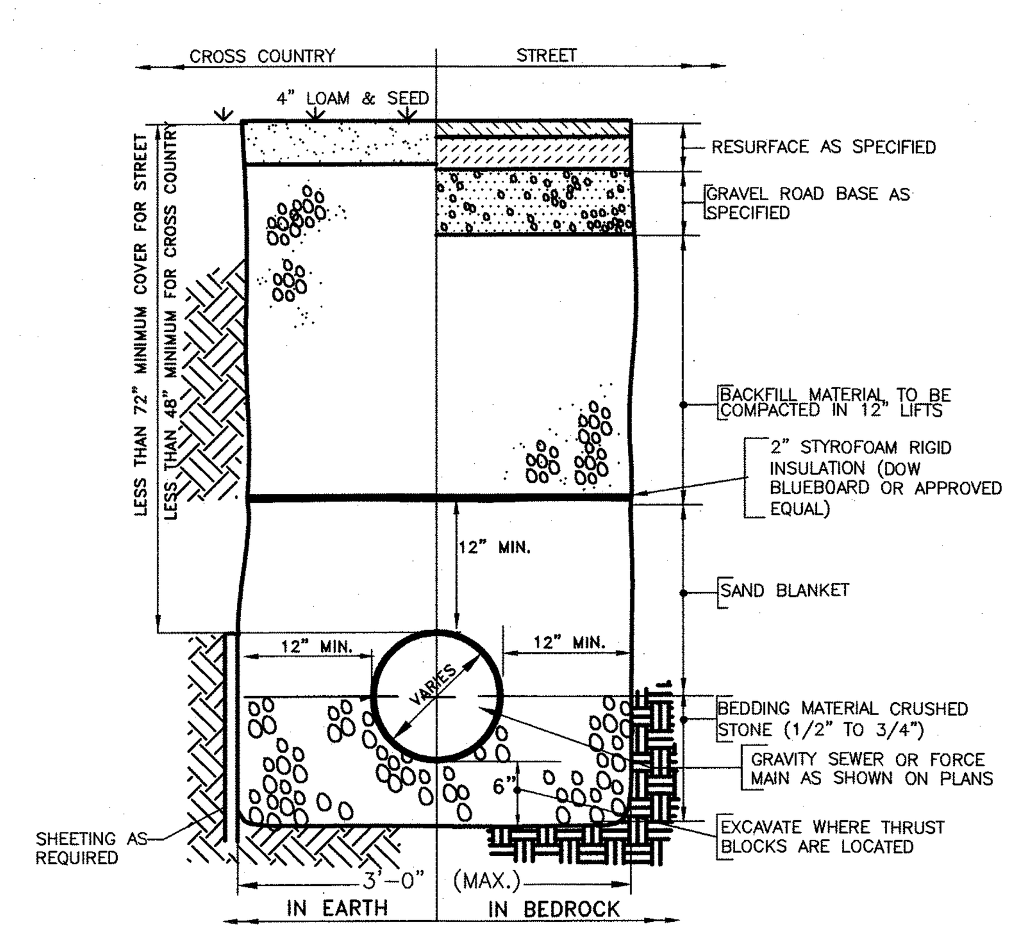


NOTES:
1. CONCRETE: 5,000 PSI MINIMUM AFTER 28 DAYS.
2. DESIGN CONFORMS WITH 310 CMR 15.00, DEP TITLE 5 REGS. FOR GREASE TRAPS.
3. ALL REINFORCEMENT PER ASTM C1227.
4. DESIGNED FOR AASHTO HS-20 LOADING, 1 TO 5 FT COVER.
5. TONGUE & GROOVE JOINT SEALED WITH BUTYL RESIN
6. TEES AND BAFFLES SOLD SEPARATELY

	WEIGHT	TOP	BOTTOM
ITEM NO. TK-M1500C	22,600#	5,400#	17,200#
TK-M1500C2C	24,400#	5,400#	19,000#

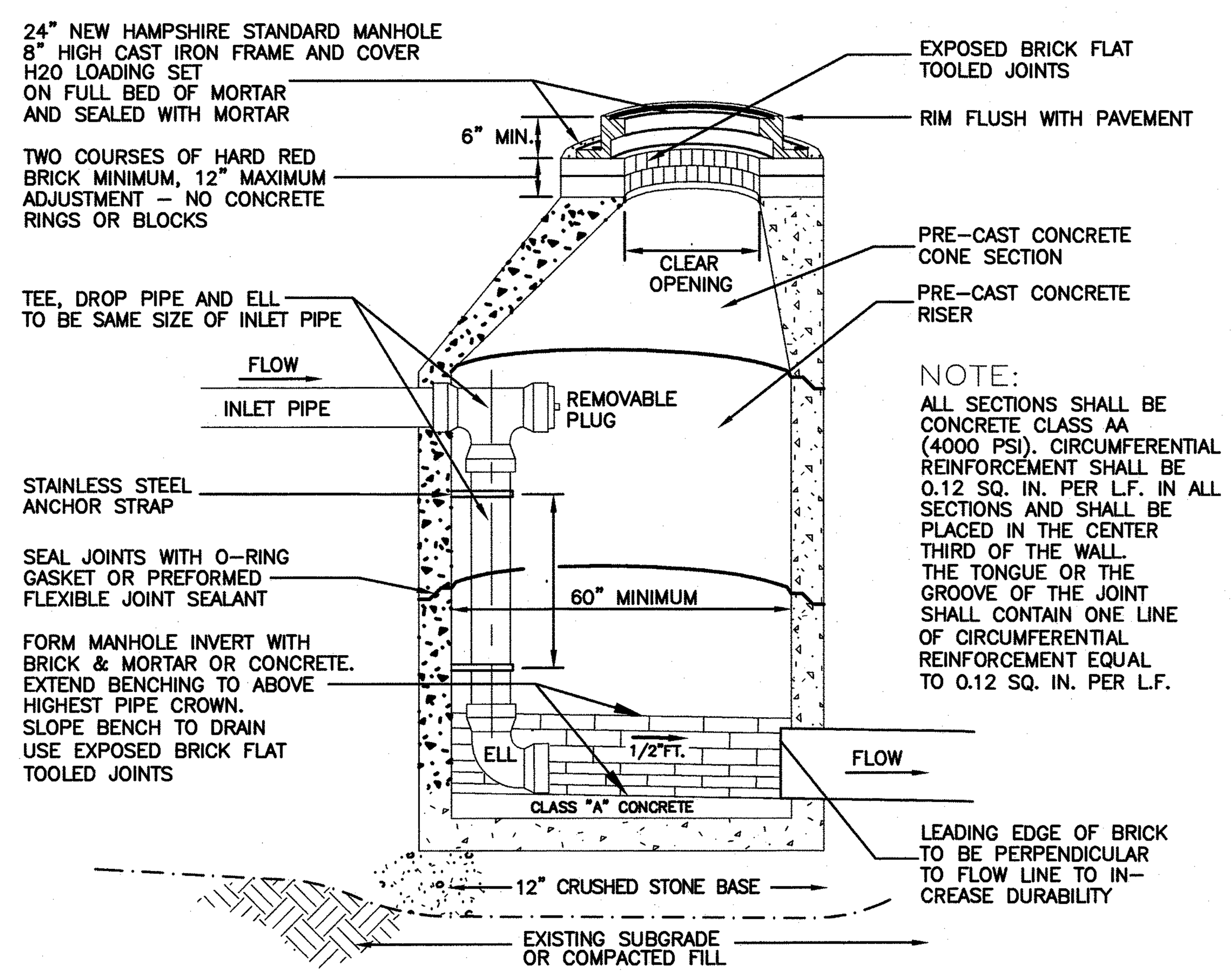
1,500 GALLON GREASE TRAP DETAIL (H-20 LOADING)

NOT TO SCALE



TYPICAL TRENCH SECTION FOR SANITARY SEWER SERVICE WITH LESS THAN 6' OF COVER

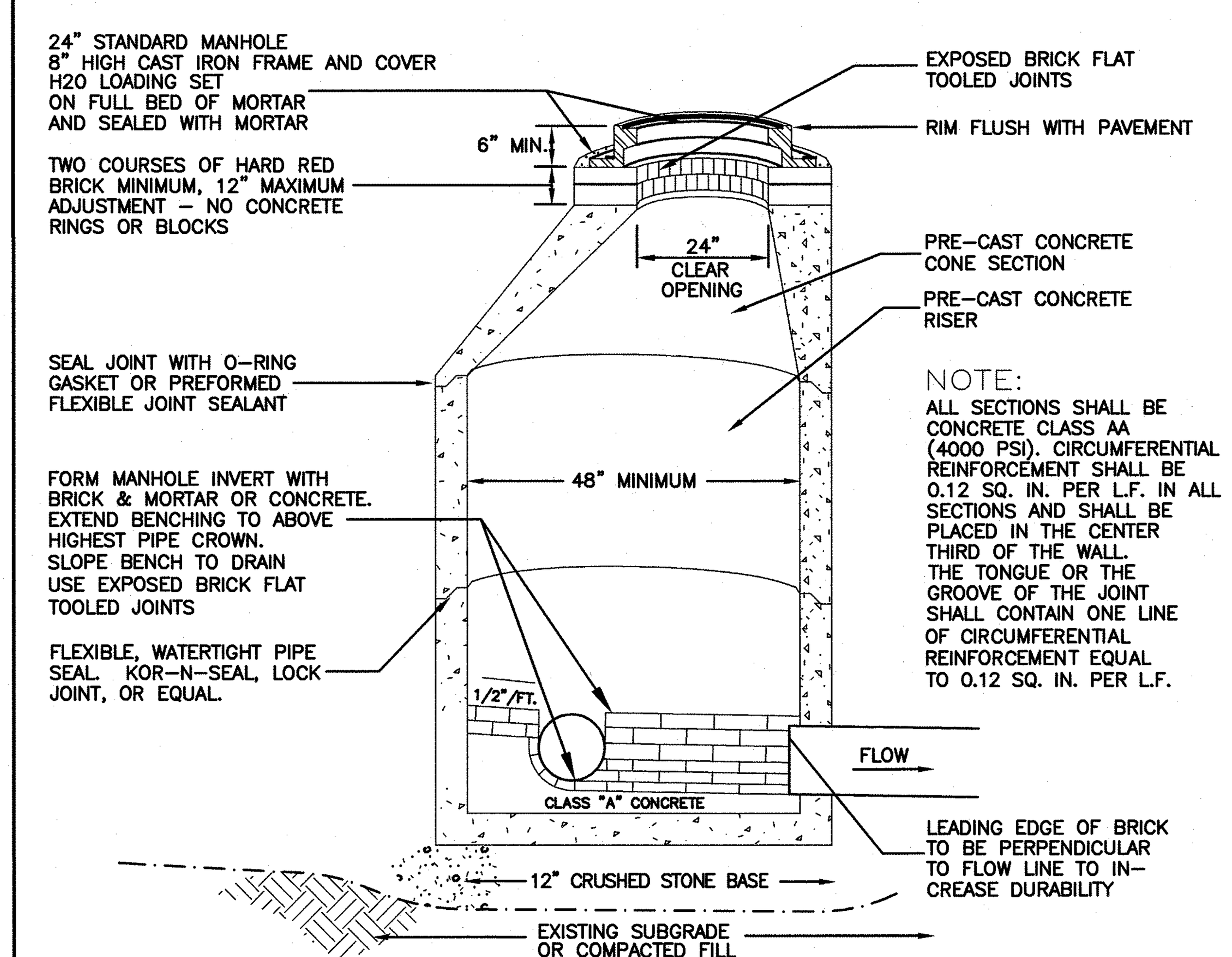
NOT TO SCALE



MORTAR SHALL CONSIST OF:
1 PART BY VOLUME PORTLAND CEMENT, 2 PARTS BY VOLUME, DAMP WASHED COARSE SAND AND POTABLE WATER TO PRODUCE A CONSISTENCY OF STIFF PASTE. SEAL ALL PRECAST JOINTS WITH MORTAR.

DROP SEWER MANHOLE

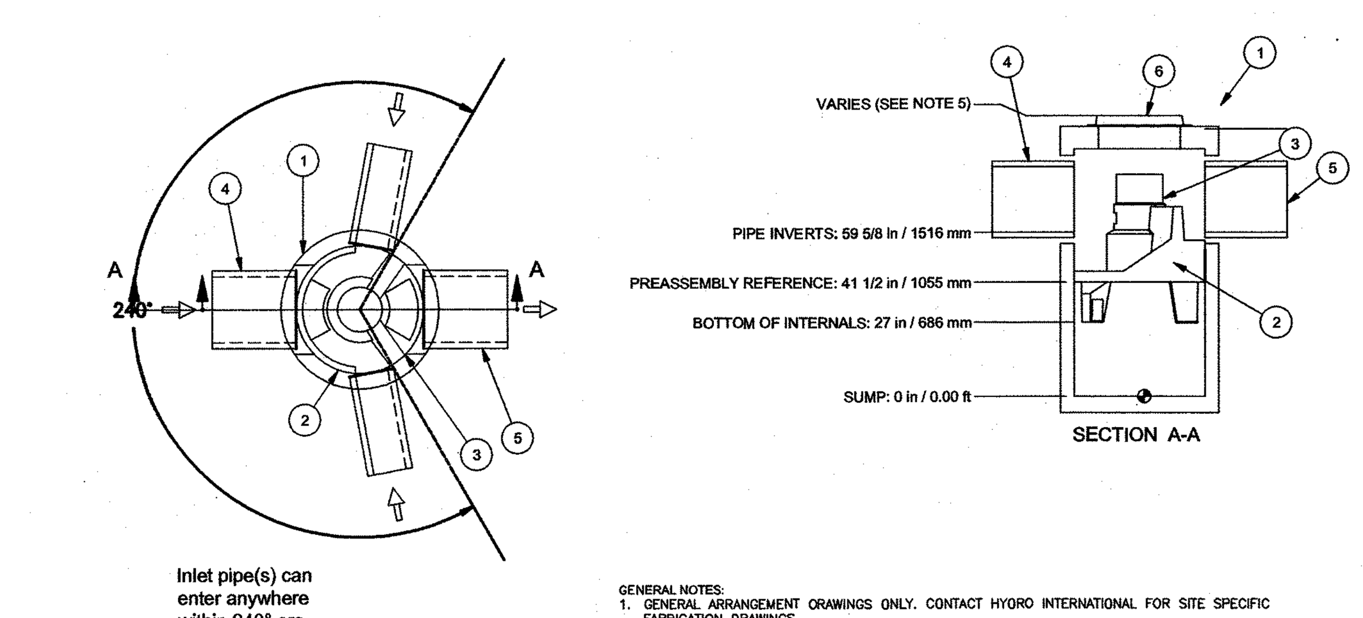
NOT TO SCALE



MORTAR SHALL CONSIST OF:
1 PART BY VOLUME PORTLAND CEMENT, 2 PARTS BY VOLUME, DAMP WASHED COARSE SAND AND POTABLE WATER TO PRODUCE A CONSISTENCY OF STIFF PASTE. SEAL ALL PRECAST JOINTS WITH MORTAR.

SEWER MANHOLE

NOT TO SCALE



Inlet pipe(s) can enter anywhere within 240° arc.

Parts List		
ITEM	SIZE (in)	DESCRIPTION
1	48	I.D. PRECAST MANHOLE
2		LEDGER SUPPORT
3		SEPARATION MODULE
4	12	INLET PIPE (BY OTHERS)
5	15	OUTLET PIPE (BY OTHERS)
6	30	FRAME AND COVER (OR GRATE) (ROUND)

GENERAL NOTES:
1. GENERAL ARRANGEMENT ORAWINGS ONLY. CONTACT HYORO INTERNATIONAL FOR SITE SPECIFIC FABRICATION DRAWINGS.
2. THE DIAMETER OF THE INLET & OUTLET PIPES MAY BE NO MORE THAN 24".
3. MULTIPLE INLET PIPES POSSIBLE (REFER TO PROJECT PLANS).
4. INLET/OUTLET PIPE ANGLE CAN VARY TO ALIGN WITH DRAINAGE NETWORK (REFER TO PROJECT PLANS).
5. PEAK FLOW RATE ANO MINIMUM HEIGHT LIMITED BY AVAILABLE COVER ANO PIPE OIAMETER.
6. LARGER SEOIMENT STORAGE CAPACITY MAY BE PROVIOED WITH A OEEPER SUMP OEPTH.

PROOUCT SPECIFICATIONS:
A. THE TREATMENT SYSTEM SHALL USE AN INOUCEO VORTEX TO SEPARATE POLLUTANTS FROM STORMWATER RUNOFF.
B. THE TREATMENT SYSTEM SHALL FIT WITHIN THE LIMITS OF EXCAVATION (AREA AND OEPTH) AS SHOWN IN THE PROJECT PLANS AND WILL NDT EXCEED THE DIMENSIDNS FDR THE DESIGN FLOW RATES SPECIFIED HEREIN.
C. THE TREATMENT SYSTEM SHALL REMOVE GREATER THAN OR EQUAL TO 90% OF TSS BASEO DN THE TARGET PARTICLE SIZE (TPS) DF 1D6 MICRONS ANO/DR 80% DF TSS BASED ON THE TPS OF 230 MICRONS AT D.7 CFS AND 1.2 CFS, RESPECTIVELY.
D. THE TREATMENT SYSTEM SHALL CONVEY THE PEAK DN-LINE FLOW RATES OF UP TD 18 CFS WITHDUT CAUSING UPSTREAM SURCHARGE CONDITIDNS. FULL-SCALE INDEPENDENT LABORATORY SCOUR TESTING SHALL DEMDNSTRATE EFFLUENT CDNTRDL DF LESS THAN OR EDUAL TD 5 MG/L FOR ALL FLOWS UP TO 200% DF MTFR-1D6.
E. THE TREATMENT SYSTEM SHALL BE CAPABLE DF CAPTURING ANO RETAINING FINE SILT ANO SAND SIZE PARTICLES. ANALYSIS OF CAPTURED SEDIMENT FROM FULL-SCALE FIELD INSTALLATIONS SHALL DEMDNSTRATE PARTICLE SIZES PREDOMINATELY IN THE 20-MICRON RANGE

"FIRST DEFENSE" UNIT DETAIL - FD-4HC

(OR APPROVED EQUAL)
NOT TO SCALE

NOTE: CONTRACTOR SHOULD CONFIRM SYSTEM PARTS AND OBTAIN SHOP DRAWINGS FROM MANUFACTURER PRIOR TO CONSTRUCTION.

GPI
Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD
PORTSMOUTH, NH 03801

STATE OF NEW HAMPSHIRE
CORY N. MASON
No.17099
LICENSED PROFESSIONAL ENGINEER
4/19/22

REVISIONS		
1	ADD JELLYFISH	4/19/22
NO.	REVISION	DATE

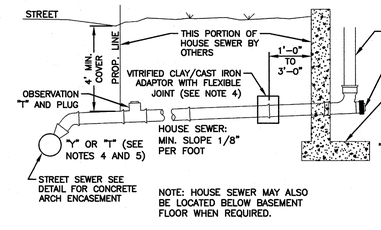
JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

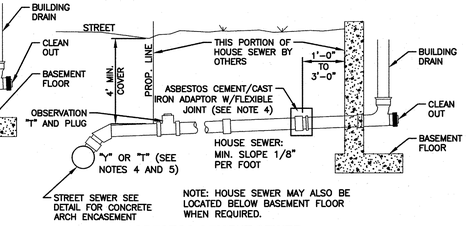
DETAIL SHEET

SCALE: NOT TO SCALE

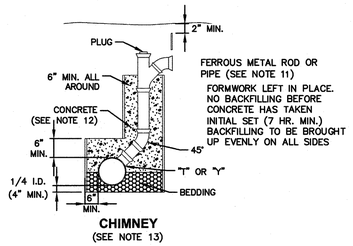
PROJECT NO. NEX-2021163



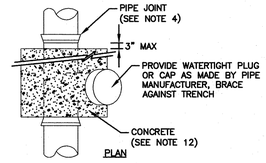
VITRIFIED CLAY SEWER AND HOUSE SEWER



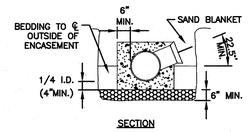
ASBESTOS CEMENT SEWER AND HOUSE SEWER

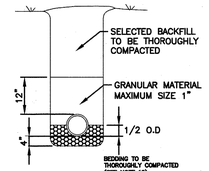


CHIMNEY
(SEE NOTE 13)

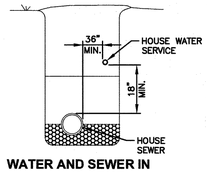


CONCRETE FULL ENCASEMENT





TRENCH CROSS-SECTION



WATER AND SEWER IN SAME TRENCH
(SEE NOTE 9)

HOUSE SEWER DETAILS
NOT TO SCALE

NOTES:
1. MINIMUM SIZE PIPE FOR HOUSE SERVICE SHALL BE 4 INCHES.
2. PIPE AND JOINT MATERIALS
   - A. VITRIFIED CLAY PIPE
     - a. PIPE AND FITTINGS SHALL BE EXTRA STRENGTH CLAY PIPE CONFORMING TO THE REQUIREMENTS OF ASTM C-700.
     - b. JOINTS SHALL BE MADE WITH OIL RESISTANT GASKETS IN ACCORDANCE WITH ASTM C-425 TYPE III MANUFACTURERS INSTRUCTIONS FOR INSTALLATION SHALL BE FOLLOWED.
   - B. ASBESTOS-CEMENT-NON-PRESSURE SEWER PIPE
     - a. PIPE AND FITTINGS SHALL CONFORM TO ASTM TENTATIVE SPECIFICATIONS C644 TYPE II.
     - b. 2. JOINTS SHALL BE OF THE SLEEVE-COUPLING TYPE CONFORMING TO ASTM SPECIFICATIONS C644 TYPE II COMPRESSION RINGS SHALL BE OF OIL RESISTANT RUBBER TYPE OR ELASTOMERIC MATERIAL AND SHALL CONFORM TO ASTM SPECIFICATION D1869. MANUFACTURERS INSTRUCTIONS SHALL BE FOLLOWED FOR INSTALLATIONS.
   - C. CAST IRON PIPE FITTINGS AND JOINTS
     - a. CAST IRON PIPE AND FITTINGS SHALL CONFORM TO THE FOLLOWING STANDARDS OF THE AMERICAN NATIONAL STANDARDS INSTITUTE:
       - A21.1 THICKNESS DESIGN OF CAST IRON PIPE
       - A21.4 CEMENT MORTAR LINING FOR CAST IRON PIPE AND FITTINGS
       - A21.6 CAST IRON PIPE CENTRIFUGALLY CAST IN METAL MOLDS FOR WATER OR OTHER LIQUIDS.
       - A21.8 CAST IRON PIPE CENTRIFUGALLY CAST IN SAND LINED MOLDS FOR WATER OR OTHER LIQUIDS.
       - A21.10 CAST IRON FITTINGS, 2 INCHES THROUGH 48 INCHES FOR WATER AND OTHER LIQUIDS.
     - b. JOINTS SHALL BE OF THE MECHANICAL OR PUSH ON TYPE JOINTS AND GASKETS SHALL CONFORM TO:
       - A21.11 RUBBER GASKET JOINTS FOR CAST IRON PRESSURE PIPE AND FITTINGS.
   - D. DUCTILE IRON PIPE, FITTINGS AND JOINTS
     - a. DUCTILE IRON PIPE AND FITTINGS SHALL CONFORM TO THE STANDARDS OF THE UNITED STATES OF AMERICA STANDARDS INSTITUTE:
       - A21.50 THICKNESS DESIGN OF DUCTILE IRON PIPE AND WITH ASTM A536 DUCTILE IRON CASTINGS
       - A21.51 DUCTILES IRON PIPE CENTRIFUGALLY CAST IN METAL MOLDS OR SAND LINED MOLDS FOR WATER OR OTHER LIQUIDS.
     - b. JOINTS SHALL BE SPECIFIED IN Cb ABOVE, CAST IRON PIPE JOINTS
3. DAMAGED PIPE SHALL BE REJECTED AND REMOVED FROM THE JOB SITE.
4. JOINTS SHALL BE BE DEPENDENT UPON A NEOPRENE OR ELASTOMERIC GASKET FOR WATERTIGHTNESS. ALL JOINTS SHALL BE PROPERLY MATCHED WITH THE PIPE MATERIALS USED. WHERE DIFFERING MATERIALS ARE TO BE CONNECTED, AS AT THE STREET SEWER "Y" OR AT THE FOUNDATION WALL, APPROPRIATE ADAPTERS SHALL BE USED.
5. "T" AND "Y" WHERE A "T" OR "Y" IS NOT AVAILABLE IN THE EXISTING STREET SEWER, AN APPROPRIATE CONNECTION SHALL BE MADE IN THE SEWER, FOLLOWING MANUFACTURERS INSTRUCTIONS (USING A BOLTED, CLAMPED OR EPOXY CEMENTED SADDLE TAPPED INTO A SMOOTHLY DRILLED OR SAWN OPENING. THE PRACTICE OF BREAKING AN OPENING WITH A SLEDGE HAMMER, STUFFING CLOTH (OR OTHER SUCH MATERIAL) AROUND THE JOINT, OR APPLYING MORTAR TO HOLD THE CONNECTION AND ANY OTHER SIMILAR CRUDE PRACTICES OR INEPT OR HASTY IMPROVISATIONS WILL NOT BE PERMITTED. THE CONNECTION SHALL BE CONCRETE ENCASED, AS SHOWN IN THE DETAIL, UP TO AND INCLUDING • 15" DIAMETER.
6. PIPE INSTALLATION THE PIPE SHALL BE HANDLED, PLACED AND JOINTED IN ACCORDANCE WITH INSTALLATION GUIDES OF THE APPROPRIATE MANUFACTURER. IT SHALL BE CAREFULLY BEDDED ON A 4 INCH LAYER OF CRUSHED STONE AND/OR GRAVEL, AS SPECIFIED IN NOTE 10, BEDDING AND RE-FILL FOR A DEPTH OF 12 INCHES ABOVE THE TOP OF THE PIPE SHALL BE CAREFULLY AND THOROUGHLY TAMPED BY HAND OR WITH APPROPRIATE MECHANICAL DEVICES. THE PIPE SHALL BE LAID AT A CONTINUOUS AND CONSTANT GRADE FROM THE STREET SEWER CONNECTION TO THE HOUSE FOUNDATION AT A GRADE OF NOT LESS THAN 1/8 INCH PER FOOT. PIPE JOINTS MUST BE MADE UNDER DRY CONDITIONS. IF WATER IS PRESENT, ALL NECESSARY STEPS SHALL BE TAKEN TO DEWATER THE TRENCH.
7. TESTING THE COMPLETED HOUSE SEWER SHALL BE SUBJECTED TO A LEAKAGE TEST IN ANY OF THE FOLLOWING MANNERS (PRIOR TO BACKFILLING):
   - A. AN OBSERVATION "T" SHALL BE INSTALLED AS SHOWN. WHEN READY TESTING , AN INFLATABLE BLADDER OR PLUG SHALL BE INSERTED JUST UPSTREAM FROM THE OPENING IN THE "T". AFTER INFLATION, WATER SHALL BE INTRODUCED INTO THE SYSTEM ABOVE THE PLUG TO A HEIGHT OF 5 FEET ABOVE THE LEVEL OF THE PLUG.
   - B. THE PIPE SHALL BE LEFT EXPOSED AND LIBERALLY HOSED WITH WATER TO SIMULATE, AS NEARLY AS POSSIBLE, WET TRENCH CONDITIONS. IF THE TRENCH IS WET, THE GROUND WATER SHALL BE PERMITTED TO RISE IN THE TRENCH OVER THE PIPE. INSPECT-IONS FOR LEAKS SHALL BE MADE THROUGH THE CLEANOUT WITH A FLASHLIGHT.
   - • DOES NOT APPLY TO INSTALLATIONS WHERE "T's" AND "Y's" ARE USED
   - C. FLUORESCENT DYE SHALL BE SPRINKLED INTO THE TRENCH OVER THE PIPE. IF THE TRENCH IS DRY, THE PIPE SHALL BE LIBERALLY HOSED WITH WATER. IF THE TRENCH IS WET, GROUND WATER SHALL BE PERMITTED TO RISE IN THE TRENCH OVER THE PIPE. OBSERVATION FOR LEAKS SHALL BE MADE IN THE FIRST MANHOLE DOWNSTREAM. LEAKAGE OBSERVED IN ANY OF THE ABOVE, ALTER-NATE TESTS SHALL BE CAUSE FOR NON-ACCEPTANCE AND THE PIPE SHALL BE DUG UP, IF NECESSARY, AND RELAID SO AS TO ASSURE WATERTIGHTNESS.
8. ILLEGAL CONNECTION NOTHING BUT SANITARY WASTE FLOW FROM THE HOUSE TOILETS, SINKS, LAUNDRY ETC. SHALL BE PERMITTED. ROOF LEADERS, FOOTING DRAINS, SUMP PUMPS OR ANY OTHER SIMILAR CONNECTION CARRYING RAIN WATER, DRAINAGE OR GROUND WATER SHALL NOT BE PERMITTED.
9. HOUSE WATER SERVICE SHOULD NOT BE LAID IN THE SAME TRENCH AS THE SEWER SERVICE, BUT WHEN NECESSARY, SHALL BE PLACED ABOVE AND TO ONE SIDE OF THE HOUSE SEWER AS SHOWN.
10. BEDDING: SCREENED GRAVEL AND/OR CRUSHED STONE FREE FROM CLAY, LOAM, ORGANIC MATERIAL AND MEETING ASTM C33-67.
    100%-PASSING 1 INCH SCREEN 90-100%-PASSING 3/4 INCH SCREEN 20-55%-PASSING 3/8 INCH SCREEN 0-10%-PASSING #4 SIEVE 0-5%-PASSING #8 SIEVE
    WHERE ORDERED BY THE ENGINEER TO STABILIZE THE TRENCH BASE, SCREENED GRAVEL OR CRUSHED STONE (1-1/2 TO 1/2 INCH) SHALL BE USED.
11. LOCATION THE LOCATION OF THE "T" OR "Y" SHALL BE RECORDED AND FILED IN THE MUNICIPAL RECORDS. IN ADDITION, A FERROUS METAL ROD OR PIPE SHALL BE PLACED OVER THE "T" OR "Y", AS DESCRIBED IN THE TYPICAL "CHIMNEY" DETAIL, TO AID IN LOCATING THE BURIED PIPE WITH A DIP NEEDLE OR PIPE FINDER.
12. CONCRETE CONCRETE SHALL CONFORM TO THE REQUIREMENTS FOR CLASS A (3000 PSI) CONCRETE OF THE N.H. DEPT. OF PUBLIC WORKS AND HIGHWAYS STANDARD SPECIFICATIONS AS FOLLOWS:
    CEMENT: 6.0 BAGS/C.Y. WATER: 5.75 GALS./BAG CEMENT
    AGGREGATE: 1-1/2 INCH MAX.
13. CHIMNEYS IF VERTICAL DROP INTO THE SEWER IS GREATER THAN 4 FEET, A CHIMNEY SHALL BE CONSTRUCTED FOR THE HOUSE CONNECTION.

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

STATE OF NEW HAMPSHIRE
CORY N. MASON No.17099
LICENSED PROFESSIONAL ENGINEER
4/19/22

REVISIONS		
NO.	REVISION	DATE

APRIL 19, 2022

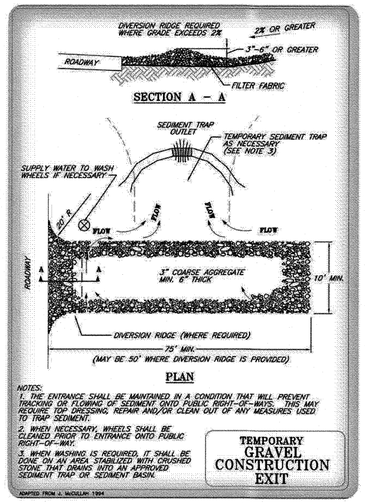
DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

DETAIL SHEET

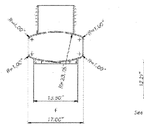
SCALE: NOT TO SCALE

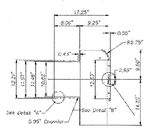
PROJECT NO. NEX-2021163

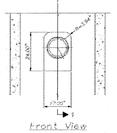
13 OF 15



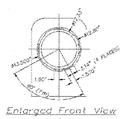
GRAVEL CONSTRUCTION EXIT
NOT TO SCALE

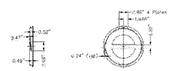


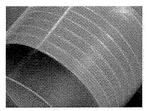


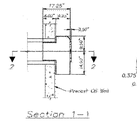


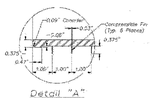
The Eliminator Catch Basin Oil & Debris Trap



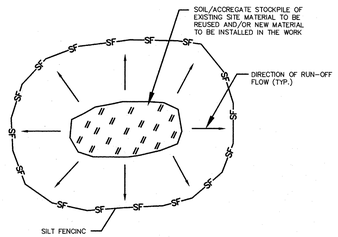






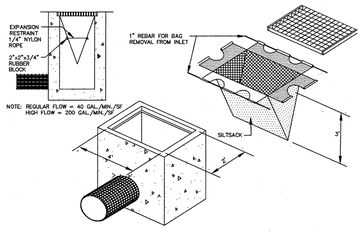


GWR Ground Water Rescue
Ground Water Rescue, Inc.
24 Ryden St., Quincy, MA 02169
Tel: 617-773-1128 Fax: 617-773-0510
www.kleanstream.com
MADE IN USA

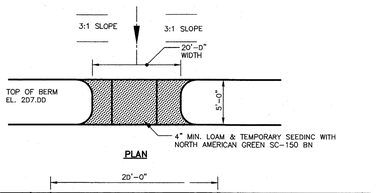


NOTES:
1. ALL EXISTING EXCAVATED MATERIAL THAT IS NOT TO BE REUSED IN THE WORK IS TO BE IMMEDIATELY REMOVED FROM THE SITE AND PROPERLY DISPOSED OF.
2. SOIL/ACCRECATE STOCKPILE SITES TO BE WHERE SHOWN ON THE DRAWINCS.
3. RESTORE STOCKPILE SITES TO PRE-EXISTINC PROJECT CONDITION AND RESEED AS REQUIRED.
4. STOCKPILE HEIGHTS MUST NOT EXCEED 35'. STOCKPILE SLOPES MUST BE 2:1 OR FLATTER.

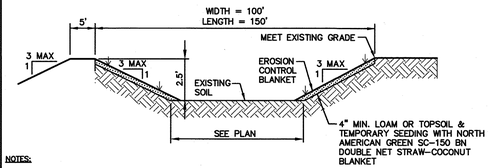
MATERIALS STOCKPILE DETAIL
NOT TO SCALE



SILTSACK DETAIL-ON OR OFF SITE
NOT TO SCALE

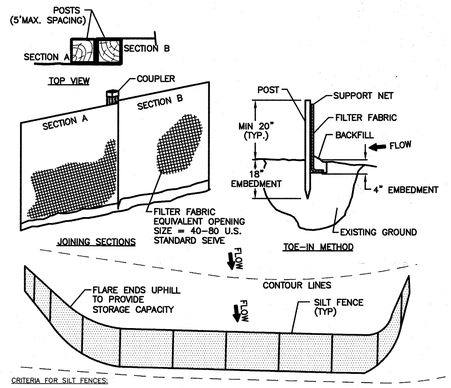


SEDIMENT TRAP SPILLWAY DETAIL
NOT TO SCALE



NOTES:
1. SIDE SLOPES OF THE TRAP SHALL BE 3:1 OR FLATTER, AND SHALL BE STABILIZED IMMEDIATELY AFTER CONSTRUCTION.
2. THE SPILLWAY ON THE TRAP SHOULD BE A MINIMUM OF 1 FOOT BELOW THE CREST OF THE TRAP AND SHALL DISCHARGE TO A STABILIZED AREA.
3. THE TRAP SHALL BE CLEANED WHEN 50% OF THE ORIGINAL VOLUME IS FILLED. MATERIALS REMOVED FROM THE TRAP SHALL BE PROPERLY DISPOSED OF AND STABILIZED.

TEMPORARY SEDIMENT TRAP TYPICAL CROSS SECTION
NOT TO SCALE



CRITERIA FOR SILT FENCES:

1) SILT FENCE FILTER CLOTH: THE FABRIC FOR THE SILT FENCE SHALL MEET THE FOLLOWINC SPECIFICATIONS:

FABRIC PROPERTIES:	MINIMUM ACCEPTABLE VALUES	TEST METHOD
CRAB TENSILE STRENGTH (lbs)	90	ASTM D1682
ELONCATION AT FAILURE (%)	50	ASTM D1682
MULLEN BURST STRENGTH (PSI)	190	ASTM D3786
PUNCTURE STRENGTH (lbs)	40	ASTM D751
EQUIVELANT OPENINC SIZE	40-80	US STD SIEVE

2) FENCE POSTS (FOR FABRICATED UNITS) – THE POSTS SHALL BE A MINIMUM OF 36 INCHES LONG. WOOD POSTS WILL BE OF SOUND QUALITY HARDWOOD WITH A MINIMUM CROSS SECTIONAL AREA OF 3.0 SQUARE INCHES. STEEL POSTS WILL BE STANDARD T OR U SECTIONS WEICHINC NOT LESS THAN 1 POUND PER LINEAR FOOT. MAXIMUM SPACINC SHALL BE 6 LINEAR FEET.

3) WIRE FENCE (FOR FABRICATED UNITS) – WIRE FENCINC SHALL BE A MINIMUM 14.5 GUACE WITH A MAXIMUM 6 INCH MESH OPENINC.

4) PREFABRICATED UNITS – PREFABRICATED UNITS MAY BE USED IN LIEU OF THE ABOVE METHOD PROVIDINC: (1) THE FILTER CLOTH AND FENCE POSTS MEET THE ABOVE CRITERIA; AND (2) THE UNIT IS INTALLED ACCORDINC TO THE MANUFACTURER'S RECOMMENDATIONS.

MAINTENANCE:

1) SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURINC PROLONCED RAINFALL. ANY REPAIRS THAT ARE REQUIRED SHALL BE MADE IMMEDIATELY.

2) IF THE FABRIC ON A SILT FENCE SHOULD DECOMPOSE OR BECOME INEFFECTIVE DURINC THE EXPECTED LIFE OF THE FENCE, THE FABRIC SHALL BE REPLACED PROMPTLY.

3) SEDIMENT DEPOSITS SHOULD BE INSPECTED AFTER EVERY STORM EVENT. THE DEPOSITS SHOULD BE REMOVED WHEN THEY REACH APPROXIMITELY ONE-HALF THE HEICHT OF THE BARRIER.

4) SEDIMENT DEPOSITS THAT ARE REMOVED OR LEFT IN PLACE AFTER THE FABRIC HAS BEEN REMOVED SHALL BE CRADED TO CONFORM WITH THE EXISTINC TOPOCRAPHY AND VECETATED.

CONSTRUCTION SPECIFICATIONS:

1) THE CEOTEXTILE FABRIC SHALL MEET THE DESICN CRITERIA FOR SILT FENCES.

2) THE FABRIC SHALL BE EMBEDDED A MINIMUM OF 8 INCHES INTO THE CROUND (4" DEEP & 4" WIDE) AND THE SOIL COMPACTED OVER THE EMBEDDED FABRIC.

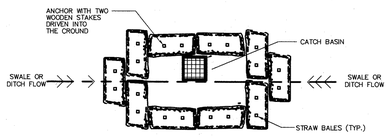
3) WOVEN WIRE FENCE SHALL BE FASTENED SECURELY TO THE FENCE POSTS WITH WIRE TIES OR STAPLES.

4) FILTER CLOTH SHALL BE FASTENED SECURELY TO THE WOVEN WIRE FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP, MID-SECTION AND BOTTOM.

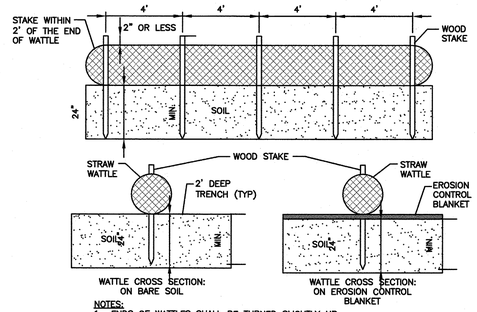
5) WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EAC OTHER, THEY SHALL BE OVERLAPPED BY 6 INCHES (24" IS PREFERRED), FOLDED, AND STAPLED.

6) POSTS TO BE SPACED AT A MAXIMUM OF 6' ON CENTER.

SEDIMENT CONTROL FENCE
NOT TO SCALE

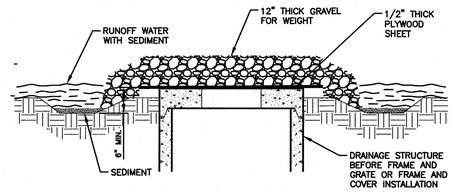


LOW POINT SEDIMENTATION CONTROL BARRIER
NOT TO SCALE



NOTES:
1. ENDS OF WATTLES SHALL BE TURNED SLIGHTLY UP.
2. RECCOMMENDED STAKES ARE 1 1/8" WIDE x 1 1/8" THICK x 30" LONG. STAKES SHALL NOT EXCEED ABOVE THE STRAW WATTLE MORE THAN 2".

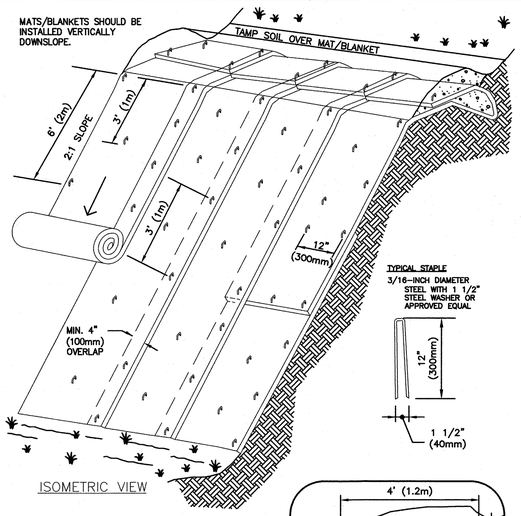
STRAW WATTLE DETAIL
NOT TO SCALE



MAINTENANCE

1. ALL STRUCTURES SHOULD BE INSPECTED AFTER EVERY RAIN STORM AND REPAIRS MADE AS NECESSARY.
2. SEDIMENT SHOULD BE REMOVED FROM THE TRAPPING DEVICES AFTER THE SEDIMENT HAS REACHED A MAXIMUM OF ONE HALF OF THE DEPTH OF THE TRAP. THE SEDIMENT SHOULD BE DISPOSED OF IN A SUITABLE AREA AND PROTECTED FROM EROSION BY EITHER STRUCTURUAL OR VEGETATIVE MEANS.
3. THE TEMPORARY TRAPS SHOULD BE REMOVED AND THE AREA REPAIRED AS SOON AS THE CONTRIBUTING DRAINAGE AREA TO THE INLET HAS BEEN COMPLETELY STABILIZED.
4. ALL STRUCTURES WITH INLET PROTECTION MUST BE CLEANED AT THE END OF CONSTRUCTION AND WHEN THE SITE IS FULLY STABILIZED.

