

Harwich Planning Board Agenda
Tuesday, April 13, 2021 – 6:30 PM
Town Hall, 732 Main Street, Harwich

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- I. CALL TO ORDER; ROLL CALL** Pursuant to Governor Baker's March 12, 2020 Order Suspending Certain Provisions of the Open Meeting Law, G.L. c. 30A, §20, and the Governor's March 15, 2020 Order imposing strict limitations on the number of people that may gather in one place, this meeting of the Harwich Planning Board is being conducted via remote participation. No in-person attendance of members of the public will be permitted, but every effort will be made to ensure that the public can adequately access the proceedings as provided for in the Order.

II. PUBLIC HEARINGS

- A. **Continuance: PB2020-28 Cape Cod Oil Company, H. Tasha, TR. of M.J.T. Enterprises, as applicant**, Jacobs Driscoll Engineering, Inc., as representative, seeks approval of a Site Plan Review Special Permit with waiver to establish and install two (2) 30,000 gallon propane tanks along with appurtenant equipment fixtures and site features pertinent to the establishment of a new Heating Fuel Resale and Storage use, which is an allowable use within the zoning district. The application is pursuant to the Code of the Town of Harwich §325-55. The property is located at 6 Station Avenue, Map 39, Parcel K3, in I-L zoning district. *Hearing continued from February 23, 2021.*

B. **Zoning Articles:**

1. **Article 39:** To see if the Town will vote to amend the Code of the Town of Harwich – Zoning Article XXIV West Harwich Special District by adding a new §325-160 as follows:

§325-160 Design Guidelines

For the purpose of this section the Harwich Planning Board shall adopt “*West Harwich Special District Site and Architectural Design Guidelines*” which shall constitute rules and regulations guiding historic structures and new construction within the WHSD.

Please note: The following article has not been accepted by the Selectmen for the May Town Meeting Warrant. The notice is attached.

2. **Article ____**: To see if the Town will vote to amend the Code of the Town of Harwich – Zoning by amending §325-42.L by making the following changing (new text shown in **bold underline** and deleted language shown in strike-out):

Parking and loading zone setbacks for all uses except single-family, two-family and single-family with accessory apartment shall be as follows. For commercial structures, wheel stops for parking spaces perpendicular to or at an angle to a structure shall be located so as to provide a clear area of three feet between the end of a vehicle parked in the space and the nearest structure.

III. PUBLIC MEETING**

A. New Business:

1. **Waiver of Site Plan**

PB2021-05 Allen Harbor Yacht Club, John T. Blute, Commodore, as owner, Joseph F. Fournier, Jr., AIA, representative, seeks approval of a Waiver of Site Plan Review pursuant to the Code of the Town of Harwich §325-55.F to expand the first floor deck, expand and replace the lower patio, rework the handicapped ramp into the new deck expansion area and the plan demonstrates proposed fencing and handicapped parking spaces additions. The property is located at 371 Lower County Road, Map 13, Parcel P1-3, -4 and -4A, in the RH-1 zoning district.

B. Old Business

1. PB2007-36 South Westgate Road – Mark Zippo (Original owner: Chapman)
2. PB2016-05 Denwich Road – Tonka Girl LLC, Mike Escher, Manager

C. Briefings and Reports by Board Members

IV. ADJOURN

***PLEASE NOTE:** *We request all who are attending this meeting to please observe the same courtesies that would be observed if you were here in person. If you need to conduct unrelated business before your item on the agenda comes up, we request you mute your line –*

Use *6 to mute and unmute your phone.

****Per the Attorney General's Office – Boards/Commissions may hold an open session for topics not reasonably anticipated by the Chair 48 hours in advance of the meeting following "New Business".**

Next Planning Board Meeting (Subject to Change) – Tuesday, April 27, 2021.
Requests for accommodations for any person having a disability can be made by contacting the Administration Office at 508-430-7513.

Authorized Posting Officer: Elaine Banta, ebanta@town.harwich.ma.us or 508-430-7511

Planning Board Agenda Item II.A.
For April 13, 2021
Limited Staff Report
PB2020-28 Cape Cod Oil

PB2020-28 Cape Cod Oil Company, H. Tasha, TR. of M.J.T. Enterprises, as applicant, Jacobs Driscoll Engineering, Inc., as representative, seeks approval of a Site Plan Review Special Permit to establish and install two (2) 30,000 gallon propane tanks along with appurtenant equipment fixtures and site features pertinent to the establishment of a new Heating Fuel Resale and Storage use, which is an allowable use within the zoning district. The application is pursuant to the Code of the Town of Harwich §325-55. The property is located at 6 Station Avenue, Map 39, Parcel K3, in I-L zoning district.

The Planning Board will open the public meeting on Tuesday, April 13, 2021 no earlier than at 6:30 p.m.

Planning Board Jurisdiction
§ 325-55 Site plan approval.

Description

The application packet was filed with the Town Clerk on October 27, 2020. Revised and additional materials and / or plans were filed following interdepartmental reviews. The following are pertinent for case review and include the following:

1. Project Narrative and application packet, prepared by Jacobs Driscoll Engineering, Inc. (JDE), dated October 26, 2020.
2. Site Development Plans - Propane Distribution Facility, prepared by Jacobs Driscoll Engineering, Inc. (JDE), stamped by Edward P. Jacobs, P.L.S. and/or Gregory W. Driscoll, Jr., P.E. as applicable, dated September 24, 2020 and last revised March 8, 2021, as follows:
 - a. Cover, General Notes and Legend, Sheet 1 of 7;
 - b. Existing Conditions Plan, Sheet 2 of 7;
 - c. Existing Conditions Plan, Sheet 3 of 7;
 - d. Layout & Materials Plan, Sheet 4 of 7;
 - e. Layout & Materials Plan, Sheet 5 of 7;
 - f. Construction Notes and Details, Sheet 6 of 7;
 - g. Construction Notes and Details, Sheet 7 of 7.
3. Propane System Schematic, prepared by SFC Engineering, dated 03/08/2021, FX-001, sheet 1 of 1, unstamped.
4. Drainage Calc and Stormwater Management Report, prepared by JDE, dated March 8, 2021, 106 pages.
5. ProPar spec 30,000 UG LPG 131, prepared for Quality Gas, dated 01/07/2014, 1 sheet.
6. Crown Energy Solutions, LLC Underground Piping Schematic (Drawing 1902-007 Sheet 1 of 1) REV 1, dated 02/20/2019 and revised 02/23/2019.
7. Crown Energy Solutions, Underground Tank Installation (Drawing 1902-007 Sheet 2 of 2), dated 02/2/2019.
8. Lighting Plan, prepared by Reflex Lighting, Not to Scale (NTS), not dated.
9. 'Galleonaire' Lighting Area/Site Luminaire data, 8 sheets.

Comments from other Boards, Departments, Committees

Fire: See attached letter in regards to fire protection and containment abutting the residential neighborhoods (2 pages).

Engineering: Here are my comments on the Cape Cod Oil Drainage and Stormwater Calcs

- What is the total disturbance associated with the proposed project? If the land disturbance is 1 acre or more a Local Stormwater Permit is required in accordance with the Comprehensive Stormwater and Illicit Discharge Regulations. The total disturbance appears to be less than 1 acre but it is unclear.
- Have test pits been conducted to confirm groundwater separation from the bottom of the infiltration proposed.
- Is there an existing septic system on the property? Septic location should be shown on the plans to confirm separation from the stormwater infiltration system.
- The Groundwater recharge volume appears to be miscalculated. The project as proposed will meet the required recharge volume.
- Are there any elements of water quality enhancement being proposed as part of the redevelopment? Water quality is referenced in relation to the roof runoff but if this water is clean how is water quality credit being applied?
- Has any consideration been given to installing a structural water quality unit to treat the runoff from the tank area?

Conservation: I have looked into it and seeing as the work will take place outside of the 100' buffer zone, Conservation does not have any direct concern with the project. That being said, there should be no alterations within the 100' resource area, other than the removal of the stored oil tanks. Any further alteration within the 100' buffer zone will need Conservation approval.

Health, Water & Highway: No issues or concerns.

Planning Staff Comments

Elaine Banta:

Administrative requirements have been generally met.

Abutter Letters have been attached for your review and consideration.

Landscape plans have not been presented. Landscaping along the residential boundaries should be reviewed pursuant to Section 325-43 of the Town Code.

The area marked storage tank area and the stockade fencing along a portion of the north boundary line is encroaching on the Cape Cod Rail Trail. An easement must be provided for continued permission to for this use.

There are three shipping containers and a shed shown on the existing conditions plan. Uses for these items should be determined, particularly the containers if they are to be relocated. If relocated, the plan and approval shall be incorporated into the findings and decision. This may require re-examining the parking schedule.

No free-standing sign (Master Sign) has been shown on the plan.

The original waiver request is no longer required as the applicant has submitted the Drainage and Stormwater Calculations have been submitted and provided to the Town Engineer. However, additional information may be provided at or before the meeting.

Board Votes

Findings of Fact (amend, add or change as necessary)

Motion to adopt the following finding of fact:

1. The property is located at 6 Station Ave and is within the I-L Zoning District and the specific site is an appropriate location for such a use.
2. The property at 2 Station Ave is operated by the applicant and operates as a home heating oil delivery business.
3. The development of property as proposed will establish a new Use – Heating Fuel Resale and Storage – Propane. The delivery of propane to homes and business is an expansion of the existing business.
4. The redevelopment and expansion of the business does not adversely affect the neighborhood as there will be no changes to the existing structure. The development will not be incompatible with the characteristics of the abutting uses in the I-L neighborhood.
5. Issues of nuisance or serious hazard to vehicles or pedestrians have been addressed through Fire Department requirements and thorough review and the applicant has agreed to underground propane storage tanks for safety reasons.
6. Adequate and appropriate facilities will be provided for the proper operation of the proposed use.