INLET PROTECTION DETAIL
NOT TO SCALE

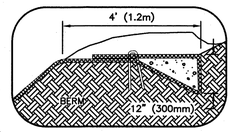


ISOMETRIC VIEW

TYPICAL SLOPE SOIL STABILIZATION

NOTES:
1. BEGIN AT THE TOP OF BLANKET INSTALLATION AREA BY ANCHORING BLANKET IN A 6" DEEP TRENCH. BACKFILL AND COMPACT TRENCH AFTER STAPLING.
2. ROLL THE BLANKET DOWN THE SWALE IN THE DIRECTION OF THE WATER FLOW. LAY BLANKETS LOOSELY & MAINTAIN DIRECT CONTACT WITH SOIL – DO NOT STRETCH.
3. THE EDGES OF BLANKETS MUST BE STAPLED WITH APPROX. 4 INCH OVERLAP WHERE 2 OR MORE STRIP WIDTHS ARE REQUIRED.
4. WHEN BLANKETS MUST BE SPLICED DOWN THE SWALE, PLACE BLANKET END OVER END WITH 6 INCH (MIN.) OVERLAP AND ANCHOR DOWN SLOPE BLANKET IN A 6 INCH DEEP TRENCH.
5. BLANKETS SHALL BE STAPLED ENOUGH TO ANCHOR BLANKET WHILE MAINTAINING CONTACT WITH SOIL. STAPLES SHALL BE PLACED DOWN THE CENTER & STAGGERED WITH THE STAPLES PLACED ALONG EDGES. PATTERN & AMOUNT OF STAPLES VARIES BY MANUFACTURER, SO FOLLOW MANUFACTURERS RECOMMENDATIONS.
6. BLANKET SHALL BE NORTH AMERICAN GREEN SC-150 OR APPROVED EQUAL.

MAINTENANCE & MATS
1. BLANKETS SHALL BE INSPECTED WEEKLY DURING CONSTRUCTION & AFTER A RAINFALL IN EXCESS OF 1/2" IN A 24-HOUR PERIOD.
2. FAILURES SHALL BE REPAIRED IMMEDIATELY. IF ANY OF THE FOLLOWING OCCUR; SLOPE WASHOUT, MAT DISPLACEMENT, DAMAGE TO MAT, THE AFFECTED AREA SHALL BE REPAIRED & RESEEDED & MAT SHALL BE REPLACED OR RE-INSTALLED.



TYPICAL INSTALLATION OF EROSION CONTROL BLANKETS FOR SLOPES
NOT TO SCALE

NOTE: DO NOT USE PRODUCTS THAT CONTAIN WELDED PLASTIC OR THAT ARE "PHOTODEGRADABLE". USE PRODUCTS WITH BIODEGRADABLE NETTING AND NATURAL FIBER MATERIAL (I.E. STRAW OR COCONUT FIBER).

BLANKET SLOPE PROTECTION FOR EROSION CONTROL
NOT TO SCALE

TEST PIT DATA

Test Pit No. 9-1 SCS Soil: Pipestone
ESHWT: >48" Standing Water: None
Refusal: 48" Roots: None

Depth	Horizon	Soil Texture	Color	Consistence	Mottles; Quantity/Contrast
0-30"	A	Loamy Sand	10yr 2/2	FR	
30-48"	B	Loamy Sand	10yr 4/4	FR	
48"	R				

Test Pit No. 9-2 SCS Soil: Pipestone
ESHWT: 36" Standing Water: None
Refusal: 38" Roots: None

Depth	Horizon	Soil Texture	Color	Consistence	Mottles; Quantity/Contrast
0-24"	A	Loamy Sand	10yr 3/2	FR	
24-33"	B	Loamy Sand	10yr 5/8	FR	
33-38"	C	Loamy Sand	2.5y 7/4	FR	@ 36" Distinct
38"	R				

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44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

STATE OF NEW HAMPSHIRE – CORY N. MASON No.17099 – LICENSED PROFESSIONAL ENGINEER – 4/19/22

REVISIONS		
1	ADD ELIMINATOR DTL FROM SHEET 12	4/19/22
NO.	REVISION	DATE

JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

DETAIL SHEET

SCALE: NOT TO SCALE

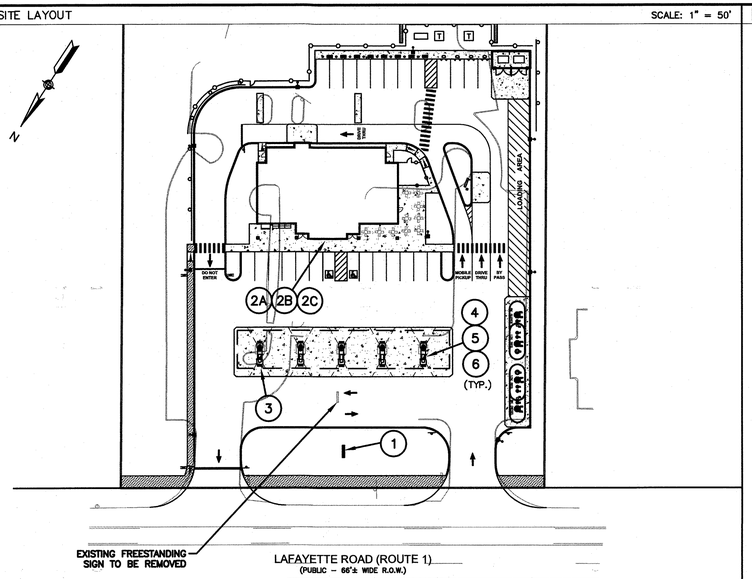
PROJECT NO. NEX-2021163

14 OF 15

F:\Projects\NEX-2021163 – Portsmouth, NH – GSC\CAD Files\21163_DET.dwg DET-6 4/19/22 4:15pm ccoll

01 SITE LAYOUT

SCALE: 1" = 50'

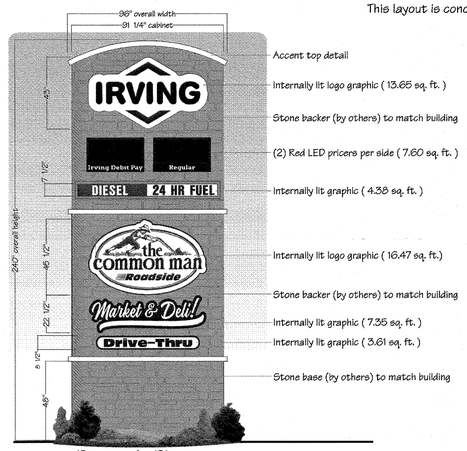


02 PROPOSED FREESTANDING SIGN ELEVATION

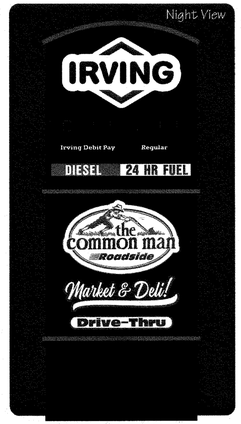
NOT TO SCALE

Common Man Roadside - Irving Epsom, NH Pylon ID Sign CONCEPTUAL — SHEET 01

This layout is conceptual only, all details to be verified and subject to change



Proposed - P1
Option 1.5a



Total area of signage: 53.06 sq. ft.

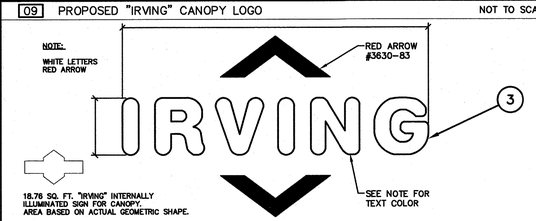
DATE: 04-26-21	JOB NAME: Common Man Roadside - Irving
REP: J.S.	
CONTACT: Brad Pernaw (617) 821-5604	

AUTHORIZED SIGNATURE REQUIRED TO BEGIN PRODUCTION

SOUSA Signs
225 East Industrial Park Dr. Manchester, NH 03109
603-622-5067 FAX 603-624-6188

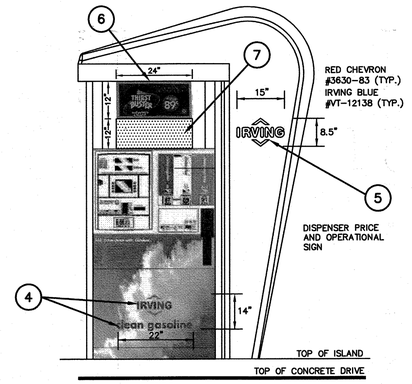
09 PROPOSED "IRVING" CANOPY LOGO

NOT TO SCALE



10 PROPOSED MULTI-PRODUCT DISPENSER

NOT TO SCALE



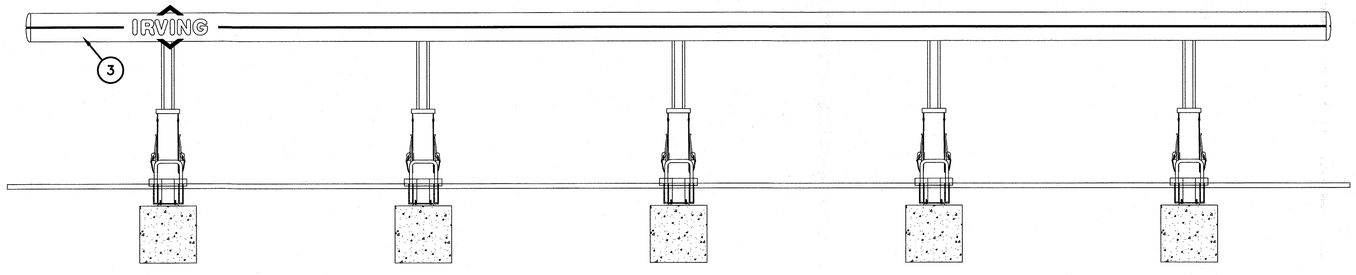
05 PROPOSED STORE ELEVATIONS

NOT TO SCALE

FRONT ELEVATION
N.T.S.

08 PROPOSED CANOPY ELEVATIONS

SCALE: 1/8"=1'-0"



AUTO FUELING CANOPY- NORTH ELEVATION
1/8" = 1'-0"

06 PROPOSED SIGN SCHEDULE

NOT TO SCALE

PROPOSED SIGN SCHEDULE

MARK	DESCRIPTION	SIZE	AREA	QTY.	TOTAL SF	ILLUM'D.
1	FREESTANDING SIGN	SEE DETAIL 2	100.0*	1	100.0	YES (INTERNAL)
2A	C-STORE WALL SIGN	SEE LOGO DETAIL 4	63.5	3	190.5	YES (INTERNAL)
2B	C-STORE WALL SIGN	SEE LOGO DETAIL 4	28.4	3	85.2	YES (INTERNAL)
2C	C-STORE WALL SIGN	SEE LOGO DETAIL 5	40.0	3	120.0	YES (INTERNAL)
3	"IRVING" CANOPY – LOGO SIGN	SEE LOGO DETAIL 9	18.76	3	56.28	YES (INTERNAL)
4	"IRVING" MPD DOOR GRAPHIC	SEE DISPENSER DETAIL 10	2.14	10	21.4	NO
5	"IRVING" DISPENSER SHROUD LOGO	SEE DISPENSER DETAIL 10	0.89	10	8.9	NO
6	"IRVING" DISPENSER ADVERTISING SIGN	SEE DISPENSER DETAIL 10	2.0	10	20.0	NO
7	DISPENSER PRICE SIGN	SEE DISPENSER DETAIL 10	2.0	10	20.0	NO

* INCLUDES BASE & STRUCTURE PER PORTSMOUTH REGULATIONS

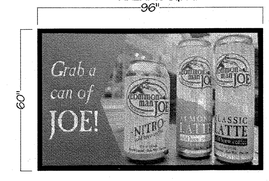
04 C-STORE BUILDING WALL SIGN

NOT TO SCALE

05 C-STORE BUILDING WALL SIGN

NOT TO SCALE

AREA: 40 Sq. Ft.



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44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

REVISIONS

NO.	REVISION	DATE

JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

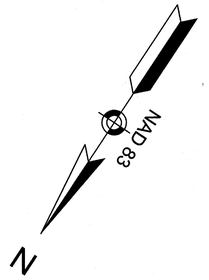
SIGN & GRAPHICS PLAN

SCALE: AS SHOWN

PROJECT NO. NEX-2021163

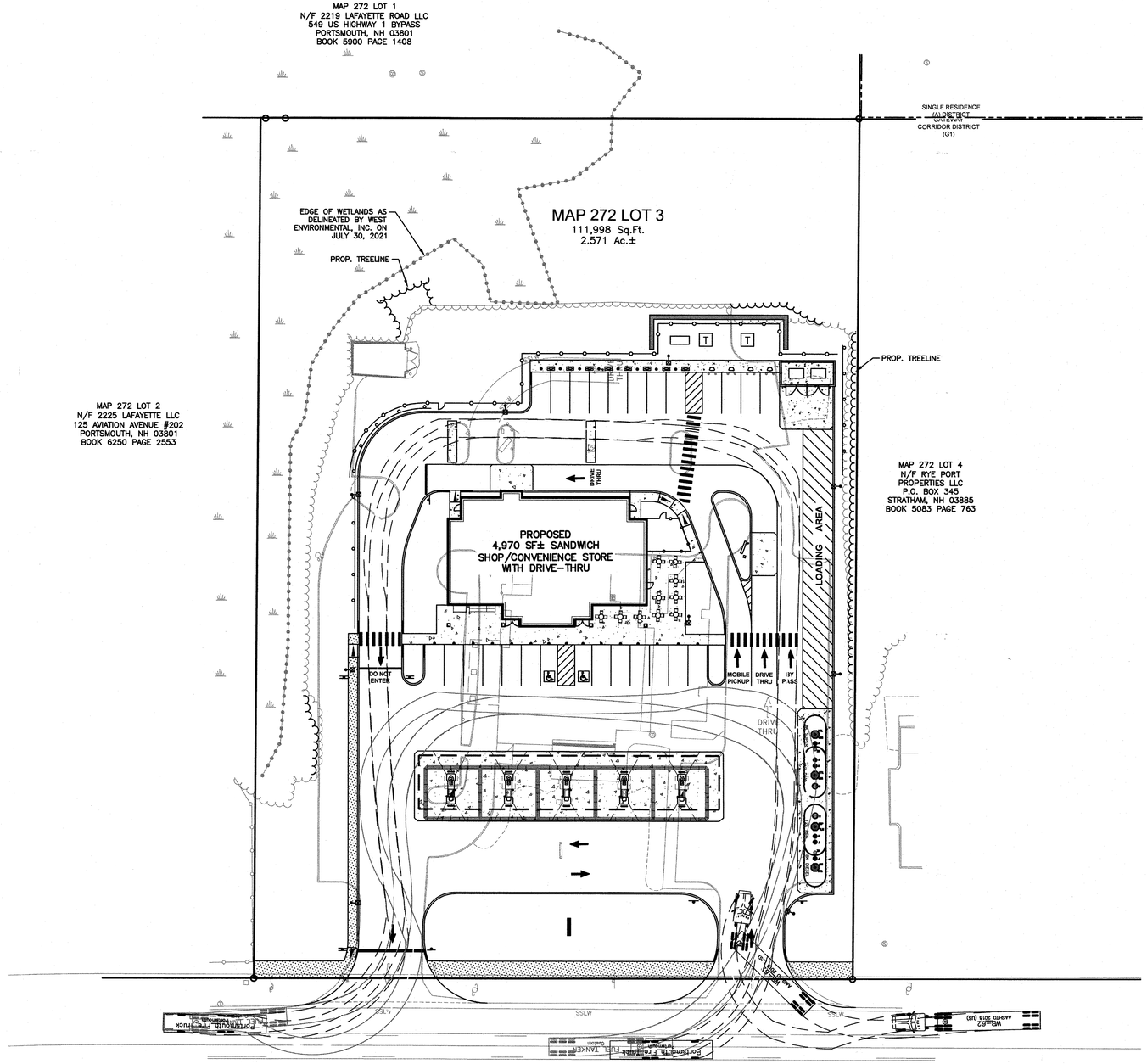
15 OF 15

F:\Projects\NEX-2021163 - Portsmouth, NH - GSC\CAD Files\21163_SIGN.dwg SIGN & GRAPHICS 4/19/22 4:15pm ccall



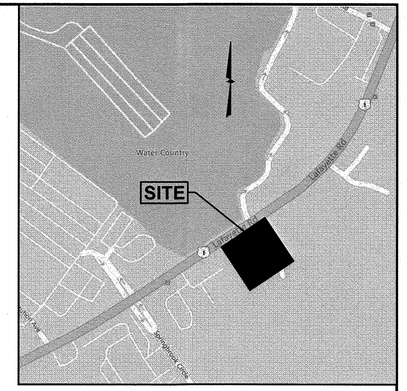
LEGEND

- VGC — VERTICAL GRANITE CURB
- SSLW — SINGLE SOLID LINE WHITE
- G — GAS LINE
- U/GRT — UNDERGROUND COMM
- W — WATER LINE
- E — UNDERGROUND ELECTRIC
- CHAIN LINK FENCE
- 90 — CONTOUR ELEVATION
- TREE
- UTILITY POLE
- GUY WIRE
- OVERHEAD WIRE
- TREELINE
- SIGN
- +98.69 — SPOT ELEVATION
- CATCH BASIN
- CLEANOUT
- SEWER MANHOLE
- TELEPHONE MANHOLE
- WATER SHUT OFF
- BOLLARD
- GM — GAS METER
- LIGHT POLE
- WETLAND LINE
- EASEMENT LINE
- PROPERTY LINE
- ABUTTER PROPERTY LINE
- ZONE LINE



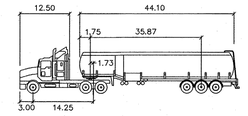
0 30 60 100

SCALE: 1" = 30'



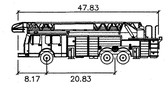
LOCATION MAP

(NOT TO SCALE)



FUEL TANKER

	feet		
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 40.0
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		



Portsmouth Fire Truck

	feet		
Width	: 8.50		
Track	: 8.50		
Lock to Lock Time	: 6.0		
Steering Angle	: 38.0		

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Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

STATE OF NEW HAMPSHIRE
CORY N. MASON No.17099 LICENSED PROFESSIONAL ENGINEER
4/19/22

REVISIONS		
2	MISC. REVISIONS	4/19/22
1	REV. PER CITY COMMENTS	3/22/22
NO.	REVISION	DATE

JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

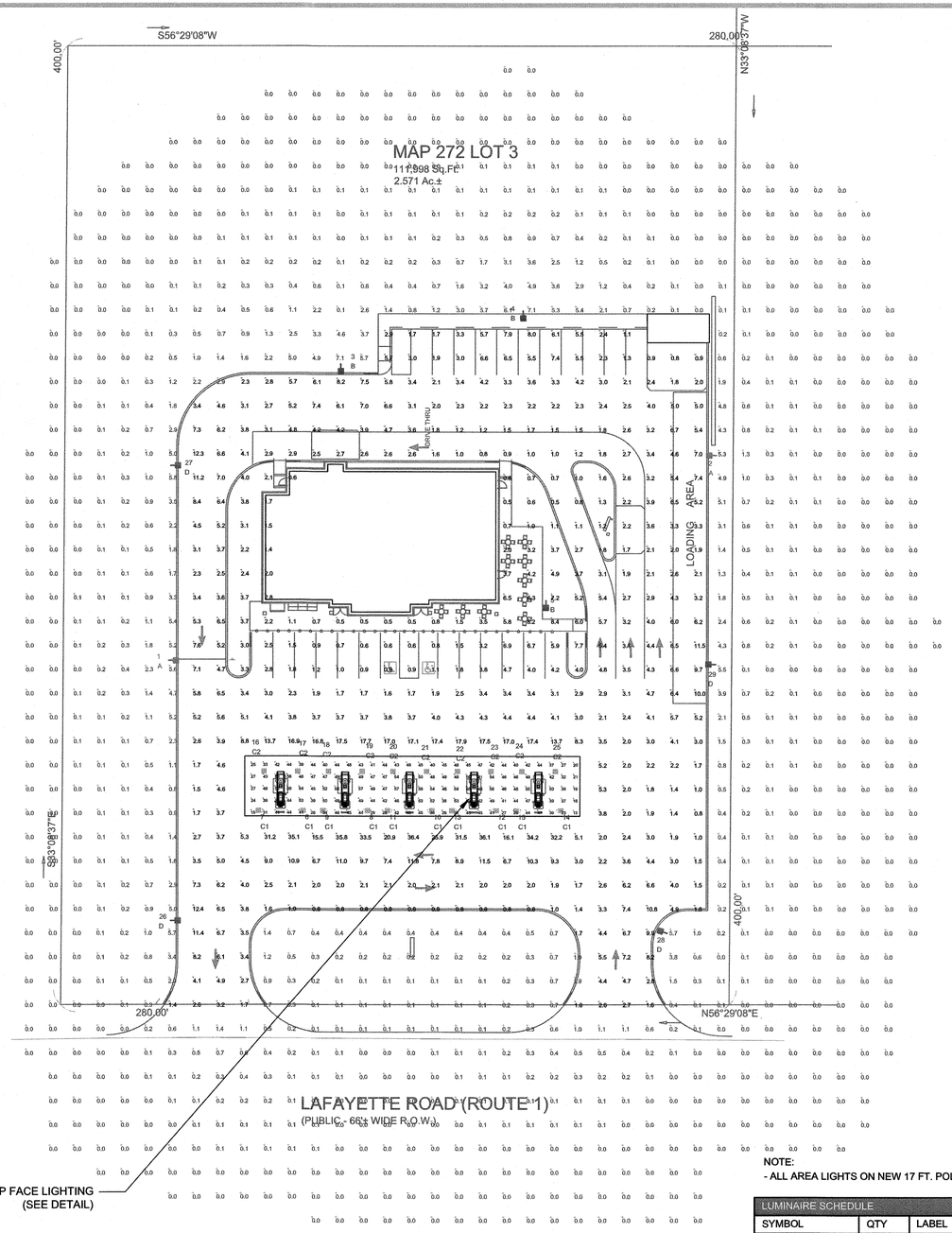
TRUCK TURN PLAN

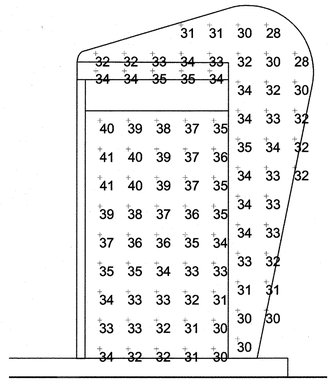
SCALE: 1"=30'

PROJECT NO. NEX-2021163

1 OF 1

811 DigSafe MA-ME-NH-RI-VT





HARP FACE
VERTICAL LIGHTING DETAIL
SCALE: 1/2" = 1 '

THIS SITE IS LOCATED IN A REGION WHERE
LIGHTING IS REGULATED BY LOCAL ORDINANCES

NOTE:
- ALL AREA LIGHTS ON NEW 17 FT. POLE MOUNTED ON 2-1/2 FT. CONCRETE BASE

LUMINAIRE LOCATION SUMMARY		
LUM NO.	LABEL	MTG. HT.
1	A	19.5
2	A	19.5
3	B	19.5
4	B	19.5
5	B	19.5
6	C1	14.5
7	C1	14.5
8	C1	14.5
9	C1	14.5
10	C1	14.5
11	C1	14.5
12	C1	14.5
13	C1	14.5
14	C1	14.5
15	C1	14.5
16	C2	14.5
17	C2	14.5
18	C2	14.5
19	C2	14.5
20	C2	14.5
21	C2	14.5
22	C2	14.5
23	C2	14.5
24	C2	14.5
25	C2	14.5
26	D	19.5
27	D	19.5
28	D	19.5
29	D	19.5

FOOTCANDLE LEVELS CALCULATED AT GRADE USING INITIAL LUMEN VALUES					
LABEL	AVG	MAX	MIN	AVG/MIN	MAX/MIN
IRVING HARP FACE (VERTICAL)	33.88	41	28	1.21	1.46
PAVED AREA	4.78	36.4	0.5	9.56	72.80
UNDEFINED	0.35	7.1	0.0	N.A.	N.A.
UNDER CANOPY	42.73	58	12	3.56	4.83

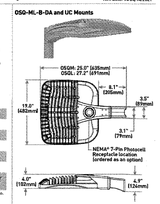
LUMINAIRE SCHEDULE										
SYMBOL	QTY	LABEL	ARRANGEMENT	LUMENS	LLF	BUG RATING	WATTS/LUMINAIRE	TOTAL WATTS	MANUFACTURER	CATALOG LOGIC
	2	A	SINGLE	16998	1.030	B2-U0-G3	132	264	Cree Inc	OSQ-ML-B-DA-XX + OSQL-B-22L-57K7-4M-UL-NM--XX + OSQ-BLSLF
	3	B	SINGLE	22098	1.030	B3-U0-G3	132	396	Cree Inc	OSQ-ML-B-DA-XX + OSQL-B-22L-57K7-4M-UL-NM-XX
	10	C1	SINGLE	12862	1.030	B2-U1-G1	141	1410	RUUD LIGHTING, INC., A CREE COMPANY	CAN-304-AF-RS-06-E-UL-WH-700-57K
	10	C2	SINGLE	13251	1.030	B3-U0-G1	134	1340	CREE, INC.	CAN-304-SL-RS-06-E-UL-XX-700-57K
	4	D	Single	17499	1.030	B2-U0-G3	132	528	Cree Inc	OSQ-ML-B-DA-XX + OSQL-B-22L-57K7-3M-UL-NM-XX + OSQ-BLSLF

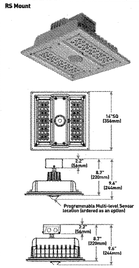
REDLEONARD ASSOCIATES
1340 Kemper Meadow Dr, Forest Park, OH 45240
513-574-9500 | redleonard.com

SCALE: 1" = 30'
LAYOUT BY: JSG
DWG SIZE: D
DATE: 1/10/22

PROJECT NAME:
IRVING OIL
GRANITE STATE C-STORE
DRAWING NUMBER:
RL-7838-S1

IRVING





		QTY	LABEL	DESCRIPTION
AREA	▰	2	A	OSQ-ML-B-DA-XX + OSQL-B-22L-57K7-4M-UL-NM--XX + OSQ-BLSLF
	▰	3	B	OSQ-ML-B-DA-XX + OSQL-B-22L-57K7-4M-UL-NM-XX
	▰	4	D	OSQ-ML-B-DA-XX + OSQL-B-22L-57K7-3M-UL-NM-XX + OSQ-BLSLF

		QTY	LABEL	DESCRIPTION
CANOPY	▰	10	C1	CAN-304-AF-RS-06-E-UL-WH-700-57K
	▰	10	C2	CAN-304-SL-RS-06-E-UL-XX-700-57K

OSQ Series

OSQ™ LED Area/Flood Luminaire featuring Cree TrueWhite® Technology – Medium & Large

Rev. Date: V4 04/14/2021

Product Description

The OSQ™ Area/Flood luminaire blends extreme optical control, advanced thermal management and modern, clean aesthetics. Built to last, the housing is rugged cast aluminum with an integral, weathertight LED driver compartment. Versatile mounting configurations offer simple installation. Its slim, low-profile design minimizes wind load requirements and blends seamlessly into the site providing even, quality illumination. The 6L lumen package is a suitable upgrade for HID applications up to 250 Watt, and the 11L lumen package is a suitable upgrade for HID applications up to 400 Watt. The 22L lumen package is a suitable upgrade for HID applications up to 750 Watts, and the 30L lumen package is a suitable upgrade for HID applications up to 1000 Watts.

Applications: Parking lots, walkways, campuses, car dealerships, office complexes, tunnels, underpasses, and internal roadways

Performance Summary

Utilizes Cree TrueWhite® Technology on 5000K Luminaires

NanoOptic® Precision Delivery Grid™ optic

Assembled in the U.S.A. of U.S. and imported parts

Initial Delivered Lumens: 4,000 - 30,000

Efficacy: Up to 173 LPW

CRI: Minimum 70 CRI (3000K, 4000K & 5700K); 90 CRI (5000K)

CCT: 3000K, 4000K, 5000K, 5700K

Limited Warranty†: 10 years on luminaire; 10 years on Colorfast DeltaGuard® finish; up to 5 years for Synapse® accessories; 1 year on luminaire accessories

† See http://creelighting.com/warranty for warranty terms. For Synapse accessories, consult Synapse spec sheets for details on warranty terms.

OSQ-ML-B-DA and UC Mounts

Luminaire	Weight
OSQM	28.9 lbs. (13.1kg)
OSQL	32.4 lbs. (14.7kg)

Note: Refer to page 11 for fixture mounting drill pattern. For additional mounts, refer to drawings beginning on page 17

Ordering Information

Fully assembled luminaire is composed of two components that must be ordered separately:

Example: **Mount:** OSQ-ML-B-AA-BK + **Luminaire:** OSQM-B-4L-30K7-2M-UL-NM-BK

Mount (Luminaire must be ordered separately)*	
OSQ-	
OSQ-ML-B-AA Adjustable Arm **OSQ-ML-B-DA** Direct Arm **OSQ-ML-B-TSP** Transportation Mount (stainless steel; do not specify color) **OSQ-ML-B-TM** Trunnion Mount	**Color Options:** **SV** Silver **BZ** Bronze **BK** Black **WH** White

* Reference EPA and pole configuration suitability data beginning on page 10

Luminaire (Mount must be ordered separately)

Family	Size	Series	Lumen Package	CCT/CRI	Optic	Voltage	Mount	Color Options	Controls**	Options
OSQ		B								
OSQ	**M** Medium **L** Large	**B**	**Medium** **4L** 4,000 Lumens **6L** 6,000 Lumens **9L** 9,000 Lumens **11L** 11,000 Lumens **16L** 16,000 Lumens **Large** **22L** 22,000 Lumens **30L** 30,000 Lumens	**30K7** 3000K, 70 CRI **40K7** 4000K, 70 CRI **50K9** 5000K, 90 CRI **57K7** 5700K, 70 CRI	**Asymmetric** **2M*** Type II Medium **3M*** Type III Medium **4M*** Type IV Medium **Symmetric** **5M** Type V Medium **5N** Type V Narrow **5Q** Type V Square **N3** Narrow Flood **33** NEMA® 3x3 **44** NEMA® 4x4 **55** NEMA® 5x5 **66** NEMA® 6x6 **75** NEMA® 7x5	**UL** Universal 120-277V **UH** Universal 347-480V - Not available with 4L or 6L lumen packages	**NM** No Mount - Must specify mount from table above - Mount ships separately **Utility Mounts** **UA** 45° Utility Arm w/8' 14/3 AWG Cord Side Exit - Includes N option **UB** 45° Utility Arm w/8' 14/3 AWG Cord End Exit - Includes N option **UC** Direct Arm Mount - Standard 2" (51mm) bolt spacing - Shipped separately - Field-installed - Includes N option **UD** Trunnion Mount - Adjustable from 0-45° in 15° increments - Includes N option	**BK** Black **BZ** Bronze **SV** Silver **WH** White	[illegible]	[illegible]

* Available with Backlight Shield when ordered with field-installed accessory (see table above)

** Luminaire comes standard with 0-10V dimming

US: creelighting.com (800) 236-6800
Canada: creelighting-canada.com (800) 473-1234

CREE LIGHTING

304 Series™

LED Recessed Canopy Luminaire

Rev. Date: V7 04/05/2021

Product Description

Luminaire housing is constructed from rugged die cast aluminum components (RS Mount) or die cast and extruded aluminum components (RD Mount). LED driver is mounted in a sealed weathertight center chamber that allows for access from below the fixture. Luminaire mounts directly to the canopy deck and is secured in place with die cast aluminum trim frame. Luminaire housing is provided with factory applied foam gasket that provides a watertight seal between luminaire housing and canopy deck. Suitable for use in single or double skin canopies with 16" (406 mm) wide panels. Designed for canopies of 19-22 gauge (maximum 0.040" (1 mm) thickness).

Applications: Petroleum stations, convenience stores, drive-thru banks and restaurants, retail and grocery

Performance Summary

Patented NanoOptic® Product Technology

Assembled in the U.S.A. of U.S. and imported parts

CRI: Minimum 70 CRI

CCT: 4000K (+/- 300K), 5700K (+/- 500K) standard

Limited Warranty†: 10 years on luminaire/10 years on Colorfast DeltaGuard® finish

† See http://creelighting.com/warranty for warranty terms

Accessories

Field-Installed
Hand-Held Remote XA-SENSREM - For successful implementation of the programmable multi-level option, a minimum of one hand-held remote is required

RS Mount

Weight
22.0 lbs. (9.9kg)

Ordering Information

Example: CAN-304-5M-RS-04-E-UL-SV-350

Product	Optic	Mounting	LED Count (x10)	Series	Voltage	Color Options	Drive Current	Options
CAN-304				E				
CAN-304	**5M** Type V Medium **5S** Type V Short **PS** Petroleum Symmetric **SL** Sparkle Petroleum	**RS** Recessed Single Skin **RD** Recessed Double Skin	**04** **06**	**E**	**UL** Universal 120-277V **UH** Universal 347-480V	**BK** Black **BZ** Bronze **SV** Silver **WH** White	**350** 350mA **525** 525mA **700*** 700mA	**DIM** **0-10V Dimming** - Control by others - Refer to Dimming spec sheet for details - Can't exceed specified drive current **F** **Fuse** - Compatible only with 120V, 277V or 347V (phase to neutral) - Consult factory if fusing is required for 208V, 240V or 480V (phase to phase) - Refer to PML spec sheet for availability with PML options - When code dictates fusing, use time delay fuse **PML** Programmable Multi-Level - Refer to PML spec sheet for details **40K** **4000K Color Temperature** - Minimum 70 CRI - Color temperature per luminaire **TRL** **Amber Turtle Friendly LEDs** - Available only with 350mA - Lumen multiplier from 5700K: 0.32 (350mA) - Power multiplier: 0.76 - 600nm dominant wavelength - Additional shielding (by others) may be required for Florida Fish and Wildlife Conservation Commission compliance

* 60 LED luminaire requires marked spacing: 48" x 24" x 6" (1,219mm x 610mm x 152mm); 48" (1,219mm) center-to-center of adjacent luminaires, 24" (610mm) luminaire center to side building member, 6" (152mm) top of luminaire to overhead building member

US: creelighting.com (800) 236-6800
Canada: creelighting-canada.com (800) 473-1234

CREE LIGHTING

OSQ™ LED Area/Flood Luminaire featuring Cree TrueWhite® Technology – Medium & Large

Product Specifications

CREE TRUEWHITE® TECHNOLOGY

A revolutionary way to generate high-quality white light, Cree TrueWhite® Technology is a patented approach that delivers an exclusive combination of 90+ CRI, beautiful light characteristics and lifelong color consistency, all while maintaining high luminous efficacy – a true no compromise solution.

CONSTRUCTION & MATERIALS

- Slim, low profile design minimizes wind load requirements
- Luminaire housing is rugged die cast aluminum with an integral, weathertight LED driver compartment and high-performance heat sink
- Convenient interlocking mounting method on direct arm and UC mounts. Mounting adaptor is rugged die cast aluminum and mounts to 3" (76mm) or larger square or round pole, secured by two 5/16-18 UNC bolts spaced on 2" (51mm) centers. Refer to page 11 for fixture mounting drill pattern.
- Mounting for the adjustable arm mount adaptor is rugged die cast aluminum and mounts to 2" (51mm) IP, 2.375" (60mm) O.D. tenon. UA and UB mounts are preset to 45°
- Adjustable arm mount can be adjusted 180° in 2.5° increments. UA and UB mounts be field adjusted in 2.5° increments to a maximum tilt of 45°
- Transportation mount is constructed of 316 stainless steel and mounts to surface with (4) 3/8" fasteners by others
- Trunnion mount is constructed of A500 and A1011 steel and is adjustable from 0-180° in 15° degree increments. UD mount is adjustable from 0-45° in 15° degree increments, and is factory preset to 45°. Trunnion mount secures to surface with (1) 3/4" bolt or (2) 1/2" or 3/8" bolts
- Luminaires ordered with NM mount include 18" (340mm) 18/5 or 16/5 cord exiting the luminaire; when combined with N or R option, 18" (340mm) 18/7 or 16/7 cord is provided. UA and UB mounts include 8' (2.4m) 14/3 AWG SEDW black cord exiting the side of the mounting arm through watertight fitting (UA) or the end of the mounting arm (UB). UC mount includes 12" (305mm) 18/5 or 16/5 leads exiting the luminaire. UD mount includes 8' (2.4m) 14/3 cord exiting the luminaire
- Utility mounts (UA, UB, UC, UD) include Utility Label per ANSI C136.15 and 7-pin NEMA® Photocell Receptacle per ANSI C136.41
- Designed for uplight and downlight applications
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Silver, bronze, black, and white are available

Weight		
Mount	Housing	
	Medium	Large
OSQ-ML-B-AA	28.4 lbs. (12.9kg)	32.0 lbs. (14.5kg)
OSQ-ML-B-DA	28.9 lbs. (13.1kg)	32.4 lbs. (14.7kg)
OSQ-ML-B-TSP	42.0 lbs. (19.1kg)	44.0 lbs. (20.0kg)
OSQ-ML-B-TM	32.6 lbs. (14.8kg)	36.1 lbs. (16.4kg)
UA	29.5 lbs. (13.4kg)	33.1 lbs. (15.0kg)
UB	29.5 lbs. (13.4kg)	33.1 lbs. (15.0kg)
UC	28.9 lbs (13.1kg)	32.4 lbs. (14.7kg)
UD	32.6 lbs. (14.8kg)	36.1 lbs. (16.4kg)

ELECTRICAL SYSTEM

- **Input Voltage:** 120-277V or 347-480V, 50/60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- When code dictates fusing, a slow blow fuse or type C/D breaker should be used to address inrush current
- Designed with 0-10V dimming capabilities. Controls by others
- Refer to Dimming spec sheet for details
- **Maximum 10V Source Current:** 1.0mA
- **Operating Temperature Range:** -40°C - +40°C (-40°F - +104°F)

REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed (UL1598)
- Suitable for wet locations
- Meets NEMA C82.77 standards
- Drivers and LEDs are UL Recognized in accordance with UL8750
- Enclosure rated IP66 per IEC 60529 when ordered without N or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2018, 3G bridge and overpass vibration standards
- ANSI C136.2 10kV surge protection, tested in accordance with IEEE/ANSI C62.41.2
- Meets FCC Part 15, Subpart B, Class A limits for conducted and radiated emissions
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Meets Buy American requirements within ARRA
- RoHS compliant. Consult factory for additional details
- Dark Sky Friendly, IDA Approved when ordered with 30K CCT and direct or transportation mounts only. Please refer to https://www.darksky.org/our-work/lighting/lighting-for-industry/fsa/fsa-products/ for most current information
- ⚠ **CA RESIDENTS WARNING:** Cancer and Reproductive Harm – www.p65warnings.ca.gov

Product Specifications

SYNAPSE® SIMPLYSNAP INTELLIGENT CONTROL

The Synapse SimplySNAP platform is a highly intuitive connected lighting solution featuring zone dimming, motion sensing, and daylight harvesting with utility-grade power monitoring and support of up to 1000 nodes per gateway. The system features a reliable and robust self-healing mesh network with a browser-based interface that runs on smartphones, tablets, and PCs. The Twist-Lock Lighting Controller (TL7-B2) and Site Controller (SS450-002) take the OSQ Series to a new performance plateau, providing extreme energy productivity, code compliance and a better light experience.

Electrical Data*

Input Power Designator	Optic	System Watts 120-480V	Utility Label Wattage	Total Current (A)					
				120V	208V	240V	277V	347V	480V
4L**	All	29	30	0.25	0.14	0.12	0.11	N/A	N/A
6L**	Asymmetric	48	50	0.41	0.23	0.20	0.17	N/A	N/A
	Symmetric	39	40	0.33	0.19	0.17	0.14	N/A	N/A
9L	All	60	60	0.51	0.29	0.25	0.22	0.18	0.13
11L	All	72	70	0.62	0.36	0.31	0.27	0.21	0.16
16L	All	104	100	0.89	0.51	0.43	0.39	0.31	0.22
22L	All	132	130	1.12	0.63	0.55	0.47	0.39	0.28
30L	All	202	200	1.72	0.96	0.84	0.72	0.60	0.43

* Electrical data at 25°C (77°F). Actual wattage may differ by +/- 10% when operating between 120-277V or 347-480V+/-10%

** Available with UL voltage only

OSQ Series Ambient Adjusted Lumen Maintenance[1]

Ambient	Optic	Initial LMF	25K hr Reported[2] LMF	50K hr Reported[2] LMF	75K hr Reported[2]/ Estimated[3] LMF	100K hr Reported[2]/ Estimated[3] LMF
5°C (41°F)	Asymmetric	1.04	1.03	1.01	0.99[2]	0.97[2]
	Symmetric	1.05	1.05	1.05	1.05[3]	1.05[3]
10°C (50°F)	Asymmetric	1.03	1.02	1.00	0.98[2]	0.96[2]
	Symmetric	1.04	1.03	1.03	1.03[3]	1.03[3]
15°C (59°F)	Asymmetric	1.02	1.01	0.99	0.97[2]	0.95[2]
	Symmetric	1.02	1.02	1.02	1.02[3]	1.02[3]
20°C (68°F)	Asymmetric	1.01	1.00	0.98	0.96[2]	0.94[2]
	Symmetric	1.01	1.01	1.01	1.01[3]	1.01[3]
25°C (77°F)	Asymmetric	1.00	0.99	0.97	0.95[2]	0.93[2]
	Symmetric	1.00	1.00	1.00	1.00[3]	1.00[3]

[1] Lumen maintenance values at 25°C (77°F) are calculated per IES TM-21 based on IES LM-80 report data for the LED package and in-situ luminaire testing. Luminaire ambient temperature factors (LATF) have been applied to all lumen maintenance factors. Please refer to the Temperature Zone Reference Document for outdoor average nighttime ambient conditions.

[2] In accordance with IES TM-21, Reported values represent interpolated values based on time durations that are up to 6x the tested duration in the IES LM-80 report for the LED.

[3] Estimated values are calculated and represent time durations that exceed the 6x test duration of the LED.

Accessories

Field-Installed		
Backlight Shield (Front Facing Optics) OSQ-BLSMF (Medium) OSQ-BLSLF (Large) **Backlight Shield (Rotated Optics)** OSQ-BLSMR (Medium) OSQ-BLSLR (Large) **Bird Spikes** OSQ-MED-BRDSPK OSQ-LG-BRDSPK	**Hand-Held Remote** XA-SENSREM - For successful implementation of the programmable multi-level option, a minimum of one hand-held remote is required	**Shorting Cap** XA-XSLSHRT

Synapse Wireless Control Accessories	
Twist-Lock Lighting Controller TL7-B2 - Suitable for 120-277V (UL) voltage only - Requires NEMA/ANSI C136.41 7-Pin Dimming Receptacle - Not for use with PML or PML2 options - Provides On/Off switching, dimming, power metering, digital sensor input, and status monitoring of luminaire - Refer to TL7-B2 spec sheet for details **Twist-Lock Lighting Controller** **TL7-HVG** - Suitable for 120-480V (UL and UH) voltage - Requires NEMA/ANSI C136.41 7-Pin Dimming Receptacle - Not for use with PML or PML2 options - Provides On/Off switching, dimming, power metering, digital sensor input, and status monitoring of luminaire - Refer to TL7-HVG spec sheet for details **SimplySNAP Central Base Station** CBSSW-450-002 - Includes On-Site Controller (SS450-002) and 5-button switch - Indoor and Outdoor rated - Refer to CBSSW-450-002 spec sheet for details	**Synapse Wireless Sensor** WSN-DPM - Motion and light sensor - Control multiple zones - Refer to WSN-DPM spec sheet for details **SimplySNAP On-Site Controller** SS450-002 - Verizon® LTE-enabled - Designed for indoor applications - Refer to SS450-002 spec sheet for details **Building Management System (BMS) Gateway** BMS-GW-002 - Required for BACnet integration - Refer to BMS-GW-002 spec sheet for details **Outdoor Antennas** **(Optional, for increased range, 8dB gain)** KIT-ANT420SM - Kit includes antenna, 20' cable and bracket KIT-ANT360 - Kit includes antenna, 30' cable and bracket KIT-ANT600 - Kit includes antenna, 50' cable and bracket - Refer to Outdoor antenna spec sheet for details

US: creelighting.com (800) 236-6800
Canada: creelighting-canada.com (800) 473-1234

CREE LIGHTING

304 Series™ LED Recessed Canopy Luminaire

Product Specifications

CONSTRUCTION & MATERIALS

- RS Mount luminaire housing is constructed from rugged die cast aluminum and incorporates integral, high performance heatsink fins specifically designed for LED canopy applications
- RD Mount luminaire housing is constructed from rugged die cast aluminum and features high performance extruded aluminum heatsinks specifically designed for LED canopy applications
- LED driver is mounted in a sealed weathertight center chamber that allows for access from below the luminaire
- Field adjustable drive current between 350mA, 525mA and 700mA on Non-IC rated luminaires
- Luminaire housing provided with factory applied foam gasket and provides for a watertight seal between luminaire housing and canopy deck
- Mounts directly to the canopy deck and is secured in place with a die cast aluminum trim frame
- RS mount includes integral junction box which allows ease of installation without need to open luminaire
- Suitable for use in single (RS Mount) or double (RD Mount) skin canopies with 16" (406mm) wide panels
- Designed for canopies of 19-22 gauge (maximum 0.040" (1mm) thickness)
- See 228 Series™ canopy luminaires for canopies using 12" (305mm) deck sections
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Black, bronze, silver, and white are available

ELECTRICAL SYSTEM

- **Input Voltage:** 120-277V or 347-480V, 50/60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral weathertight electrical box with terminal strips (12Ga-20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- When code dictates fusing, a slow blow fuse or type C/D breaker should be used to address inrush current
- **10V Source Current:** 0.15mA

REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Meets FCC Part 15, Subpart B, Class A limits for conducted and radiated emissions
- Enclosure meets IP66 requirements per IEC 60529
- ANSI C136.2 10kV surge protection, tested in accordance with IEEE/ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- DLC qualified with select SKUs. Please refer to www.designlights.org for most current information
- RoHS Compliant. Consult factory for additional details
- Meets Buy American requirements within ARRA
- ⚠ **CA RESIDENTS WARNING:** Cancer and Reproductive Harm – www.p65warnings.ca.gov

Electrical Data*

LED Count (x10)	System Watts 120-480V	Total Current (A)					
		120V	208V	240V	277V	347V	480V
350mA							
04	46	0.39	0.24	0.22	0.21	0.15	0.12
06	69	0.57	0.34	0.30	0.27	0.21	0.16
525mA							
04	71	0.59	0.35	0.31	0.28	0.21	0.16
06	101	0.84	0.49	0.43	0.38	0.30	0.22
700mA							
04	94	0.79	0.46	0.40	0.36	0.28	0.21
06	135	1.14	0.65	0.57	0.50	0.40	0.29

* Electrical data at 25°C (77°F). Actual wattage may differ by +/- 10% when operating between 120-277V or 347-480V

304 Series™ Ambient Adjusted Lumen Maintenance[1]

Ambient	CCT	Initial LMF	25K hr Reported[2] LMF	50K hr Reported[2] LMF	75K hr Estimated[3] LMF	100K hr Estimated[3] LMF
5°C (41°F)	30K/40K/50K/57K	1.04	1.01	0.99	0.98	0.96
	TRL	1.06	1.06	1.06	1.06	1.06
10°C (50°F)	30K/40K/50K/57K	1.03	1.00	0.98	0.97	0.95
	TRL	1.04	1.04	1.04	1.04	1.04
15°C (59°F)	30K/40K/50K/57K	1.02	0.99	0.97	0.96	0.94
	TRL	1.03	1.03	1.03	1.03	1.03
20°C (68°F)	30K/40K/50K/57K	1.01	0.98	0.96	0.95	0.93
	TRL	1.01	1.01	1.01	1.01	1.01
25°C (77°F)	30K/40K/50K/57K	1.00	0.97	0.95	0.94	0.92
	TRL	1.00	1.00	1.00	1.00	1.00

[1] Lumen maintenance values at 25°C (77°F) are calculated per IES TM-21 based on IES LM-80 report data for the LED package and in-situ luminaire testing. Luminaire ambient temperature factors (LATF) have been applied to all lumen maintenance factors. Please refer to the Temperature Zone Reference Document for outdoor average nighttime ambient conditions.

[2] In accordance with IES TM-21, Reported values represent interpolated values based on time durations that are up to 6x the tested duration in the IES LM-80 report for the LED.

[3] Estimated values are calculated and represent time durations that exceed the 6x test duration of the LED.

US: creelighting.com (800) 236-6800
Canada: creelighting-canada.com (800) 473-1234

CREE LIGHTING

REDLEONARD ASSOCIATES

1340 Kemper Meadow Dr, Forest Park, OH 45240
513-574-9500 | redleonard.com

PROJECT NAME:
IRVING OIL
GRANITE STATE C-STORE

DRAWING NUMBER:
RL-7838-S1

IRVING

1 NORTH ELEVATION - COLOR RENDERING
Scale: 3/16" = 1'-0"

2 EAST ELEVATION - PRESENTATION
Scale: 3/16" = 1'-0"

SAMYN – D'ELIA
ARCHITECTS, P.A.

CONSULTANTS / DESIGN TEAM:

ARCHITECT:
SAMYN-D'ELIA ARCHITECTS, P.A.
P.O. BOX 1259
ASHLAND, NH 03217
T: (603) 968-7133 F: (603) 968-3057

STRUCTURAL ENGINEER:
Foley Buhl & Roberts
500 Commercial Street
Manchester, NH 03101
T: (603) 622-4578

HVAC, ELEC. & PLUMB. ENGINEER:
Charles P. Buckley, P.E.
500 Depot Street
Rumney, NH 03266
T: (603) 786-9992

CIVIL ENGINEER:
Greenman-Perdersen, Inc.
44 Stiles Road Suite One
Salem, NH 03079
T: (603) 893-0720

SCHEMATIC DESIGN PROGRESS 4/18/2022

KEY PLAN & NORTH ARROW:

DRAWN BY: MR

CHECKED BY: WD

PROJECT:
PORTSMOUTH ROADSIDE

PORTSMOUTH, NEW HAMPSHIRE

DRAWING TITLE:
EXTERIOR ELEVATIONS - PRESENTATION

ISSUED:
Schematic Design

PROJECT NO: 2202 DATE: Apr. 18, 2022

REVISION	DATE	COMMENTS

SHEET NUMBER:
P201

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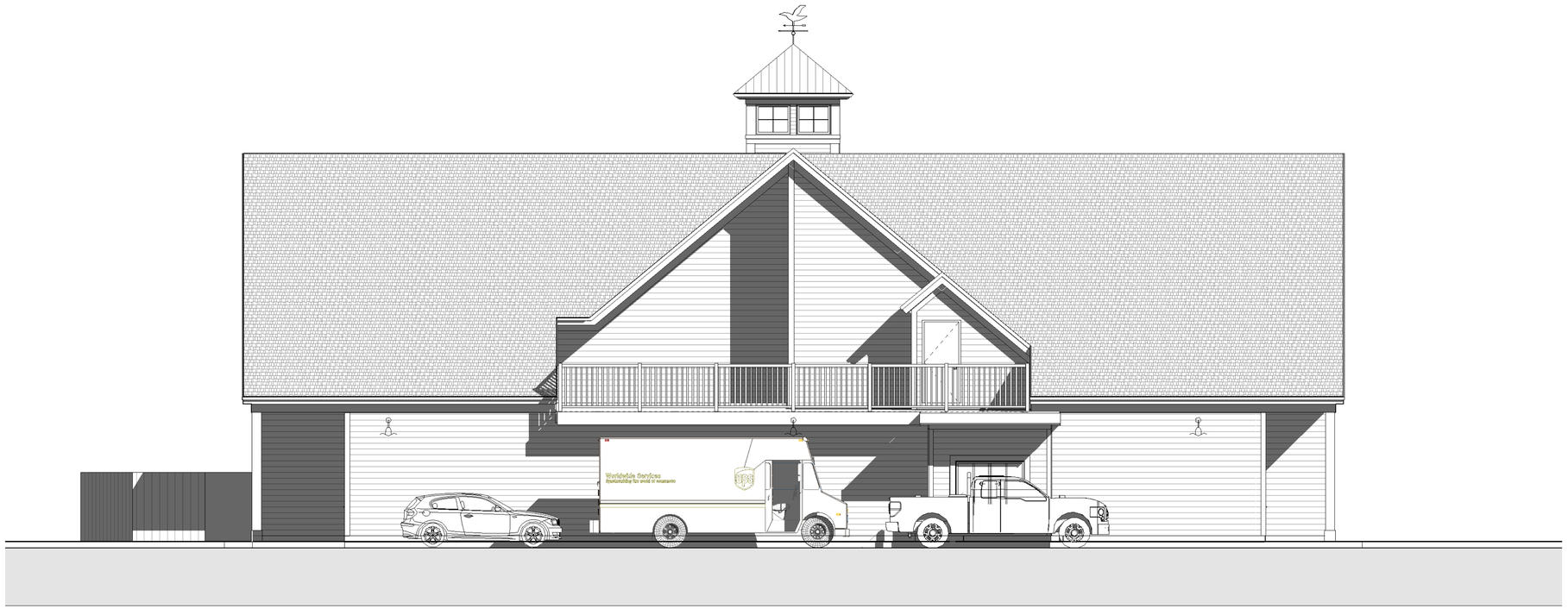

1 SOUTH ELEVATION - PRESENTATION
Scale: 3/16" = 1'-0"

2 WEST ELEVATION - PRESENTATION
Scale: 3/16" = 1'-0"

SAMYN – D'ELIA
ARCHITECTS, P.A.

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P.O. BOX 1259
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SCHEMATIC DESIGN PROGRESS 4/18/2022

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PORTSMOUTH, NEW HAMPSHIRE

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Schematic Design

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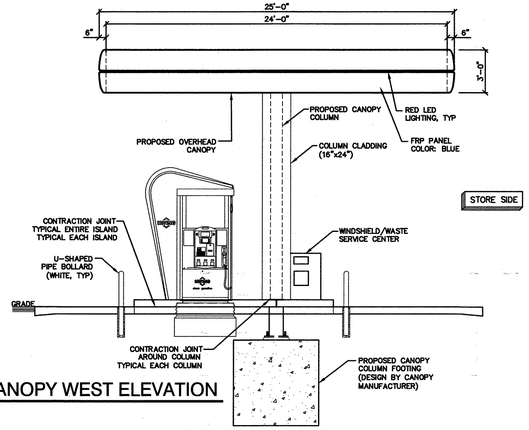
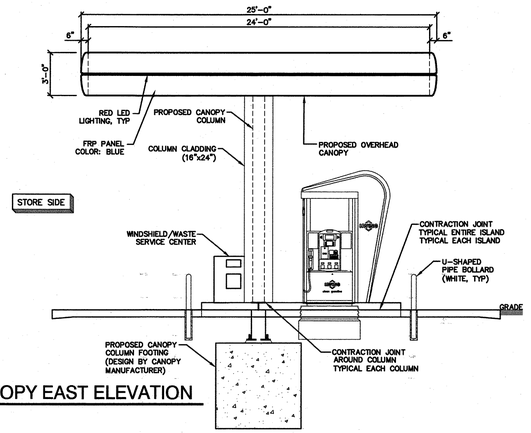


A AUTO FUELING - CANOPY WEST ELEVATION
3/16" = 1'-0"



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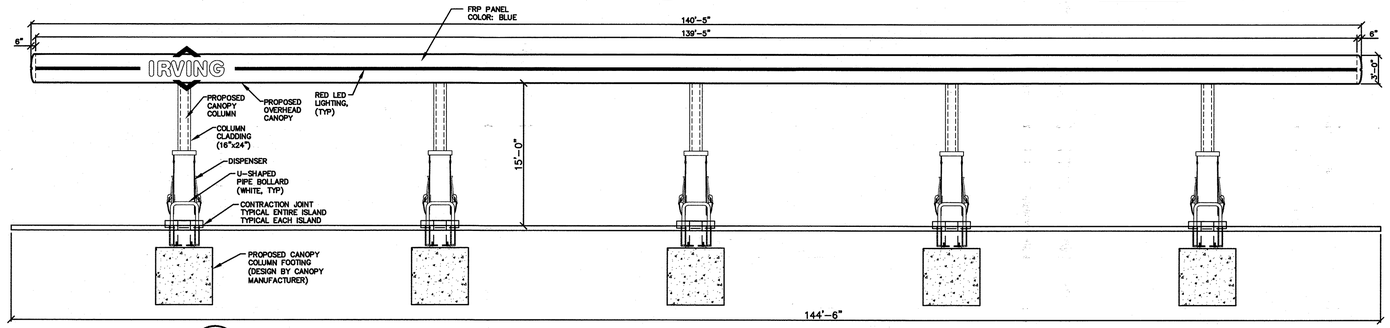

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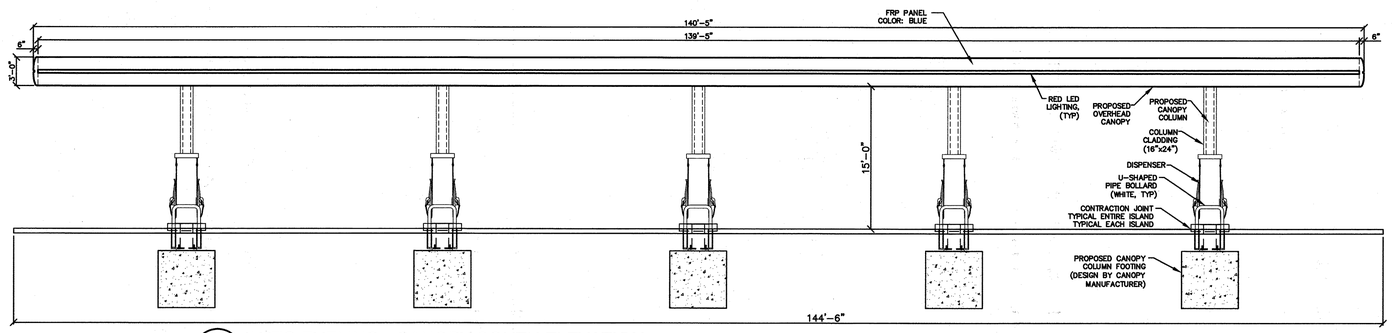
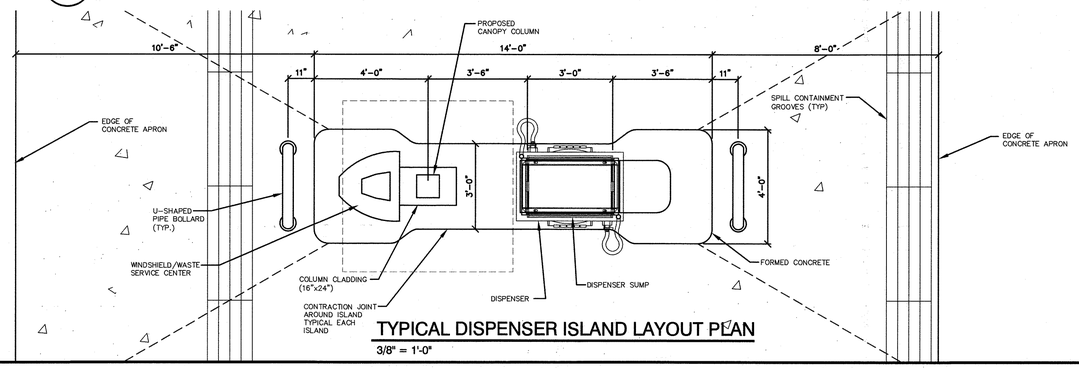
1/8" = 1'-0"



2 AUTO FUELING - CANOPY SOUTH ELEVATION
1/8" = 1'-0"



TYPICAL DISPENSER ISLAND LAYOUT PLAN
3/8" = 1'-0"

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

REVISIONS		
NO.	REVISION	DATE

JANUARY 26, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

PROPOSED CANOPY ELEVATIONS

SCALE: AS SHOWN

PROJECT NO. NEX-2021163

1 OF 1

STORMWATER MANAGEMENT REPORT

PROPOSED RETAIL MOTOR FUEL OUTLET
TAX MAP 272 LOT 3
2255 LAFAYETTE ROAD
PORTSMOUTH, NEW HAMPSHIRE

GPI

44 Stiles Road, Suite One
Salem, NH 03079
(603) 893-0720

Prepared For:

Granite State Convenience, LLC
25 Springer Road
Hooksett, NH 03106

Revised: April 19, 2022
February 3, 2022

(GPI Project No.: NEX-2021163)

Granite State Convenience, LLC
Proposed Retail Motor Fuel Outlet
Stormwater Management Report

TABLE OF CONTENTS

SECTION 1 EXECUTIVE SUMMARY

This report contains a stormwater management analysis for the proposed retail fuel development located at 2255 Lafayette Road (Route 1) in Portsmouth, New Hampshire. The analysis includes both pre- and post-development calculations of stormwater runoff rates at specific locations on the project site.

This analysis has been prepared in accordance with both City of Portsmouth requirements and the guidelines contained in the New Hampshire Department of Environmental Services (NHDES) New Hampshire Stormwater Manual.

The project site consists of one parcel identified as Map 272 Lot 3 which totals approximately 2.571 acres. The site is bordered by Lafayette Road (Route 1) to the northwest, commercial properties to the northeast and southwest and wooded areas containing wetlands to the south and southeast.

The applicant is proposing to construct a 4,970 square foot convenience store with food service and drive-thru, a fueling canopy with 5 retail fuel islands and 10 fueling locations, and associated paved driveways and parking. Access to the proposed developed site will be provided by two separate one-way ingress and one-way egress from Lafayette Road. Two underground storage tanks (USTs) will be located along the western site driveway to Lafayette Road. Water and sewer for the proposed building will be provided by municipal services. Electric service will be provided via an existing utility pole on Lafayette Road and a new on-site transformer.

In order to mitigate increases in peak discharge rates of stormwater runoff as a result of the new impervious surfaces, a comprehensive stormwater management system has been designed that includes deep-sump, hooded catch basins, First Defense Hydrodynamic Separators, an oil/water separator, a Jellyfish Filter treatment unit, and an underground detention system with outlet control structure.

Based on site topography and discharge points, one analysis point is identified for the purposes of this analysis. Design Point #1 represents overland flow which flows southeast eventually to an on-site wetland which is part of a larger off-site wetland system.

The table below summarizes the comparative pre- and post-development peak rates of stormwater runoff at the design point.

TABLE 1: PEAK RATE ANALYSIS SUMMARY

Design Storm	Pre-Development (cfs)	Post-Development (cfs)	Change (cfs)
DESIGN POINT #1 – Wetland			
2-year	3.5	3.4	-0.1
10-year	8.1	6.8	-1.3
25-year	12.0	9.7	-2.3
50-year	15.8	12.1	-3.7

(All values shown are peak rates in CFS)

In conclusion, by incorporating a new on-site drainage system that includes provisions for stormwater treatment and detention, there will be a decrease in the peak rates of stormwater runoff leaving the property at the design point as a result of this project.

Implementing the maintenance procedures outlined in the Inspection and Maintenance Manual (I&M) will ensure the long-term performance of the system.

SECTION 2 EXISTING CONDITIONS

The project site consists of one parcel identified as Map 272 Lot 3 which totals approximately 2.571 acres. The site is bordered by Lafayette Road (Route 1) to the northwest, commercial properties to the northeast and southwest and wooded areas containing wetlands to the south and southeast.

The site is previously developed and contains a Burger King restaurant with drive-thru, which is currently vacant, and associated paved parking lot and driveways to Lafayette Road. The majority of the lot is paved and on-site drainage structures are limited to a single catch basin in the landscaped area northwest of the existing building which had no visible pipe outlet at the time of survey. The majority of stormwater runoff currently sheet flows uncontrolled and untreated over the pavement to the southeast eventually off the edge of pavement to the wetland.

Site topography is variable, with slopes ranging from mild (2% on the maintained front lawn) to severe (25% or greater) near the wetland areas. Elevations range from 53 at the southern edge of the property to 67 at the northwest property corner along Lafayette Road.

The NRCS Web Soil Survey identifies on-site soils as Urban Land with no Hydrologic Soil Group (HSG) classification. Areas directly south of the site are identified as Pipestone sand with an HSG-A classification which is used in the analysis.

Test pits were performed by Greenman-Pedersen, Inc. (GPI) on September 30, 2021. Test Pits encountered Loamy Sand with estimated seasonal high groundwater table (ESHWT) encountered at 36 inches below ground in Test Pit 9-1 and not encountered in Test Pit 9-2. Refusal was encountered at 38 inches and 48 inches below ground respectively. Test pit logs are included in Appendix C.

On-site wetlands were delineated by West Environmental, Inc. on July 30, 2021 along the northeast and southeast property lines and are shown on the Existing Conditions Plan with the associated 100-foot wetland buffer.

The site is not located in a special flood hazard area (100-year flood) per Flood Insurance Rate Map Number 33015C0270F, with an effective date of January 29, 2021.

SECTION 3 PROPOSED CONDITIONS

The applicant is proposing to construct a 4,970 square foot convenience store with food service and drive-thru, a fueling canopy with 5 retail fuel islands and 10 fueling locations, and associated paved driveways and parking. Access to the proposed developed site will be provided by two separate one-way ingress and one-way egress from Lafayette Road. Two underground storage tanks (USTs) will be located along the western site driveway to Lafayette Road. Water and sewer for the proposed building will be provided by municipal services. Electric service will be provided via an existing utility pole on Lafayette Road and a new on-site transformer.

In order to mitigate increases in peak discharge rates of stormwater runoff as a result of the new impervious surfaces, a comprehensive stormwater management system has been designed that includes deep-sump, hooded catch basins, First Defense Hydrodynamic Separators, an oil/water separator, a Jellyfish Filter treatment unit, and an underground detention system with outlet control structure.

To safeguard against oil or gas introduction into the drainage system, stormwater runoff from areas in which fuel is dispensed will be collected in hooded catch basins with deep sumps and routed through an oil/water separator unit. Such pretreatment of stormwater reduces both suspended solids and oils in the drainage system and is recommended by NHDES. Runoff will then enter an underground detention system consisting of four (4) rows of 36-inch HDPE pipe with watertight joints. This system, together with the outlet control structure, will attenuate peak rates of runoff discharging to the design point during all design storms. Finally, runoff discharging from the detention system will flow through a Jellyfish Filter which uses membrane filters to remove fine particles and particulate-bound pollutants such as nitrogen, phosphorous, metals, and hydrocarbons.

The Jellyfish Filter is performance tested to achieve 89% TSS and 51% total Nitrogen (TN) removal efficiencies, which satisfy the Enhanced Stormwater Treatment Standards described in Section 7.6.2 of the *Site Plan Review Regulations*.

Recharge of runoff from non-high load areas (where petroleum products are not dispensed) was explored but was not possible due to the presence of high groundwater and the nature of the existing topography.

The total area of disturbance related to the proposed redevelopment and stormwater management system construction is approximately 75,000 square feet therefore the project will require an EPA Construction General Permit under the NPDES program. The area of disturbance is less than 100,000 square feet, therefore, the project is not subject to an NHDES Alteration of Terrain (AoT) permit.

SECTION 4 STORMWATER MODELING METHODOLOGY

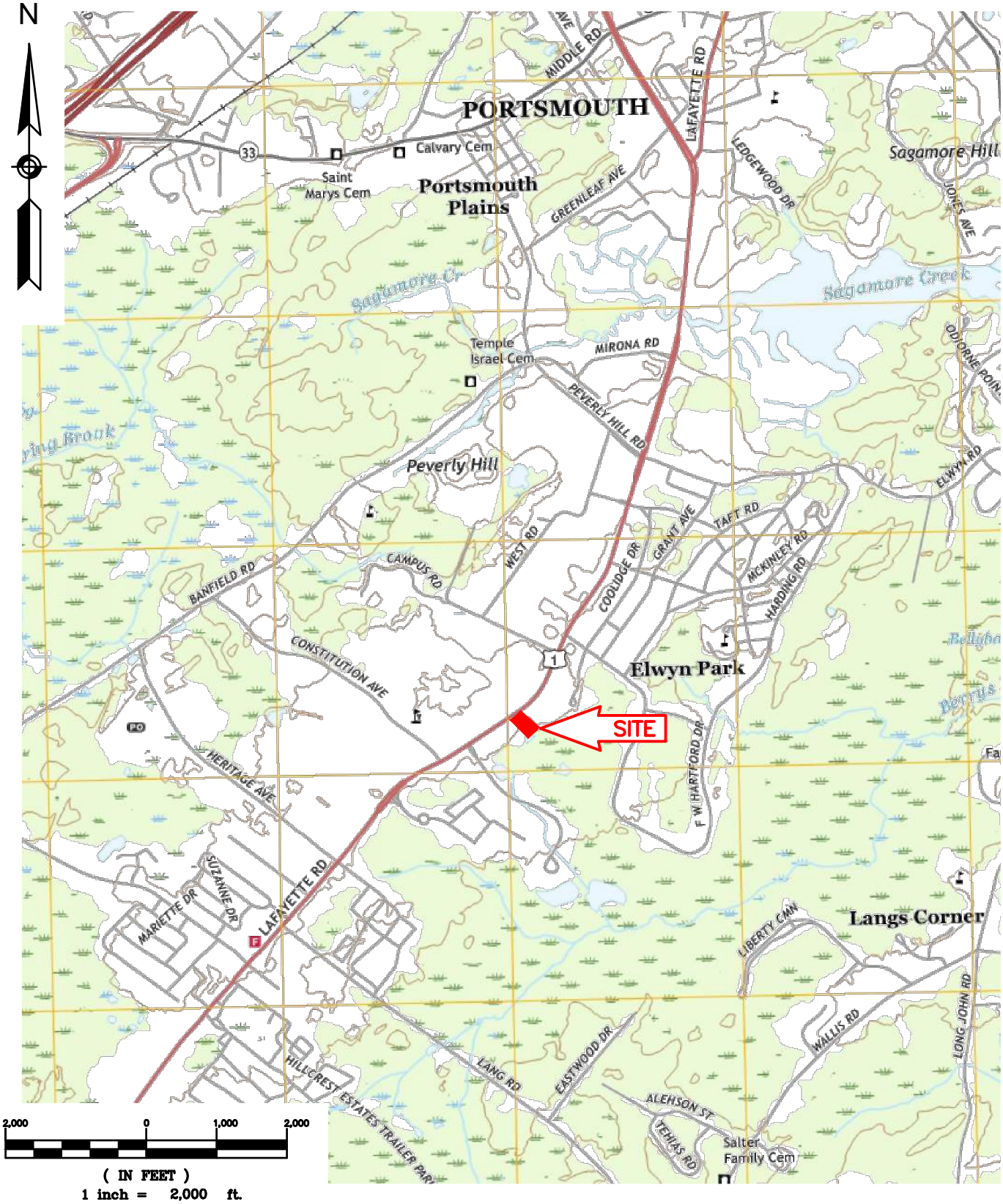
The drainage system for this project was modeled using HydroCAD, a stormwater modeling computer program that analyzes the hydrology, and hydraulics of stormwater runoff. HydroCAD is based largely on the hydrology techniques developed by the Soil Conservation Service (SCS/NRCS), combined with other hydrology and hydraulics calculations. For a given rainfall event, these techniques are used to generate hydrographs throughout a watershed. This provides verification that a given drainage system is adequate for the area under consideration, or to predict where flooding or erosion is likely to occur.

In HydroCAD, each watershed is modeled as a subcatchment, streams and culverts as a Reach (or Pond, depending on available storage capacity), and large wetlands and other natural or artificial storage areas as a Pond. SCS hydrograph generation and routing procedures were used to model both Pre-development and Post-development runoff conditions.

The Pre-development and Post-development watershed limits and the subcatchment characteristics were determined using both USGS and on-the-ground topographic survey information and through visual, on-site inspection. Conservative estimates were used at all times in estimating the hydrologic characteristics of each watershed or subcatchment.

APPENDIX A

Figures



USGS MAP

ASSESSORS MAP 272 LOT 3
2255 LAFAYETTE ROAD
PORTSMOUTH, NH

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road, Suite One
Salem, NH 03079

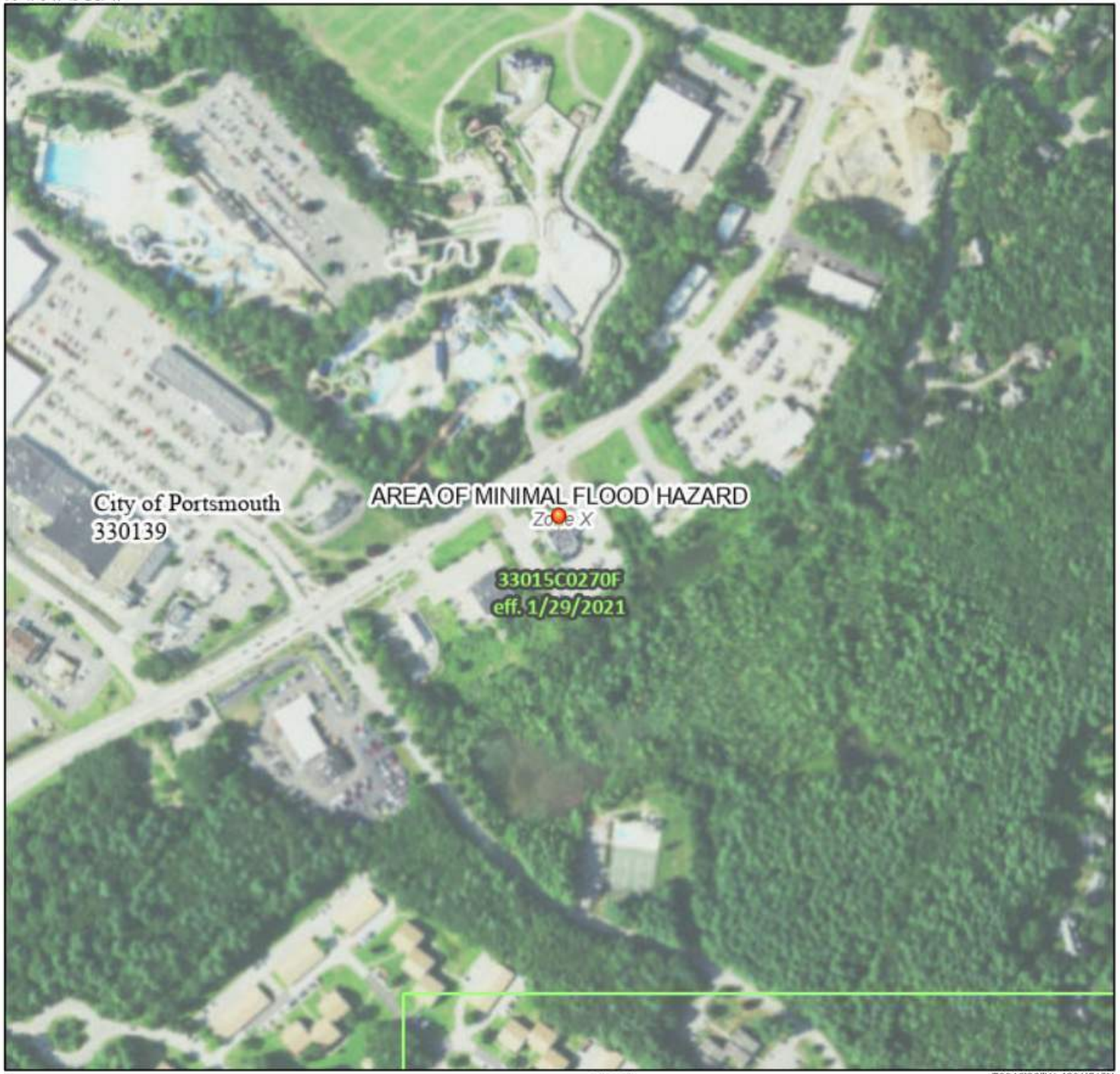
DRAWN BY: SMS
PROJECT #: NEX-2021163
DATE: 1/7/2022
FIGURE 1

F:\Projects\NEX-2021163 - Portsmouth, NH - GSC\Drainage\Stormwater Report\Appendix A - Figures\21163 - USGS Map.dwg USGS 1/10/22 8:58am ssimon

National Flood Hazard Layer FIRMette

FEMA

70°47'6"W 43°2'17"N



70°46'29"W 43°1'51"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/3/2021 at 3:56 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

APPENDIX B

Soils Information

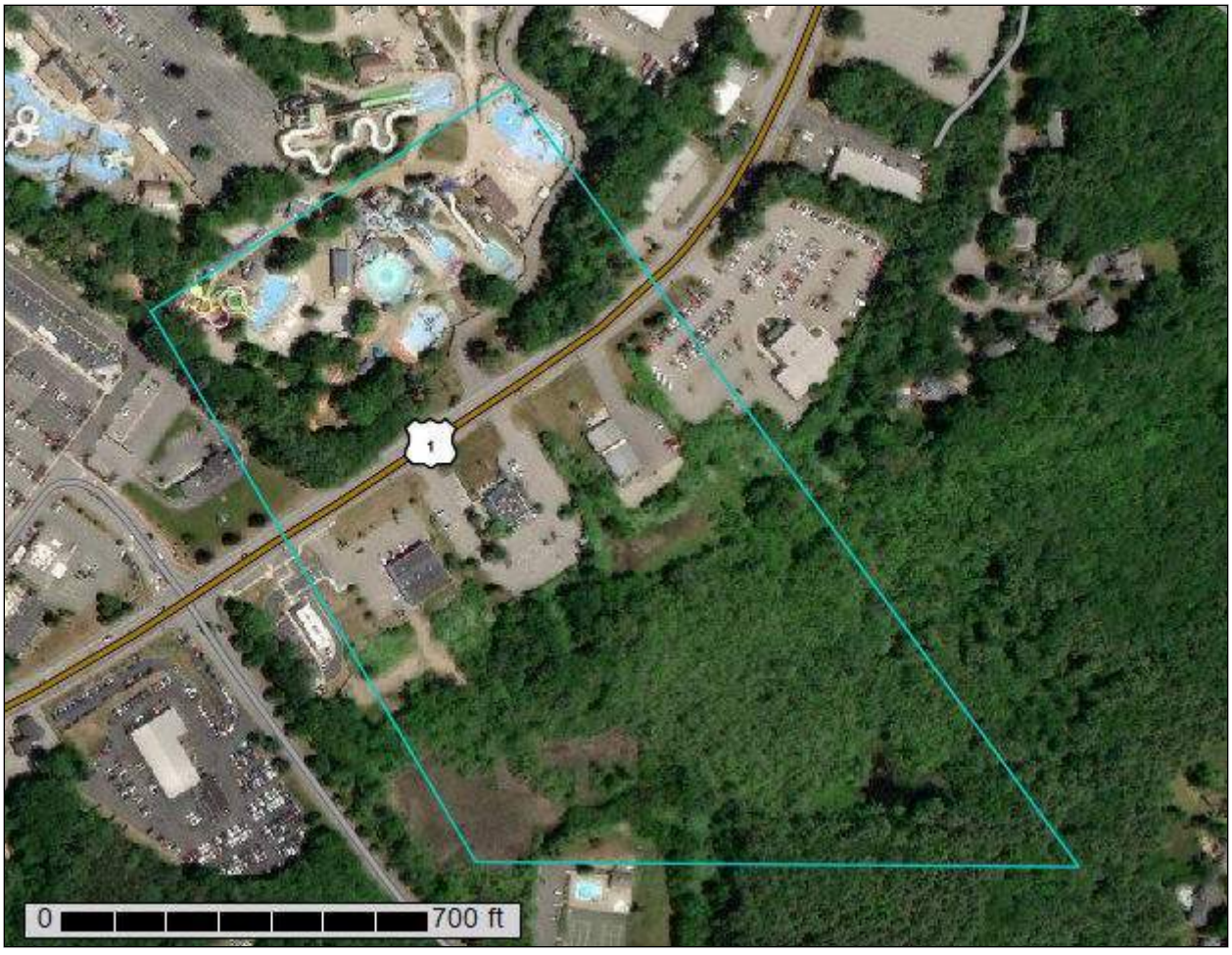
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Rockingham County, New Hampshire



September 20, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,850 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Rockingham County, New Hampshire
Survey Area Data: Version 22, May 29, 2020

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

Date(s) aerial images were photographed: Dec 31, 2009—Jun 14, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
140B	Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky	5.4	17.5%
299	Udorthents, smoothed	4.6	14.8%
314A	Pipestone sand, 0 to 5 percent slopes	13.9	44.6%
699	Urban land	7.2	23.1%
Totals for Area of Interest		**31.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate

pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Rockingham County, New Hampshire

140B—Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky

Map Unit Setting

National map unit symbol: 2w82m
Elevation: 380 to 1,070 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Chatfield, very stony, and similar soils: 35 percent
Hollis, very stony, and similar soils: 25 percent
Canton, very stony, and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands

Hydric soil rating: No

Description of Canton, Very Stony

Setting

Landform: Ridges, hills, moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Hollis, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam

2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Minor Components

Freetown

Percent of map unit: 5 percent
Landform: Bogs, marshes, depressions, kettles, swamps
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Newfields, very stony

Percent of map unit: 5 percent
Landform: Hills, ground moraines, moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Walpole, very stony

Percent of map unit: 3 percent
Landform: Outwash plains, depressions, depressions, deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Rock outcrop

Percent of map unit: 2 percent
Landform: Ridges, hills
Hydric soil rating: Unranked

299—Udorthents, smoothed

Map Unit Setting

National map unit symbol: 9cmt
Elevation: 0 to 840 feet
Mean annual precipitation: 44 to 49 inches
Mean annual air temperature: 48 degrees F
Frost-free period: 155 to 165 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Properties and qualities

Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

314A—Pipestone sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 9cn2
Elevation: 0 to 2,100 feet
Mean annual precipitation: 28 to 55 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 100 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Pipestone and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pipestone

Setting

Landform: Outwash terraces

Typical profile

H1 - 0 to 6 inches: sand
H2 - 6 to 33 inches: sand
H3 - 33 to 60 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: Yes

Minor Components

Not named wet

Percent of map unit: 5 percent
Landform: Outwash terraces
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Chocorua

Percent of map unit: 5 percent
Landform: Bogs
Hydric soil rating: Yes

Deerfield

Percent of map unit: 5 percent
Hydric soil rating: No

Squamscott

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

699—Urban land

Map Unit Composition

Urban land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Not named

Percent of map unit: 15 percent
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