Site Plan Review Special Permit (Pursuant to § 325-55 of the Code) – Suggested Motions:

To Approve with Conditions Case PB2020-28 Cape Cod Oil - The property is located at 6 Station Avenue, Map 39, Parcel K3, in I-L zoning district.

The decision is based on the findings of facts stated and the fact that the proposal does not substantially change the relationship of the structure to the site or to abutting properties and structures and the application meets the necessary requirements and criteria for approval. The following conditions are imposed:

- a. All work must comply with local, state and federal Fire regulations.
- b. All drainage and storm water requirements, local, state and federal, shall be met and approved by the Harwich Town Engineer prior to the commencement of construction operations, if determined to be required by the Town Engineer.
- c. Prior to commencement of any work on the subject site, a fully executed and recorded Easement must be provided for continued use of the land outside the property boundaries. Otherwise, the area outside the bounds of the property must be vacated and restored to match the surround area if needed.
- d. Conservation restrictions shall be adhered to.
- e. Any changes to the site plan, other than those resulting from the Planning Board's review and approval, shall be subject to further Planning Board review and approval. Changes incorporated through the Planning Board's review and approval shall be incorporated and shown on the As-Built plan.
- f. This decision shall be recorded at the Barnstable Registry of Deeds prior to the issuance of a building permit.
- g. Changes to the plan may require further Planning Board review.
- h. All Signage shall comply with the requirements of the Code of the Town of Harwich and the Building Department, including directional signage.
- i. Lighting shall comply with the requirements of the Code of the Town of Harwich.
- j. Conformance with all review procedure requirements outlined pursuant to §400-18.G Inspection, certificate of completion and as-built plan, of the Code of the Town of Harwich shall be met.

2. The Board may **deny** the waiver and thereby require submission of a Site Plan Review application for a special permit. Denial is based on the findings of facts **[state the reasons above]** and the fact that these facts may demonstrate substantial changes with the relationship of the structure to the site and to abutting properties and structures, or;
3. Alternatively, a request a continuance may be appropriate (next meetings: April 27th and May
Continue the meeting to a date and time certain **[state reason / purpose or additional information to be submitted, etc.]**



Harwich Fire Department

175 Sisson Road
Harwich, Ma 02645
508-430-7548



David LeBlanc, Chief of Department

Craig Thornton, Deputy Fire Chief

Office of Fire Prevention / Code Enforcement

April 5, 2021

To the members of the Town of Harwich Planning Board

RE: Cape Cod Oil, 6 Station Avenue, Harwich, MA 02645

Greetings,

Chief Leblanc, Deputy Chief Thornton and I have been working with SFC Engineering Company and the architect Jody Ameden for Cape Cod Oil on plans for the construction of a new storage facility. The storage of 60,000 gallons of propane is not something that we can take lightly and in light of this have been working on a plan to make this facility as safe as possible. The greatest concern is that this location is directly in the center of a residential neighborhood. The following are some of our concerns:

1. There is only one access point into this property, driveway access is off of Station Ave. or Main Street.
2. Only one fire hydrant on this property.
3. The elevation of this property is higher than the residential property to the south, propane is heavier than air and is going to settle into low lying areas if there is a leak.
4. Impact to the neighborhood, aesthetics of two, thirty thousand above ground storage tanks.
5. Safety - ensuring that this is the safest facility for the Town and surrounding neighborhoods.

Propane and its storage is a historically safe product and has been used as a fuel for decades. Propane in unsafe circumstances can have a very rapid and explosive result. If propane in its storage vessel is exposed to heat and ruptures a bleve can occur. We have asked for some changes to make this a safer storage site.

1. Place tanks underground so as to prevent anyone from tampering with the tanks.
2. Placing the tanks underground is much more aesthetically pleasing to the neighborhood and those using the bike trail.
3. There is no chance of these tanks being exposed to any heat source.
4. There is only one connection between the tanks and the tanker or bobtail for loading or offloading.
5. With only one way into this site it is safer if these tanks are underground.
6. We are conducting a hydrant flow test on Monday April 12th to see if the sole hydrant on the property is adequate.
7. The tank to the rear of the property is a tank that they brought in that is currently not in use and empty at this time.
8. The building on the property can hold seven tractors which is used for maintenance and truck cleaning.

9. All trailers on the property are empty at night, the product is stored in the smaller bobtail trucks for emergency calls during the night.
10. The cement pad to the rear of the building is for truck storage, this is inside a fenced off area.
11. There is storage in this area for smaller propane tanks for home use.
12. At this time I saw storage space for 10 trailers on site. It is currently undetermined where the other twelve may be stored or where they may be located in the future.



Bruce Young, Fire Inspector
Harwich Fire Prevention

From: Daniel Roderick [<mailto:DRoderick@clarku.edu>]

Sent: Tuesday, November 24, 2020 12:54 PM

To: Elaine Banta <ebanta@town.harwich.ma.us>

Subject: PB2020-28 Cape Cod Oil Company, H. Tasha, TR. of M.J.T. Enterprises

Dear Elaine Banta,

Please consider the following comments in advance of the December 1 Planning Board Public hearing related to PB2020-28 Cape Cod Oil Company, H. Tasha, TR. of M.J.T. Enterprises.

- To fully understand the impact to the neighborhood environment, it would be good to know the nature of the “expand(ed) business”. Does the expanded business involve:
 - Distribution only?
 - Retail (open to the public)?
 - What are the hours/days of operation?
- Relevant to the prior comment, idling trucks within the current operation are a concern with respect to noise and greenhouse gas emission/pollution. Trucks are often witnessed idling as early as 3-4am, for several hours, and clearly audible to abutting residents many of whom live 100-150’ from the current and or existing sight. What steps will Cape Cod Oil take to:
 - Limit noise pollution, particularly during the evening/early morning hours
 - Reduce admissions from trucks idling unnecessarily
 - What quality assurance will Cape Cod Oil and/or the Town of Harwich develop so that surrounding residents and the ecological environment can continue the quiet enjoyment and healthy air quality of their home, such has been experienced for the past several decades?
- Please further describe the tank size. The drawings in the package show 44’X11’. Assuming these are length and width, what is the height of the tanks?
- Will the project result in sightline changes for any of the abutters?
 - If so, whom (which address) and to what extent?
 - If changes to sightlines are present within the proposed project, can screenings (preferably natural/vegetative) be added to the project?
- The package references “coordination with the Conservation office” and that a “Conservation filing will not be required”.
 - It would be comforting for the abutters to know more about why a Conservation filing will not be required.
 - Can either Cape Cod Oil, Jacobs Driscoll Engineering, Inc., or the Conservation Commission provide a written statement detailing and/or further expand the criteria used in determining that a filing is not required?
- Propane cylinder storage facilities are cited as some of the most dangerous workplaces listed by OSHA. What is Cape Cod Oil Company’s safety plan with respect to this facility, specifically:
 - Worker safety
 - Abutter safety in the event of leaks, fire or explosion: what mitigation structures/strategies are/will be in place to prevent injury and property damage?
 - Please describe the mitigation structures/strategies related to tanker trucks that will be in place to prevent injury and property damage. This question is posed with the assumption that propane tanker trucks will be parked at the facility and those trucks propose the same/similar risks as the larger storage tanks.

- Please describe measures that will be employed to insure security at this facility.
- With the assumption that there may be the need, what is the plan for evacuation for nearby residents and how will that plan be shared/communicated? This question specifically pertains to leak, fire or explosion events.
- For any of the planning contingencies and mitigation strategies raised above, what is the plan for coordinating with the Harwich Fire Department and/or other emergency response agencies?
- What quality assurance will be developed to support safety efforts?
- Cape Cod Oil appears to own several locations. Has the company considered housing this operation at one of the alternative holdings OR considered acquiring new property to meet the new business need? Specifically, it may be safer and less intrusive to install this infrastructure in a nonresidential setting and one with more appropriate setbacks considering.

Thank you for considering these comments in advance of the hearing.

Respectfully,

Dan Roderick

Dan Roderick
Director, Facilities Management
Clark University
DRoderick@clarku.edu | 508.793.7578
950 Main St. Worcester MA 01610

Charleen Greenhalgh

From: Contact form at Harwich MA <cmsmailer@civicplus.com>
Sent: Wednesday, January 13, 2021 1:05 PM
To: Charleen Greenhalgh
Subject: [Harwich MA] PB2020-28 Cape Cod Oil propane tank installation (Sent by Richard Coleman, rjcoleman2@comcast.net)

Hello cgreenhalgh,

Richard Coleman (rjcoleman2@comcast.net) has sent you a message via your contact form (<https://www.harwich-ma.gov/users/cgreenhalgh/contact>) at Harwich MA.

If you don't want to receive such e-mails, you can change your settings at <https://www.harwich-ma.gov/user/496/edit>.

Message:

Good Morning,

I am writing with serious concerns for (2) 30,000gallon propane tanks being installed abutting my properties back yard.

Here are some pressing matters:

1. Tanks of that size have no business abutting residential area. What is the plan for a major disaster? The former owners of property were a small family run oil company.
2. Tanks will also butt a heavily used area of the Cape Cod rail trail and other businesses on the opposite side of said trail. What security will be in place to prevent people from tampering with structures and inadvertently causing a problem.
3. It will negatively affect my properties value and resale value.
4. Truck traffic from 3:30am to midnight will be increased causing issues on Great Western Rd. The small company has already had a oil spill leaving that location causing environmental concerns and disrupting area for months.
5. What will happen with open air firepits? There are 5 with in 50 to 300 ft of the proposed location. Are we to loose our right to enjoy our evening fires?
6. Look up the destruction caused by one tank exploding let alone 2. I burns up everything with in 1000ft in all directions and can send debris 1.5 miles away.
7. There are already 2 other propane distribution centers on Great Wester Rd in SOuth Dennis not 3 miles away in industrial areas with no houses.

My opinion is that this project is not in keeping with the surround current use of properties on eithre side of this small parcel of land to warrant these tanks being installed.

Respectfully,

Richard Coleman
428 Great Western Rd
Harwich Ma 02645



Delmira

Cape Cod Rail Trail

Depot Rd

Station Ave

2 Station Ave

Great Western Rd

Issued for: Site Plan Review

Issued: September 24, 2020

JDE Project Number: 01-2020-015

Site Development Plans Propane Distribution Facility

6 Station Avenue,
Harwich, Barnstable County, MA 02645

PREPARED FOR:



227 Route 6,
Provincetown,
Barnstable County, MA 02657



LOCUS MAP
SCALE: 1"=1,500'

PREPARED BY:

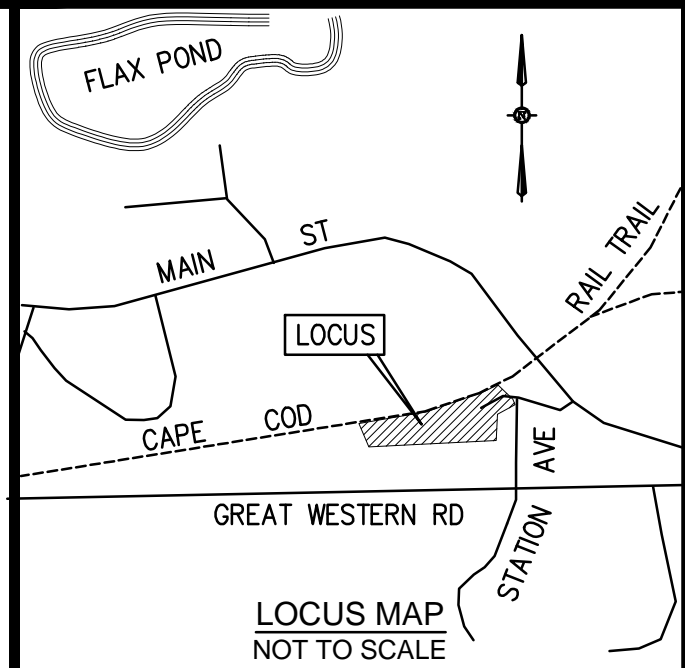


Jacobs Driscoll
Engineering

Civil Engineering and Land Surveying Professionals
50 Oliver Street
North Easton, MA 02356

CONSTRUCTION NOTES

1. ALL PROPOSED WALKWAYS WILL BE HANDICAPPED ACCESSIBLE. ALL PROPOSED SLOPES ON WALKWAYS TO BE LESS THAN 5%.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY EXISTING INFORMATION OR OTHER PROPOSED IMPROVEMENTS. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO JACOBS DRISCOLL ENGINEERING (JDE). CONTRACTOR WILL REFER TO (JDE) FOR ALL TECHNICAL COMMENTS FOR RESOLUTION OF THE CONFLICT.
3. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
4. THE TERM "PROPOSED" (PROP.) MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS OR, WHERE APPLICABLE, RE-USING EXISTING MATERIALS IDENTIFIED AS "REMOVE AND RESET". (R&R)
5. JOINTS BETWEEN NEW BITUMINOUS CONCRETE ROADWAY PAVEMENT AND SAWCUT EXISTING PAVEMENT SHALL BE SEALED WITH BITUMEN AND BACKSANDS.
6. THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR THEIR REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE THE START OF ANY WORK. THE CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO LOCATE THE UTILITIES EXACTLY. THE CONTRACTOR SHALL PRESERVE ALL UNDERGROUND UTILITIES. THE CONTRACTOR MUST CALL "DIG SAFE" (AT 1-888-DIG-SAFE) AND THE TOWN OF WEST BRIDGEWATER DPW AT LEAST 72 HOURS TO MARK APPROPRIATE UTILITIES BEFORE THE START OF CONSTRUCTION.
7. ALL AREAS DISTURBED DURING CONSTRUCTION SHALL BE REPLACED IN KIND. LAWN AREAS SHALL HAVE A MODIFIED LOAM BORROW PLACED AND SEEDED. THE MODIFIED LOAM BORROW SHALL HAVE A MINIMUM DEPTH OF 4" AND SHALL BE PLACED FLUSH WITH THE TOP OF ADJACENT CURB, EDGING, BERM, OR OTHER SURFACE.
8. THE CONTRACTOR SHALL WATER, MOW, AND FERTILIZE LAWN AREAS UNTIL SATISFACTORY GRASS STANDS, AND/OR THE OWNER OR ITS REPRESENTATIVE IS SATISFIED.
9. THE CONTRACTOR SHALL PROTECT ALL UNDERGROUND DRAINAGE, SEWER, AND UTILITY FACILITIES FROM EXCESSIVE VEHICULAR LOADS DURING CONSTRUCTION. ANY FACILITIES DAMAGED BY CONSTRUCTION LOADS SHALL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
10. UPON AWARD OF CONTRACT, CONTRACTOR SHALL MAKE ALL NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN ALL NECESSARY PERMITS, PAY ALL FEES AND POST ALL BONDS ASSOCIATED WITH SAME, AND COORDINATE WITH THE ENGINEER AS REQUIRED.
11. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR JOB SITE SAFETY AND ALL CONSTRUCTION MEANS AND METHODS.
12. PRIOR TO THE START OF CONSTRUCTION THE CONTRACTOR SHALL SUBMIT A SCHEDULE OF OPERATIONS TO THE OWNER AND OBTAIN ALL NECESSARY APPROVALS. THE CONTRACTOR SHALL NOTIFY AND COORDINATE WITH THE OWNER, THEIR ENGINEER OR REPRESENTATIVE.
13. FINAL LAYOUT AND STAKING OF ALL PROPOSED FEATURES AND GRADING SHALL BE REVIEWED IN THE FIELD AND APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO ANY SITE PREPARATION OR CONSTRUCTION. THE CONTRACTOR SHALL NOT ADJUST OR MODIFY THE LAYOUT AND STAKING OF ANY PROPOSED FEATURES UNTIL FINAL APPROVAL FROM THE OWNER'S REPRESENTATIVE.
14. THE CONTRACTOR SHALL REMOVE ALL STUMPS, RUBBISH, AND DEBRIS FROM THE PROJECT SITE. STORAGE OF THESE ITEMS WILL NOT BE PERMITTED ON THE PROJECT SITE. THE CONTRACTOR SHALL LEAVE THE SITE IN A SAFE, CLEAN, AND LEVEL CONDITION AT THE COMPLETION OF THE SITE CLEARING WORK.
15. ALL ELECTRICAL, TELEPHONE, AND LOCAL FIRE DEPARTMENT CONDUITS ARE TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR. TRENCHING, BACKFILLING, CONCRETE AND STREET REPAIR SHALL BE PERFORMED BY THE GENERAL CONTRACTOR.
16. PROPOSED MANHOLE RIMS & GRATES ARE TO BE SET FLUSH AND CONSISTENT WITH GRADING PLANS. ADJUST ALL OTHER RIM ELEVATIONS OF MANHOLES, GAS GATES, WATER GATES AND OTHER UTILITIES TO FINISHED GRADE WITHIN THE LIMITS OF THE SITE WORK. IF ANY CONFLICTS ARE DISCOVERED NOTIFY OWNER'S REPRESENTATIVE.
17. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS WITH THE APPROPRIATE UTILITY COMPANIES FOR POLE RELOCATION, AND FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE, FIRE ALARM, AND ANY OTHER PRIVATE UTILITIES, AS REQUIRED.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A TOWN OF WEST BRIDGEWATER PUBLIC WORKS CONSTRUCTION LICENSE.
19. OWNER MAY REMOVE SNOW FROM SITE AS NECESSARY AND WILL NOT PLACE ON TOWN/STATE PROPERTY.
20. THE MAINTENANCE OF THE DRAINAGE SYSTEM IS THE OWNER'S RESPONSIBILITY.
21. ANY HYDRANT, FIRE PROTECTION WATER SUPPLY LINE AND ASSOCIATED DEVICES ON SUBJECT PROPERTY SHALL BE MAINTAINED TO THE REQUIREMENTS OF NFPA25.