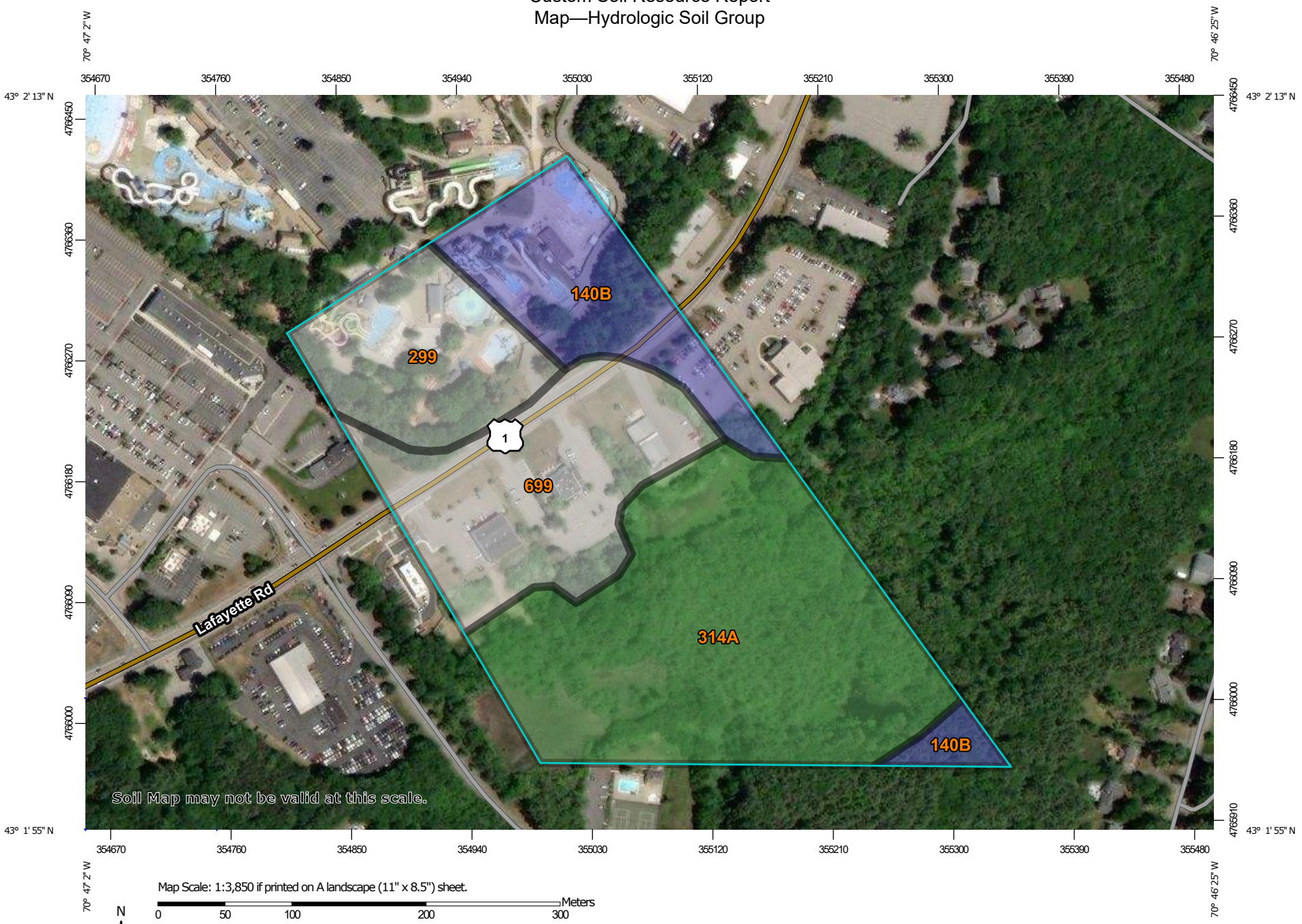
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:3,850 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Rockingham County, New Hampshire
Survey Area Data: Version 22, May 29, 2020

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

Date(s) aerial images were photographed: Dec 31, 2009—Jun 14, 2017

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
140B	Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky	B	5.4	17.5%
299	Udorthents, smoothed		4.6	14.8%
314A	Pipestone sand, 0 to 5 percent slopes	A/D	13.9	44.6%
699	Urban land		7.2	23.1%
Totals for Area of Interest			**31.1**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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APPENDIX C

Test Pit Logs

TEST PIT DATA

Client: Granite State Convenience
Project Address: 2255 Lafayette Road
Town, State: Portsmouth, NH
Job Number: NEX-2021163
Date: September 30, 2021
Performed by: Diane Pantermoller

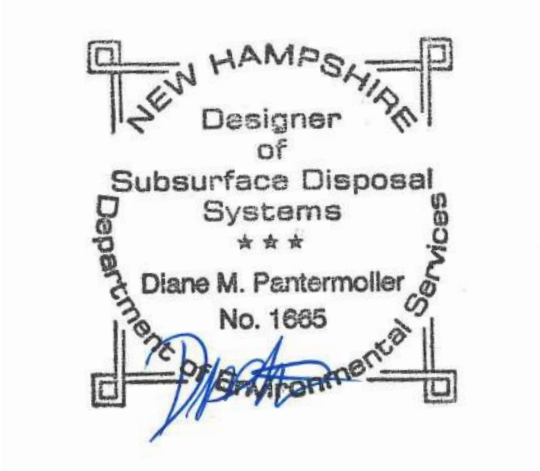
Test Pit No.	**9-1**	SCS Soil:	Pipestone
ESHWT:	>48”	Standing Water:	None
Refusal:	48”	Roots:	None

Depth	Horizon	Soil Texture	Color	Consistence	Mottles; Quantity/Contrast
0-30”	A	Loamy Sand	10yr 2/2	FR	
30-48”	B	Loamy Sand	10yr 4/4	FR	
48”	R				

Test Pit No.	**9-2**	SCS Soil:	Pipestone
ESHWT:	36”	Standing Water:	None
Refusal:	38”	Roots:	None

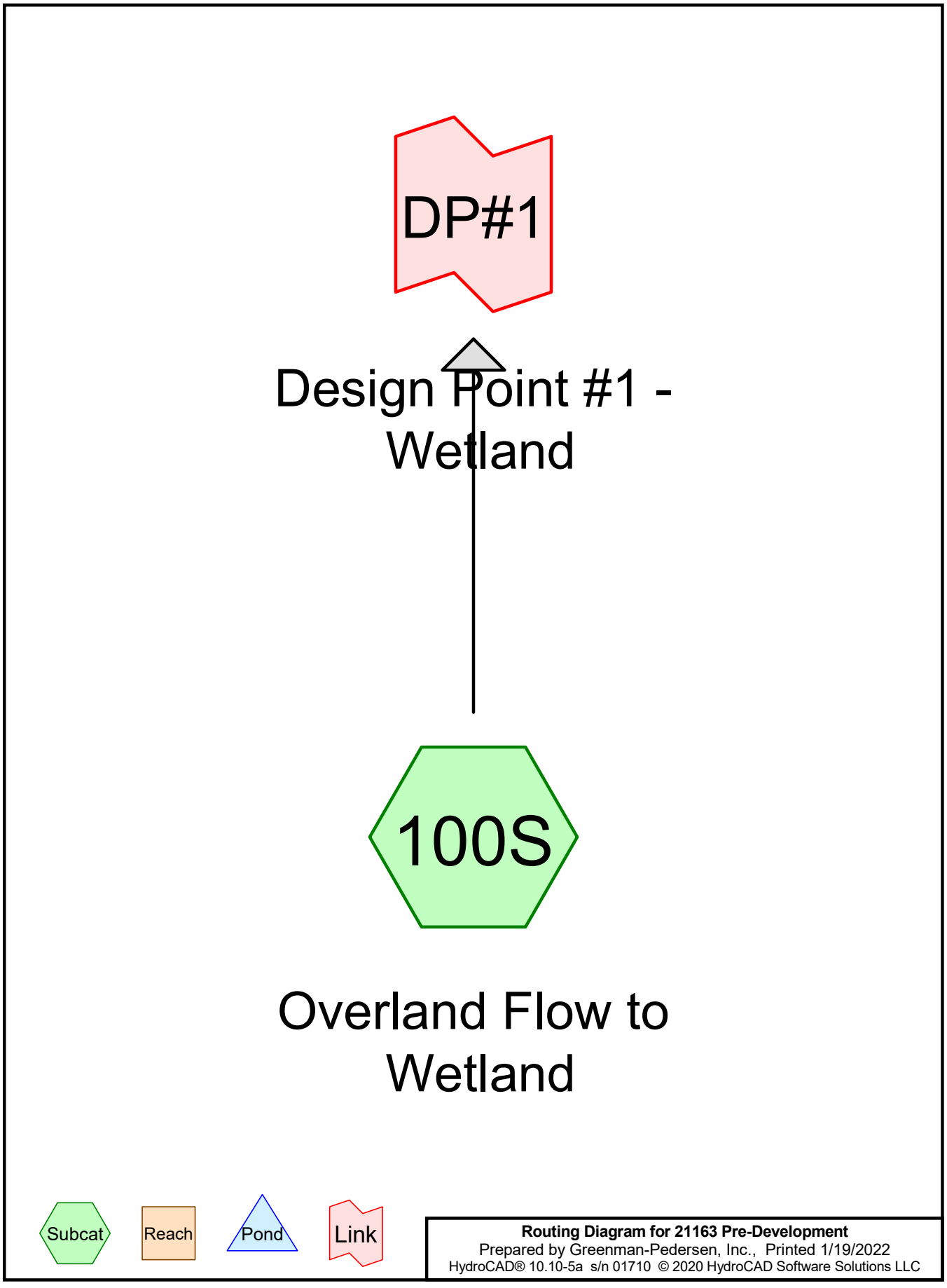
Depth	Horizon	Soil Texture	Color	Consistence	Mottles; Quantity/Contrast
0-24”	A	Loamy Sand	10yr 3/2	FR	
24-33”	B	Loamy Sand	10yr 5/8	FR	
33-38”	C	Loamy Sand	2.5y 7/4	FR	@ 36” Distinct
38”	R				

NOTES



APPENDIX D

Pre-Development HydroCAD Computations



Routing Diagram for 21163 Pre-Development
Prepared by Greenman-Pedersen, Inc., Printed 1/19/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.683	39	>75% Grass cover, Good, HSG A (100S)
1.376	98	Paved parking, HSG A (100S)
0.123	98	Roofs, HSG A (100S)
0.461	30	Woods, Good, HSG A (100S)
2.643	**71**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.643	HSG A	100S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
2.643		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.683	0.000	0.000	0.000	0.000	0.683	>75% Grass cover, Good	100S
1.376	0.000	0.000	0.000	0.000	1.376	Paved parking	100S
0.123	0.000	0.000	0.000	0.000	0.123	Roofs	100S
0.461	0.000	0.000	0.000	0.000	0.461	Woods, Good	100S
2.643	**0.000**	**0.000**	**0.000**	**0.000**	**2.643**	**TOTAL AREA**	

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100S: Overland Flow to Runoff Area=2.643 ac 56.72% Impervious Runoff Depth=1.20"
Flow Length=179' Tc=6.0 min CN=71 Runoff=3.52 cfs 0.264 af

Link DP#1: Design Point #1 - Wetland Inflow=3.52 cfs 0.264 af
Primary=3.52 cfs 0.264 af

Total Runoff Area = 2.643 ac Runoff Volume = 0.264 af Average Runoff Depth = 1.20"
43.28% Pervious = 1.144 ac 56.72% Impervious = 1.499 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100S: Overland Flow to Runoff Area=2.643 ac 56.72% Impervious Runoff Depth=2.62"
Flow Length=179' Tc=6.0 min CN=71 Runoff=8.07 cfs 0.577 af

Link DP#1: Design Point #1 - Wetland Inflow=8.07 cfs 0.577 af
Primary=8.07 cfs 0.577 af

Total Runoff Area = 2.643 ac Runoff Volume = 0.577 af Average Runoff Depth = 2.62"
43.28% Pervious = 1.144 ac 56.72% Impervious = 1.499 ac

Summary for Subcatchment 100S: Overland Flow to Wetland

Runoff = 8.07 cfs @ 12.09 hrs, Volume= 0.577 af, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.65"

Area (ac)	CN	Description
0.683	39	>75% Grass cover, Good, HSG A
1.376	98	Paved parking, HSG A
0.123	98	Roofs, HSG A
0.461	30	Woods, Good, HSG A
2.643	71	Weighted Average
1.144		43.28% Pervious Area
1.499		56.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	12	0.0900	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.71"
1.2	13	0.0540	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.71"
0.5	51	0.0590	1.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.5	103	0.0510	1.13		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.2	179	Total, Increased to minimum Tc = 6.0 min			

Summary for Link DP#1: Design Point #1 - Wetland

Inflow Area = 2.643 ac, 56.72% Impervious, Inflow Depth = 2.62" for 10-Year event
Inflow = 8.07 cfs @ 12.09 hrs, Volume= 0.577 af
Primary = 8.07 cfs @ 12.09 hrs, Volume= 0.577 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100S: Overland Flow to Runoff Area=2.643 ac 56.72% Impervious Runoff Depth=3.86"
Flow Length=179' Tc=6.0 min CN=71 Runoff=11.96 cfs 0.850 af

Link DP#1: Design Point #1 - Wetland Inflow=11.96 cfs 0.850 af
Primary=11.96 cfs 0.850 af

Total Runoff Area = 2.643 ac Runoff Volume = 0.850 af Average Runoff Depth = 3.86"
43.28% Pervious = 1.144 ac 56.72% Impervious = 1.499 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

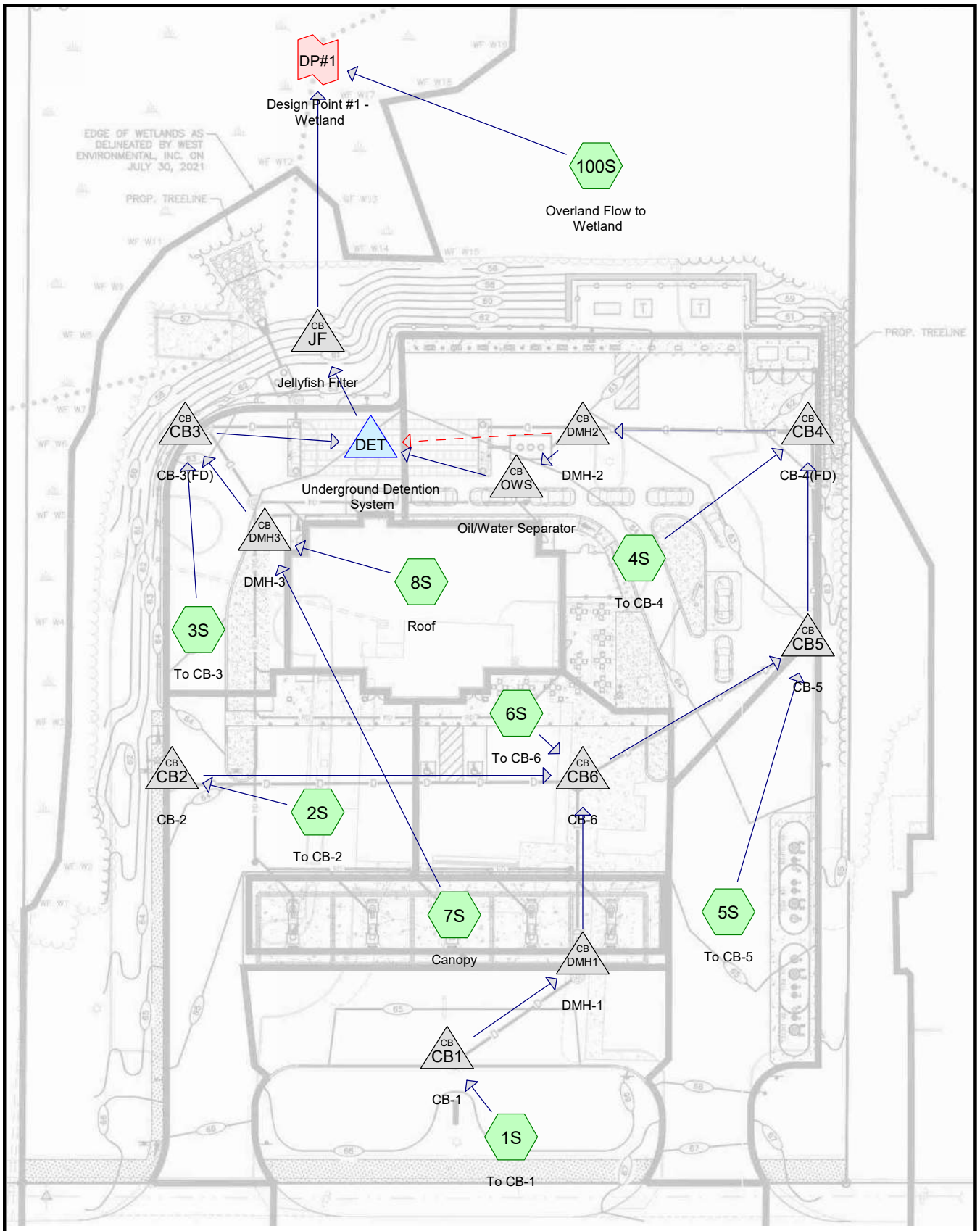
Subcatchment 100S: Overland Flow to Runoff Area=2.643 ac 56.72% Impervious Runoff Depth=5.09"
Flow Length=179' Tc=6.0 min CN=71 Runoff=15.75 cfs 1.120 af

Link DP#1: Design Point #1 - Wetland Inflow=15.75 cfs 1.120 af
Primary=15.75 cfs 1.120 af

Total Runoff Area = 2.643 ac Runoff Volume = 1.120 af Average Runoff Depth = 5.09"
43.28% Pervious = 1.144 ac 56.72% Impervious = 1.499 ac

APPENDIX E

Post-Development HydroCAD Computations



Subcat | Reach | Pond | Link

Routing Diagram for 21163 Post-Development REV1
Prepared by Greenman-Pedersen, Inc., Printed 4/19/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.731	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S, 4S, 6S, 100S)
1.349	98	Paved parking, HSG A (1S, 2S, 3S, 4S, 5S, 6S, 7S, 100S)
0.114	98	Roofs, HSG A (8S)
0.449	30	Woods, Good, HSG A (100S)
2.643	**70**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.643	HSG A	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 100S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
2.643		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.731	0.000	0.000	0.000	0.000	0.731	>75% Grass cover, Good	1S, 2S, 3S, 4S, 6S, 100S
1.349	0.000	0.000	0.000	0.000	1.349	Paved parking	1S, 2S, 3S, 4S, 5S, 6S, 7S, 100S
0.114	0.000	0.000	0.000	0.000	0.114	Roofs	8S
0.449	0.000	0.000	0.000	0.000	0.449	Woods, Good	100S
2.643	**0.000**	**0.000**	**0.000**	**0.000**	**2.643**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	CB1	61.05	60.50	50.9	0.0108	0.012	0.0	12.0	0.0
2	CB2	60.20	59.50	138.6	0.0051	0.012	0.0	12.0	0.0
3	CB3	58.80	57.00	28.8	0.0625	0.012	0.0	12.0	0.0
4	CB4	57.95	57.55	80.7	0.0050	0.012	0.0	18.0	0.0
5	CB5	58.40	58.05	70.4	0.0050	0.012	0.0	18.0	0.0
6	CB6	59.25	58.65	93.9	0.0064	0.012	0.0	15.0	0.0
7	DET	57.00	56.90	3.0	0.0333	0.012	0.0	18.0	0.0
8	DMH1	60.40	59.50	65.9	0.0137	0.012	0.0	12.0	0.0
9	DMH2	57.45	57.35	10.4	0.0096	0.012	0.0	6.0	0.0
10	DMH2	57.95	57.00	29.4	0.0323	0.012	0.0	18.0	0.0
11	DMH3	59.20	58.90	30.5	0.0098	0.012	0.0	12.0	0.0
12	JF	56.40	56.25	12.4	0.0121	0.012	0.0	18.0	0.0
13	OWS	57.10	57.00	7.5	0.0133	0.012	0.0	6.0	0.0

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: To CB-1 Runoff Area=0.390 ac 61.82% Impervious Runoff Depth=1.45"
Tc=6.0 min CN=75 Runoff=0.65 cfs 0.047 af

Subcatchment 2S: To CB-2 Runoff Area=0.206 ac 97.16% Impervious Runoff Depth=3.25"
Tc=6.0 min CN=96 Runoff=0.73 cfs 0.056 af

Subcatchment 3S: To CB-3 Runoff Area=0.123 ac 79.43% Impervious Runoff Depth=2.29"
Tc=6.0 min CN=86 Runoff=0.33 cfs 0.023 af

Subcatchment 4S: To CB-4 Runoff Area=0.331 ac 90.25% Impervious Runoff Depth=2.84"
Tc=6.0 min CN=92 Runoff=1.07 cfs 0.078 af

Subcatchment 5S: To CB-5 Runoff Area=0.172 ac 100.00% Impervious Runoff Depth=3.48"
Tc=6.0 min CN=98 Runoff=0.62 cfs 0.050 af

Subcatchment 6S: To CB-6 Runoff Area=0.135 ac 97.82% Impervious Runoff Depth=3.36"
Tc=6.0 min CN=97 Runoff=0.48 cfs 0.038 af

Subcatchment 7S: Canopy Runoff Area=0.081 ac 100.00% Impervious Runoff Depth=3.48"
Tc=0.0 min CN=98 Runoff=0.36 cfs 0.023 af

Subcatchment 8S: Roof Runoff Area=0.114 ac 100.00% Impervious Runoff Depth=3.48"
Tc=0.0 min CN=98 Runoff=0.50 cfs 0.033 af

Subcatchment 100S: Overland Flow to Runoff Area=1.091 ac 11.63% Impervious Runoff Depth=0.06"
Flow Length=416' Tc=8.1 min CN=42 Runoff=0.01 cfs 0.006 af

Pond CB1: CB-1 Peak Elev=61.46' Inflow=0.65 cfs 0.047 af
12.0" Round Culvert n=0.012 L=50.9' S=0.0108 '/' Outflow=0.65 cfs 0.047 af

Pond CB2: CB-2 Peak Elev=60.71' Inflow=0.73 cfs 0.056 af
12.0" Round Culvert n=0.012 L=138.6' S=0.0051 '/' Outflow=0.73 cfs 0.056 af

Pond CB3: CB-3(FD) Peak Elev=59.33' Inflow=1.05 cfs 0.080 af
12.0" Round Culvert n=0.012 L=28.8' S=0.0625 '/' Outflow=1.05 cfs 0.080 af

Pond CB4: CB-4(FD) Peak Elev=59.21' Inflow=3.54 cfs 0.269 af
18.0" Round Culvert n=0.012 L=80.7' S=0.0050 '/' Outflow=3.54 cfs 0.269 af

Pond CB5: CB-5 Peak Elev=59.46' Inflow=2.48 cfs 0.191 af
18.0" Round Culvert n=0.012 L=70.4' S=0.0050 '/' Outflow=2.48 cfs 0.191 af

Pond CB6: CB-6 Peak Elev=60.03' Inflow=1.86 cfs 0.141 af
15.0" Round Culvert n=0.012 L=93.9' S=0.0064 '/' Outflow=1.86 cfs 0.141 af

Pond DET: Underground Detention System Peak Elev=58.57' Storage=837 cf Inflow=4.31 cfs 0.349 af
Outflow=3.36 cfs 0.349 af

Pond DMH1: DMH-1 Peak Elev=60.81' Inflow=0.65 cfs 0.047 af
12.0" Round Culvert n=0.012 L=65.9' S=0.0137 '/' Outflow=0.65 cfs 0.047 af

Pond DMH2: DMH-2 Peak Elev=58.88' Inflow=3.54 cfs 0.269 af
Primary=0.56 cfs 0.189 af Secondary=3.05 cfs 0.080 af Outflow=3.54 cfs 0.269 af

Pond DMH3: DMH-3 Peak Elev=59.71' Inflow=0.86 cfs 0.056 af
12.0" Round Culvert n=0.012 L=30.5' S=0.0098 '/' Outflow=0.86 cfs 0.056 af

Pond JF: Jellyfish Filter Peak Elev=57.38' Inflow=3.36 cfs 0.349 af
18.0" Round Culvert n=0.012 L=12.4' S=0.0121 '/' Outflow=3.36 cfs 0.349 af

Pond OWS: Oil/Water Separator Peak Elev=58.71' Inflow=0.56 cfs 0.189 af
6.0" Round Culvert n=0.012 L=7.5' S=0.0133 '/' Outflow=0.56 cfs 0.189 af

Link DP#1: Design Point #1 - Wetland Inflow=3.36 cfs 0.354 af
Primary=3.36 cfs 0.354 af

Total Runoff Area = 2.643 ac Runoff Volume = 0.354 af Average Runoff Depth = 1.61"
44.63% Pervious = 1.179 ac 55.37% Impervious = 1.463 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: To CB-1 Runoff Area=0.390 ac 61.82% Impervious Runoff Depth=2.99"
Tc=6.0 min CN=75 Runoff=1.37 cfs 0.097 af

Subcatchment 2S: To CB-2 Runoff Area=0.206 ac 97.16% Impervious Runoff Depth=5.18"
Tc=6.0 min CN=96 Runoff=1.13 cfs 0.089 af

Subcatchment 3S: To CB-3 Runoff Area=0.123 ac 79.43% Impervious Runoff Depth=4.08"
Tc=6.0 min CN=86 Runoff=0.57 cfs 0.042 af

Subcatchment 4S: To CB-4 Runoff Area=0.331 ac 90.25% Impervious Runoff Depth=4.73"
Tc=6.0 min CN=92 Runoff=1.73 cfs 0.130 af

Subcatchment 5S: To CB-5 Runoff Area=0.172 ac 100.00% Impervious Runoff Depth=5.41"
Tc=6.0 min CN=98 Runoff=0.95 cfs 0.077 af

Subcatchment 6S: To CB-6 Runoff Area=0.135 ac 97.82% Impervious Runoff Depth=5.30"
Tc=6.0 min CN=97 Runoff=0.74 cfs 0.060 af

Subcatchment 7S: Canopy Runoff Area=0.081 ac 100.00% Impervious Runoff Depth=5.41"
Tc=0.0 min CN=98 Runoff=0.54 cfs 0.036 af

Subcatchment 8S: Roof Runoff Area=0.114 ac 100.00% Impervious Runoff Depth=5.41"
Tc=0.0 min CN=98 Runoff=0.77 cfs 0.051 af

Subcatchment 100S: Overland Flow to Runoff Area=1.091 ac 11.63% Impervious Runoff Depth=0.50"
Flow Length=416' Tc=8.1 min CN=42 Runoff=0.24 cfs 0.045 af

Pond CB1: CB-1 Peak Elev=61.69' Inflow=1.37 cfs 0.097 af
12.0" Round Culvert n=0.012 L=50.9' S=0.0108 '/' Outflow=1.37 cfs 0.097 af

Pond CB2: CB-2 Peak Elev=61.00' Inflow=1.13 cfs 0.089 af
12.0" Round Culvert n=0.012 L=138.6' S=0.0051 '/' Outflow=1.13 cfs 0.089 af

Pond CB3: CB-3(FD) Peak Elev=59.53' Inflow=1.67 cfs 0.129 af
12.0" Round Culvert n=0.012 L=28.8' S=0.0625 '/' Outflow=1.67 cfs 0.129 af

Pond CB4: CB-4(FD) Peak Elev=60.15' Inflow=5.91 cfs 0.454 af
18.0" Round Culvert n=0.012 L=80.7' S=0.0050 '/' Outflow=5.91 cfs 0.454 af

Pond CB5: CB-5 Peak Elev=60.37' Inflow=4.19 cfs 0.323 af
18.0" Round Culvert n=0.012 L=70.4' S=0.0050 '/' Outflow=4.19 cfs 0.323 af

Pond CB6: CB-6 Peak Elev=60.69' Inflow=3.24 cfs 0.246 af
15.0" Round Culvert n=0.012 L=93.9' S=0.0064 '/' Outflow=3.24 cfs 0.246 af

Pond DET: Underground Detention System Peak Elev=59.33' Storage=1,459 cf Inflow=7.16 cfs 0.583 af
Outflow=6.74 cfs 0.583 af

Pond DMH1: DMH-1 Peak Elev=61.12' Inflow=1.37 cfs 0.097 af
12.0" Round Culvert n=0.012 L=65.9' S=0.0137 '/' Outflow=1.37 cfs 0.097 af

Pond DMH2: DMH-2 Peak Elev=59.71' Inflow=5.91 cfs 0.454 af
Primary=0.57 cfs 0.282 af Secondary=5.46 cfs 0.172 af Outflow=5.91 cfs 0.454 af

Pond DMH3: DMH-3 Peak Elev=59.87' Inflow=1.31 cfs 0.088 af
12.0" Round Culvert n=0.012 L=30.5' S=0.0098 '/' Outflow=1.31 cfs 0.088 af

Pond JF: Jellyfish Filter Peak Elev=57.95' Inflow=6.74 cfs 0.583 af
18.0" Round Culvert n=0.012 L=12.4' S=0.0121 '/' Outflow=6.74 cfs 0.583 af

Pond OWS: Oil/Water Separator Peak Elev=59.52' Inflow=0.57 cfs 0.282 af
6.0" Round Culvert n=0.012 L=7.5' S=0.0133 '/' Outflow=0.57 cfs 0.282 af

Link DP#1: Design Point #1 - Wetland Inflow=6.83 cfs 0.628 af
Primary=6.83 cfs 0.628 af

Total Runoff Area = 2.643 ac Runoff Volume = 0.628 af Average Runoff Depth = 2.85"
44.63% Pervious = 1.179 ac 55.37% Impervious = 1.463 ac

Summary for Subcatchment 1S: To CB-1

Runoff = 1.37 cfs @ 12.09 hrs, Volume= 0.097 af, Depth= 2.99"
Routed to Pond CB1 : CB-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.65"

Area (ac)	CN	Description
0.149	39	>75% Grass cover, Good, HSG A
0.241	98	Paved parking, HSG A
0.390	75	Weighted Average
0.149		38.18% Pervious Area
0.241		61.82% Impervious Area

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

Summary for Subcatchment 2S: To CB-2

Runoff = 1.13 cfs @ 12.08 hrs, Volume= 0.089 af, Depth= 5.18"
Routed to Pond CB2 : CB-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.65"

Area (ac)	CN	Description
0.006	39	>75% Grass cover, Good, HSG A
0.200	98	Paved parking, HSG A
0.206	96	Weighted Average
0.006		2.84% Pervious Area
0.200		97.16% Impervious Area

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

Summary for Subcatchment 3S: To CB-3

Runoff = 0.57 cfs @ 12.09 hrs, Volume= 0.042 af, Depth= 4.08"
Routed to Pond CB3 : CB-3(FD)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.65"

Area (ac)	CN	Description
0.025	39	>75% Grass cover, Good, HSG A
0.097	98	Paved parking, HSG A
0.123	86	Weighted Average
0.025		20.57% Pervious Area
0.097		79.43% Impervious Area

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

Summary for Subcatchment 4S: To CB-4

Runoff = 1.73 cfs @ 12.08 hrs, Volume= 0.130 af, Depth= 4.73"
Routed to Pond CB4 : CB-4(FD)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.65"

Area (ac)	CN	Description
0.032	39	>75% Grass cover, Good, HSG A
0.299	98	Paved parking, HSG A
0.331	92	Weighted Average
0.032		9.75% Pervious Area
0.299		90.25% Impervious Area

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

Summary for Subcatchment 5S: To CB-5

Runoff = 0.95 cfs @ 12.08 hrs, Volume= 0.077 af, Depth= 5.41"
Routed to Pond CB5 : CB-5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.65"

Area (ac)	CN	Description
0.172	98	Paved parking, HSG A
0.172		100.00% Impervious Area

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

Summary for Subcatchment 6S: To CB-6

Runoff = 0.74 cfs @ 12.08 hrs, Volume= 0.060 af, Depth= 5.30"
Routed to Pond CB6 : CB-6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.65"

Area (ac)	CN	Description
0.003	39	>75% Grass cover, Good, HSG A
0.132	98	Paved parking, HSG A
0.135	97	Weighted Average
0.003		2.18% Pervious Area
0.132		97.82% Impervious Area

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

Summary for Subcatchment 7S: Canopy

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.54 cfs @ 12.00 hrs, Volume= 0.036 af, Depth= 5.41"
Routed to Pond DMH3 : DMH-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.65"

Area (ac)	CN	Description
0.081	98	Paved parking, HSG A
0.081		100.00% Impervious Area

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

Summary for Subcatchment 8S: Roof

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.77 cfs @ 12.00 hrs, Volume= 0.051 af, Depth= 5.41"
Routed to Pond DMH3 : DMH-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.65"

Area (ac)	CN	Description
0.114	98	Roofs, HSG A
0.114		100.00% Impervious Area

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

Summary for Subcatchment 100S: Overland Flow to Wetland

Runoff = 0.24 cfs @ 12.34 hrs, Volume= 0.045 af, Depth= 0.50"
Routed to Link DP#1 : Design Point #1 - Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.65"

Area (ac)	CN	Description
0.516	39	>75% Grass cover, Good, HSG A
0.127	98	Paved parking, HSG A
0.449	30	Woods, Good, HSG A
1.091	42	Weighted Average
0.964		88.37% Pervious Area
0.127		11.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	25	0.0320	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.71"
4.1	286	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.5	105	0.0510	1.13		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.1	416	Total			

Summary for Pond CB1: CB-1

Inflow Area = 0.390 ac, 61.82% Impervious, Inflow Depth = 2.99" for 10-Year event
Inflow = 1.37 cfs @ 12.09 hrs, Volume= 0.097 af
Outflow = 1.37 cfs @ 12.09 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min
Primary = 1.37 cfs @ 12.09 hrs, Volume= 0.097 af
Routed to Pond DMH1 : DMH-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 61.69' @ 12.10 hrs
Flood Elev= 64.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	61.05'	**12.0" Round Culvert** L= 50.9' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 61.05' / 60.50' S= 0.0108 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.35 cfs @ 12.09 hrs HW=61.68' TW=61.08' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.35 cfs @ 3.65 fps)

Summary for Pond CB2: CB-2

Inflow Area = 0.206 ac, 97.16% Impervious, Inflow Depth = 5.18" for 10-Year event
Inflow = 1.13 cfs @ 12.08 hrs, Volume= 0.089 af
Outflow = 1.13 cfs @ 12.08 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min
Primary = 1.13 cfs @ 12.08 hrs, Volume= 0.089 af
Routed to Pond CB6 : CB-6

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 61.00' @ 12.12 hrs
Flood Elev= 63.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	60.20'	**12.0" Round Culvert** L= 138.6' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 60.20' / 59.50' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.05 cfs @ 12.08 hrs HW=60.94' TW=60.53' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.05 cfs @ 2.34 fps)

Summary for Pond CB3: CB-3(FD)

Inflow Area = 0.317 ac, 92.05% Impervious, Inflow Depth = 4.90" for 10-Year event
Inflow = 1.67 cfs @ 12.00 hrs, Volume= 0.129 af
Outflow = 1.67 cfs @ 12.00 hrs, Volume= 0.129 af, Atten= 0%, Lag= 0.0 min
Primary = 1.67 cfs @ 12.00 hrs, Volume= 0.129 af
Routed to Pond DET : Underground Detention System

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 59.53' @ 12.11 hrs
Flood Elev= 62.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.80'	**12.0" Round Culvert** L= 28.8' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 58.80' / 57.00' S= 0.0625 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.65 cfs @ 12.00 hrs HW=59.50' TW=58.52' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.65 cfs @ 2.84 fps)

Summary for Pond CB4: CB-4(FD)

Inflow Area = 1.234 ac, 84.61% Impervious, Inflow Depth = 4.41" for 10-Year event
Inflow = 5.91 cfs @ 12.09 hrs, Volume= 0.454 af
Outflow = 5.91 cfs @ 12.09 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min
Primary = 5.91 cfs @ 12.09 hrs, Volume= 0.454 af
Routed to Pond DMH2 : DMH-2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 60.15' @ 12.10 hrs
Flood Elev= 61.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	57.95'	**18.0" Round Culvert** L= 80.7' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 57.95' / 57.55' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=5.41 cfs @ 12.09 hrs HW=60.06' TW=59.65' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.41 cfs @ 3.06 fps)

Summary for Pond CB5: CB-5

Inflow Area = 0.903 ac, 82.54% Impervious, Inflow Depth = 4.29" for 10-Year event
Inflow = 4.19 cfs @ 12.09 hrs, Volume= 0.323 af
Outflow = 4.19 cfs @ 12.09 hrs, Volume= 0.323 af, Atten= 0%, Lag= 0.0 min
Primary = 4.19 cfs @ 12.09 hrs, Volume= 0.323 af
Routed to Pond CB4 : CB-4(FD)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 60.37' @ 12.11 hrs
Flood Elev= 63.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.40'	**18.0" Round Culvert** L= 70.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 58.40' / 58.05' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.10 cfs @ 12.09 hrs HW=60.19' TW=60.06' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 3.10 cfs @ 1.76 fps)

Summary for Pond CB6: CB-6

Inflow Area = 0.732 ac, 78.44% Impervious, Inflow Depth = 4.03" for 10-Year event
Inflow = 3.24 cfs @ 12.09 hrs, Volume= 0.246 af
Outflow = 3.24 cfs @ 12.09 hrs, Volume= 0.246 af, Atten= 0%, Lag= 0.0 min
Primary = 3.24 cfs @ 12.09 hrs, Volume= 0.246 af
Routed to Pond CB5 : CB-5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 60.69' @ 12.12 hrs
Flood Elev= 63.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	59.25'	**15.0" Round Culvert** L= 93.9' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 59.25' / 58.65' S= 0.0064 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.79 cfs @ 12.09 hrs HW=60.54' TW=60.20' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 2.79 cfs @ 2.73 fps)

Summary for Pond DET: Underground Detention System

Inflow Area = 1.552 ac, 86.13% Impervious, Inflow Depth = 4.51" for 10-Year event
Inflow = 7.16 cfs @ 12.08 hrs, Volume= 0.583 af
Outflow = 6.74 cfs @ 12.11 hrs, Volume= 0.583 af, Atten= 6%, Lag= 1.8 min
Primary = 6.74 cfs @ 12.11 hrs, Volume= 0.583 af
Routed to Pond JF : Jellyfish Filter

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 59.33' @ 12.11 hrs Surf.Area= 1,290 sf Storage= 1,459 cf
Flood Elev= 60.50' Surf.Area= 1,290 sf Storage= 1,977 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.7 min (774.8 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	57.00'	0 cf	**19.25'W x 67.00'L x 3.50'H Field A** 4,514 cf Overall - 2,468 cf Embedded = 2,046 cf x 0.0% Voids
#2A	57.00'	1,977 cf	**ADS N-12 36"** x 4 Inside #1 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.1 cf Row Length Adjustment= +40.00' x 7.10 sf x 4 rows 19.25' Header x 7.10 sf x 2 = 273.3 cf Inside
		1,977 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	57.00'	**18.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 57.00' / 56.90' S= 0.0333 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#2	Device 1	57.00'	**5.0" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	57.50'	**5.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	59.00'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.71 cfs @ 12.11 hrs HW=59.33' TW=57.95' (Dynamic Tailwater)
└─**1=Culvert** (Passes 6.71 cfs of 9.98 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 2.31 cfs @ 5.65 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.54 cfs @ 5.65 fps)
  └─**4=Orifice/Grate** (Weir Controls 2.86 cfs @ 1.87 fps)

Pond DET: Underground Detention System - Chamber Wizard Field A

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.1 cf
Row Length Adjustment= +40.00' x 7.10 sf x 4 rows

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

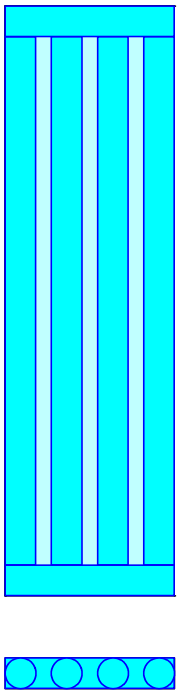
1 Chambers/Row x 20.00' Long +40.00' Row Adjustment +3.50' Header x 2 = 67.00' Row Length
4 Rows x 42.0" Wide + 21.0" Spacing x 3 = 19.25' Base Width
42.0" Chamber Height = 3.50' Field Height

4 Chambers x 142.0 cf +40.00' Row Adjustment x 7.10 sf x 4 Rows + 19.25' Header x 7.10 sf x 2 = 1,977.3 cf Chamber Storage
4 Chambers x 177.1 cf +40.00' Row Adjustment x 8.86 sf x 4 Rows + 19.25' Header x 8.86 sf x 2 = 2,466.7 cf Displacement

4,514.1 cf Field - 2,466.7 cf Chambers = 2,047.4 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 1,977.3 cf = 0.045 af
Overall Storage Efficiency = 43.8%
Overall System Size = 67.00' x 19.25' x 3.50'

4 Chambers
167.2 cy Field
75.8 cy Stone



Summary for Pond DMH1: DMH-1

Inflow Area = 0.390 ac, 61.82% Impervious, Inflow Depth = 2.99" for 10-Year event
Inflow = 1.37 cfs @ 12.09 hrs, Volume= 0.097 af
Outflow = 1.37 cfs @ 12.09 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min
Primary = 1.37 cfs @ 12.09 hrs, Volume= 0.097 af
Routed to Pond CB6 : CB-6

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 61.12' @ 12.12 hrs
Flood Elev= 65.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	60.40'	**12.0" Round Culvert** L= 65.9' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 60.40' / 59.50' S= 0.0137 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.29 cfs @ 12.09 hrs HW=61.08' TW=60.56' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.29 cfs @ 3.20 fps)

Summary for Pond DMH2: DMH-2

Inflow Area = 1.234 ac, 84.61% Impervious, Inflow Depth = 4.41" for 10-Year event
Inflow = 5.91 cfs @ 12.09 hrs, Volume= 0.454 af
Outflow = 5.91 cfs @ 12.09 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min
Primary = 0.57 cfs @ 11.67 hrs, Volume= 0.282 af
Routed to Pond OWS : Oil/Water Separator
Secondary = 5.46 cfs @ 12.09 hrs, Volume= 0.172 af
Routed to Pond DET : Underground Detention System

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 59.71' @ 12.10 hrs
Flood Elev= 63.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	57.45'	**6.0" Round Culvert** L= 10.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 57.45' / 57.35' S= 0.0096 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf
#2	Secondary	57.95'	**18.0" Round Culvert** L= 29.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 57.95' / 57.00' S= 0.0323 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.56 cfs @ 11.67 hrs HW=58.25' TW=57.90' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.56 cfs @ 2.83 fps)

Secondary OutFlow Max=5.17 cfs @ 12.09 hrs HW=59.66' TW=59.30' (Dynamic Tailwater)
2=Culvert (Inlet Controls 5.17 cfs @ 2.93 fps)

Summary for Pond DMH3: DMH-3

Inflow Area = 0.195 ac,100.00% Impervious, Inflow Depth = 5.41" for 10-Year event
Inflow = 1.31 cfs @ 12.00 hrs, Volume= 0.088 af
Outflow = 1.31 cfs @ 12.00 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min
Primary = 1.31 cfs @ 12.00 hrs, Volume= 0.088 af
Routed to Pond CB3 : CB-3(FD)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 59.87' @ 12.00 hrs
Flood Elev= 64.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	59.20'	**12.0" Round Culvert** L= 30.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 59.20' / 58.90' S= 0.0098 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.27 cfs @ 12.00 hrs HW=59.87' TW=59.50' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.27 cfs @ 3.22 fps)