PERMITTING SET

REVISIONS		
No.	DATE	DESCRIPTION
1	10-19-20	REVISE PER TOWN COMMENTS
2	03-08-21	REVISE PER TOWN COMMENTS

DRAWN BY:	TME
CHECKED BY:	EPJ
DESIGNED BY:	TME / GWD

COVER, GENERAL NOTES AND LEGEND

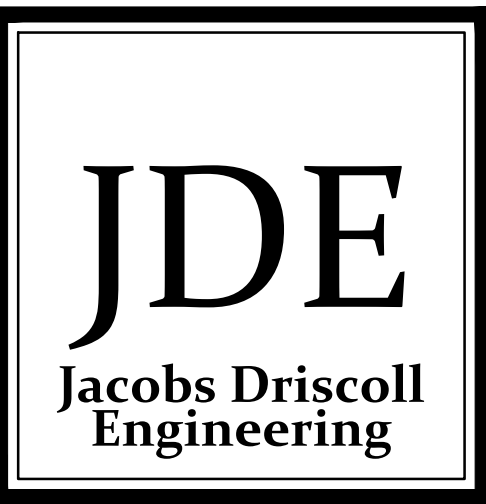
6 STATION AVENUE
IN
HARWICH
(BARNSTABLE COUNTY)
MASSACHUSETTS

SEPTEMBER 24, 2020

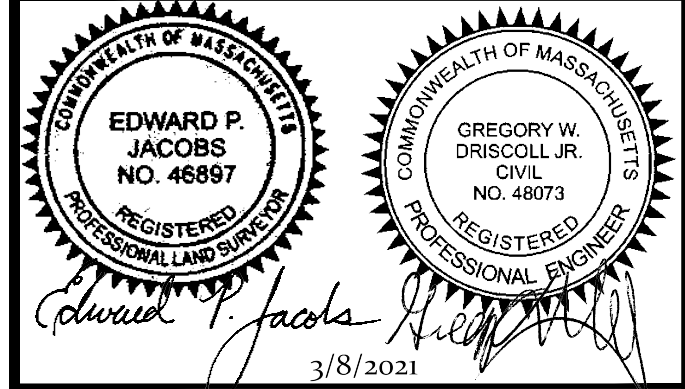
PREPARED FOR:

CAPE COD OIL
COMPANY

227 ROUTE 6
PROVINCETOWN
MASSACHUSETTS
02657



50 Oliver Street
North Easton, Massachusetts 02356
Phone: 508-928-4400
www.JacobsDriscoll.com



SHEET 1 OF 7

JOB NUMBER: 01-2020-015

1.) LOCUS PROPERTY IS COMPRISED OF :
ASSESSOR'S MAP 39 PLOT K3
DEED BOOK 13840 / PAGE 205
OWNER OF RECORD: MICHAEL J. TASHA TRS.

2.) PLAN REFERENCES :
P-1.) PLAN BOOK 377 PAGE 20

3.) PROJECT BENCHMARKS :
BM-A DRILL HOLE SET IN CONC. PAD ELEVATION = 26.00'
BM-B CORNER OF CONC. PAD OF BUILDING ELEVATION = 27.00'
(DATUM: NAVD88)

4.) ZONING INFORMATION ZONING DISTRICT : IL (INDUSTRIAL LIMITED)
MINIMUM / MAXIMUM ZONING REQUIREMENTS
MIN. LOT AREA = 20,000 S.F.
MIN. LOT FRONTAGE = 100'
MIN. BUILDING SETBACKS : FRONT = 25' SIDE = 25' REAR = 50'
MAX. BUILDING HEIGHT = 40' OR 2.5 STORIES
MAX. BUILDING COVERAGE % = 40%
MIN. GREEN SPACE % = 30%

5.) THE PROPERTY LINE INFORMATION SHOWN IS BASED ON CURRENT AVAILABLE RECORD INFORMATION CONSISTING OF PLANS AND DEEDS AND AN ACTUAL ON THE GROUND FIELD SURVEY PERFORMED BY THIS FIRM ON AND BETWEEN 7-13-20 AND 8-18-20.

6.) COMMUNITY PANEL NUMBER: 25001C0612J (DATE: 7-16-2014) THE FLOOD INSURANCE RATE MAP DEFINES THIS AREA AS ZONE X, AREA OUTSIDE THE 0.2% CHANCE ANNUAL FLOOD PLAIN.



PERMITTING SET

REVISIONS		
NO.	DATE	DESCRIPTION
1	10-19-20	REVISE PER TOWN COMMENTS
2	03-08-21	REVISE PER TOWN COMMENTS

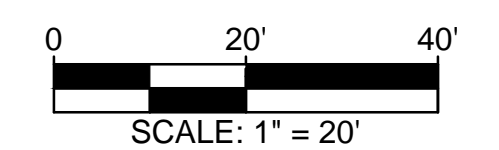
DRAWN BY:	TME
CHECKED BY:	EPJ
DESIGNED BY:	TME / GWD

EXISTING CONDITIONS PLAN

6 STATION AVENUE
IN
HARWICH
(BARNSTABLE COUNTY)
MASSACHUSETTS

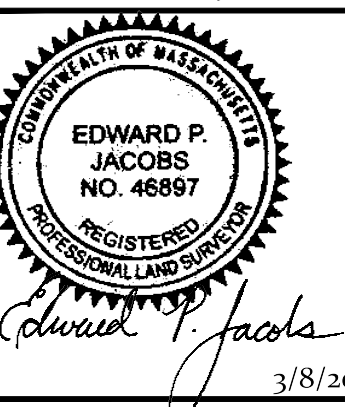
SEPTEMBER 24, 2020

PREPARED FOR:
CAPE COD OIL
COMPANY
227 ROUTE 6
PROVINCETOWN
MASSACHUSETTS
02657



JDE
Jacobs Driscoll
Engineering

50 Oliver Street
North Easton, Massachusetts 02356
Phone: 508-928-4400
www.JacobsDriscoll.com

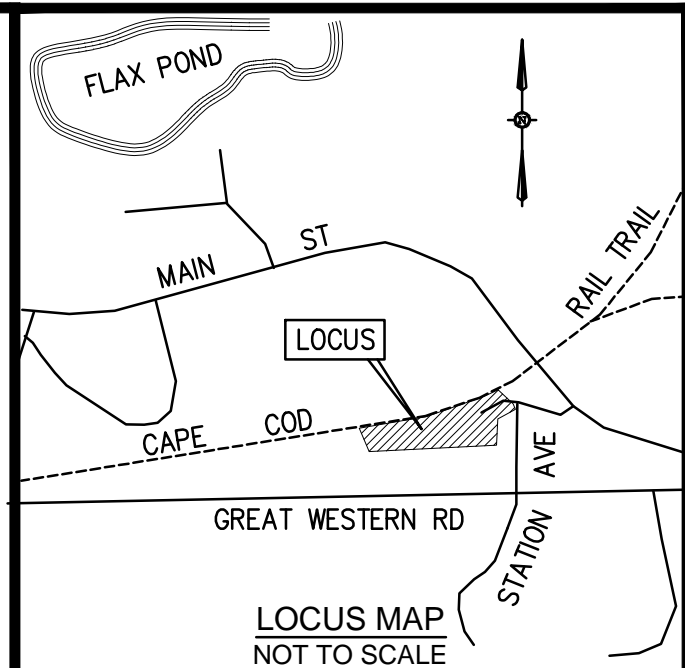
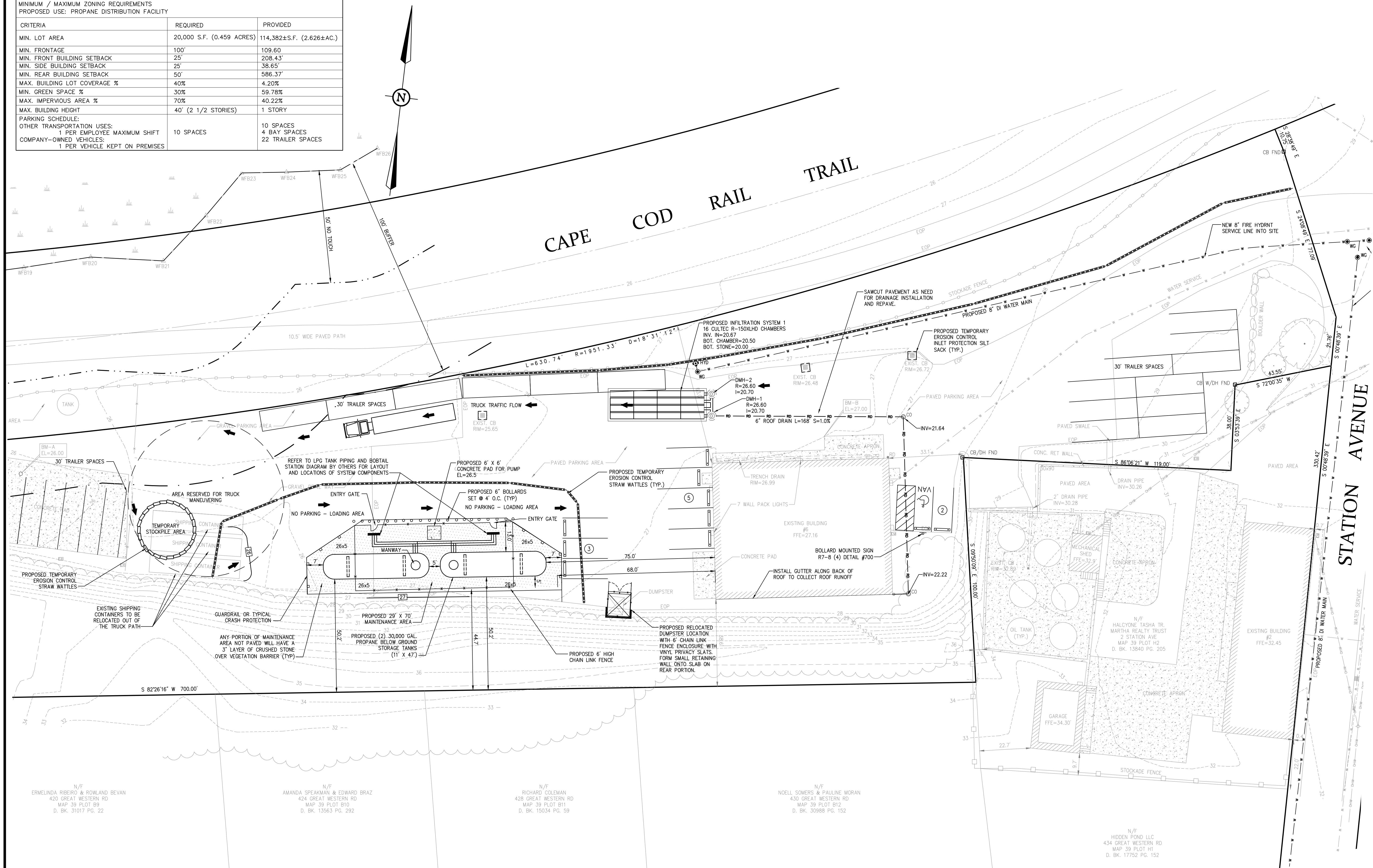


SHEET 3 OF 7

JOB NUMBER: 01-2020-015

X:\2020\01-2020-015 MJT - 2 & 6 Station Ave, Harwich\CIVIL\DESIGN\01-2020-015 EX.dwg

ZONING TABLE		
ZONE: INDUSTRIAL – LIMITED (I-L)		
MINIMUM / MAXIMUM ZONING REQUIREMENTS		
PROPOSED USE: PROPANE DISTRIBUTION FACILITY		
CRITERIA	REQUIRED	PROVIDED
MIN. LOT AREA	20,000 S.F. (0.459 ACRES)	114,382±S.F. (2.626±AC.)
MIN. FRONTAGE	100'	109.60
MIN. FRONT BUILDING SETBACK	25'	208.43'
MIN. SIDE BUILDING SETBACK	25'	38.65'
MIN. REAR BUILDING SETBACK	50'	586.37'
MAX. BUILDING LOT COVERAGE %	40%	4.20%
MIN. GREEN SPACE %	30%	59.78%
MAX. IMPERVIOUS AREA %	70%	40.22%
MAX. BUILDING HEIGHT	40' (2 1/2 STORIES)	1 STORY
PARKING SCHEDULE:		
OTHER TRANSPORTATION USES:		
COMPANY-OWNED VEHICLES:	10 SPACES	10 SPACES
1 PER VEHICLE KEPT ON PREMISES		4 BAY SPACES
		22 TRAILER SPACES



PERMITTING SET

[illegible]

DRAWN BY: TME

CHECKED BY: EPJ

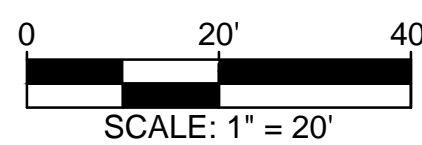
DESIGNED BY: TME / GWD

LAYOUT & MATERIALS PLAN

6 STATION AVENUE
IN
HARWICH
(BARNSTABLE COUNTY)
MASSACHUSETTS

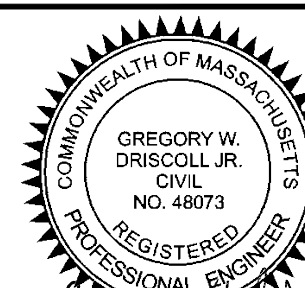
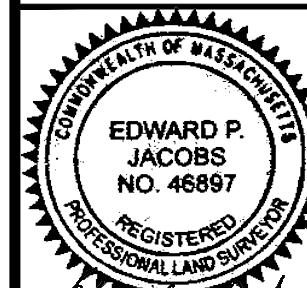
SEPTEMBER 24, 2020

PREPARED FOR:
CAPE COD OIL
COMPANY
227 ROUTE 6
PROVINCETOWN
MASSACHUSETTS
02657



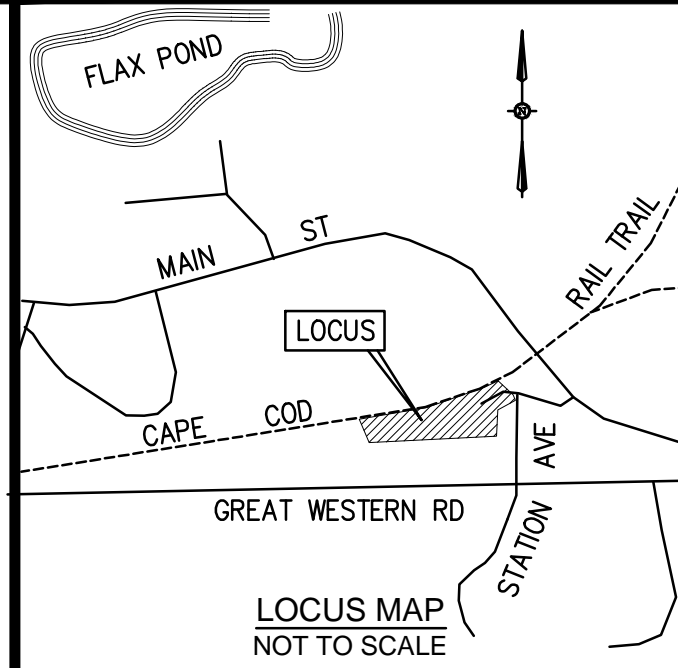
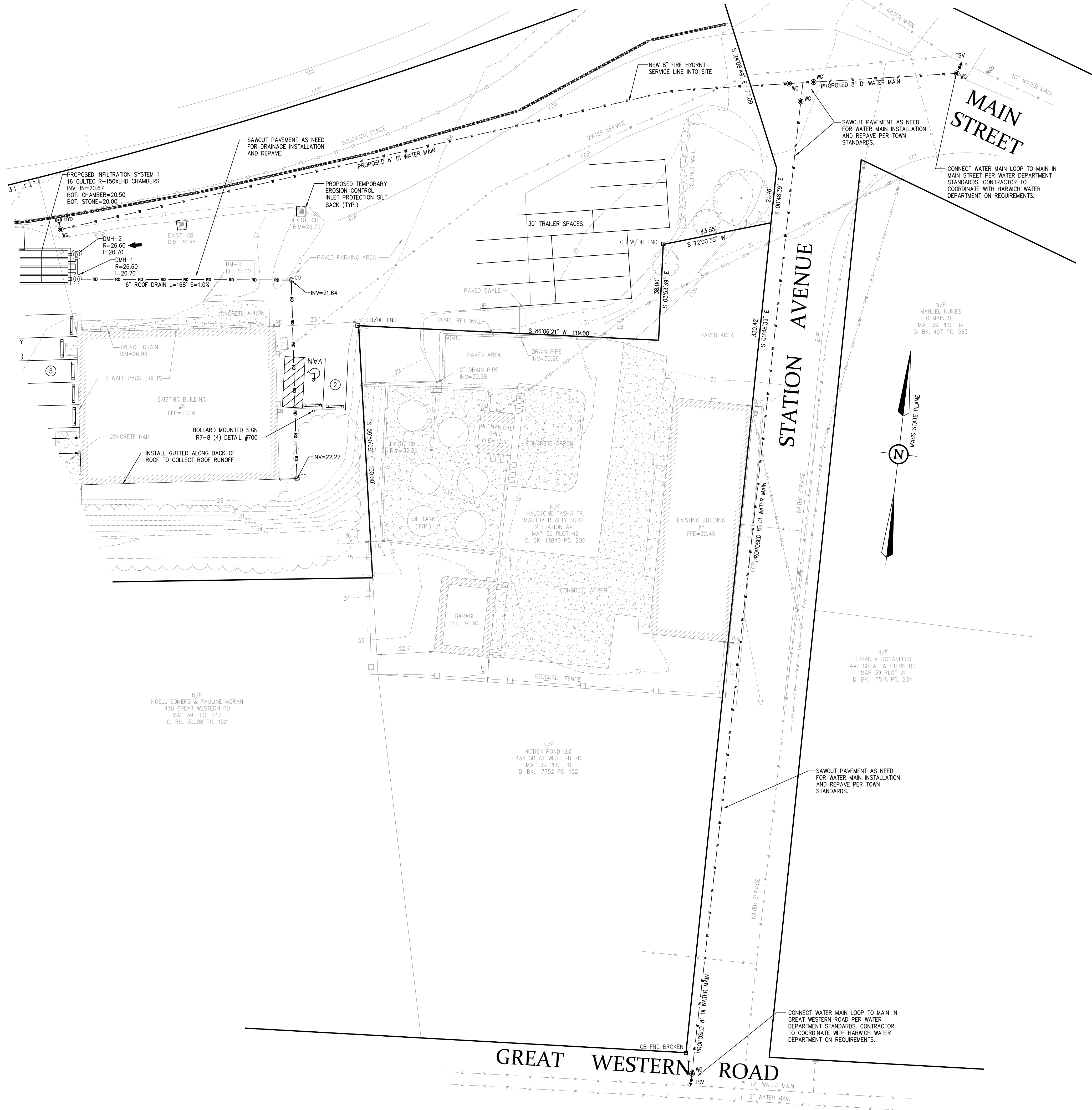
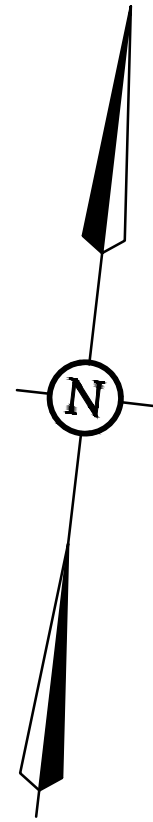
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SHEET 4 OF 7