Summary for Pond JF: Jellyfish Filter

Inflow Area = 1.552 ac, 86.13% Impervious, Inflow Depth = 4.51" for 10-Year event
Inflow = 6.74 cfs @ 12.11 hrs, Volume= 0.583 af
Outflow = 6.74 cfs @ 12.11 hrs, Volume= 0.583 af, Atten= 0%, Lag= 0.0 min
Primary = 6.74 cfs @ 12.11 hrs, Volume= 0.583 af
Routed to Link DP#1 : Design Point #1 - Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 57.95' @ 12.11 hrs
Flood Elev= 62.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	56.40'	**18.0" Round Culvert** L= 12.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 56.40' / 56.25' S= 0.0121 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=6.73 cfs @ 12.11 hrs HW=57.95' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 6.73 cfs @ 4.58 fps)

Summary for Pond OWS: Oil/Water Separator

Inflow Area = 1.234 ac, 84.61% Impervious, Inflow Depth = 2.74" for 10-Year event
Inflow = 0.57 cfs @ 11.67 hrs, Volume= 0.282 af
Outflow = 0.57 cfs @ 11.67 hrs, Volume= 0.282 af, Atten= 0%, Lag= 0.0 min
Primary = 0.57 cfs @ 11.67 hrs, Volume= 0.282 af
Routed to Pond DET : Underground Detention System

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 59.52' @ 12.10 hrs
Flood Elev= 63.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	57.10'	**6.0" Round Culvert** L= 7.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 57.10' / 57.00' S= 0.0133 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.56 cfs @ 11.67 hrs HW=57.90' TW=57.56' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.56 cfs @ 2.83 fps)

Summary for Link DP#1: Design Point #1 - Wetland

Inflow Area = 2.643 ac, 55.37% Impervious, Inflow Depth = 2.85" for 10-Year event
Inflow = 6.83 cfs @ 12.11 hrs, Volume= 0.628 af
Primary = 6.83 cfs @ 12.11 hrs, Volume= 0.628 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: To CB-1 Runoff Area=0.390 ac 61.82% Impervious Runoff Depth=4.29"
Tc=6.0 min CN=75 Runoff=1.96 cfs 0.139 af

Subcatchment 2S: To CB-2 Runoff Area=0.206 ac 97.16% Impervious Runoff Depth=6.68"
Tc=6.0 min CN=96 Runoff=1.44 cfs 0.115 af

Subcatchment 3S: To CB-3 Runoff Area=0.123 ac 79.43% Impervious Runoff Depth=5.52"
Tc=6.0 min CN=86 Runoff=0.77 cfs 0.056 af

Subcatchment 4S: To CB-4 Runoff Area=0.331 ac 90.25% Impervious Runoff Depth=6.21"
Tc=6.0 min CN=92 Runoff=2.23 cfs 0.171 af

Subcatchment 5S: To CB-5 Runoff Area=0.172 ac 100.00% Impervious Runoff Depth=6.92"
Tc=6.0 min CN=98 Runoff=1.21 cfs 0.099 af

Subcatchment 6S: To CB-6 Runoff Area=0.135 ac 97.82% Impervious Runoff Depth=6.80"
Tc=6.0 min CN=97 Runoff=0.95 cfs 0.077 af

Subcatchment 7S: Canopy Runoff Area=0.081 ac 100.00% Impervious Runoff Depth=6.92"
Tc=0.0 min CN=98 Runoff=0.69 cfs 0.046 af

Subcatchment 8S: Roof Runoff Area=0.114 ac 100.00% Impervious Runoff Depth=6.92"
Tc=0.0 min CN=98 Runoff=0.98 cfs 0.066 af

Subcatchment 100S: Overland Flow to Runoff Area=1.091 ac 11.63% Impervious Runoff Depth=1.06"
Flow Length=416' Tc=8.1 min CN=42 Runoff=0.83 cfs 0.097 af

Pond CB1: CB-1 Peak Elev=62.58' Inflow=1.96 cfs 0.139 af
12.0" Round Culvert n=0.012 L=50.9' S=0.0108 '/' Outflow=1.96 cfs 0.139 af

Pond CB2: CB-2 Peak Elev=62.29' Inflow=1.44 cfs 0.115 af
12.0" Round Culvert n=0.012 L=138.6' S=0.0051 '/' Outflow=1.44 cfs 0.115 af

Pond CB3: CB-3(FD) Peak Elev=59.74' Inflow=2.14 cfs 0.169 af
12.0" Round Culvert n=0.012 L=28.8' S=0.0625 '/' Outflow=2.14 cfs 0.169 af

Pond CB4: CB-4(FD) Peak Elev=61.05' Inflow=7.78 cfs 0.601 af
18.0" Round Culvert n=0.012 L=80.7' S=0.0050 '/' Outflow=7.78 cfs 0.601 af

Pond CB5: CB-5 Peak Elev=61.45' Inflow=5.55 cfs 0.430 af
18.0" Round Culvert n=0.012 L=70.4' S=0.0050 '/' Outflow=5.55 cfs 0.430 af

Pond CB6: CB-6 Peak Elev=62.06' Inflow=4.34 cfs 0.331 af
15.0" Round Culvert n=0.012 L=93.9' S=0.0064 '/' Outflow=4.34 cfs 0.331 af

Pond DET: Underground Detention System Peak Elev=59.55' Storage=1,623 cf Inflow=9.41 cfs 0.770 af
Outflow=8.99 cfs 0.770 af

Pond DMH1: DMH-1 Peak Elev=62.34' Inflow=1.96 cfs 0.139 af
12.0" Round Culvert n=0.012 L=65.9' S=0.0137 '/' Outflow=1.96 cfs 0.139 af

Pond DMH2: DMH-2 Peak Elev=60.23' Inflow=7.78 cfs 0.601 af
Primary=0.58 cfs 0.351 af Secondary=7.21 cfs 0.251 af Outflow=7.78 cfs 0.601 af

Pond DMH3: DMH-3 Peak Elev=60.00' Inflow=1.67 cfs 0.112 af
12.0" Round Culvert n=0.012 L=30.5' S=0.0098 '/' Outflow=1.67 cfs 0.112 af

Pond JF: Jellyfish Filter Peak Elev=58.43' Inflow=8.99 cfs 0.770 af
18.0" Round Culvert n=0.012 L=12.4' S=0.0121 '/' Outflow=8.99 cfs 0.770 af

Pond OWS: Oil/Water Separator Peak Elev=59.89' Inflow=0.58 cfs 0.351 af
6.0" Round Culvert n=0.012 L=7.5' S=0.0133 '/' Outflow=0.58 cfs 0.351 af

Link DP#1: Design Point #1 - Wetland Inflow=9.72 cfs 0.867 af
Primary=9.72 cfs 0.867 af

Total Runoff Area = 2.643 ac Runoff Volume = 0.867 af Average Runoff Depth = 3.94"
44.63% Pervious = 1.179 ac 55.37% Impervious = 1.463 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: To CB-1 Runoff Area=0.390 ac 61.82% Impervious Runoff Depth=5.57"
Tc=6.0 min CN=75 Runoff=2.53 cfs 0.181 af

Subcatchment 2S: To CB-2 Runoff Area=0.206 ac 97.16% Impervious Runoff Depth=8.10"
Tc=6.0 min CN=96 Runoff=1.73 cfs 0.139 af

Subcatchment 3S: To CB-3 Runoff Area=0.123 ac 79.43% Impervious Runoff Depth=6.89"
Tc=6.0 min CN=86 Runoff=0.95 cfs 0.070 af

Subcatchment 4S: To CB-4 Runoff Area=0.331 ac 90.25% Impervious Runoff Depth=7.62"
Tc=6.0 min CN=92 Runoff=2.71 cfs 0.210 af

Subcatchment 5S: To CB-5 Runoff Area=0.172 ac 100.00% Impervious Runoff Depth=8.34"
Tc=6.0 min CN=98 Runoff=1.45 cfs 0.119 af

Subcatchment 6S: To CB-6 Runoff Area=0.135 ac 97.82% Impervious Runoff Depth=8.22"
Tc=6.0 min CN=97 Runoff=1.14 cfs 0.093 af

Subcatchment 7S: Canopy Runoff Area=0.081 ac 100.00% Impervious Runoff Depth=8.34"
Tc=0.0 min CN=98 Runoff=0.83 cfs 0.056 af

Subcatchment 8S: Roof Runoff Area=0.114 ac 100.00% Impervious Runoff Depth=8.34"
Tc=0.0 min CN=98 Runoff=1.17 cfs 0.079 af

Subcatchment 100S: Overland Flow to Runoff Area=1.091 ac 11.63% Impervious Runoff Depth=1.72"
Flow Length=416' Tc=8.1 min CN=42 Runoff=1.65 cfs 0.157 af

Pond CB1: CB-1 Peak Elev=64.55' Inflow=2.53 cfs 0.181 af
12.0" Round Culvert n=0.012 L=50.9' S=0.0108 '/' Outflow=2.53 cfs 0.181 af

Pond CB2: CB-2 Peak Elev=64.04' Inflow=1.73 cfs 0.139 af
12.0" Round Culvert n=0.012 L=138.6' S=0.0051 '/' Outflow=1.73 cfs 0.139 af

Pond CB3: CB-3(FD) Peak Elev=60.39' Inflow=2.59 cfs 0.206 af
12.0" Round Culvert n=0.012 L=28.8' S=0.0625 '/' Outflow=2.59 cfs 0.206 af

Pond CB4: CB-4(FD) Peak Elev=62.24' Inflow=9.55 cfs 0.742 af
18.0" Round Culvert n=0.012 L=80.7' S=0.0050 '/' Outflow=9.55 cfs 0.742 af

Pond CB5: CB-5 Peak Elev=62.82' Inflow=6.84 cfs 0.532 af
18.0" Round Culvert n=0.012 L=70.4' S=0.0050 '/' Outflow=6.84 cfs 0.532 af

Pond CB6: CB-6 Peak Elev=63.72' Inflow=5.39 cfs 0.413 af
15.0" Round Culvert n=0.012 L=93.9' S=0.0064 '/' Outflow=5.39 cfs 0.413 af

Pond DET: Underground Detention System Peak Elev=60.21' Storage=1,972 cf Inflow=11.53 cfs 0.948 af
Outflow=10.55 cfs 0.948 af

Pond DMH1: DMH-1 Peak Elev=64.17' Inflow=2.53 cfs 0.181 af
12.0" Round Culvert n=0.012 L=65.9' S=0.0137 '/' Outflow=2.53 cfs 0.181 af

Pond DMH2: DMH-2 Peak Elev=61.12' Inflow=9.55 cfs 0.742 af
Primary=0.73 cfs 0.409 af Secondary=8.82 cfs 0.333 af Outflow=9.55 cfs 0.742 af

Pond DMH3: DMH-3 Peak Elev=60.43' Inflow=2.00 cfs 0.135 af
12.0" Round Culvert n=0.012 L=30.5' S=0.0098 '/' Outflow=2.00 cfs 0.135 af

Pond JF: Jellyfish Filter Peak Elev=58.69' Inflow=10.55 cfs 0.948 af
18.0" Round Culvert n=0.012 L=12.4' S=0.0121 '/' Outflow=10.55 cfs 0.948 af

Pond OWS: Oil/Water Separator Peak Elev=60.66' Inflow=0.73 cfs 0.409 af
6.0" Round Culvert n=0.012 L=7.5' S=0.0133 '/' Outflow=0.73 cfs 0.409 af

Link DP#1: Design Point #1 - Wetland Inflow=12.14 cfs 1.105 af
Primary=12.14 cfs 1.105 af

Total Runoff Area = 2.643 ac Runoff Volume = 1.105 af Average Runoff Depth = 5.02"
44.63% Pervious = 1.179 ac 55.37% Impervious = 1.463 ac

APPENDIX F

Supplemental Calculations and Backup Data

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New Hampshire
Location	
Longitude	70.780 degrees West
Latitude	43.034 degrees North
Elevation	0 feet
Date/Time	Wed, 22 Sep 2021 13:51:31 -0400

Per Env-Wq 1503.08(l) these values are increased by 15% for the analysis

2yr 3.71
10yr 5.65
25yr 7.16
50yr 8.58

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.50	0.65	0.82	1.04	**1yr**	0.71	0.98	1.22	1.57	2.04	2.68	2.93	**1yr**	2.37	2.83	3.25	3.97	4.59	**1yr**
2yr	0.32	0.50	0.62	0.82	1.03	1.30	**2yr**	0.89	1.18	1.52	1.95	2.50	3.23	3.60	**2yr**	2.86	3.46	3.97	4.72	5.37	**2yr**
5yr	0.37	0.58	0.73	0.98	1.25	1.61	**5yr**	1.08	1.47	1.89	2.44	3.16	4.10	4.62	**5yr**	3.63	4.44	5.09	5.99	6.76	**5yr**
10yr	0.41	0.65	0.82	1.12	1.46	1.90	**10yr**	1.26	1.73	2.24	2.91	3.78	4.91	5.58	**10yr**	4.34	5.37	6.15	7.17	8.05	**10yr**
25yr	0.48	0.76	0.97	1.34	1.78	2.35	**25yr**	1.54	2.15	2.79	3.65	4.78	6.23	7.16	**25yr**	5.51	6.89	7.89	9.12	10.14	**25yr**
50yr	0.54	0.86	1.11	1.55	2.08	2.77	**50yr**	1.80	2.54	3.31	4.36	5.71	7.46	8.66	**50yr**	6.60	8.33	9.54	10.93	12.09	**50yr**
100yr	0.60	0.97	1.25	1.78	2.43	3.28	**100yr**	2.10	2.99	3.93	5.20	6.83	8.94	10.48	**100yr**	7.91	10.08	11.53	13.11	14.41	**100yr**
200yr	0.68	1.11	1.44	2.06	2.85	3.86	**200yr**	2.46	3.54	4.65	6.18	8.16	10.71	12.67	**200yr**	9.48	12.19	13.95	15.74	17.19	**200yr**
500yr	0.81	1.33	1.73	2.51	3.51	4.81	**500yr**	3.03	4.41	5.82	7.78	10.32	13.62	16.31	**500yr**	12.06	15.68	17.95	20.04	21.72	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.36	0.44	0.59	0.72	0.88	**1yr**	0.62	0.87	0.92	1.33	1.68	2.26	2.56	**1yr**	2.00	2.46	2.89	3.18	3.94	**1yr**
2yr	0.32	0.49	0.60	0.81	1.00	1.19	**2yr**	0.87	1.16	1.37	1.82	2.33	3.08	3.49	**2yr**	2.73	3.36	3.86	4.59	5.12	**2yr**
5yr	0.35	0.54	0.67	0.92	1.18	1.41	**5yr**	1.01	1.38	1.61	2.12	2.73	3.83	4.25	**5yr**	3.39	4.09	4.77	5.60	6.32	**5yr**
10yr	0.39	0.60	0.74	1.03	1.33	1.61	**10yr**	1.15	1.57	1.81	2.38	3.05	4.42	4.94	**10yr**	3.91	4.75	5.54	6.51	7.29	**10yr**
25yr	0.44	0.67	0.84	1.20	1.58	1.91	**25yr**	1.36	1.87	2.10	2.75	3.53	4.78	6.01	**25yr**	4.23	5.78	6.80	7.95	8.82	**25yr**
50yr	0.49	0.74	0.92	1.33	1.78	2.18	**50yr**	1.54	2.13	2.35	3.06	3.93	5.41	6.96	**50yr**	4.79	6.69	7.94	9.25	10.20	**50yr**
100yr	0.54	0.82	1.03	1.48	2.04	2.48	**100yr**	1.76	2.43	2.63	3.40	4.34	6.09	8.06	**100yr**	5.39	7.75	9.28	10.78	11.79	**100yr**
200yr	0.60	0.90	1.15	1.66	2.31	2.83	**200yr**	2.00	2.77	2.94	3.77	4.79	6.84	9.33	**200yr**	6.06	8.97	10.84	12.57	13.65	**200yr**
500yr	0.70	1.04	1.34	1.94	2.76	3.39	**500yr**	2.39	3.31	3.42	4.29	5.45	7.99	11.32	**500yr**	7.07	10.89	13.33	15.44	16.55	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.29	0.44	0.54	0.72	0.89	1.09	**1yr**	0.77	1.06	1.26	1.74	2.20	3.01	3.17	**1yr**	2.66	3.05	3.61	4.40	5.09	**1yr**
2yr	0.34	0.52	0.64	0.87	1.07	1.27	**2yr**	0.92	1.24	1.48	1.96	2.51	3.45	3.72	**2yr**	3.05	3.58	4.11	4.87	5.67	**2yr**
5yr	0.40	0.62	0.77	1.05	1.34	1.63	**5yr**	1.16	1.59	1.88	2.53	3.25	4.37	4.98	**5yr**	3.87	4.79	5.42	6.40	7.18	**5yr**
10yr	0.47	0.72	0.89	1.25	1.61	1.98	**10yr**	1.39	1.94	2.28	3.10	3.95	5.38	6.21	**10yr**	4.76	5.97	6.82	7.87	8.78	**10yr**
25yr	0.58	0.88	1.09	1.56	2.06	2.58	**25yr**	1.77	2.52	2.96	4.07	5.14	7.82	8.33	**25yr**	6.92	8.01	9.12	10.36	11.43	**25yr**
50yr	0.67	1.03	1.28	1.84	2.47	3.14	**50yr**	2.13	3.07	3.60	5.00	6.31	9.79	10.42	**50yr**	8.66	10.02	11.38	12.74	13.98	**50yr**
100yr	0.79	1.20	1.50	2.17	2.98	3.83	**100yr**	2.57	3.74	4.37	6.15	7.74	12.24	13.04	**100yr**	10.83	12.53	14.18	15.70	17.09	**100yr**
200yr	0.93	1.40	1.77	2.56	3.57	4.67	**200yr**	3.08	4.57	5.34	7.58	9.51	15.35	16.32	**200yr**	13.58	15.70	17.71	19.33	20.91	**200yr**
500yr	1.15	1.71	2.21	3.20	4.56	6.07	**500yr**	3.93	5.94	6.93	10.02	12.51	20.72	21.97	**500yr**	18.34	21.13	23.74	25.46	27.30	**500yr**

Powered by ACIS Northeast Regional Climate Center

OUTLET APRON DESIGN

Project: Lafayette Rd, Portsmouth, NH Job # 2021163
Date: 26-Jan-22

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road
Suite One
Salem, NH 03079

FES-1 (from HydroCAD POND DET)
Q25 = 9 cfs
D_o = 18 inches
Tw = 0.8 feet

Design Criteria

Apron Dimensions

The dimensions of the apron at the outlet of the pipe shall be determined as follows:

1.) The width of the apron at the outlet of the pipe or channel shall be 3 times the diameter of the pipe, or the width of the channel.

USE THIS W= **4.5** feet

2.) The length of the apron shall be determined from the following formula when the tailwater depth at the outlet of the pipe or channel is less than one-half the diameter of the pipe or one-half the width of the channel:

La=1.8*Q/ Do^3/2+ 7Do
La= **19.32** feet

Where:

La is the length of the apron
Q is the discharge from the pipe or channel
D_o is the diameter of pipe of width of channel

3.) When the depth of the tailwater at the outlet of the pipe or channel is equal to or greater than one-half the diameter of the pipe or the width of the channel. Then the following formula applies:

USE THIS La=3.0*Qo/ Do^1.5 +7D_o
La= **25.197** feet

4.) Where there is no well defined channel downstream of the outlet, the width of the downstream end of the apron shall be determined as follows:

a. For minimum tailwater conditions where the tailwater depth is less than the elevation of the center of the pipe:

W=3*Do+La
W= **23.82** feet

b. For maximum tailwater conditions where the tailwater depth is greater than the elevation of the center of the pipe:

USE THIS W=3*Do+0.4*La
W= **14.58** feet

5.) Where there is a stable well-defined channel downstream of the apron, the bottom of the apron shall be equal to the width of the channel.

6.) The side of the apron in a well-defined channel shall be 2:1 (horizontal to vertical) or flatter. The height of the structural lining along the channel sides shall begin at the elevation equal to the top of conduit and taper down to the channel bottom through the length of the apron.

7.) The bottom grade of the apron shall be level (0% grade). No overfall is allowable at the end of the apron.

8.) The apron shall be located so that there are no bends in the horizontal alignment of the apron.

Rock Riprap

The following criteria shall be used to determine the dimensions of the rock riprap used for the apron:

1.) The median stone diameter shall be determined using the formula:

d_{50}=0.02*Q^4/3/(Tw*D_o)

d_{50}= **3.72** inches **USE** **4** inches

d_{50} minimum 3 inches

Where:
d_{50} is the median stone diameter in feet
Tw is the tailwater depth above the invert of the pipe channel in feet
Q is the discharge from the pipe or channel in cubic feet per second
D_o is the diameter of the pipe or width of the channel in feet

2.) Fifty percent by weight of the riprap mixture shall be smaller the than median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size.

3.) The quality and gradation of the rock, the thickness of the riprap lining, filter material and the quality of the stone shall meet the requirements in the Rock Riprap BMP. The minimum depth shall be 6 inches or 1.5 times the largest stone size in the mixture whichever is larger (d).

Thickness of the riprap
d = 1.5*(d100 avg.(largest stone size))
d= **10** inches*

* must use a minimum of 6"

Rock Rip Rap Gradation

% of weight smaller than the given size	size of stone in inches		
100	**5.6**	to	**7.4**
85	**4.8**	to	**6.7**
50	**3.7**	to	**5.6**
15	**1.1**	to	**1.9**

Hydro International

First Defense® High Capacity

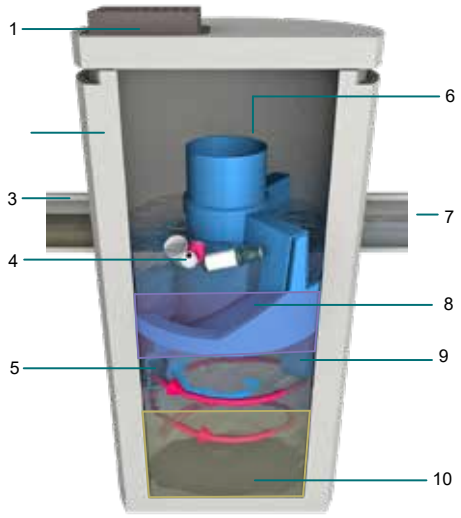
Advanced Hydrodynamic Separator

Product Summary

A Simple Solution for your Trickiest Sites

First Defense® High Capacity is a versatile stormwater separator with some of the highest approved flow rates in the United States, enabling engineers and contractors to save site space and projects costs by using the smallest possible footprint. It also works with single and multiple inlet pipes and inlet grates has an internal bypass to convey infrequent peak flows directly to the outlet.

Fig.1 The First Defense® High Capacity has internal components designed to efficiently capture pollutants and prevent washout at



Product Profile

1. Inlet Grate (optional)
2. Precast chamber
3. Inlet Pipe (optional)
4. Floatables Draw Off Slot (not pictured)
5. Inlet Chute
6. Internal Bypass
7. Outlet pipe
8. Oil and Floatables Storage
9. Outlet chute
10. Sediment Storage Sump

Applications

- Areas requiring a minimum of 50% TSS removal
- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Highways, car parks, industrial areas and urban developments
- Pre-treatment to ponds, storage systems, green infrastructure

How it Works

Highest Flow through the Smallest Footprint

Contaminated stormwater runoff enters the inlet chute from a surface grate and/or inlet pipe. The inlet chute introduces flow into the chamber tangentially to create a low energy vortex flow regime (magenta arrow) that directs sediment into the sump while oils, floating trash and debris rise to the surface.

Treated stormwater exits through a submerged outlet chute located opposite to the direction of the rotating flow (blue arrow). Enhanced vortex separation is provided by forcing the rotating flow within the vessel to follow the longest path possible rather than directly from inlet to outlet.

Higher flows bypass the treatment chamber to prevent turbulence and washout of captured pollutants. An internal bypass conveys infrequent peak flows directly to the outlet eliminating the need for, and expense of, external bypass control structures. A floatables draw off slot functions to convey floatables into the treatment chamber prior to bypass.

Benefits

Small & Simple

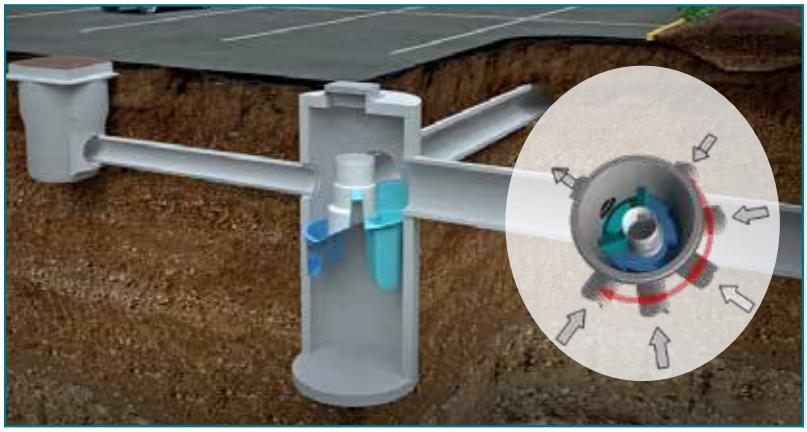
- Cut footprint size, cut costs: First Defense® provides space-saving, easy-to-install surface water treatment in standard sized chambers/ manholes.
- Adapt to site limitations: Variable configuratoins will help you effectively slip First Defense® into a tight spot. It also works well with large pipes, multiple inlet pipes and inlet grates.
- Save installation time: Every First Defense® unit is delivered to site pre-assembled and ready for installation – so installation is as easy as fitting any chamber/manhole.

Stormwater Solutions

→ hydro-int.com/firstdefense

Sizing & Design

This adaptable online treatment system works easily with large pipes, multiple inlet pipes, inlet grates and now, contains a high capacity bypass for the conveyance of large peak flows. Designed with site flexibility in mind, the First Defense® High Capacity allows engineers to maximize available site space without compromising treatment level.



Free Sizing Tool

This simple online tool will recommend the best separator, model size and online/offline arrangement based on site-specific data entered by the user.

Go to hydro-int.com/sizing to access the tool.

First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates		Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	110µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd^3 / m^3)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.84 / 23.7	1.06 / 30.0	15 / 424	18 / 450	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	1.88 / 53.2	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC	5 / 1.5	2.35 / 66.2	2.94 / 83.2	20 / 566	24 / 600	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	4.23 / 119.8	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	7.52 / 212.9	50 / 1415	48 / 1200	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 -1.8	7.40 / 2.2
FD-10HC	10 / 3.0	9.38 / 265.6	11.75 / 332.7	50 / 1415	48 / 1200	1742 / 6594	4.4 / 3.3	6.5 -8.0 / 2.0 - 2.4	10.25 / 3.12

[1]Contact Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]Minimum distance for models depends on pipe diameter.

Maintenance

Easy vactor hose access through the center shaft of the system makes for quick, simple sump cleanout while trash and floatables can be fished out from the surface with a net.

Nobody maintains our systems better than we do. To ensure optimal, ongoing device performance, be sure to recommend Hydro International as a preferred service and maintenance provider to your clients.

Hydro International

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200
Email: stormwaterinquiry@hydro-int.com
Web: www.hydro-int.com/firstdefense

FD_SS_B_2105

Download Drawings!

→ hydro-int.com/fddrawings

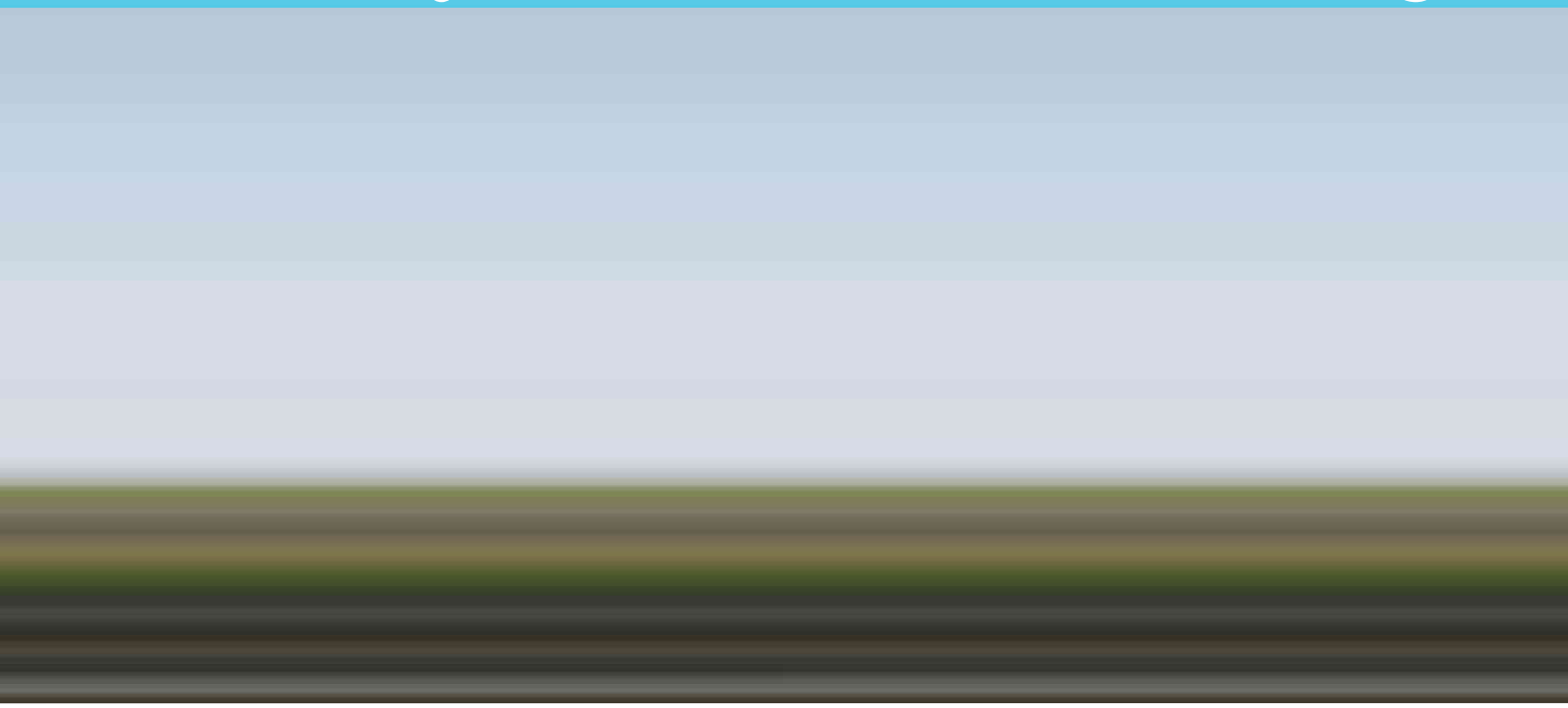
Access the Operation & Maintenance Manual

→ hydro-int.com/fd-om

CONTECH®
ENGINEERED SOLUTIONS

Jellyfish® Filter
Stormwater Treatment

The experts you need to solve your stormwater challenges



Contech is the leader in stormwater solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

Your Contech Team

STORMWATER CONSULTANT

It's my job to recommend the best solution to meet permitting requirements.

STORMWATER DESIGN ENGINEER

I work with consultants to design the best approved solution to meet your project's needs.

REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved.

SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction.

Contech is your partner in stormwater management solutions

Setting new standards in Stormwater Treatment – Jellyfish® Filter

The Jellyfish Filter has been tested in the field and laboratory, and has received approval from numerous stormwater regulatory agencies.

The Jellyfish Filter is a stormwater quality treatment technology featuring high flow pretreatment and membrane filtration in a compact stand-alone system. Jellyfish removes floatables, trash, oil, debris, TSS, fine silt-sized particles, and a high percentage of particulate-bound pollutants; including phosphorus, nitrogen, metals and hydrocarbons. The high surface area membrane cartridges, combined with up-flow hydraulics, frequent, passive backwashing, and rinseable/ reusable cartridges ensure long-lasting performance.

Jellyfish® Filter

How the Jellyfish® Filter Treats Stormwater

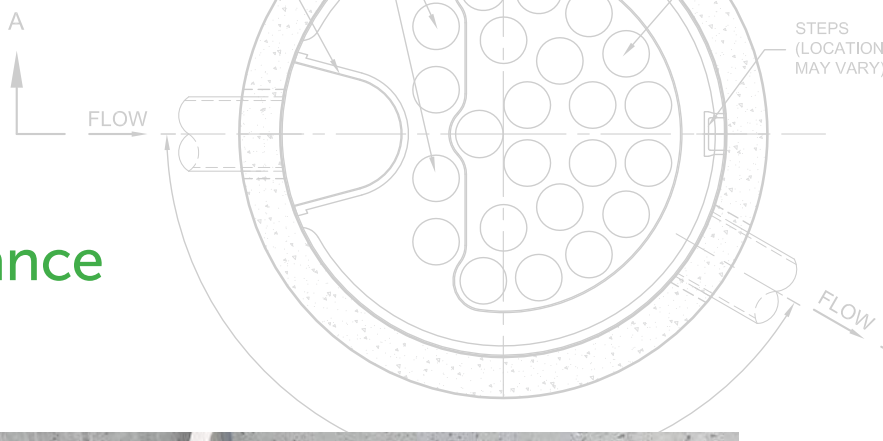
Tested in the field and laboratory ...

- Stormwater enters the Jellyfish through the inlet pipe and traps floating pollutants behind the maintenance access wall and below the cartridge deck.
- Water is conveyed below the cartridge deck where a separation skirt around the cartridges isolates oil, trash and debris outside the filtration zone.
- Water is directed to the filtration zone and up through the top of the cartridge where it exits via the outlet pipe.
- The membrane filters provide a very large surface area to effectively remove fine sand and silt-sized particles, and a high percentage of particulate-bound pollutants such as nitrogen, phosphorus, metals, and hydrocarbons while ensuring long-lasting treatment.
- As influent flow subsides, the water in the backwash pool flows back into the lower chamber. This passive backwash extends cartridge life.
- The draindown cartridge(s) located outside the backwash pool enables water levels to balance.

Jellyfish® Filter Standard Configuration

Learn More:
www.ContechES.com/jellyfish

Pretreat bioretention or infiltration with Jellyfish to extend service life.



Jellyfish® Filter Performance Testing Results

APPLICATION TIPS

- The Peak Diversion Jellyfish provides treatment and high-flow bypass in one structure, eliminating the need for a separate bypass structure.
- LID and GI are complemented by filtration solutions, as they help keep sites free from fine sediments that can impede performance, remove unsightly trash, and provide a single point of maintenance.
- Selecting a filter with a long maintenance cycle and low maintenance cost will result in healthy waterways and happy property owners.

The pleated tentacles of the Jellyfish® Filter provide a large surface area for pollutant removal.

POLLUTANT OF CONCERN	% REMOVAL
Total Trash	99%
Total Suspended Solids (TSS)	89%
Total Phosphorus (TP)	59%
Total Nitrogen (TN)	51%
Total Copper (TCu)	> 50%
Total Zinc (TZn)	> 50%

Sources:
TARP II Field Study – 2012 JF 4-2-1 Configuration
MRDC Floatables Testing – 2008 JF6-6-1 Configuration

Jellyfish® Filter Features and Benefits

FEATURE	BENEFITS
High surface area membrane filtration	Low flux rate promotes cake filtration and slows membrane occlusion
High design treatment flow rate per cartridge (up to 80 gpm (5 L/s))	Compact system with a small footprint, lower construction cost
Low driving head (typically 18 inches or less (457 mm))	Design flexibility, lower construction cost
Lightweight cartridges with passive backwash	Easy maintenance and low life-cycle cost

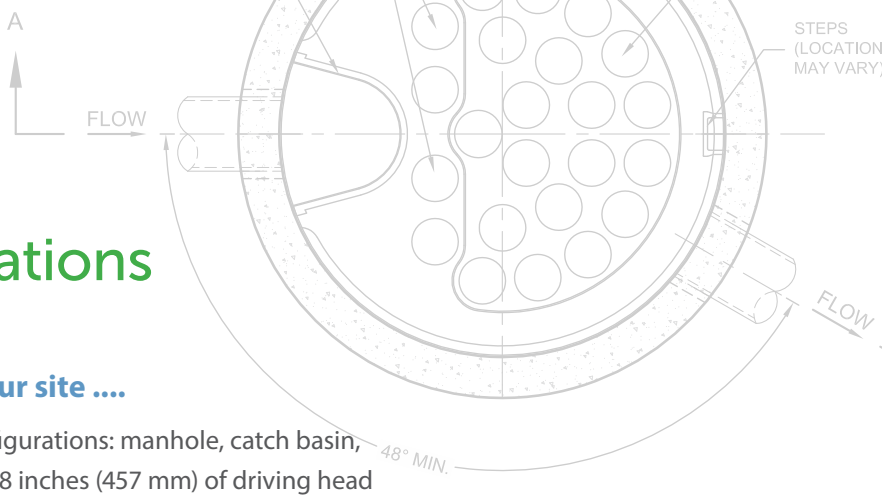
The Jellyfish Filter can be configured in a manhole, catch basin, or vault.

Select Jellyfish® Filter Certifications and Verifications

The Jellyfish Filter has been reviewed by numerous state and federal programs, including:

- Washington State Department of Ecology (TAPE) GULD – BASIC, Phosphorus
- Virginia Department of Environmental Quality (VA DEQ)
- Texas Commission of Environmental Quality (TCEQ)
- Canada ISO 14034 Environmental Management – Environmental Technology Verification (ETV)
- Philadelphia Water District (PWD)
- Maryland Department of the Environment (MD DOE)

Field tested and performance verified

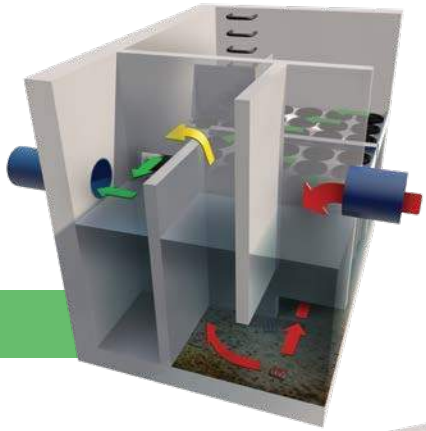


Jellyfish® Filter Configurations

Multiple system configurations to optimize your site ....

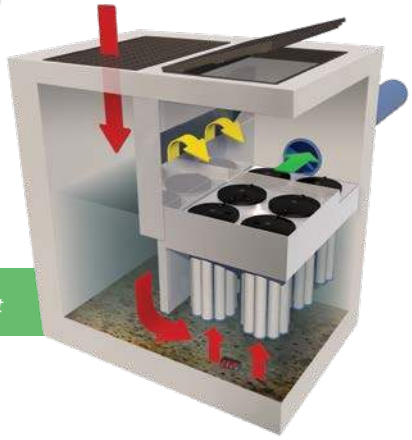
The Jellyfish Filter can be manufactured in a variety of configurations: manhole, catch basin, vault, fiberglass tank, or custom configurations. Typically, 18 inches (457 mm) of driving head is designed into the system. For low drop sites, the designed driving head can be less.

Manhole



Vault

Curb Inlet



Grated Inlet

Jellyfish® Filter Maintenance

- Jellyfish Filter cartridges are light weight and reusable
- Maintenance of the filter cartridges is performed by removing, rinsing and reusing the cartridge tentacles.
- Vacuum extraction of captured pollutants in the sump is recommended at the same time.
- Full cartridge replacement intervals differ by site due to varying pollutant loading and type, and maintenance frequency. Replacement is anticipated every 2-5 years.
- Contech® has created a network of Certified Maintenance Providers to provide maintenance on stormwater BMP's.

The Jellyfish® Filter tentacle is light and easy to clean.

A partner you can rely on

STORMWATER SOLUTIONS

PIPE SOLUTIONS

STRUCTURES SOLUTIONS

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11. Data Quality Assessment

Data was analyzed using statistical methods in accordance with guidelines in the **TARP Protocol for Stormwater Best Management Practice Demonstrations**, and the **VTAP Guidance for Evaluating Stormwater Manufactured Treatment Devices**. Data was examined by statistical and regression analysis, ANOVA statistics, non-parametric analysis, correlations, probability distributions of data, normality testing, standards, and physical data replication.

Data integrity in the laboratory was addressed in a multi-level review process for all analyses conducted. The initial step in this review process was conducted by each lab analyst as tests were conducted. Calibration values and procedures were checked against previous tests to alert the analyst to in case of malfunction in equipment or test errors.

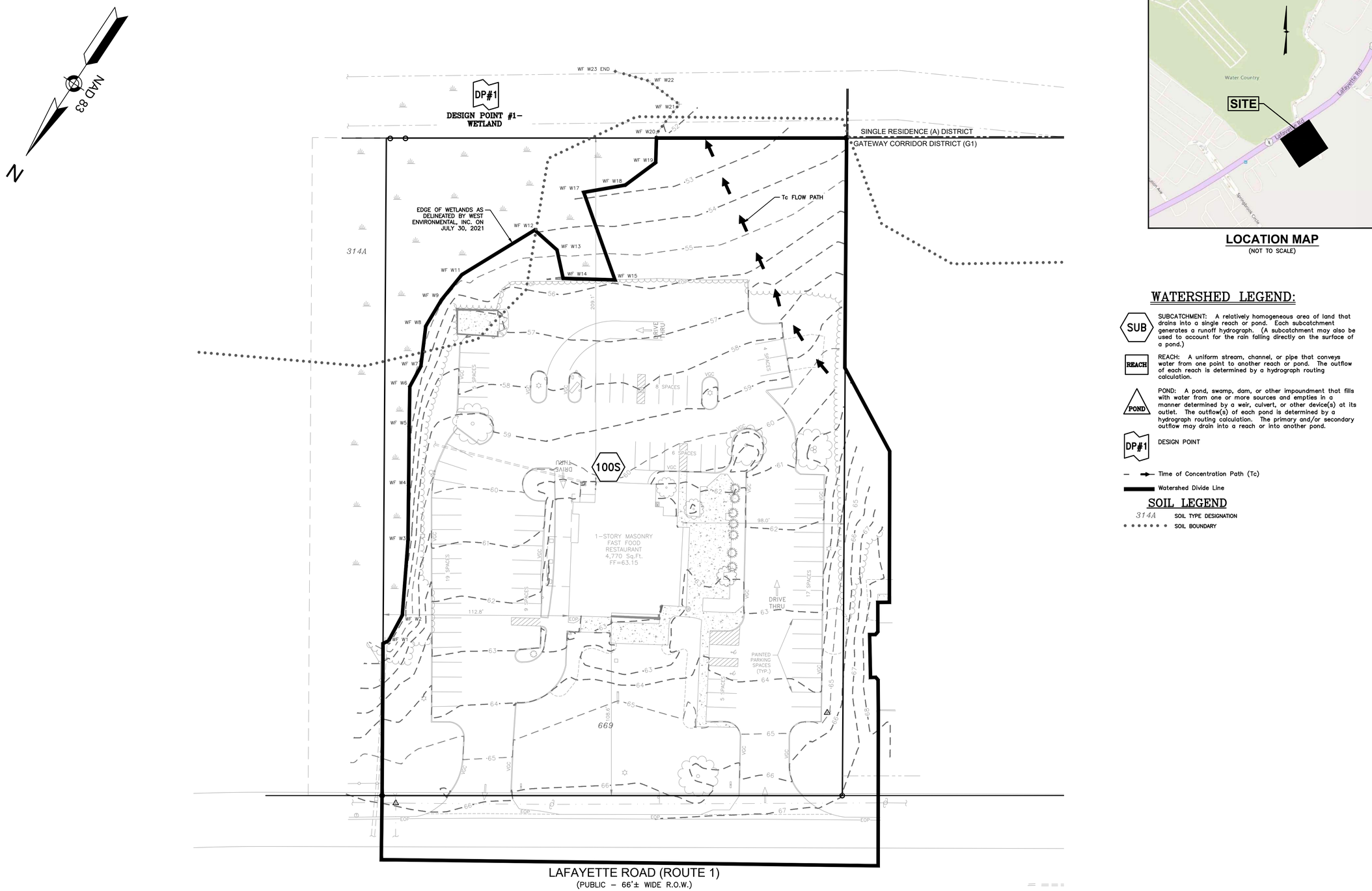
The second level of review was conducted by the lab director who collected results and entered these values into the tabular spreadsheets for each test. Each of the results was checked for accuracy of input as well as to appropriateness for the samples which were analyzed. All results were overseen or conducted personally by the lab manager. All preliminary calculations were reviewed.

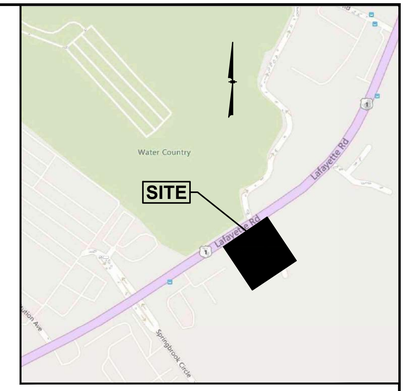
The final level of review was conducted by the project manager who reviewed all results generated within the laboratory.

12. Conclusions

Field testing of an Imbrium Systems' Jellyfish® Filter model JF4-2-1 with second-generation filtration cartridges was conducted in accordance with the TARP and VTAP field test protocols. The physical modeling campaign was carried out on the University of Florida campus with the full-scale unit loaded by rainfall-runoff from a surface parking watershed. A total of 25 monitored storm events, with 15 inches of cumulative rainfall depth, were treated by the JF4 during this study. Of the 25 storms treated, two storms generated flows exceeding the maximum design flow of 200 gpm. No maintenance was required or conducted during the 13-month monitoring period from May 28, 2010 to June 27, 2011.

Treatment results generated median SSC and TSS removal efficiency results of 99% and 89%, respectively. Median removal efficiency was 59% for Total Phosphorus and 51% for Total Nitrogen. For Total Copper, Zinc, Lead and Chromium median removal efficiencies were 90, 70, 81, and 36%, respectively. The d_{50} for influent and effluent particle sizes were 82 and 3 μm, respectively. Median head loss never exceeded 8.4 inches (21.4 cm) for any event and across the entire monitoring campaign the median head loss was 3.3 inches (8.3 cm). Dry basis particulate matter (PM) recovered from the treatment unit totaled 166 pounds, and the JF4-2-1 had a volumetric capacity to retain a significantly larger mass of PM. Median and peak head losses were driven predominately by flow rate and to a much lesser degree by filter cartridge ripening which was muted. At the completion of the monitoring campaign, a 95% mass balance was obtained on particulate matter (PM) which validates the testing methods used throughout this study. This mass balance on PM is an independent requirement to validate the influent and effluent monitoring and validates the most rigorous unit operation and process physical modeling available. The results obtained in this field study demonstrate that the Jellyfish Filter's particulate removal performance is reasonably insensitive to incoming particle size distribution (PSD) and runoff event duration.





LOCATION MAP
(NOT TO SCALE)

WATERSHED LEGEND:

SUB — SUBCATCHMENT: A relatively homogeneous area of land that drains into a single reach or pond. Each subcatchment generates a runoff hydrograph. (A subcatchment may also be used to account for the rain falling directly on the surface of a pond.)

REACH — REACH: A uniform stream, channel, or pipe that conveys water from one point to another reach or pond. The outflow of each reach is determined by a hydrograph routing calculation.

POND — POND: A pond, swamp, dam, or other impoundment that fills with water from one or more sources and empties in a manner determined by a weir, culvert, or other device(s) at its outlet. The outflow(s) of each pond is determined by a hydrograph routing calculation. The primary and/or secondary outflow may drain into a reach or into another pond.

DP#1 — DESIGN POINT

— → Time of Concentration Path (Tc)

Watershed Divide Line

SOIL LEGEND

314A — SOIL TYPE DESIGNATION

• • • • • • SOIL BOUNDARY

0 30 60 100

SCALE: 1" = 30'

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Salem, NH 03079

PREPARED FOR
GRANITE STATE CONVENIENCE, LLC
25 SPRINGER ROAD
HOOKSETT, NH

PROPOSED RETAIL MOTOR FUEL OUTLET
2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

REVISIONS		
NO.	REVISION	DATE

FEBRUARY 3, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

PRE-DEVELOPMENT DRAINAGE AREA PLAN

SCALE: 1"=30'

PROJECT NO. NEX-2021163

1 OF 2

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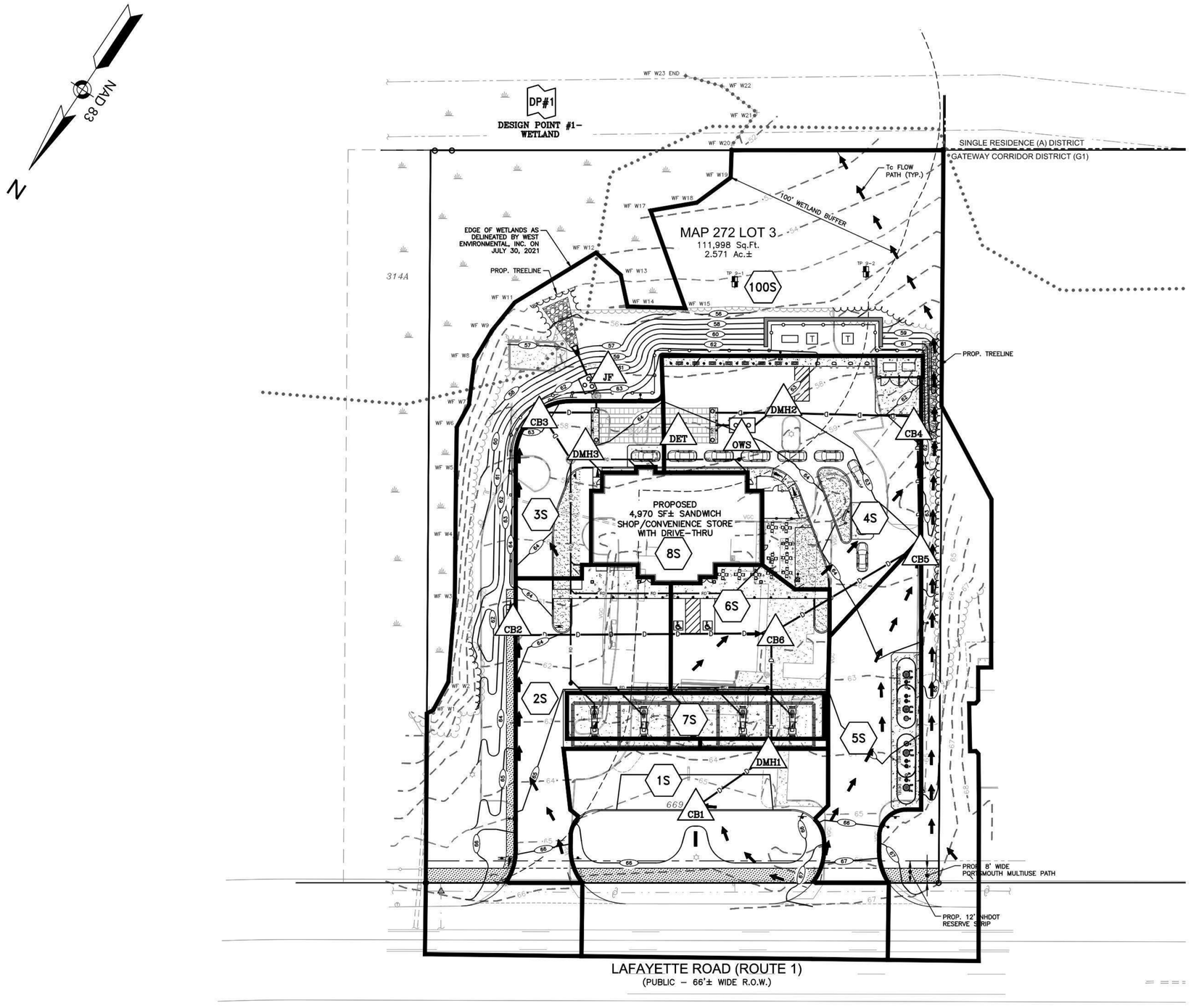

LOCATION MAP
(NOT TO SCALE)

WATERSHED LEGEND:

- SUB — SUBCATCHMENT: A relatively homogeneous area of land that drains into a single reach or pond. Each subcatchment generates a runoff hydrograph. (A subcatchment may also be used to account for the rain falling directly on the surface of a pond.)
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- DP#1 — DESIGN POINT
- Time of Concentration Path (Tc)
- Watershed Divide Line

SOIL LEGEND

- 314A — SOIL TYPE DESIGNATION
- SOIL BOUNDARY

0 30 60 100
SCALE: 1" = 30'

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2255 LAFAYETTE ROAD PORTSMOUTH, NH 03801

REVISIONS		
1	MISC. REVISIONS	4/19/22
NO.	REVISION	DATE

FEBRUARY 3, 2022

DRAWN/DESIGN BY	CHECKED BY
CCC/NID	DRJ

POST-DEVELOPMENT DRAINAGE AREA PLAN

SCALE: 1"=30'

PROJECT NO. NEX-2021163

2 OF 2

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INSPECTION & MAINTENANCE MANUAL FOR STORMWATER MANAGEMENT SYSTEMS

PROPOSED RETAIL MOTOR FUEL OUTLET
TAX MAP 272 LOT 3
2255 LAFAYETTE ROAD
PORTSMOUTH, NEW HAMPSHIRE

GPI

44 Stiles Road, Suite One
Salem, NH 03079
(603) 893-0720

Prepared For:

Granite State Convenience, LLC
25 Springer Road
Hooksett, NH 03106

Revised: April 19, 2022
February 3, 2022

(GPI Project No.: NEX-2021163)

Granite State Convenience, LLC
Proposed Retail Motor Fuel Outlet
Inspection & Maintenance Manual

TABLE OF CONTENTS

SECTION 1 I & M DOCUMENTATION REQUIREMENTS

The Owner of Record shall be responsible for the continued operation, and maintenance of all stormwater management systems in accordance with this manual and Section 7.6.5 of the City of Portsmouth Site Plan Review Regulations. Logs of inspections and maintenance shall be maintained and filed with the City of Portsmouth as needed. Copies will need to be kept for the most recent three years and made available to the Planning Board and City Engineer upon request.

Logs shall include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the cleanout of any sediments or debris, the location where the sediment and debris was disposed after removal will be indicated. Disposal of the accumulated sediment and hydrocarbons must be in accordance with applicable local, state, and federal guidelines and regulations.

All stormwater facilities associated with this development are identified on Figure 1 contained within Section 3 of this manual and listed individually on the log form included herein, and shall be inspected and maintained in accordance with the procedures outlined in Section 4.

SECTION 2 BMP SPECIFIC I & M PROCEDURES

Driveway/Parking Lot Sweeping

Sweeping shall be done once in the early fall and then immediately following spring snowmelt to remove sand and other debris and when visual buildup of debris is apparent. Pavement surfaces shall be swept at other times such as in the fall after leaves have dropped to remove accumulated debris. Since contaminants typically accumulate within 12 inches of the curbline, street cleaning operations should concentrate in cleaning curb and gutter lines for maximum pollutant removal efficiency. Other areas shall also be swept periodically when visual buildup of debris is apparent. Once removed from paved surfaces, the sweeping must be handled and disposed of properly. Disposal of the accumulated sediment and hydrocarbons must be in accordance with applicable local, state, and federal guidelines and regulations.

Deep Sump Hooded Catch Basins

Inspect and clean as required all catch basins at least two times per year including at the end of the foliage and snow removal seasons. Sediment must be removed whenever the depth of deposits is greater than or equal to one half the depth from the bottom of sump to the invert of the lowest pipe in the basin. If the basin outlet is designed with a hood to trap floatable materials check to ensure watertight seal is working. Damaged hoods should be replaced when noted by inspection. At a minimum, remove floating debris and hydrocarbons at the time of the inspection. Sediment and debris can be removed by a clamshell bucket; however, a vacuum truck is preferred. Disposal of the accumulated sediment and hydrocarbons must be in accordance with applicable local, state, and federal guidelines and regulations.

Outlet Aprons/Weirs

Inspect at least once annually for damage and deterioration. Repair damages immediately.

Oil/Water Separator

The system should initially be inspected within the first three months after completion of the site's construction and after any rainfall greater than 1-inch. The units should be inspected after every major storm but at least on a monthly basis. Cleaning of the units should be done at least twice a year and should include the following:

1. Removal of accumulated oil and grease and sediment by using a vacuum truck or similar catch basin cleaning device.
2. Visually inspect, and clean as needed, inlet and outlets including tees during each inspection.
3. At a minimum, remove any floating debris at the time of the inspection.

Disposal of the accumulated sediment and hydrocarbons must be in accordance with applicable local, state, and federal guidelines and regulations.

Hydrodynamic Separators (First Defense Units)

Initial maintenance to be performed twice a year for the first year after the unit is online and operational. A vacuum truck must be used at a minimum of once per year for sediment removal. Refer to the attached First Defense Owner's manual for operation and maintenance procedures and schedules thereafter.

Jellyfish Filter Treatment Unit
See attached product maintenance materials by Contech ES.

Underground Detention System
All subsurface systems should initially be inspected within the first three months after completion of the site's construction.

Preventive maintenance should be performed at least every six months and sediment shall be removed from pretreatment BMP's after every major storm event. The Detention System shall be inspected on regular bi-annual scheduled dates. Sediment and debris removal should be through the use of truck mounted vacuum equipment. Outlet pipes should be flushed to point of discharge on the same frequency as mentioned above. Disposal of the accumulated sediment and hydrocarbons must be in accordance with applicable local, state, and federal guidelines and regulations.

The following is the recommended procedure to inspect the underground system in service:

1. Locate the riser or cleanout section of the system. The riser/cleanout will typically be 6 or 12" in diameter or larger.
2. Remove the lid from the riser/cleanout.
3. Measure the sediment buildup at each riser and cleanout location. Only certified confined space entry personnel having appropriate equipment should be permitted to enter the system.
4. Inspect each manifold, all laterals, and outlet pipes for sediment build up, obstructions, or other problems. Obstructions should be removed at this time.
5. If measured sediment build up is between 2" to 8", cleaning should be considered; if sediment build up exceeds 8", cleaning should be performed at the earliest opportunity. A thorough cleaning of the system (manifolds and laterals) shall be performed by water jets and/or truck mounted vacuum equipment.

Pretreatment BMP's shall be inspected and cleaned during the regular bi-annual inspections.

The inlet and outlet of the subsurface systems should be checked periodically to ensure that flow structures are not blocked by debris. All pipes connecting the structures to the system should be checked for debris that may obstruct flow. Inspections should be conducted monthly during wet weather conditions from March to November.

Vegetated Areas
Inspect slopes and embankments early in the growing season to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows. During the summer months, all landscape features are to be maintained with the minimum possible amount of fertilizers, pesticides or herbicides.

Winter Maintenance
Proposed snow storage is located along the edge of the roadways. Any excess snow is to be trucked offsite. During the winter months all snow is to be stored such that snowmelt is

controlled. Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage swales or ditches. The minimum amount of deicing chemicals needed is to be used. It is recommended that winter maintenance contractors be current UNHT2 Green SnowPro Certified applicators or equivalent. In addition, a NHDES Salt Applicator Certification is recommended, but not required. Information on these certifications can be found in the links provided below:

- http://t2.unh.edu/green-snopro-training-and-nhdes-certification
- http://des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/salt-applicator-certification.htm

Control of Invasive Species

During maintenance activities, check for the presence of invasive species. Invasive species must be managed/removed in accordance with RSA 430:530 and AGR 3800. See Section 4 of this manual for information from the University of New Hampshire Cooperative Extension and the New Hampshire Guide to Upland Invasive Species from the New Hampshire Department of Agriculture Markets and Food, Plant Industry Division or the information provided on their website (http://www.agriculture.nh.gov/divisions/plant-industry/invasive-plants.htm).

SECTION 3 LONG TERM MAINTENANCE PLAN EXHIBIT

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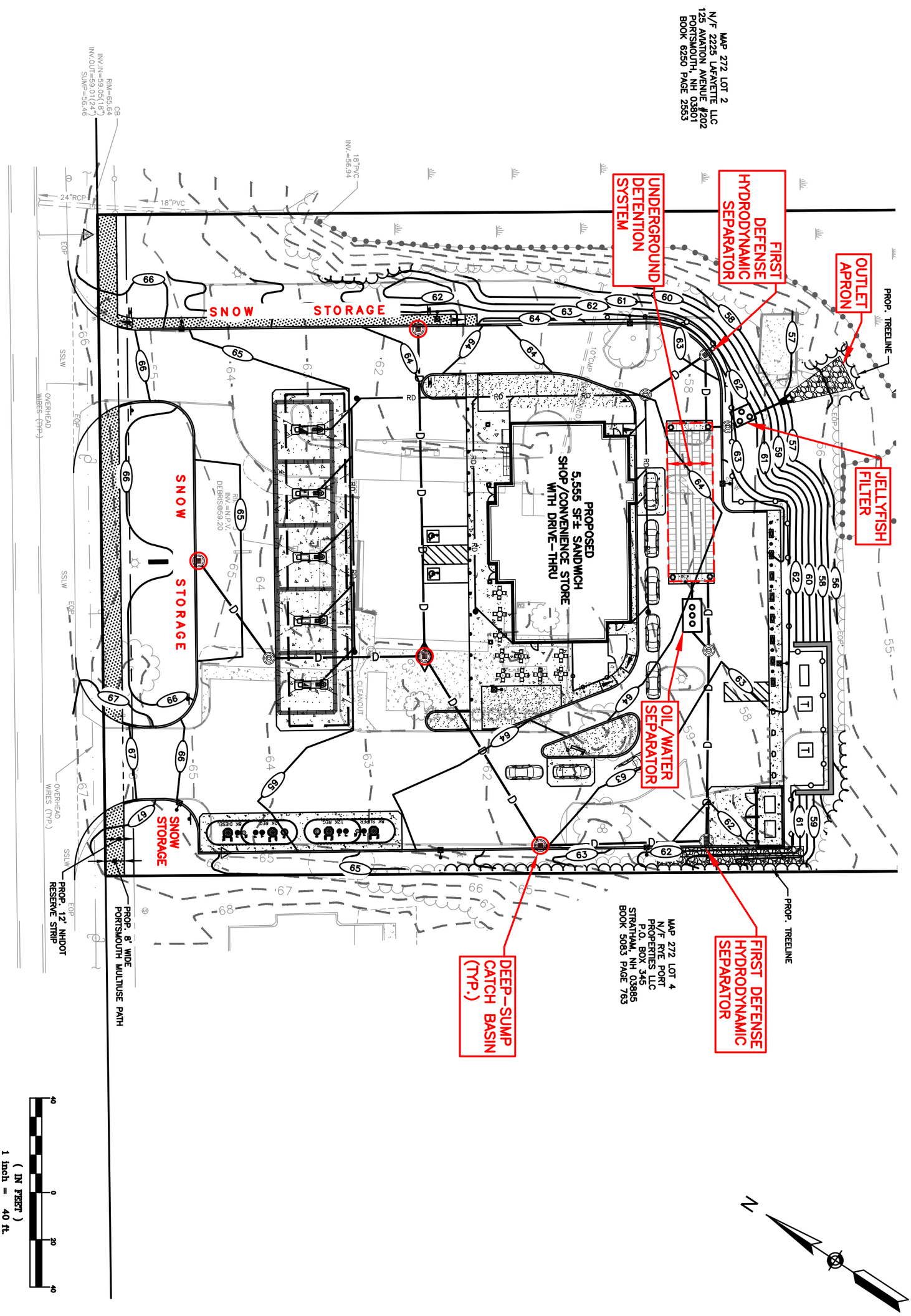

LONG TERM MAINTENANCE EXHIBIT

2255 LAFAYETTE ROAD
PORTSMOUTH, NEW HAMPSHIRE

GPI Engineering Design Planning Construction Management
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44 Stiles Road, Suite One
Salem, NH 03079

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REV.:	4/19/22 –
FIGURE	1

SECTION 4 CONTROL OF INVASIVE SPECIES

CONTACT INFORMATION

TERRESTRIAL PLANTS

Douglas Cygan, Invasive Species Coordinator, NH Department of Agriculture, Markets & Food, Division of Plant Industry, 29 Hazen Drive, Concord, NH 03301
(603) 271-3488, douglas.cygan@agr.nh.gov
Website: www.agriculture.nh.gov

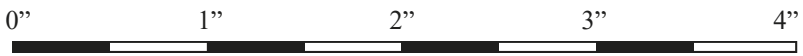
AQUATIC PLANTS

Amy Smagula, Clean Lakes and Exotic Species Coordinator, NH Department of Environmental Services, 29 Hazen Drive, PO Box 95, Concord, NH 03302
(603) 271-2248, asmagula@des.state.nh.us.

RESOURCES

NH Coastal Watershed Invasive Plant Partnership (CWIPP)
www.des.nh.gov/organization/divisions/water/wmb/coastal/cwipp/index.htm
Invasive Plant Atlas of New England (IPANE)
http://invasives.eeb.uconn.edu/ipane
Natural Resource Conservation Service (NRCS)
http://plants.usda.gov
New England Wildflower Society (NEWS)
www.newfs.org
New Hampshire Department of Agriculture, Markets & Food (DAMF)
www.agriculture.nh.gov
New Hampshire Department of Resources & Economic Development, Natural Heritage Bureau (DRED)
http://www.naturalheritage.org
New Hampshire Department of Resources & Economic Development, Division of Forests and Lands (DRED)
http://www.nhdfl.org/organization/div_nhnhi.htm
New Hampshire Department of Environmental Services (DES)
www.des.state.nh.us/wmb/exoticspecies
New Hampshire Fish & Game Department
www.wildlife.state.nh.us
The Nature Conservancy (TNC)
www.nature.org
U.S. Department of Agriculture's Animal Plant Health Inspection Service (USDA APHIS)
www.aphis.usda.gov
University of New Hampshire Cooperative Extension (UNHCE)
www.ceinfo.unh.edu

Funding for the printing of this booklet provided by:
U.S. Department of Agriculture's Animal Plant Health Inspection Service



New Hampshire Guide to Upland Invasive Species

New Hampshire
Department of Agriculture
Markets and Food, Plant Industry Division

5th Edition
2018

Douglas Cygan

Introduction

Throughout the world, non-native invasive species have become an overwhelming problem resulting in impacts to the natural environment and managed landscapes. Invasive species typically possess certain traits that give them an advantage over most native species. The most common traits include the production of many offspring, early and rapid development, and adaptability and high tolerance to many environmental conditions. These traits allow invasive species to be highly competitive and, in many cases, suppress native species. Studies show that invasives can reduce natural diversity, impact endangered or threatened species, reduce wildlife habitat, create water quality impacts, stress and reduce forest and agricultural crop production, damage personal property, and cause health problems.

Invasive species began arriving in North America in the mid-to-late 1700s by various means. Many were brought here for ornamental uses, erosion control, or to provide for wildlife habitat. Others arrived inadvertently through international travel and commerce.

Impacts and Actions

Biologists have found that invasive species cover more than 100 million acres of land in the U.S. and their population numbers continue to spread. The repeated process of spread has become so extreme that invasive species cost the United States billions of dollars per year. This is a result of lost agricultural and forest crops, impacts to natural resources and the environment, and the control efforts required to eradicate them.

On February 3, 1999, President Clinton signed Executive Order 13112, which established the National Invasive Species Council. The Council is responsible for assessing the impacts of invasive species, providing the nation with guidance and leadership on invasive species issues, and seeing that federal programs are coordinated and compatible with state and local initiatives.

Each state is also required to participate by evaluating and responding to their invasive species concerns. In the summer of 2000, the State of New Hampshire passed House Bill 1258-FN, which created the Invasive Species Act (ISA) and the New Hampshire Invasive Species Committee.

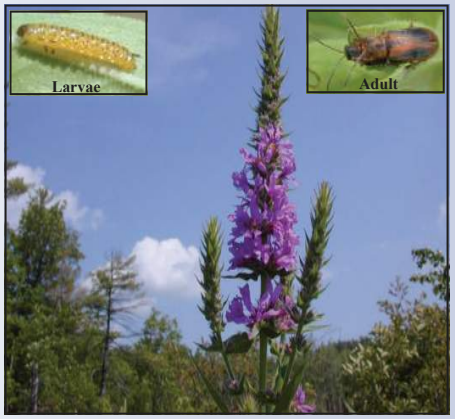
GLOSSARY OF PLANT TERMS

Alternate: Arranged singly at each node, as leaves or buds on different sides of a stem.
Annual: Living or growing for only one year or season.
Aril: A fleshy, usually brightly colored cover of a seed that develops from the ovule stalk and partially or entirely envelops the seed.
Axis: The point at which the leaf is attached to the main stem or branch.
Berry: A small, juicy, fleshy fruit.
Biennial: Having a life cycle that normally takes two growing seasons to complete.
Capsule: A dry dehiscent fruit that develops from two or more united capsules.
Compound: Composed of more than one part.
Deciduous: Shedding or losing foliage at the end of the growing season.
Dehiscent: The spontaneous opening of a fruit at maturity.
Drupe: A fleshy fruit usually having a single hard stone enclosing a seed.
Entire: Referring to a leaf not having an indented margin.
Filiform: Having the form resembling a thread or filament.
Furrowed: A rut groove or narrow depression.
Glabrous: Having no hairs or projections; smooth.
Imbricate: To be arranged with regular overlapping edges.
Inflorescence: A cluster of small flowers arranged on a flower stalk.
Lanceolate: A leaf tapering from a rounded base toward an apex, lance-shaped
Lenticels: The small, corky pores or narrow lines on the surface of the stems of woody plants that allow the interchange of gases between the interior tissue and the surrounding air.
Lustrous: Having a sheen or glow.
Native: A species that originated in a certain place or region; indigenous.
Naturalized: Adapted or acclimated to a new environment without cultivation.
Opposite: Growing in pairs on either side of a stem.
Ovate: Broad or rounded at the base and tapering toward the end.
Panicle: A branched cluster of flowers in which the branches are racemes
Peduncle: The stalk of a solitary flower of an inflorescence.
Peltate: Leaf being round with the stem attached near its center.
Perennial: Living three or more years.
Perfect: Having both stamens and pistals in the same flower.
Pod: A dry, several-sealed, dehiscent fruit.
Pubescent: Covered in fine short hairs.
Raceme: Elongated cluster of flowers along the main stem in which the flowers at the base open first.
Rhizome: A horizontal, usually underground stem that often sends out roots and shoots from its nodes.
Samara: A winged, often one-seed indehiscent fruit as of the ash, elm or maple.
Simple: Having no divisions or branches; not compound.
Umbel: A flat-topped or rounded inflorescence.

Lythrum salicaria - Purple Loosestrife

Family: Lythraceae
Native to: Eurasia

Description: Perennial growing 30-80" tall by $^{2}/_{3}$'s as wide. **Stems:** 4-6 sided, turning woody in summer. **Leaves:** Opposite to whorled, lanceolate, 2-4" long. **Flowers:** Spiked raceme, purple to magenta, June to October. **Fruit:** Capsule. **Habitat:** Mostly found in wetlands and aquatic systems, full to partial sun. **Spread:** Each plant can produce approximately 2.5-4.5 million seeds. Seeds dispersed by water, wildlife and humans. **Comments:**Invades wetlands suppressing native species and destroying wildlife habitat. **Controls:** Hand pull, use a spade to dig larger plants or use biocontrols (*Galerucella Spp*., top left is a larvae & top right is an adult).



Photos by Douglas Cygan

Phragmites australis - Common Reed

Family: Poaceae
Native to: Eurasia

Description: Perennial rhizomatous grass growing 14' tall. **Stems:** Called 'culms' are large, hollow and grow up to 1" dia. **Leaves:** Lanceolate, up to 24" long, bluish-green in color. **Flowers:** Panicles with many spikelets having seven small reddish flowers. **Habitat:** Mostly found in marshlands, but also grows in freshwater wetlands and aquatic systems, full to partial sun. **Spread:** Spreads primarily by rhizomes. **Comments:** Forms dense colonies that suppress native species and alter wildlife habitat. **Controls:** Hand pull small plants. Use a spade to dig larger plants or apply herbicides.

Photos by Douglas Cygan

New Hampshire Invasive Species Committee

The New Hampshire Invasive Species Committee (ISC) is an advisory group for the Commissioner of the NH Department of Agriculture, Markets & Food (DAMF) on matters concerning invasive species in the state. The ISC consists of 11 appointed members representing the following: the NH Department of Agriculture, the NH Department of Environmental Services, the NH Department of Resources & Economic Development, the NH Department of Transportation, the NH Department of Fish & Game, The College of Life Science & Agriculture of the University of NH, the UNH Cooperative Extension, environmental interests, horticultural interests, general public interests, and livestock owners & feed growers interests. The ISC meets regularly to conduct the following efforts:

- Review information;
- Evaluate and discuss potentially invasive plant, insect and fungi species of concern;
- Host guest presentations on related topics;
- Develop outreach and educational materials;
- Formulate management practices as guidance for the control of invasive species; and
- Prepare lists of proposed prohibited and restricted species.

(*Note: This committee is not charged with the evaluation or listing of aquatic plant species, which is conducted by the Department of Environmental Services under RSA-487:16-a. However, a brief description of the program and four of the aquatic species are described on pages 29 & 30 of this book*).

New Hampshire Rules

In accordance with the Invasive Species Act (ISA), HB 1258-FN, the DAMF is the lead state agency for terrestrial invasive plants, insects and fungi species. The DAMF has the responsibility for the evaluation, publication and development of rules on invasive plant species. This is for the purpose of protecting the health of native species, the environment, commercial agriculture, forest crop production, and human health. Therefore, the rule, Agr 3800, states "**No person shall collect, transport, import, export, move, buy, sell, distribute, propagate or transplant any living or viable portion of any listed prohibited invasive plant species, which includes all of their cultivars and varieties, listed"** (see the New Hampshire Department of Agriculture's website at www.agriculture.nh.gov to review the complete set of rules).

Invasive Upland Plant Species (Agr 3800)

Invasive Insect Species

(To see the complete list of all 16 invasive insects refer to rules Agr 3800)

Invasive Aquatic Plant Species

To see the complete list of invasive aquatic plants refer to DES's Env-Wq 1300 rules

New Hampshire Department of Environmental Services Aquatic Invasive Plant Species

"Exotic aquatic species" are plants or animals that are not part of New Hampshire's native aquatic flora and fauna. Since the first exotic aquatic plant infestation in New Hampshire was discovered in 1965 in Lake Winnipesaukee, exotic aquatic plant infestations have increased to a total of 83 infestations in 72 waterbodies in 2008. Species present include variable milfoil (63 waterbodies), Eurasian milfoil (3 waterbodies), fanwort (9 waterbodies), water chestnut (1 waterbody) and Brazilian elodea (1 waterbody), Curly Leaf Pondweed (3 waterbodies), and European Naiad (3 waterbodies), and Didymo (1 waterbody). Most of these exotic plants can propagate by fragmentation as well as by seed.

Exotic aquatic plant fragments can easily become attached to aquatic recreational equipment, such as boats, motors, and trailers, and can spread from waterbody to waterbody through transient boating activities. Infestations can have detrimental effects on the ecological, recreational, aesthetic, and economic values of the state's precious surface waters, limiting use of the waterbodies and decreasing shorefront property values by as much as 1020 percent according to a UNH study (Halstead, et al., 2001).

Myriophyllum heterophyllum - Variable Milfoil

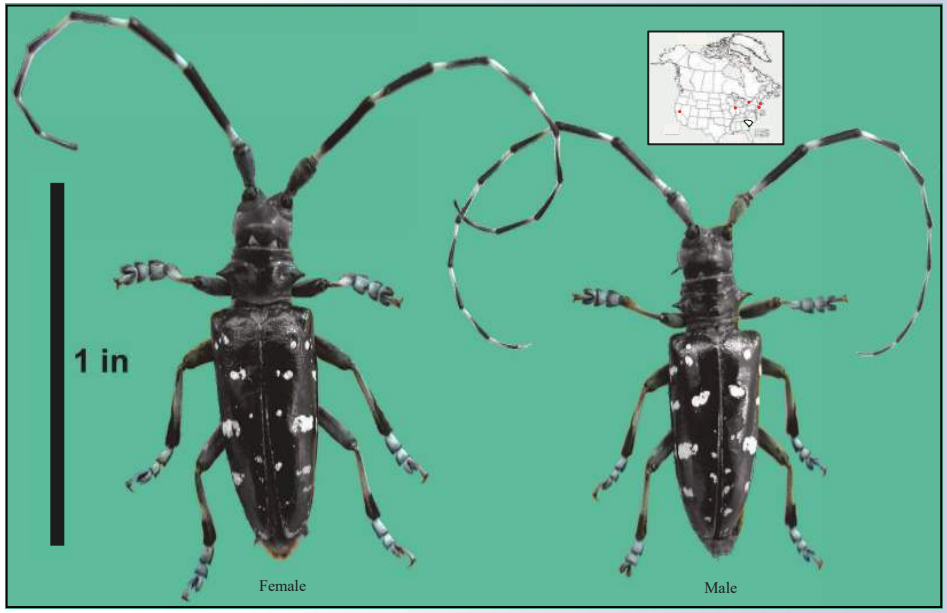
Family: Haloragaceae
Native to: Eurasia

Description: Submerged aquatic perennial growing 20' tall. **Stems:** Round, thick and reddish. **Leaves:** Feathery leaflets surrounding the stem. **Flowers:** Stalks that emerge above the water with green leaves, June to August. **Habitat:** Lakes, ponds, calm streams, and other similar aquatic systems with full to partial sun. **Spread:** It reproduces primarily by vegetative propagules when individual plant segments break off, and dispersed by water movement, humans, and boats. **Comments:**Invades water bodies, suppresses native species and destroys fish habitat. **Controls:** Prevention, hand pulling, bottom screening, and aquatic herbicide use.

Photos by Amy Smagula

Anoplophora glabripennis - Asian Longhorned Beetle

Family: Cerambycidae
Native to: Europe



Asian Longhorned Beetle—*Anoplophora glabripennis* (Photo by Chris Rallis)

The Asian longhorned beetle (ALB) is a serious threat to a large variety of deciduous hardwoods in North America. ALB is a large glossy black insect with white spots dotting its elytra. Adults grow to 1-1.5" long and have whitish bandings on their antennae. Females are typically bigger than males. Tree injury occurs when larvae tunnel through the xylem (heartwood) of the host, thus weakening the tree. Hosts trees include, but aren't limited to: Maple, Chestnut, Poplar, Willow, Birch, Elm, and Mountain ash. Adult females chew a crater in the bark and lay 1-egg per site. Upon hatching the larvae feed on the wood and emerge as adults in 1-2 years through perfect $^{3}/_{8}$" diameter exit holes. Other signs include coarse wood shavings called frass, oozing sap, oviposition sites, leaf-feeding damage, and mature beetles. **If found, please call the NH Dept. of Agriculture at (603) 271-2561**.


Oviposition Site


Egg (Rutgers University)


Sap flow from injury


Larval damage (Rutgers Univ.)


Adult feeding damage on leaf


3/8" diameter exit hole

Photos by Douglas Cygan, Chris Rallis & Rutgers University

DO NOT MOVE FIREWOOD

WHAT YOU CAN DO

There are many things that you, as an individual, can do to help control the spread of invasive species and preserve native flora and fauna:

- Minimize impacts to natural vegetation, soils, and drainage.
- Learn how to identify invasive plants and know how to tell them apart from native species.
- Control invasives on your property by following recommended practices.
- When landscaping, ask your local garden center or contact your County Extension Service about alternative plantings.
- Become active in local or regional initiatives to control invasives.
- After working in an area with invasive species remove any soil, or propagules that may have adhered to clothing, shoes, vehicle tires, etc.

CONTROL METHODS

Mechanical: Mechanical control involves hand pulling, digging, cultivation, mowing, cutting or utilizing some type of physical barrier such as a tarpaulin, mulch, wood chips, etc. This method is most effective when populations of unwanted species are low.

Cultural: Cultural control is the manipulation of a plant community to prevent the introduction or spread of an unwanted species. This can be accomplished by modifying the growing environment such as the soil, available light or moisture, or planting trees or shrubs that can outcompete the invasive species.

Chemical: Chemical control involves the use of an approved herbicide to manage a targeted species. The application method must be chosen to avoid damage to beneficial or native species. The applicator must adhere to all State and Federal pesticide regulations and in many cases be licensed by the state. For more information, contact the NH Department of Agriculture's Pesticide Control Division at 603-271-3550 or www.agriculture.nh.gov.

Biological: Biological control is the use of native or introduced beneficial organisms to naturally reduce populations of unwanted species. Most biological controls are found to be self-sustaining and host specific.

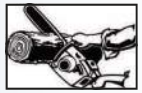

Pulling


Digging


Cutting-Hand tools


Herbiciding


Mowing

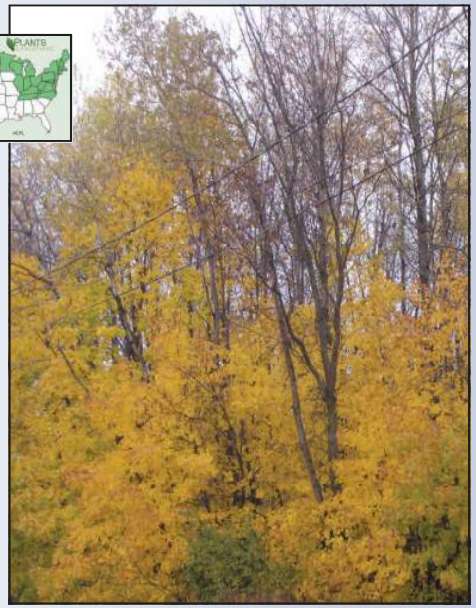

Cutting-Saws


Biocontrols

Acer platanoides - Norway Maple

Family: Aceraceae
Native to: Europe

Norway Maple—*Acer platanoides*



Norway Maple (in yellow) Invasion in Franklin, NH

Description: Large deciduous tree 60' high by 40' wide. **Bark:** Grayish and somewhat furrowed. **Twigs:** Smooth, olive-brown. **Buds:** Terminal, imbricate, rounded, smooth, greenish-red. **Leaves:** Opposite, 4-7" wide, 5-lobed, dark green to dark red above, lustrous below. **Flowers:** Greenish-yellow, April. **Fruit:** Horizontal samara. **Zone:** 3-7. **Habitat:** Moist, well drained soils, full sun to partial shade. **Spread:** Seeds spread by wind and water. **Comments:** Leaf stalks exude milky white sap. Fast growing, buds break earlier than most native species. Naturalizes in woodlands where it can outcompete native species. **Controls:** Pull or dig seedlings/saplings. Cut large trees and prune suckers when they sprout. Herbicide: foliar spray, cut-stem, bark banding, or slash bark with ax and apply to wounds.

Milky white sap-leaf petiole

Leaf with winged seed

Terminal buds rounded

Flowers greenish-yellow

Bark is grayish & furrowed

Leaves turn yellow in Fall

Photos by Douglas Cygan

Agrilus planipennis - Emerald Ash Borer

Family: Buprestidae
Native to: Asia

Emerald Ash Borer—*Agrilus planipennis*

Dead standing Ash trees (Canadian Forest Service)

Emerald Ash Borers (EAB) are small invasive wood boring beetles that attack all species of ash trees (*Fraxinus spp.*). Native to East Asia, it is suspected that they were accidentally introduced to North America in infested wood packing material. The adults are 3/8" to ½" in length by 1/16" in width. Their bodies have a dark metallic green appearance. Adults emerge from a D-shaped exit hole from late May to mid-July and live for 3-6 weeks, during which time they feed on ash foliage, and fly 1-mile or so in search of a mate and to lay eggs. Females will lay 60-90 eggs in the crevices of ash tree bark. Larvae emerging from the eggs create distinctive S -shaped feeding galleries within the cambium which is directly beneath the bark. These feeding galleries can girdle the tree and result in tree death. Movement of EAB into new uninfested areas is principally through transportation of firewood. **If found, please contact the NH Dept. of Agriculture at (603) 271-2561.**

Egg

Larvae in feeding galleries

Adult with wings spread

Feeding galleries in cambium

D-shaped exit hole

EAB Purple prism trap

Photos by Douglas Cygan & Chris Rallis

DO NOT MOVE FIREWOOD

Adelges tsugae - Hemlock Wooly Adelgid

Family: Adelgidae
Native to: Asia

Hemlock Wooly Adelgid—*Adelges tsugae* Nests

Hemlock trees dead from Adelgid (www.earthportal.org)

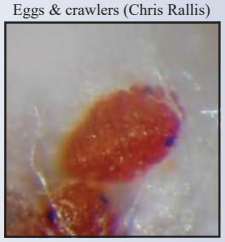
Hemlock Wooly Adelgid (*Adelges tsugae*) (HWA) is a serious pest to all North American hemlock trees (*Tsuga spp.*). It is native to Japan & China and was first found in the Pacific Northwest in the 1920's. By the 1950's it had reached the east coast and now infects hemlock trees from Georgia to Maine. It spreads by movement of nursery stock, wind and animals. These insects are extremely small averaging about $^{1}/_{8}$" in length with piercing-sucking mouth parts similar in appearance to aphids. All adults are females with each producing 50-300 eggs. To protect themselves & their eggs they produce a white-waxy covering. Adults insert their piercing mouth parts into the stem at the base of the needles. Trees die from needle loss & lack of nutrition. **If found, please call the NH Dept. of Agriculture at (603) 271-2561**.