JOB NUMBER: 01-2020-015



PERMITTING SET

REVISIONS		
No.	DATE	DESCRIPTION
1	10-19-20	REVISE PER TOWN COMMENTS
2	03-08-21	REVISE PER TOWN COMMENTS

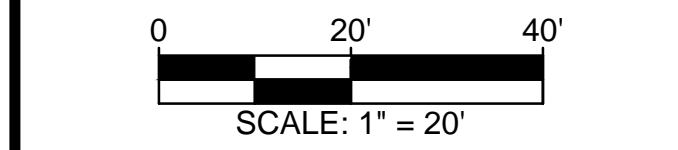
DRAWN BY: TME
CHECKED BY: EPJ
DESIGNED BY: TME / GWD

LAYOUT & MATERIALS PLAN

6 STATION AVENUE
IN
HARWICH
(BARNSTABLE COUNTY)
MASSACHUSETTS

SEPTEMBER 24, 2020

PREPARED FOR:
CAPE COD OIL
COMPANY
227 ROUTE 6
PROVINCETOWN
MASSACHUSETTS
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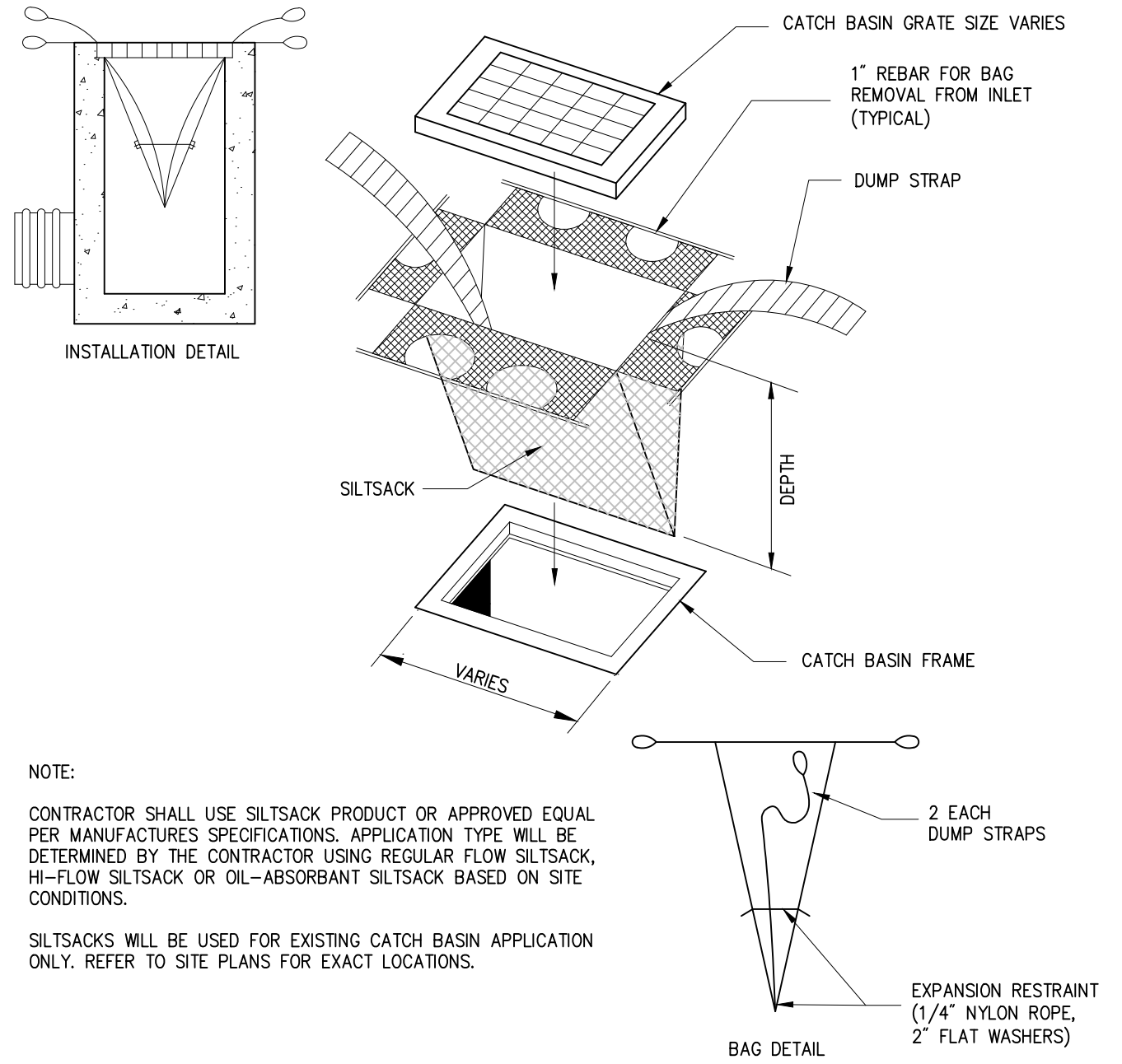
EDWARD P. JACOBS
NO. 46897