Adult female laying eggs

Egg mass in protective nest

Eggs & crawlers (Chris Rallis)

Heavily infested branch



Crawlers (Chris Rallis)

Crawler leaving nest (Chris Rallis)

Photos by Douglas Cygan & Chris Rallis

DO NOT MOVE FIREWOOD

Ailanthus altissima - Tree of Heaven

Family: Simaroubaceae
Native to: China

Tree of Heaven—*Ailanthus altissima*

Tree of Heaven invasion

Description: Deciduous tree up to 60' tall by 40' wide. **Bark:** Grayish, slightly furrowed. **Twigs:**Reddish-brown. **Leaves:** Compound, 18-24" long with 13 -25 leaflets arranged alternately on stem, lanceolate, 3-5" long with 2-4 teeth near base. **Flowers:** Panicles, 8-16" long, yellowish-green, mid-June. **Fruit:** Samara. **Zone:** 4-8. **Habitat:** Highly adaptable and pollution tolerant, full sun to partial shade. **Spread:** Seeds are wind dispersed. **Comments:** Very fast growing, dense canopy shades out native species. **Controls:** Remove seedlings and saplings by hand. Larger trees can be mechanically removed or cut. To prevent suckering, if trees are cut, apply herbicide to cut portion of stump.

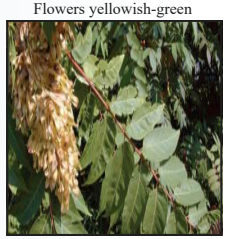
Leaf scar on stem

Compound leaves & leaf

Leaf bud

Flowers yellowish-green

Bark grayish & furrowed



Winged seed cluster

Photos by Douglas Cygan

Alliaria petiolata - Garlic Mustard

Family: Cruciferae
Native to: Europe

Garlic Mustard—*Alliaria petiolata*

Woodland invasion (photo by Cornell University)

Description: Cool season biennial, 2nd year plants flower and reach 2-3$^1/_2$' tall. **Leaves:** Triangular, coarsely toothed, heart-shaped. **Flowers:** Umbel, small, 4-petals, white, April-May. **Fruit:** Pods, seeds turn black when mature. **Zone:** 4-8. **Habitat:** Prefers moist shaded flood-plains, forests and roadsides, adaptable to most soil and light conditions. **Spread:** Seeds spread by water and wildlife. **Comments:** Plants spread quickly into natural areas leading to competition and displacement of native species. **Controls:** Small populations can be hand pulled while large populations can be continuously cut back to prevent flowering and seed production. Herbicide treatments are also effective.

Basal rosette

Leaf

Flower buds

Flowers 4-petaled, white

Stems

Seed pods

Photos by Douglas Cygan

Rosa multiflora - Multiflora Rose

Family: Rosaceae
Native to: Japan & Korea

Multiflora Rose-*Rosa multiflora*

Multiflora Rose invasion, Canterbury, NH

Description: Hardy shrub / climber reaching up to 15' or more in height and 10' in width. **Stems:** Long and arching, forming dense clumps, thorns may or may not be present. **Leaves:** Alternately arranged, compound with 7-9 leaflets and having feather margins at base. **Flowers:** Clusters of white or pink, June to July. **Fruit:** Rose hips turn red in fall. **Zone:** 3-8. **Habitat:** Prefers moist, well drained soils, full sun. **Spread**: Fruits with seeds are dispersed by birds. **Comments:** Very aggressive, leading to competition and displacement of native species. **Controls:** Hand or mechanical removal, cutting, or herbicide application.

Twig/stem bark

Leaves

Feathery margin at base of leaf

Flowers white

Fall color

Fruit is called a hip

Photos by Douglas Cygan

Rhamnus cathartica - Common Buckthorn

Family: Rhamnaceae
Native to: Eurasia

Description: Deciduous shrub or small tree measuring 20' by 15'. **Bark:** Grayish to brown with raised lenticels. **Stems:** Cinnamon colored with terminal spine. **Leaves:** Alternate, simple and broadly ovate with toothed margins. **Flowers:** Inconspicuous, 4-petaled, greenish-yellow, mid-June. **Fruit:** Fleshy, 1/4" diameter turning black in the fall. **Zone:** 3-7. **Habitat:** Adapts to most conditions including pH, heavy shade to full sun. **Spread:** Seeds are bird dispersed. **Comments: Highly:** Aggressive, fast growing, outcompetes native species. **Controls:** Remove seedlings and saplings by hand. Larger trees can be cut or plants can be treated with an herbicide.

Photos courtesy of John M. Randall/The Nature Conservancy

Rhamnus frangula - Glossy Buckthorn

Family: Rhamnaceae
Native to: Japan

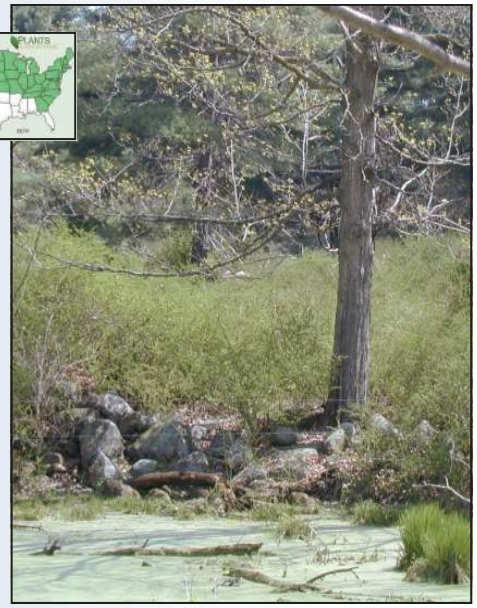
Description: Tall deciduous shrub up to 20' in height by 15' wide, **Bark:** Grayish with whitish lenticels. **Twigs:** Reddish-brown. **Leaves:** Ovate, 4-5" long by 3-4" wide, arranged alternate or whorled on stem. **Flowers:** Small, greenish-white, mid-June. **Fruit:** Fleshy, turning black in the fall. **Zone:** 2-7. **Habitat:** Highly adaptable and pollution tolerant, full sun to partial shade. **Spread:** Seeds are bird dispersed. **Comments:** Very fast growing, dense canopy shades out native species. **Controls:** Remove seedlings and saplings by hand. Larger trees can be cut or herbicide may be used.

Photos by Douglas Cygan

Berberis thunbergii - Japanese Barberry

Family: Berberidaceae
Native to: Japan

Japanese Barberry-*Berberis thunbergii*



Japanese Barberry invasion, Antrim, NH

Description: Deciduous shrub, 2-4$^{1}/_{2}$' tall. **Leaves:** Ovate, simple, entire. Color varies depending on variety. **Flowers:** Small yellowish, bloom in May in clusters of 2-4. **Fruit:** Drupe, turning red in summer. **Zone:** 4-8. **Habitat:** Prefers well drained soils in semi shade and often occurring in forests, roadsides, and open fields. **Spread:** Seeds are dispersed by wildlife. **Comments:** Forms dense thickets in natural environments where it becomes established, resulting in impacts to native flora and fauna. **Controls:** Remove small immature plants by hand. Dig larger plants with a garden spade or remove mechanically. Cut stems at base or control with herbicide treatment.

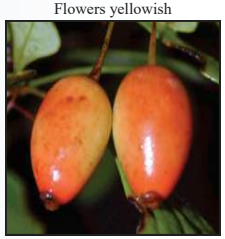
'Crimson Pygmy' variety

Leaves

Thorn

Flowers yellowish

Frost covered Barberry



Fruit is a fleshy drupe

Photos by Douglas Cygan

Berberis vulgaris - European Barberry

Family: Berberidaceae
Native to: China

European Barberry-*Berberis vulgaris*

Woodland invasion, Claremont, NH

Description: Shrub 3-8' in height by 3-6' in width. **Stems:** Tan bark with 3 long spines at each leaf axis. **Leaves:** Alternate, simple, $^{1}/_{2}$"-1$^{1}/_{2}$" long, bright green above, dull below. **Flowers:** Perfect, yellow, $^{1}/_{2}$" long, mid-April to May. **Fruit:** Oblong drupe turning pale red in fall. **Zone:** 4-8. **Habitat:** Prefers full sun to partial shade and open spaces to wooded areas. **Spread:** Seeds are dispersed by birds and wildlife. **Comments:** Highly adaptable to most environments and is pollution tolerant. **Controls:** Hand pull young plants. Cut or mechanically remove older larger plants or apply approved herbicides for large populations.

Thorns

Leaves

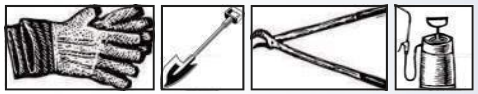
Flowers

Flowers whitish-yellow

Stems

Seed pods

Photos by Douglas Cygan



Polygonum cuspidatum - Japanese Knotweed

Family: Polygonaceae
Native to: Japan

Description: Perennial reaching 10' in height and width. Bohemian Knotweed (*Reynoutria x bohemica*) is similar. **Stems:** Greenish, hollow and jointed, similar to bamboo. **Leaves:** Alternate, broadly ovate, 3-7" long. **Flowers:** Small, whitish, forming panicles, August-September. **Seeds:** Calyx, brown, triangular. **Habitat:** Found in woodland sites, open spaces, ditches, roadsides, riverbanks. Prefers moist, well-drained soils. **Spread:** Stem & root fragments, and by seed. **Comments:** Aggressive, spreads quickly along surface waters and in right-of-ways. **Controls: Do <u>not</u> mow**, cut stems at base then smother by covering area with heavy-duty fabric/plastic, herbicides also recommended.

Photos by Douglas Cygan

Polygonum perfoliatum - Mile-a-Minute Vine

Family: Polygonaceae
Native to: Asia

Description: Very fast growing herbaceous perennial vine growing to 25' in height. **Stems:** Greenish with stiff barbs used for support. **Leaves:** Alternate, triangular in shape with clasping bract at the base, 1-3" long. **Flowers:** Racemes, inconspicuous and white forming at the bract, August - October. **Seeds:** An achene within a greenish, berry-like fruit. **Habitat:** Grows in partial shade to full sun, fields, roadsides & forests. Prefers moist, well-drained soils. **Spread:** Seed spread by birds & wildlife. **Comments:** Fast growing, aggressive. **Controls:** Mowing, hand cutting or herbicide use is recommended.

Photos by Leslie J. Mehrhoff

Microstegium vimineum - Japanese Stilt Grass

Family: Poaceae
Native to: Asia

Japanese Stilt Grass—*Microstegium vimineum*

Japanese Stilt Grass woodland invasion

Description: Weak-stemmed annual grass, reaching 2-4' tall. **Leaves:** Lanceolate, tapered at both ends, 2-3" long with silvery stripe of reflective hairs down the midrib. **Flowers:** Racemes occur at the ends of the stalk itself, late August. **Fruit:** Achenes develop in late fall. **Zone:** 5-11. **Habitat:** Occurs along riverbanks, floodplains, forests and roadsides, adaptable to most soil and light conditions. **Spread:** Seeds spread by water, wildlife & humans. **Comments:** Plants spread quickly into natural areas leading to competition and displacement of native species. **Controls:** Small populations can be hand pulled while large populations can be continuously cut back to prevent flowering and seed production. Herbicide treatments are also effective.

Early development

Root (UMASS Extension)

Leaf with silvery reflective hairs along midrib

Fall-leaves turn purplish

Seed-Achene

Photos courtesy of Leslie J. Mehrhoff/UCONN-IPANE and UMASS Extension

Celastrus orbiculatus - Oriental Bittersweet

Family: Celastraceae
Native to: Japan, China

Oriental Bittersweet-*Celastrus orbiculatus*

Oriental Bittersweet invasion, Concord, NH

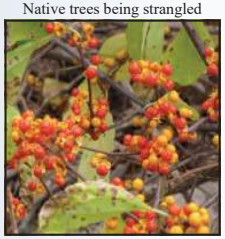
Description: Deciduous vine reaching heights of 40-60'. **Bark:** Tannish, furrowed. **Leaves:** Alternate, ovate, bluntly toothed, 3-4" long by 2/3's as wide, tapered at the base. **Flowers:** Small, greenish, blooming in spring. **Fruit:** Yellow dehiscent capsule surrounding an orange-red aril. *Fruits occur in the axils of the stems whereas native bittersweet (Celastrus scandens) fruits at the ends.* **Zone:** 4-8. **Habitat:** Disturbed edges, roadsides, fields, forests and along rivers and streams. **Spread:** Birds and humans. **Comments:** Very aggressive, climbs up and over trees and smothers them. Do not buy wreaths made of these vines. **Controls:** Difficult to manage. Cutting, pulling, or recommended herbicide use applied to foliage, bark, or cut-stump.

Looking up into canopy

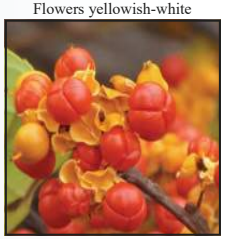
Leaves

Native trees being strangled

Flowers yellowish-white

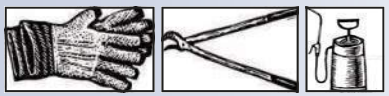


Mature Orange-yellow fruit



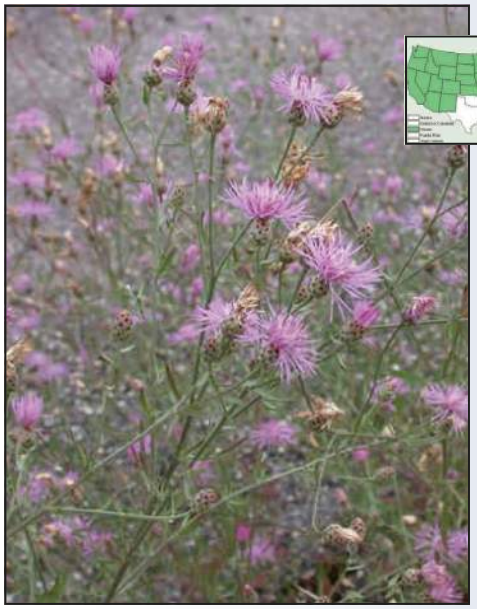
Fruit is a fleshy capsule

Photos by Douglas Cygan

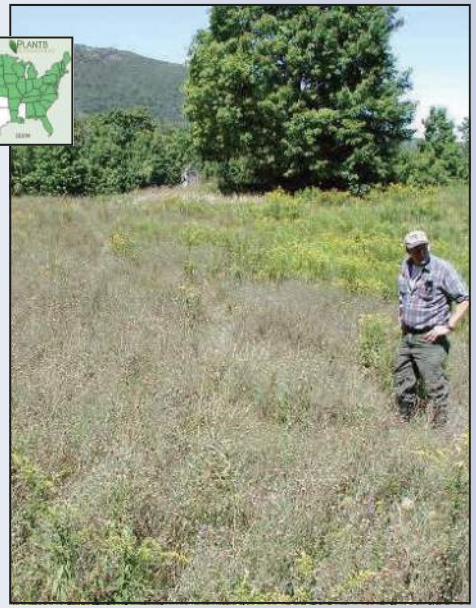


Centaurea maculosa - Spotted Knapweed

Family: Compositae
Native to: Eurasia



Spotted Knapweed—*Centaurea maculosa*



Invasion (photo by Leslie Mehrhoff)

Description: Tall erect herbaceous perennial living 3-5 years. **Leaves:** Alternate, divided, Pale green, 1-3" long. **Flowers:** Aster-like, terminal, purple, July-August. **Fruit:** Each plant produces thousands of brownish seeds per year. **Zone:** 3-10. **Habitat:** Invades dry sunny roadsides, fields and waste places. Its large taproot allows it to survive harsh winters and draught **Spread:** Seeds spread by wind and wildlife. **Comments:** Plants spread quickly into natural meadows and fields leading to competition and displacement of native species. Roots excrete a toxin killing off other plants. **Controls:** Small populations can be hand pulled while large populations can be continuously cut back to prevent flowering and seed production. Herbicide treatments are also effective.

Basal rosette

Leaf

Seed head

Flowers—Aster like

Stems

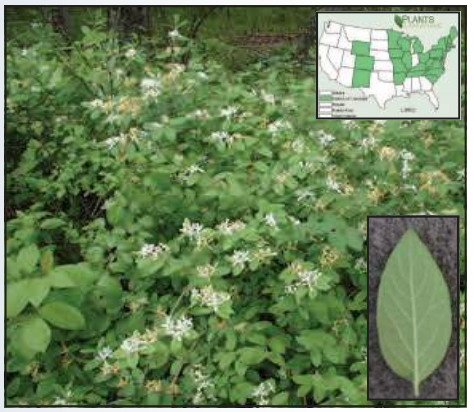
Seeds

Photos by Leslie Mehrhoff & Douglas Cygan

Lonicera morrowii - Morrow's Honeysuckle

Family: Caprifoliaceae
Native to: Japan

Description: Shrub reaching 6-8' tall. **Stems:** Smooth, glabrous, Tannish, hollow. **Leaves:** Ovate, simple, entire, opposite, pubescent beneath, 1-2 1/2" long. **Flowers:** Tubular, white, turning yellow with age, May to June. **Fruits:** Berry turning red. **Zone:** 3 . **Habitat:** Moist to wet shaded floodplains, forests, roadsides, fields, waste places. **Spread:** Seeds are dispersed by wildlife and humans. **Comments:** Rapidly invades sites, forming a dense vegetative layer that outcompetes native flora and fauna species. **Controls:** Hand control is effective for small plants, while mechanical removal and repetitive cutting also work well. Herbicide treatment is better for areas with greater infestations.



Photos by Douglas Cygan & Leaf Photo by Leslie J. Mehrhoff

Lonicera tatarica - Tatarian Honeysuckle

Family: Caprifoliaceae
Native to: Eurasia

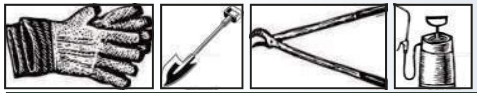
Description: Upright deciduous shrub reaching 6-15' tall. **Stems:** Smooth, glabrous, tan, hollow. **Leaves:** Ovate, smooth, bluish-green, opposite, 1-2 1/2" long. **Flowers:** Tubular, pink or white, April to May. **Fruit:** Berry with two seeds, turning red in fall. **Zone:** 3. **Habitat:** Under story species in woodland sites, also invades open spaces. Thrives in moist soils. **Spread:** Seeds dispersed by wildlife and humans. **Comments:** Rapidly invades forests, fields, roadsides and floodplains. Outcompetes native species. **Controls:** Hand control is effective for small plants while mechanical removal, cutting and chemical applications are better for larger stands.

Photos by Leslie J. Mehrhoff & Berry Photo by Douglas Cygan

Lonicera x bella - Showy Bush Honeysuckle

Family: Caprifoliaceae
Native to: Eurasia

Description: Shrub reaching 20' in height and width. **Stems:** Greenish to tan with corky wings. **Leaves:** Oppositely arranged, simple and elliptic, 1-3" long by half as wide, light green. **Flowers:** Yellow, white or pink, May to early June. **Fruit:** Fleshy red, forming in pairs in leaf axis. **Zone:** 4. **Habitat:** Prefers dry upland soils, full sun to heavy shade, pH adaptable. **Spread:** Seeds are dispersed by birds. **Comments:** *L. x bella* is a cross between *L. tatarica* & *L. morrowii*. Spreads into natural areas forming dense stands, which displace native species. **Controls**: Hand or mechanical removal, continuous cutting, girdling, and herbicide treatment.

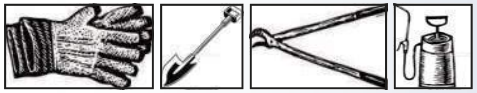


Photos courtesy of Leslie J. Mehrhoff/UCONN-IPANE

Lonicera japonica - Japanese Honeysuckle

Family: Caprifoliaceae
Native to: Eurasia

Description: Climbing vine. **Stems:** Reddish-brown, pubescent. **Leaves:** Opposite and not clasping the stem as opposed to the three native honeysuckle vines that do clasp the stem, oblong, $1^1/_2$ -2" long, rounded at base. **Flowers:** Tubular, white or yellow, fragrant, May to mid-July. **Fruit:** Berry, smooth, blackish to slightly purplish. **Zone:** 4-8. **Habitat:** Prefers moist soils and full sun to partial shade. **Spread:** Seeds spread by wildlife. **Comments:** Vines grow quickly, covering native vegetation, resulting in loss of habitat. **Controls:** hand or mechanical removal, cutting, girdling, chemical.



Photos courtesy of John M. Randall/The Nature Conservancy
& Leaf Photo by Leslie J. Mehrhoff

Cynanchum nigrum - Black Swallow-Wort

Family: Asclepiadaceae
Native to: Eurasia

Description: Perennial herbaceous vine that grows to 6'. **Leaves:** Opposite, lanceolate, dark glossy green, simple with a smooth edge, 2-4" long. **Flowers:** Small $^1/_4$", 5-petaled, purplish, from June to September. **Seed:** Seeds are similar to those of milkweed. **Zone:** 4 to 8. **Habitat:** It prefers full to partial sun. **Spread:** Seeds dispersed by wind. **Comments:** Invades roadsides, fields, disturbed sites, meadows, and woodlands, outcompeting native species. **Controls:** Hand pull young plants. Remove and destroy seed pods before they open. Apply herbicides as a foliar spray during the growing season. If plants are to be dug, use a spade and make sure that all root fragments are removed.

Photos by Douglas Cygan

Cynanchum rossicum - Pale Swallow-Wort

Family: Asclepiadaceae
Native to: China

Description: Perennial vine growing to 3-6'. Very similar to black swallow-wort with the exception of the flowers. **Leaves:** Opposite, lanceolate, 2-4" long. **Flowers:** Magenta, $^3/_8$", flowering from June to September. **Seed:** Seeds are similar to milkweed. **Zone:** 4 to 8. **Habitat:** It prefers full to partial sun. **Spread:** Seeds dispersed by wind. **Comments:** Invades roadsides, fields, disturbed sites, meadows and woodlands. **Controls:** Hand pull young plants. Remove and destroy seed pods before they open. Apply herbicides as a foliar spray. Dig using a spade to ensure all root fragments are removed.

Photos courtesy of John M. Randall/The Nature Conservancy

Elaeagnus umbellata - Autumn Olive

Family: Elaeagnaceae
Native to: Asia

Autumn Olive—Elaeagnus umbellata

Autumn Olive invasion in Concord, NH

Description: Weedy deciduous shrub measuring 20' by 20'. **Bark:** Silvery-gray and smooth with whitish lenticels. **Stems:** Cinnamon-brown. **Leaves:** Elliptical, 2-3" long, glossy, green above and silverish below. **Flowers:** Solitary, whitish, 4-petaled, mid-June. **Fruit:** Drupe. **Zone:** 3-8. **Habitat:** Naturalizes in open spaces exposed to full sun. **Spread:** Seeds dispersed by birds and wildlife. **Comments:** Very aggressive. Outcompetes and displaces native species. **Controls:** Remove seedlings and saplings by hand. Larger shrubs can be mechanically removed, or cut and apply herbicide to stump.

Silvery-gray Bark

Leaves

Terminal bud

Flowers whitish

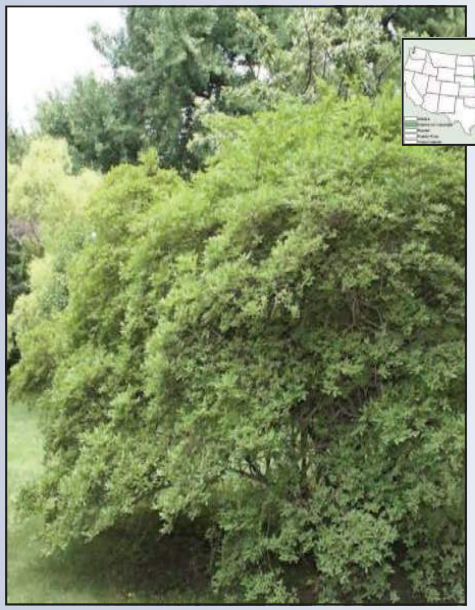
Fall Color

Fruit is a fleshy drupe

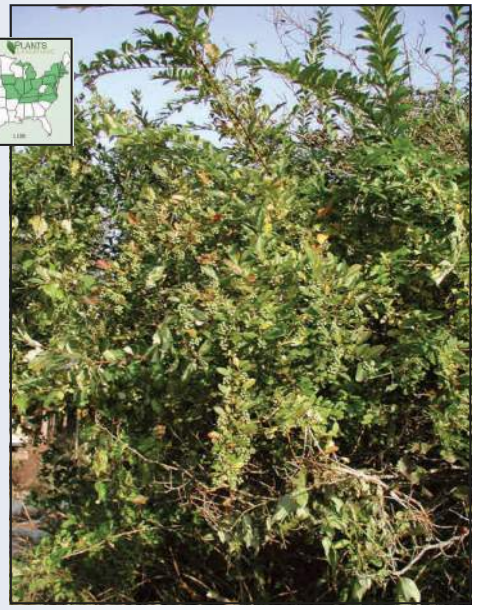
Photos by Douglas Cygan

Ligustrum obtusifolium - Blunt-leaved Privet

Family: Oleaceae
Native to: Europe



Blunt-leaved Privet-*Ligustrum obtusifolium*



Blunt-leaved Privet (Photo: Leslie J. Mehrhoff)

Description: Shrub reaching 12' tall by 10-12' wide. **Stems:** Greenish, smooth. **Leaves:** Opposite, simple and elliptic, 1-3" long by half as wide, blunt tipped, light green. **Flowers:** Small white panicles, May to early June. **Fruit:** Small blackish drupe. **Zone:** 4-7. **Habitat:** Prefers dry upland soils, full sun to heavy shade, pH adaptable. **Spread:** Seeds dispersed by birds. **Comments**: Becomes established in natural areas leading to competition and displacement of native species. **Controls:** Hand or mechanical removal, cutting, herbicide applications such as foliar or cut-stem.

Twig/stem bark

Leaves

Terminal bud

Flowers white

Fall color

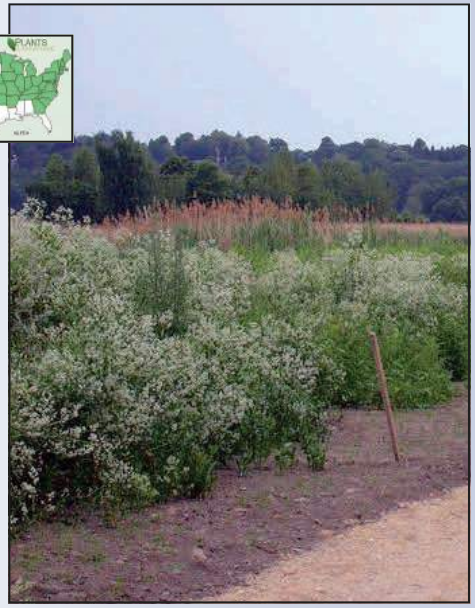
Fruit is a dark drupe

Photos by Douglas Cygan & Leslie Mehrhoff

Lepidium latifolium - Perennial Pepperweed

Family: Cruciferae
Native to: Eurasia

Perennial Pepperweed—*Lepidium latifolium*

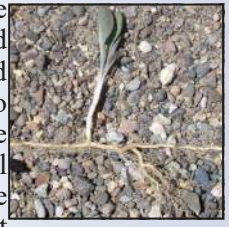


Perennial Pepperweed invasion Seacoast area, NH

Description: Long lived perennial growing 2-4' tall. **Leaves:** Alternate, lanceolate with serrated edge. **Flowers:** Terminal, tightly clustered, white, July. **Fruit:** Silicle, rounded, flattish, hairy $^{1}/_{16}$" long. **Zone:** 4-8. **Habitat:** Prefers wet, brackish soils such as coastal tidal marshes and ditches, wetlands, and floodplains. **Spread:** Seeds and creeping rhizome fragments spread by water, wildlife and humans. **Comments:** Plants spread quickly into natural areas leading to competition and displacement of native coastal wetland species. **Controls:** Small populations can be hand pulled while large populations can be continuously cut back to prevent flowering and seed production. Herbicide treatments are also effective.

Basal rosette

Leaf



Rhizome root with shoot

Flower head

Persistent stems

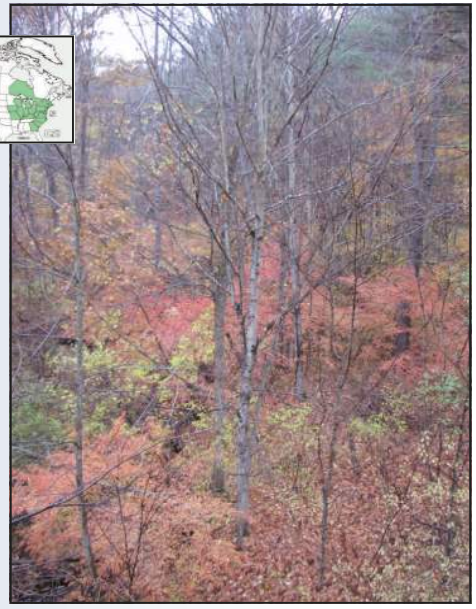
Seeds (photo—USDA)

Photos by Kevin Lucey & Jennifer Forman

Euonymus alatus - Burning Bush

Family: Celastraceae
Native to: Asia

Burning Bush-*Euonymus alatus*



Burning Bush invasion, Boscawen, NH

Description: Deciduous shrub reaching 20' in height and width. **Stems:** Greenish with corky wings. **Leaves:** Oppositely arranged, simple and elliptic, 1-3" long by half as wide, light green. **Flowers:** Inconspicuous greenish-yellow, May to June. **Fruit:** Fleshy green capsule turning red in fall. **Zone:** 3 to 8. **Habitat:** Prefers dry upland soils, full sun to heavy shade, pH adaptable. **Spread**: Seeds are dispersed by birds and wildlife. **Comments:** Outcompetes and displaces native species. **Controls:** Hand remove seedlings and saplings. Use a spade or shovel to dig out larger plants. Large populations may be controlled with herbicide use.

Corky-winged bark

Leaves

Terminal buds

Flowers yellowish-white

Fall color

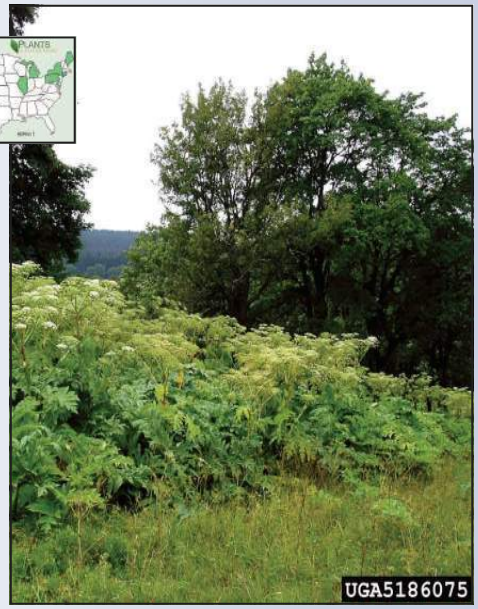
Fruit is a fleshy capsule

Photos by Douglas Cygan

Heracleum mantegazzianum - Giant Hogweed

Family: Apiaceae
Native to: China

Giant Hogweed-*Heracleum mantegazzianum*



Open field invasion (Photo-Bugwood.org)

Description: Biennial growing to 15' tall. **Stems:** Greenish with purple splotches, 2-4" diameter with coarse hairs, hollow. **Leaves:** Large, compound, deeply incised, 3-5' wide, hairy on underside. **Flowers:** White inflorescence, 1-2' in diameter, May-June. **Seeds:** Flattened, $^{3}/_{8}$" long, ovate with 4 brown resin canals. **Zone:** 3-8. **Habitat:** Found in wet areas, roadsides, gardens, open spaces, full sun to partial shade. **Spread:** Seeds dispersed by water, wildlife and humans. **Comments:** The clear, watery sap is phototoxic to human skin, causing severe blistering and burns. Spreads readily and displaces native species. **Controls:** Remove plants by digging up tap root. Herbicide can also be used as a foliar treatment.

Purple spotted, hairy stem

Leaf

130-150 Floral rays

Flowers whitish umbel

Persistent dead stalks

Seeds with resinous veins

Photos by Douglas Cygan

Hesperis matronalis - Dame's Rocket

Family: Brassicaceae
Native to: Eurasia

Dame's Rocket—*Hesperis matronalis*

Dame's Rocket invasion

Description: Cool season biennial, 2nd year plants flower and reach 30" tall. **Leaves:** Alternately arranged and lanceolate in shape with toothed margins. **Flowers:** Terminal racemes, 4-petals, purplish, early to mid spring. **Fruit:** Pods, seeds turn brown when mature. **Zone:** 4-8. **Habitat:** Prefers partial sun, moist to mesic conditions such as floodplains, forests and roadsides, adaptable to full sun with adequate moisture. **Spread:** Seeds spread by water and wildlife. **Comments:** Plants spread quickly into natural areas leading to competition and displacement of native species. **Controls:** Small populations can be hand pulled while large populations can be continuously cut back to prevent flowering and seed production. Herbicide treatments are also effective.

Basal rosette

Leaf

Flower buds

Flowers 4-petaled, white

Stems

Seed pods

Photos by Leslie Mehroff

SECTION 5 STORMWATER INSPECTION & MAINTENANCE LOG

STORMWATER INSPECTION MAINTENANCE LOG

2255 Lafayette Road- Portsmouth, NH

General Information			
Project Name	Retail Motor Fuel Outlet	**Location**	Portsmouth, NH
Date of Inspection		**Start/ End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			

	Site Specific BMP's	Maintenance Interval
1	Street Sweeping	1 year
2	Deep Sump Catch Basins	6 months
3	Outlet Apron/Weirs	1 Year
4	Oil/Water Separator	6 months
5	Hydrodynamic Separators (First Defense Unit)	1 Year (See separate maintenance log for First Defense Unit)
6	Jellyfish Filter	1 Year (See separate maintenance log for Jellyfish Filter)
7	Underground Detention System	6 months

STORMWATER INSPECTION MAINTENANCE LOG

2255 Lafayette Road - Portsmouth, NH

BMP Description	Corrective Action Required?	Notes
Street Sweeping		
Evidence of debris accumulation	☐ Yes ☐ No	
Evidence of oil grease	☐ Yes ☐ No	
Other (specify)	☐ Yes ☐ No	
Deep Sump Catch Basins		
Grates clear of debris	☐ Yes ☐ No	
Inlet and outlet clear of debris	☐ Yes ☐ No	
Evidence of oil grease	☐ Yes ☐ No	
Observance of accumulated sediment	☐ Yes ☐ No	Sediment Depth =
Evidence of structural deterioration	☐ Yes ☐ No	
Evidence of flow bypassing facility	☐ Yes ☐ No	
Other (specify)	☐ Yes ☐ No	
Outlet Aprons/Weirs		
Inlet/ inflow pipe clear of debris	☐ Yes ☐ No	
Overflow spillway clear of debris	☐ Yes ☐ No	
Evidence of rilling or gullying	☐ Yes ☐ No	
Tree growth	☐ Yes ☐ No	
Other (specify)	☐ Yes ☐ No	
Oil / Water Seperator		
Grates clear of debris	☐ Yes ☐ No	
Inlet and outlet clear of debris	☐ Yes ☐ No	
Observance of accumulated sediment	☐ Yes ☐ No	Sediment Depth =
Evidense of oil grease	☐ Yes ☐ No	
Evidence of flow bypassing facility	☐ Yes ☐ No	
Hydrodynamic Separator (First Defense Unit)		
See separate maintenance log for First Defense Unit		
Jellyfish Filter		
See separate maintenance log for Jellyfish Filter		
Underground Detention System		
Inlet and outlet clear of debris	☐ Yes ☐ No	
Pipe bottom clear of debris	☐ Yes ☐ No	
Observance of accumulated sediment	☐ Yes ☐ No	Sediment Depth =
Bottom dewaters within 72 hrs. of a storm event	☐ Yes ☐ No	
Outlet control structure clear of debris	☐ Yes ☐ No	
Other (specify)		

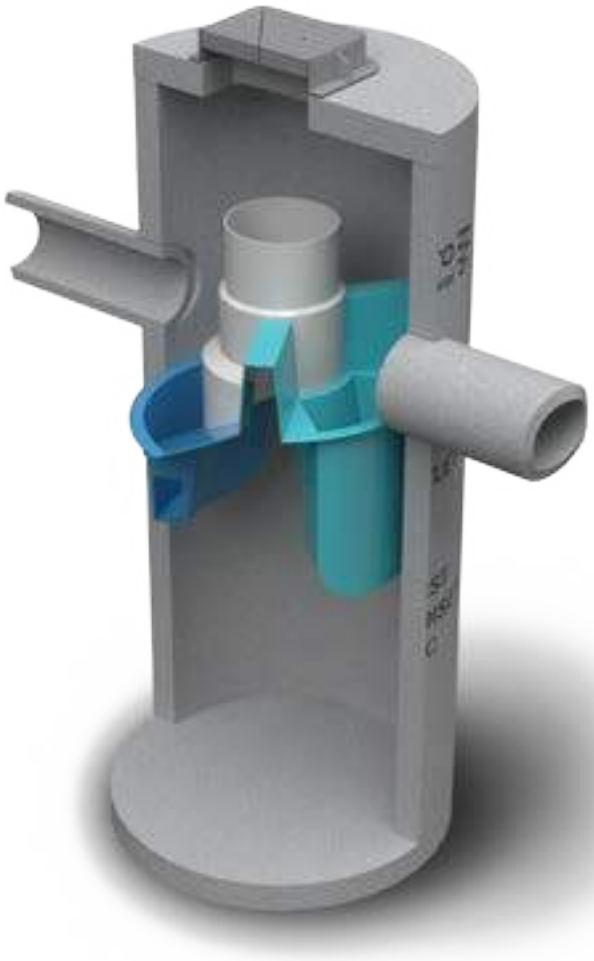
NOTE: Photos shall be provided with each inspection log and shall be sufficiently labeled to identify photo location.

SECTION 6 DE-ICING LOG

Deicing Log

Date Applied	Type of Deicing Material	Amount Applied

Hydro International



Operation and Maintenance Manual

First Defense® and First Defense® High Capacity

Vortex Separator for Stormwater Treatment

Table of Contents

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Hydro Maintenance Services

Hydro International has been engineering stormwater treatment systems for over 30 years. We understand the mechanics of removing pollutants from stormwater and how to keep systems running at an optimal level.

Nobody Knows our Systems Better than we do

Avoid Service Negligence

Sanitation services providers not intimately familiar with stormwater treatment systems are at risk of the following:

- Inadvertently breaking parts or failing to clean/replace system components appropriately.
- Charging you for more frequent maintenance because they lacked the tools to service your system properly in the first place.
- Billing you for replacement parts that might have been covered under your Hydro warranty plan
- Charging for maintenance that may not yet have been required.

Leave the Dirty Work to us

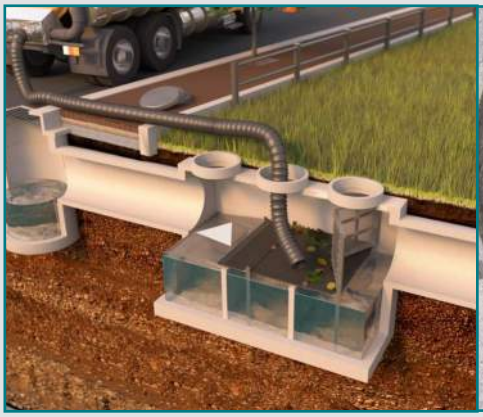
Trash, sediment and polluted water is stored inside treatment systems until they are removed by our team with a vactor truck. Sometimes teams must physically enter the system chambers in order to prepare the system for maintenance and install any replacement parts. Services include but are not limited to:

- Solids removal
- Removal of liquid pollutants
- Replacement media installation (when applicable)

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Better Tools, Better Results

Not all vactor trucks are created equal. Appropriate tools and suction power are needed to service stormwater systems appropriately. Companies who don't specialize in stormwater treatment won't have the tools to properly clean systems or install new parts.



Service Warranty

Make sure you're not paying for service that is covered under your warranty plan. Only Hydro International's service teams can identify tune-ups that should be on us, not you.

Treatment Systems Serviced by Hydro:

- Stormwwater filters
- Stormwater separators
- Baffle boxes
- Biofilters/biorention systems
- Storage structures
- Catch basins
- Stormwater ponds
- Permeable pavement



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I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations (refer to *Section II. Model Sizes & Configurations*, page 4) to accommodate a wide range of pipe sizes, peak flows and depth constraints.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for “offline” arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 500% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

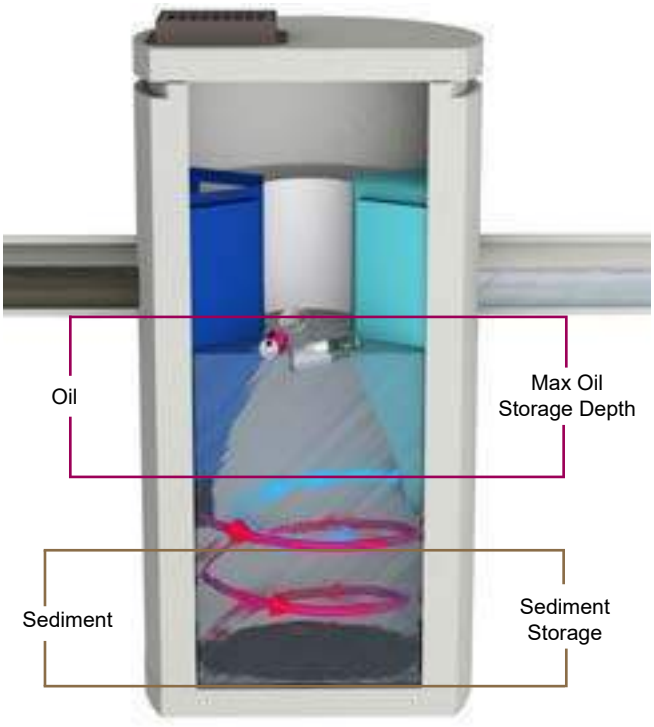

Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components of the First Defense®-4HC and First Defense®-6HC have modified geometries as to allow greater design flexibility needed to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2a - 2b). First Defense® model parameters and design criteria are shown in Table 1.

First Defense® Components

1. **Built-In Bypass**
2. **Inlet Pipe**
3. **Inlet Chute**
4. **Floatables Draw-off Port**
5. **Outlet Pipe**
6. **Floatables Storage**
7. **Sediment Storage**
8. **Inlet Grate or Cover**

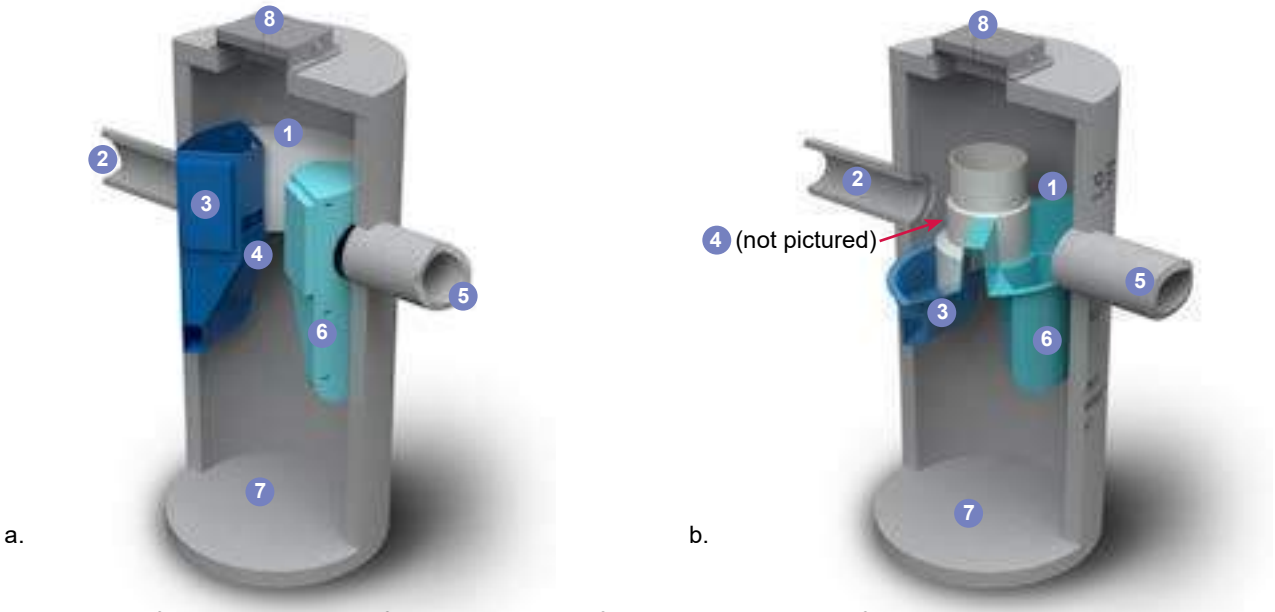

Fig.2a) First Defense®-4 and First Defense®-6; b) First Defense®-4HC and First Defense®-6HC, with higher capacity dual internal bypass and larger maximum pipe diameter.

First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates		Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	106µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd^3 / m^3)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.84 / 23.7	1.60 / 45.3	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	1.88 / 50.9	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC	5 / 1.5	2.34 / 66.2	2.94 / 82.1	20 / 566	24 / 609	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	4.73 / 133.9	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	7.52 / 212.9	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 -1.8	7.40 / 2.2

[1]Contact Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]Minimum distance for models depends on pipe diameter.

III. Maintenance

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil. Maximum pollutant storage capacities are provided in Table 1.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense®-HC have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

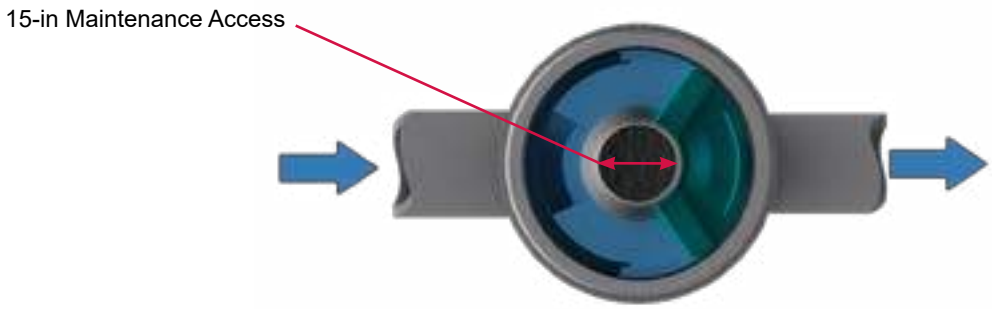

Fig.3 The central opening to the sump of the First Defense®-HC is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / flotables removal, for a 6-ft First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.5).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose and skimmer pole to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.

- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.

Fig.4 Floatables are removed with a vactor hose (First Defense model FD-4, shown).

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- First Defense® Maintenance Log

Floatables and sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. Remove oil and floatables stored on the surface of the water with the vactor hose (Fig.5) or with the skimmer or net (not pictured).

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).

6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor (Fig.5).

7. Retract the vactor hose from the vessel.

8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.

9. Securely replace the grate or lid.

Fig.5 Sediment is removed with a vactor hose (First Defense model FD-4, shown).

Maintenance at a Glance

Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.	

First Defense® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL SIZE (CIRCLE ONE): **FD-4** **FD-4HC** **FD-6** **FD-6HC**

INLET (CIRCLE ALL THAT APPLY): **GRATED INLET (CATCH BASIN)** **INLET PIPE (FLOW THROUGH)**

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

First Defense® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment Removed	Site Activity and Comments

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Turning Water Around...®

CONTECH®
ENGINEERED SOLUTIONS

Jellyfish® Filter
Owner's Manual

Jellyfish® Filter

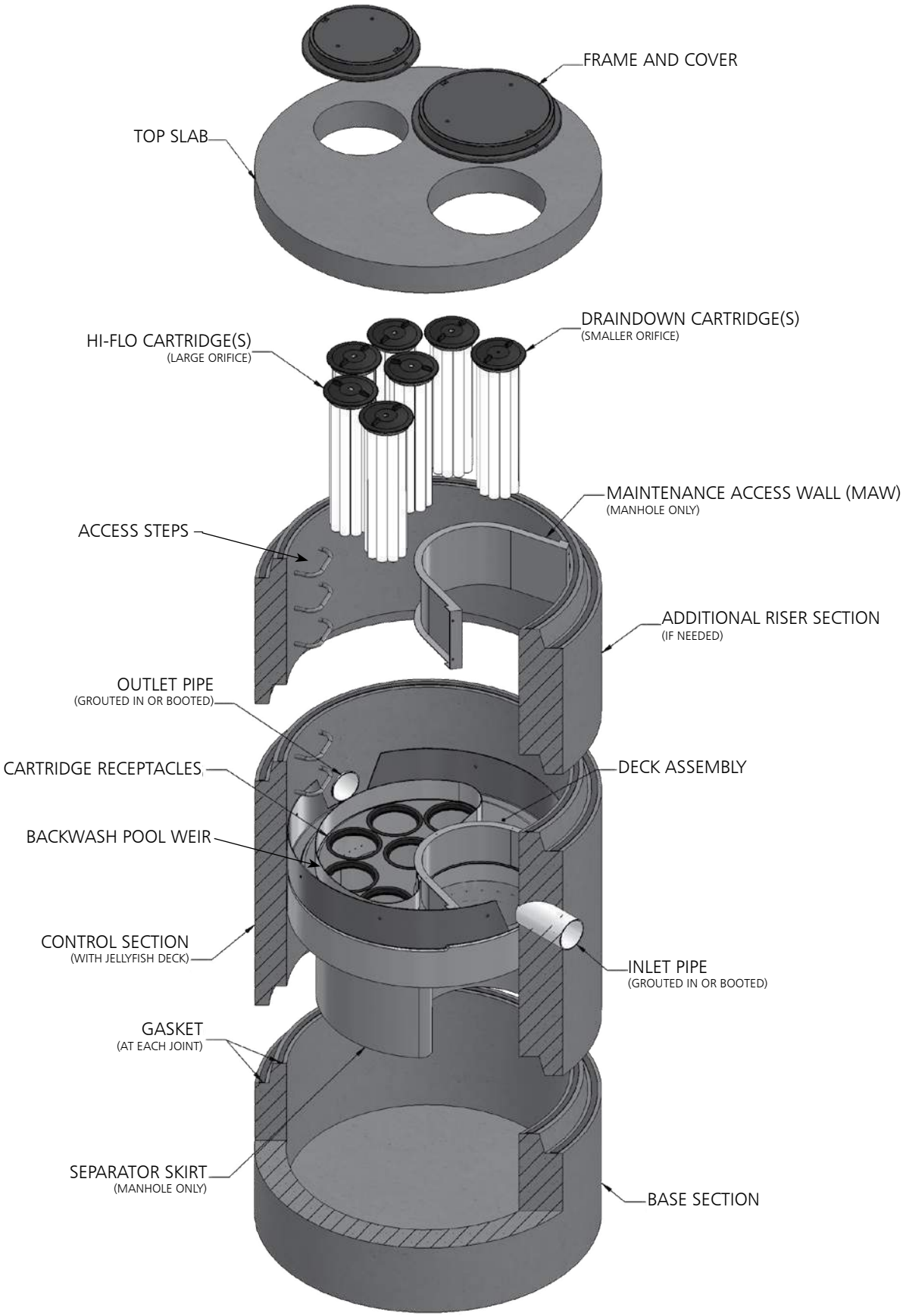
Table of Contents

THANK YOU FOR PURCHASING THE JELLYFISH® FILTER!

Contech Engineered Solutions would like to thank you for selecting the Jellyfish Filter to meet your project's stormwater treatment needs. With proper inspection and maintenance, the Jellyfish Filter is designed to deliver ongoing, high levels of stormwater pollutant removal.

If you have any questions, please feel free to call us or e-mail us:

Contech Engineered Solutions
9025 Centre Pointe Drive, Suite 400 | West Chester, OH 45069
513-645-7000 | 800-338-1122
www.ContechES.com
info@conteches.com


FRAME AND COVER
TOP SLAB
HI-FLO CARTRIDGE(S)
(LARGE ORIFICE)
DRAINDOWN CARTRIDGE(S)
(SMALLER ORIFICE)
MAINTENANCE ACCESS WALL (MAW)
(MANHOLE ONLY)
ACCESS STEPS
ADDITIONAL RISER SECTION
(IF NEEDED)
OUTLET PIPE
(GROUTED IN OR BOOTED)
CARTRIDGE RECEPTACLES
DECK ASSEMBLY
BACKWASH POOL WEIR
CONTROL SECTION
(WITH JELLYFISH DECK)
INLET PIPE
(GROUTED IN OR BOOTED)
GASKET
(AT EACH JOINT)
SEPARATOR SKIRT
(MANHOLE ONLY)
BASE SECTION

WARNINGS / CAUTION

1. FALL PROTECTION may be required.
2. WATCH YOUR STEP if standing on the Jellyfish Filter Deck at any time; Great care and safety must be taken while walking or maneuvering on the Jellyfish Filter Deck. Attentive care must be taken while standing on the Jellyfish Filter Deck at all times to prevent stepping onto a lid, into or through a cartridge hole or slipping on the deck.
3. The Jellyfish Filter Deck can be SLIPPERY WHEN WET.
4. If the Top Slab, Covers or Hatches have not yet been installed, or are removed for any reason, great care must be taken to NOT DROP ANYTHING ONTO THE JELLYFISH FILTER DECK. The Jellyfish Filter Deck and Cartridge Receptacle Rings can be damaged under high impact loads. This type of activity voids all warranties. All damaged items to be replaced at owner's expense.
5. Maximum deck load 2 persons, total weight 450 lbs.

Safety Notice

Jobsite safety is a topic and practice addressed comprehensively by others. The inclusions here are intended to be reminders to whole areas of Safety Practice that are the responsibility of the Owner(s), Manager(s) and Contractor(s). OSHA and Canadian OSH, and Federal, State/Provincial, and Local Jurisdiction Safety Standards apply on any given site or project. The knowledge and applicability of those responsibilities is the Contractor's responsibility and outside the scope of Contech Engineered Solutions.

Confined Space Entry

Secure all equipment and perform all training to meet applicable local and OSHA regulations regarding confined space entry. It is the Contractor's or entry personnel's responsibility to proceed safely at all times.

Personal Safety Equipment

Contractor is responsible to provide and wear appropriate personal protection equipment as needed including, but not limited to safety boots, hard hat, reflective vest, protective eyewear, gloves and fall protection equipment as necessary. Make sure all equipment is staffed with trained and/or certified personnel, and all equipment is checked for proper operation and safety features prior to use.

- Fall protection equipment
- Eye protection
- Safety boots
- Ear protection
- Gloves
- Ventilation and respiratory protection
- Hard hat
- Maintenance and protection of traffic plan

Chapter 1

1.0 – Owner Specific Jellyfish Filter Product Information

Below you will find a reference page that can be filled out according to your Jellyfish Filter specification to help you easily inspect, maintain and order parts for your system.

Owner Name:	
Phone Number:	
Site Address:	
Site GPS Coordinates/unit location:	
Unit Location Description:	
Jellyfish Filter Model No.:	
Contech Project & Sequence Number	
No. of Hi-Flo Cartridges	
No. of Cartridges:	
Length of Draindown Cartridges:	
No. of Blank Cartridge Lids:	
Bypass Configuration (Online/Offline):	

Notes:

_____

_____

_____

_____

Chapter 2

2.0 – Jellyfish Filter System Operations and Functions

The Jellyfish Filter is an engineered stormwater quality treatment technology that removes a high level and wide variety of stormwater pollutants. Each Jellyfish Filter cartridge consists of eleven membrane - encased filter elements ("filtration tentacles") attached to a cartridge head plate. The filtration tentacles provide a large filtration surface area, resulting in high flow and high pollutant removal capacity.

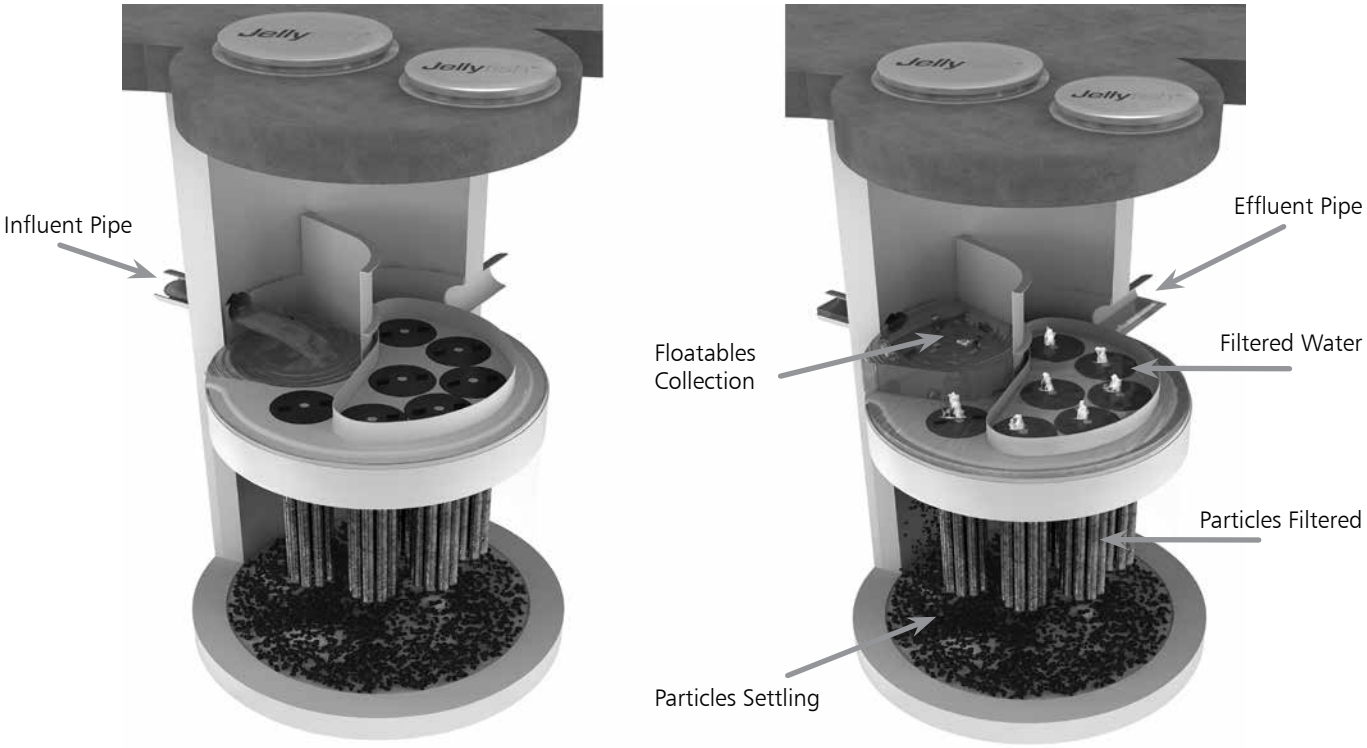
The Jellyfish Filter functions are depicted in Figure 1 below.

FIGURE 1

Jellyfish Filter Treatment Functions

Membrane Filtration

Section View with Maintenance Access Wall (MAW) Cutaway



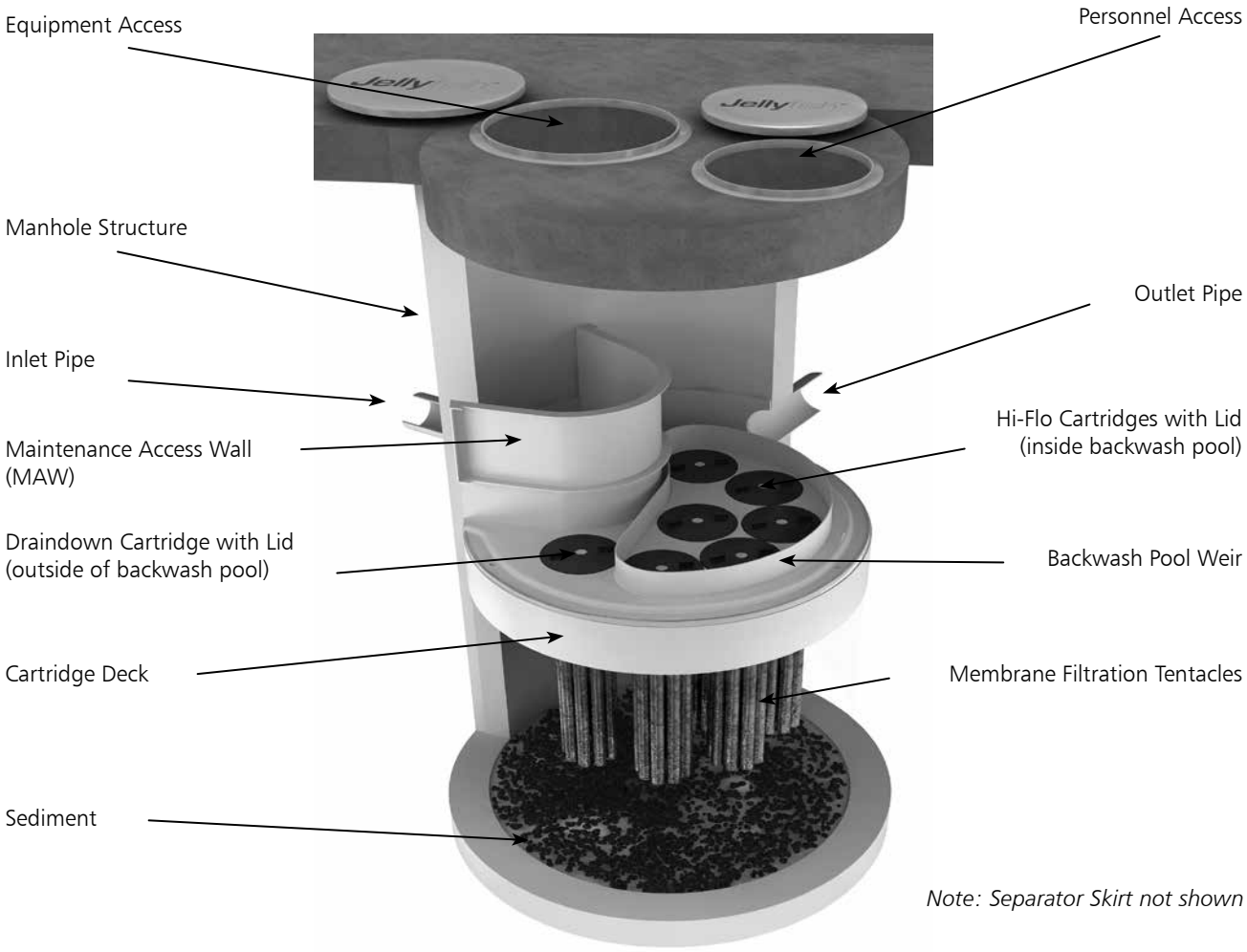
Jellyfish Filter cartridges are backwashed after each peak storm event, which removes accumulated sediment from the membranes. This backwash process extends the service life of the cartridges and increases the time between maintenance events.

For additional details on the operation and pollutant capabilities of the Jellyfish Filter please refer to additional details on our website at www.ContechES.com.

2.1 – Components and Cartridges

The Jellyfish Filter and components are depicted in Figure 2 below.

FIGURE 2 **Jellyfish Filter Components**



Tentacles are available in various lengths as depicted in Table 1 below.

Table 1 – Cartridge Lengths / Weights and Cartridge Lid Orifice Diameters

Cartridge Lengths	Dry Weight	Hi-Flo Orifice Diameter	Draindown Orifice Diameter
15 inches (381 mm)	10 lbs (4.5 kg)	35 mm	20 mm
27 inches (686 mm)	14.5 lbs (6.6 kg)	45 mm	25 mm
40 inches (1,016 mm)	19.5 lbs (8.9 kg)	55 mm	30 mm
54 inches (1,372 mm)	25 lbs (11.4 kg)	70 mm	35 mm

2.2 – Jellyfish Membrane Filtration Cartridge Assembly

The Jellyfish Filter utilizes multiple membrane filtration cartridges. Each cartridge consists of removable cylindrical filtration "tentacles" attached to a cartridge head plate. Each filtration tentacle has a threaded pipe nipple and o-ring. To attach, insert the top pipe nipples with the o-ring through the head plate holes and secure with locking nuts. Hex nuts to be hand tightened and checked with a wrench as shown below.

2.3 – Jellyfish Membrane Filtration Cartridge Installation

- Cartridge installation will be performed by trained individuals and coordinated with the installing site Contractor. Flow diversion devices are required to be in place until the site is stabilized (final paving and landscaping in place). Failure to address this step completely will reduce the time between required maintenance.
- Descend to the cartridge deck (see Safety Notice and page 3).
- Refer to Contech's submittal drawings to determine proper quantity and placement of Hi-Flo, Draindown and Blank cartridges with appropriate lids. Lower the Jellyfish membrane filtration cartridges into the cartridge receptacles within the cartridge deck. It is possible that not all cartridge receptacles will be filled with a filter cartridge. In that case, a blank headplate and blank cartridge lid (no orifice) would be installed.

Cartridge Assembly

Do not force the tentacles down into the cartridge receptacle, as this may damage the membranes. Apply downward pressure on the cartridge head plate to seat the lubricated rim gasket (thick circular gasket surrounding the circumference of the head plate) into the cartridge receptacle. (See Figure 3 for details on approved lubricants for use with rim gasket.)

- Examine the cartridge lids to differentiate lids with a small orifice, a large orifice, and no orifice.
  - Lids with a small orifice are to be inserted into the Draindown cartridge receptacles, outside of the backwash pool weir.
  - Lids with a large orifice are to be inserted into the Hi-Flo cartridge receptacles within the backwash pool weir.
  - Lids with no orifice (blank cartridge lids) and a blank headplate are to be inserted into unoccupied cartridge receptacles.
- To install a cartridge lid, align both cartridge lid male threads with the cartridge receptacle female threads before rotating approximately 1/3 of a full rotation until firmly seated. Use of an approved rim gasket lubricant may facilitate installation.

3.0 Inspection and Maintenance Overview

The primary purpose of the Jellyfish® Filter is to capture and remove pollutants from stormwater runoff. As with any filtration system, these pollutants must be removed to maintain the filter's maximum treatment performance. Regular inspection and maintenance are required to insure proper functioning of the system.
Maintenance frequencies and requirements are site specific and vary depending on pollutant loading. Additional maintenance activities may be required in the event of non-storm event runoff, such as base-flow or seasonal flow, an upstream chemical spill or due to excessive sediment loading from site erosion or extreme runoff events. It is a good practice to inspect the system after major storm events.
Inspection activities are typically conducted from surface observations and include:

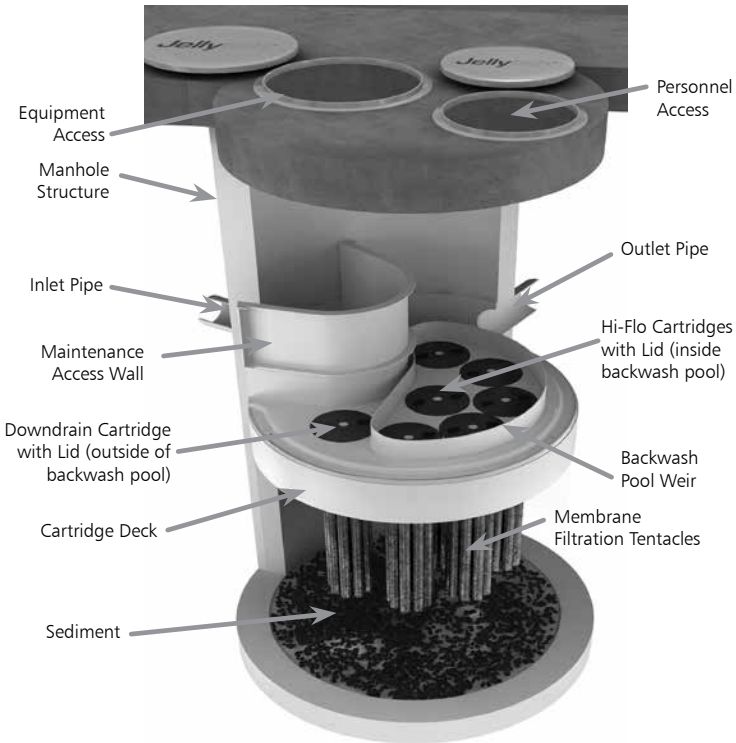
- Observe if standing water is present
- Observe if there is any physical damage to the deck or cartridge lids
- Observe the amount of debris in the Maintenance Access Wall (MAW) or inlet bay for vault systems

Maintenance activities include:

- Removal of oil, floatable trash and debris
- Removal of collected sediments
- Rinsing and re-installing the filter cartridges
- Replace filter cartridge tentacles, as needed

4.0 Inspection Timing

Inspection of the Jellyfish Filter is key in determining the maintenance requirements for, and to develop a history of, the site's pollutant loading characteristics. In general, inspections should be performed at the times indicated below; *or per the approved project stormwater quality documents (if applicable), whichever is more frequent*.



Note: Separator Skirt not shown

1. A minimum of quarterly inspections during the first year of operation to assess the sediment and floatable pollutant accumulation, and to ensure proper functioning of the system.
2. Inspection frequency in subsequent years is based on the inspection and maintenance plan developed in the first year of operation. Minimum frequency should be once per year.
3. Inspection is recommended after each major storm event.
4. Inspection is required immediately after an upstream oil, fuel or other chemical spill.

5.0 Inspection Procedure

The following procedure is recommended when performing inspections:

1. Provide traffic control measures as necessary.
2. Inspect the MAW or inlet bay for floatable pollutants such as trash, debris, and oil sheen.
3. Measure oil and sediment depth in several locations, by lowering a sediment probe until contact is made with the floor of the structure. Record sediment depth, and presences of any oil layers.
4. Inspect cartridge lids. Missing or damaged cartridge lids to be replaced.
5. Inspect the MAW (where appropriate), cartridge deck and receptacles, and backwash pool weir, for damaged or broken components.

5.1 Dry weather inspections

- Inspect the cartridge deck for standing water, and/or sediment on the deck.
- No standing water under normal operating conditions.
- Standing water inside the backwash pool, but not outside the backwash pool indicates, that the filter cartridges need to be rinsed.

Inspection Utilizing Sediment Probe

- Standing water outside the backwash pool is not anticipated and may indicate a backwater condition caused by high water elevation in the receiving water body, or possibly a blockage in downstream infrastructure.
- Any appreciable sediment (≥1/16") accumulated on the deck surface should be removed.

5.2 Wet weather inspections

- Observe the rate and movement of water in the unit. Note the depth of water above deck elevation within the MAW or inlet bay.
- Less than 6 inches, flow should be exiting the cartridge lids of each of the draindown cartridges (i.e. cartridges located outside the backwash pool).
- Greater than 6 inches, flow should be exiting the cartridge lids of each of the draindown cartridges and each of the hi-flo cartridges (i.e. cartridges located inside the backwash pool), and water should be overflowing the backwash pool weir.
- 18 inches or greater and relatively little flow is exiting the cartridge lids and outlet pipe, this condition indicates that the filter cartridges need to be rinsed.

6.0 Maintenance Requirements

Required maintenance for the Jellyfish Filter is based upon results of the most recent inspection, historical maintenance records, or the site specific water quality management plan; whichever is more frequent. In general, maintenance requires some combination of the following:

1. Sediment removal for depths reaching 12 inches or greater, or within 3 years of the most recent sediment cleaning, whichever occurs sooner.
2. Floatable trash, debris, and oil removal.
3. Deck cleaned and free from sediment.
4. Filter cartridges rinsed and re-installed as required by the most recent inspection results, or within 12 months of the most recent filter rinsing, whichever occurs sooner.
5. Replace tentacles if rinsing does not restore adequate hydraulic capacity, remove accumulated sediment, or if damaged or missing. It is recommended that tentacles should remain in service no longer than 5 years before replacement.
6. Damaged or missing cartridge deck components must be repaired or replaced as indicated by results of the most recent inspection.
7. The unit must be cleaned out and filter cartridges inspected immediately after an upstream oil, fuel, or chemical spill. Filter cartridge tentacles should be replaced if damaged or compromised by the spill.

7.0 Maintenance Procedure

The following procedures are recommended when maintaining the Jellyfish Filter:

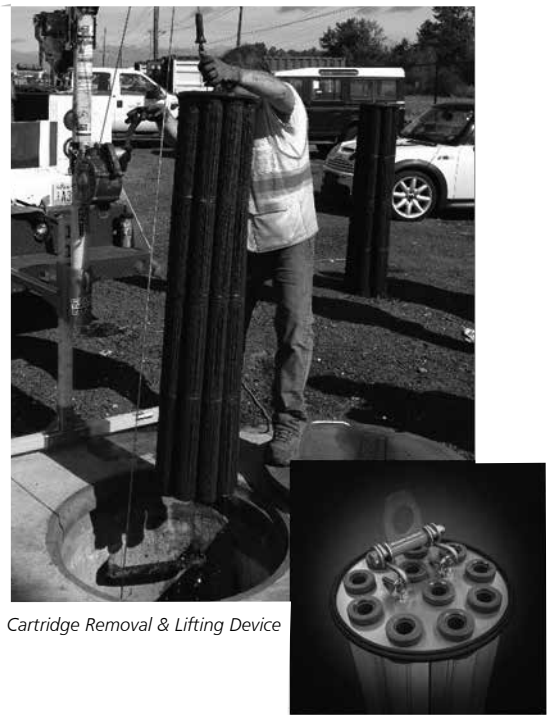
1. Provide traffic control measures as necessary.
2. Open all covers and hatches. Use ventilation equipment as required, according to confined space entry procedures. *Caution: Dropping objects onto the cartridge deck may cause damage*.
3. Perform Inspection Procedure prior to maintenance activity.
4. To access the cartridge deck for filter cartridge service, descend into the structure and step directly onto the deck. Caution: Do not step onto the maintenance access wall (MAW) or backwash pool weir, as damage may result. Note that the cartridge deck may be slippery.
5. Maximum weight of maintenance crew and equipment on the cartridge deck not to exceed 450 lbs.

7.1 Filter Cartridge Removal

1. Remove a cartridge lid.
2. Remove cartridges from the deck using the lifting loops in the cartridge head plate. Rope or a lifting device (available from Contech) should be used. *Caution: Should a snag occur, do not force the cartridge upward as damage to the tentacles may result. Wet cartridges typically weigh between 100 and 125 lbs*.
3. Replace and secure the cartridge lid on the exposed empty receptacle as a safety precaution. Contech does not recommend exposing more than one empty cartridge receptacle at a time.

7.2 Filter Cartridge Rinsing

1. Remove all 11 tentacles from the cartridge head plate. Take care not to lose or damage the O-ring seal as well as the plastic threaded nut and connector.
2. Position tentacles in a container (or over the MAW), with the threaded connector (open end) facing down, so rinse water is flushed through the membrane and captured in the container.



Cartridge Removal & Lifting Device

3. Using the Jellyfish rinse tool (available from Contech) or a low-pressure garden hose sprayer, direct water spray onto the tentacle membrane, sweeping from top to bottom along the length of the tentacle. Rinse until all sediment is removed from the membrane. *Caution: Do not use a high pressure sprayer or focused stream of water on the membrane. Excessive water pressure may damage the membrane*.
4. Collected rinse water is typically removed by vacuum hose.

5. Reassemble cartridges as detailed later in this document. Reuse O-rings and nuts, ensuring proper placement on each tentacle.

7.3 Sediment and Flotables Extraction

1. Perform vacuum cleaning of the Jellyfish Filter only after filter cartridges have been removed from the system. Access the lower chamber for vacuum cleaning only through the maintenance access wall (MAW) opening. Be careful not to damage the flexible plastic separator skirt that is attached to the underside of the deck on manhole systems. Do not lower the vacuum wand through a cartridge receptacle, as damage to the receptacle will result.
2. Vacuum floatable trash, debris, and oil, from the MAW opening or inlet bay. Alternatively, floatable solids may be removed by a net or skimmer.
3. Pressure wash cartridge deck and receptacles to remove all

Rinsing Cartridge with Contech Rinse Tool

sediment and debris. Sediment should be rinsed into the sump area. Take care not to flush rinse water into the outlet pipe.

4. Remove water from the sump area. Vacuum or pump equipment should only be introduced through the MAW or inlet bay.
5. Remove the sediment from the bottom of the unit through the MAW or inlet bay opening.
6. For larger diameter Jellyfish Filter manholes (≥8-ft) and some

Vacuuming Sump Through MAW

vaults complete sediment removal may be facilitated by removing a cartridge lid from an empty receptacle and inserting a jetting wand (not a vacuum wand) through the receptacle. Use the sprayer to rinse loosened sediment toward the vacuum hose in the MAW opening, being careful not to damage the receptacle.

7.4 Filter Cartridge Reinstallation and Replacement

1. Cartridges should be installed after the deck has been cleaned. It is important that the receptacle surfaces be free from grit and debris.
2. Remove cartridge lid from deck and carefully lower the filter cartridge into the receptacle until head plate gasket is seated squarely in receptacle. *Caution: Do not force the cartridge downward; damage may occur.*
3. Replace the cartridge lid and check to see that both male threads are properly seated before rotating approximately 1/3 of a full rotation until firmly seated. Use of an approved rim gasket lubricant may facilitate installation. See next page for additional details.
4. If rinsing is ineffective in removing sediment from the tentacles, or if tentacles are damaged, provisions must be made to replace the spent or damaged tentacles with new tentacles. Contact Contech to order replacement tentacles.

7.5 Chemical Spills

Caution: If a chemical spill has been captured, do not attempt maintenance. Immediately contact the local hazard response agency and contact Contech.

7.6 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.

Jellyfish Filter Components & Filter Cartridge Assembly and Installation

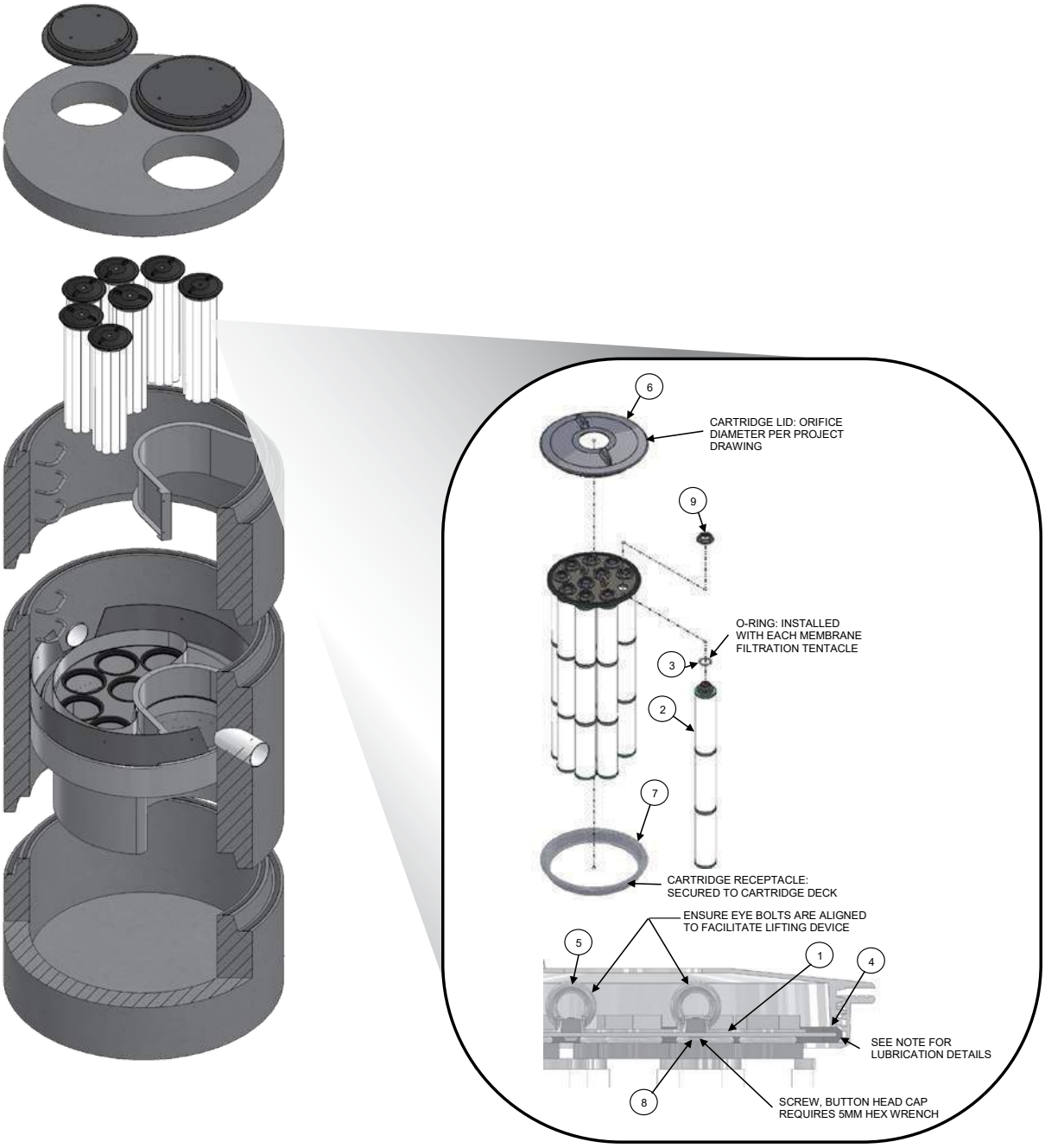


TABLE 1: BOM

ITEM NO.	DESCRIPTION
1	JF HEAD PLATE
2	JF TENTACLE
3	JF O-RING
4	JF HEAD PLATE GASKET
5	JF CARTRIDGE EYELET
6	JF 14IN COVER
7	JF RECEPTACLE
8	BUTTON HEAD CAP SCREW M6X14MM SS
9	JF CARTRIDGE NUT

TABLE 2: APPROVED GASKET LUBRICANTS

PART NO.	MFR	DESCRIPTION
78713	LA-CO	LUBRI-JOINT
40501	HERCULES	DUCK BUTTER
30600	OATEY	PIPE LUBRICANT
PSLUBXL1Q	PROSELECT	PIPE JOINT LUBRICANT

NOTES:

Head Plate Gasket Installation:
Install Head Plate Gasket (Item 4) onto the Head Plate (Item 1) and liberally apply a lubricant from Table 2: Approved Gasket Lubricants onto the gasket where it contacts the Receptacle (Item 7) and Cartridge Lid (Item 6). Follow Lubricant manufacturer's instructions.

Lid Assembly:
Rotate Cartridge Lid counter-clockwise until both male threads drop down and properly seat. Then rotate Cartridge Lid clock-wise approximately one-third of a full rotation until Cartridge Lid is firmly secured, creating a watertight seal.

Jellyfish Filter Inspection and Maintenance Log

Owner: _____ Jellyfish Model No.:_____

Location: _____ GPS Coordinates: _____

Land Use: Commercial:_____ Industrial: _____ Service Station:_____

Road/Highway:____ Airport: _____ Residential: _____ Parking Lot:_____

Date/Time:					
Inspector:					
Maintenance Contractor:					
Visible Oil Present: (Y/N)					
Oil Quantity Removed					
Floatable Debris Present: (Y/N)					
Floatable Debris removed: (Y/N)					
Water Depth in Backwash Pool					
Cartridges externally rinsed/re-commissioned: (Y/N)					
New tentacles put on Cartridges: (Y/N)					
Sediment Depth Measured: (Y/N)					
Sediment Depth (inches or mm):					
Sediment Removed: (Y/N)					
Cartridge Lids intact: (Y/N)					
Observed Damage:					
Comments:					