GREGORY W. DRISCOLL JR.
NO. 48073

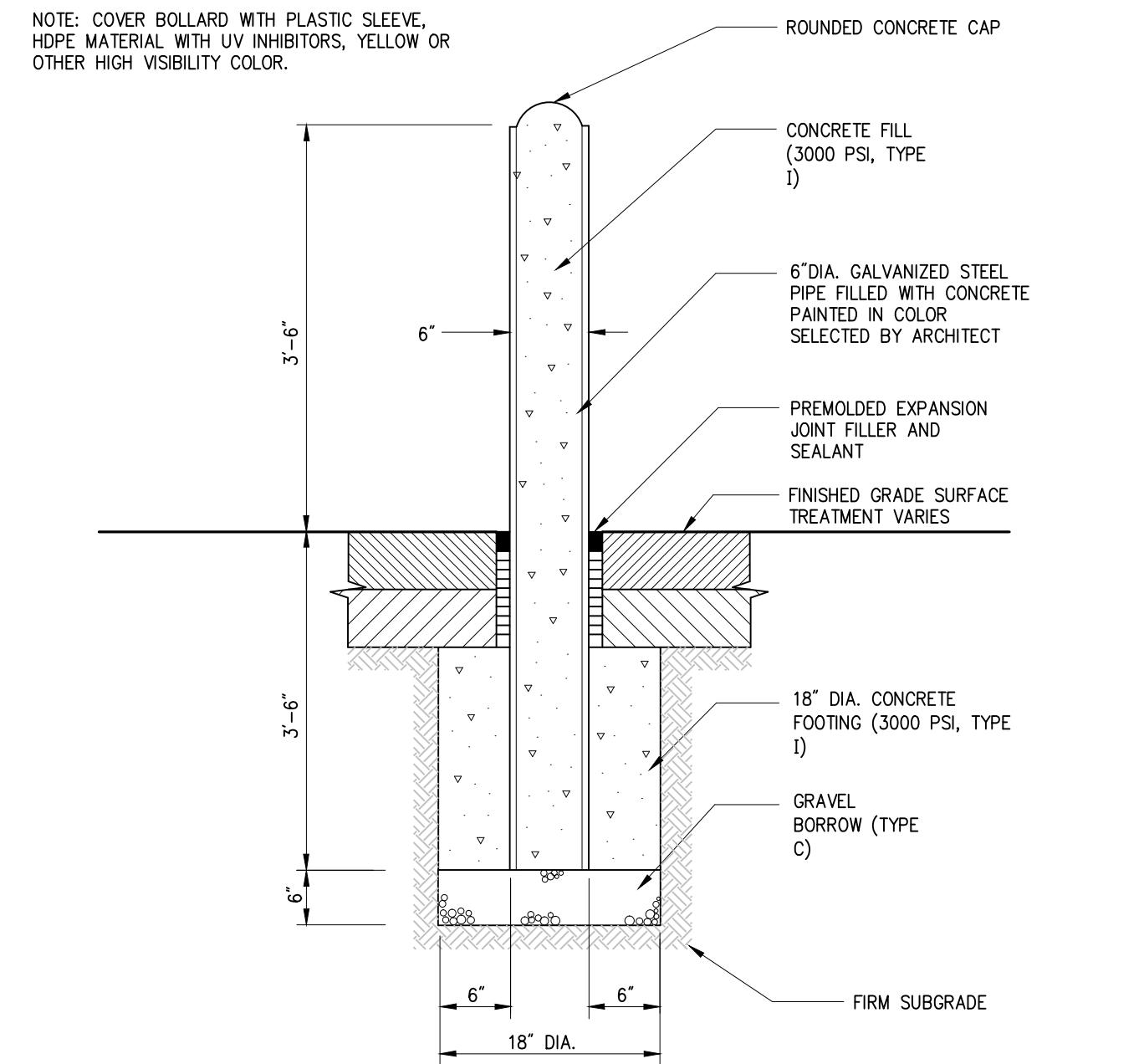
3/8/2021

SHEET 5 OF 7

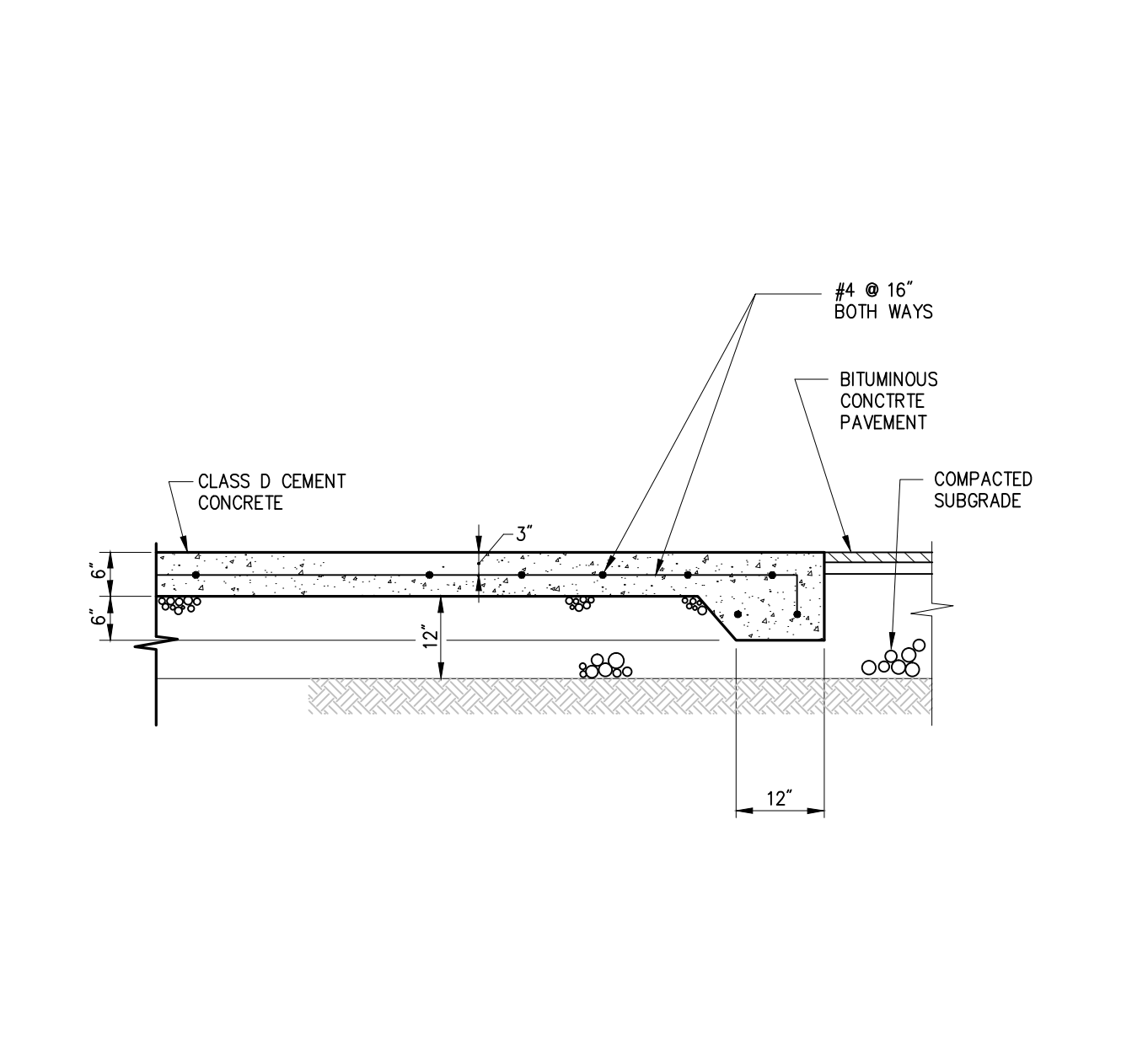
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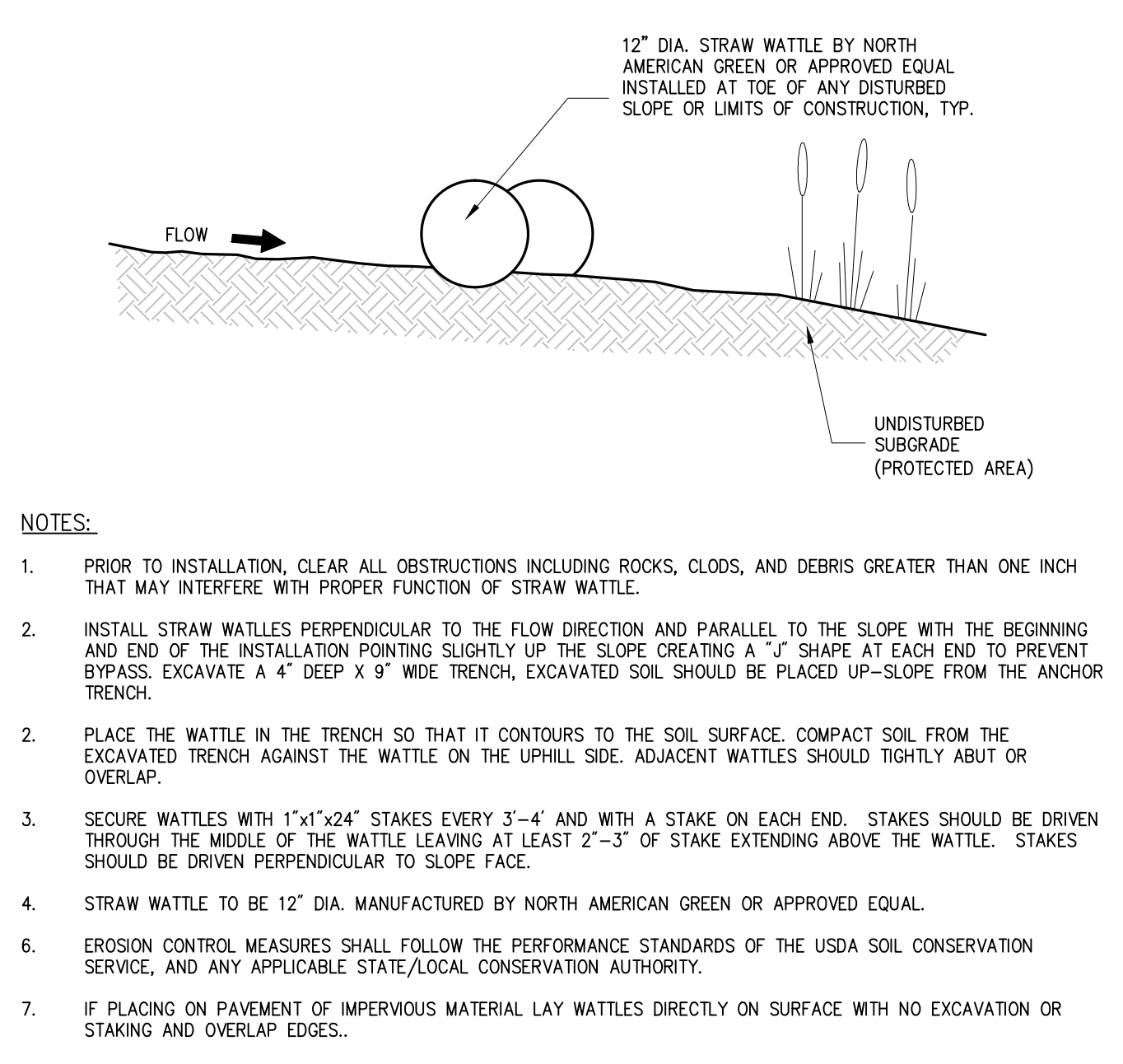
DETAIL # 514 INLET PROTECTION SILTSACK JDE



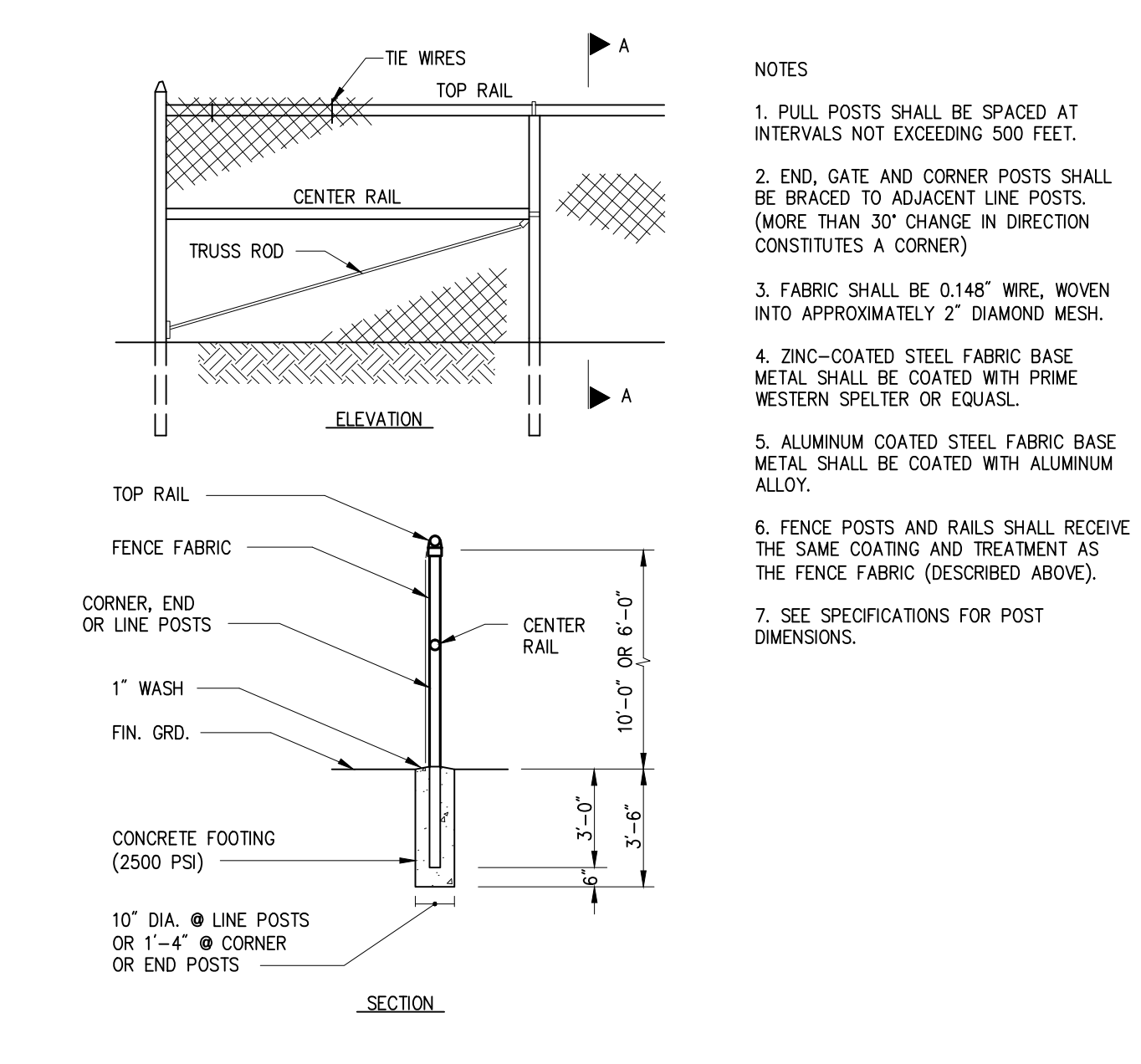
DETAIL # 446 CONCRETE FILLED BOLLARD JDE



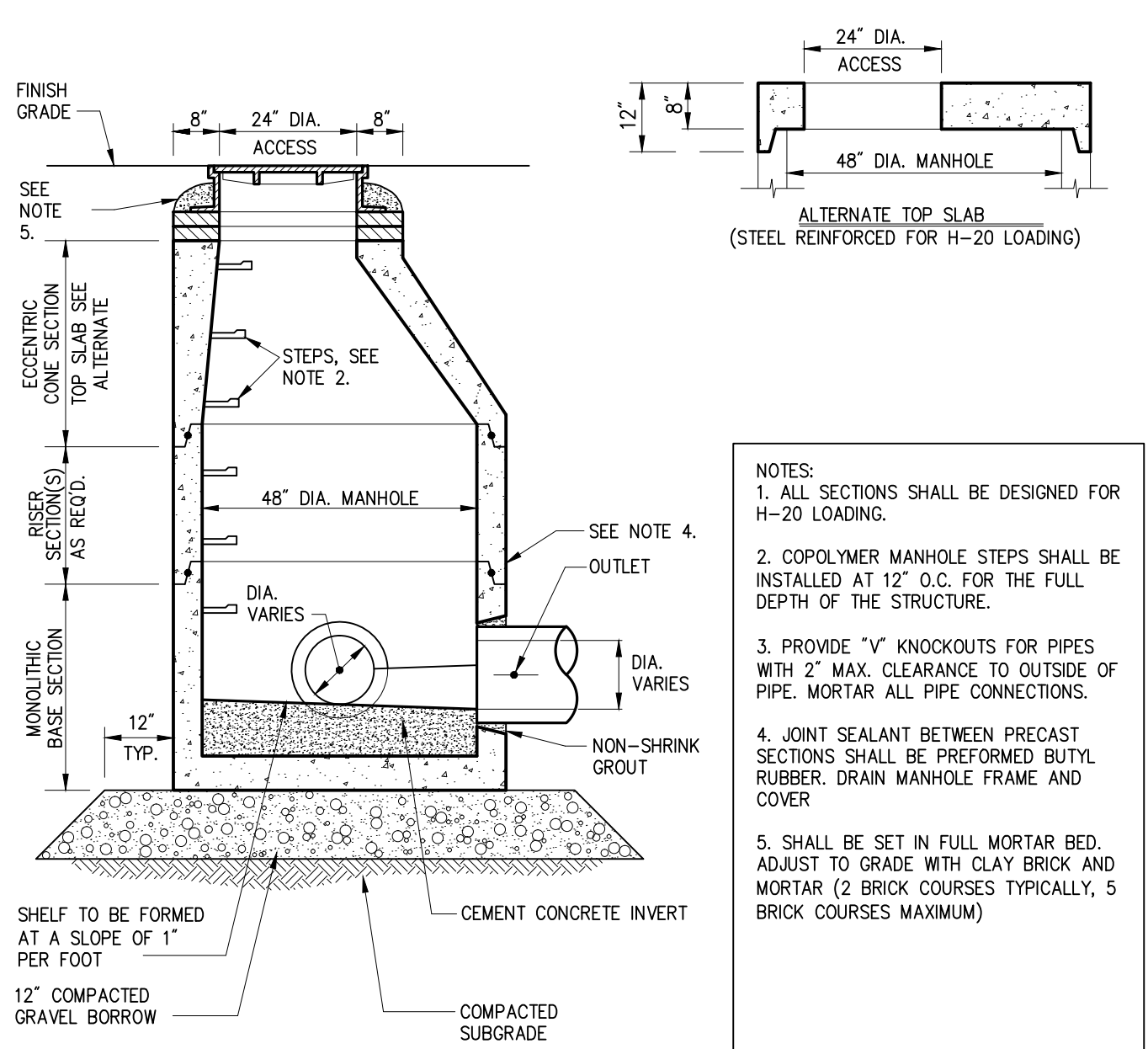
DETAIL # 444 CONCRETE PAD JDE



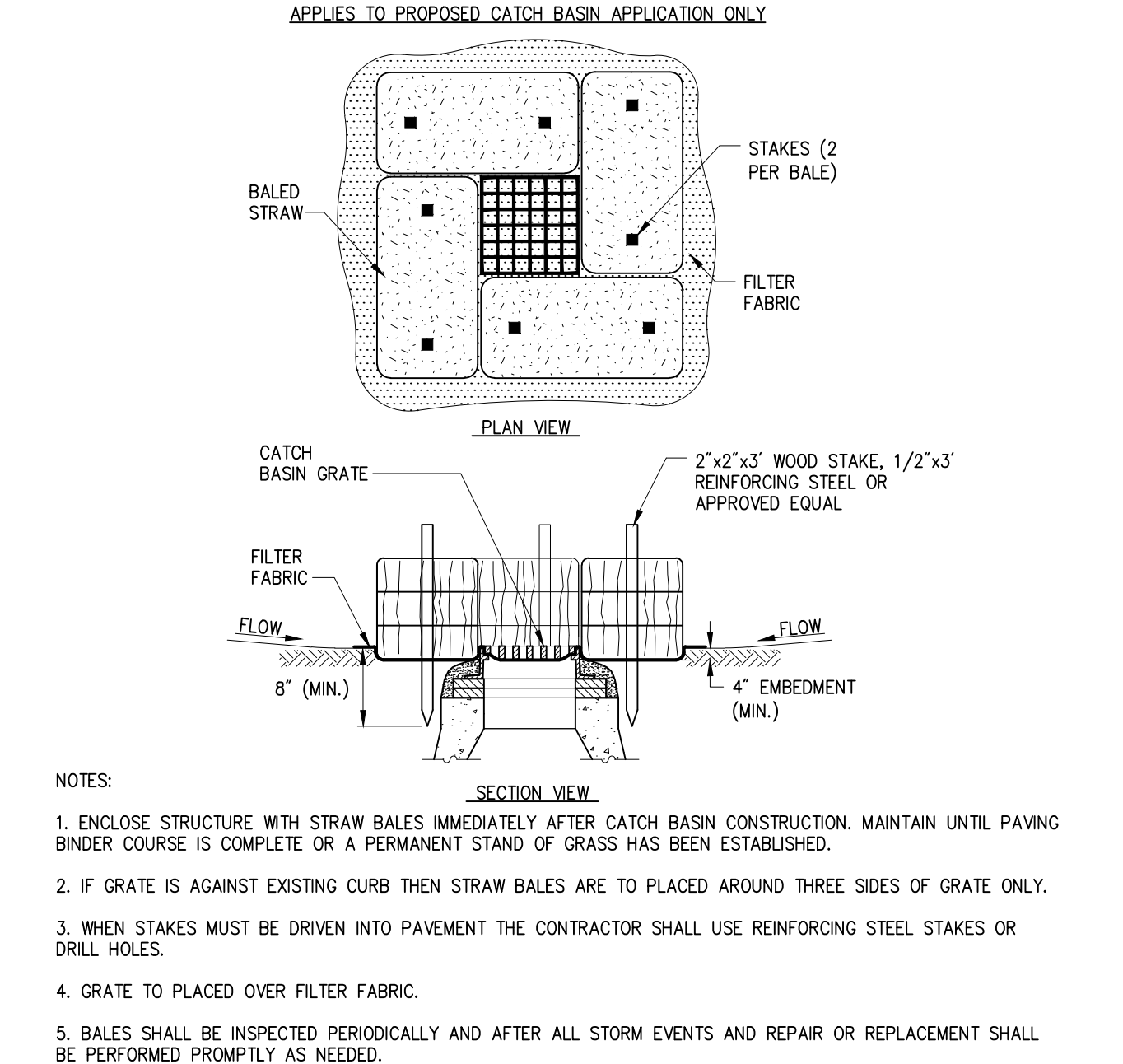
DETAIL # 519 STRAW WATTLE EROSION CONTROL JDE



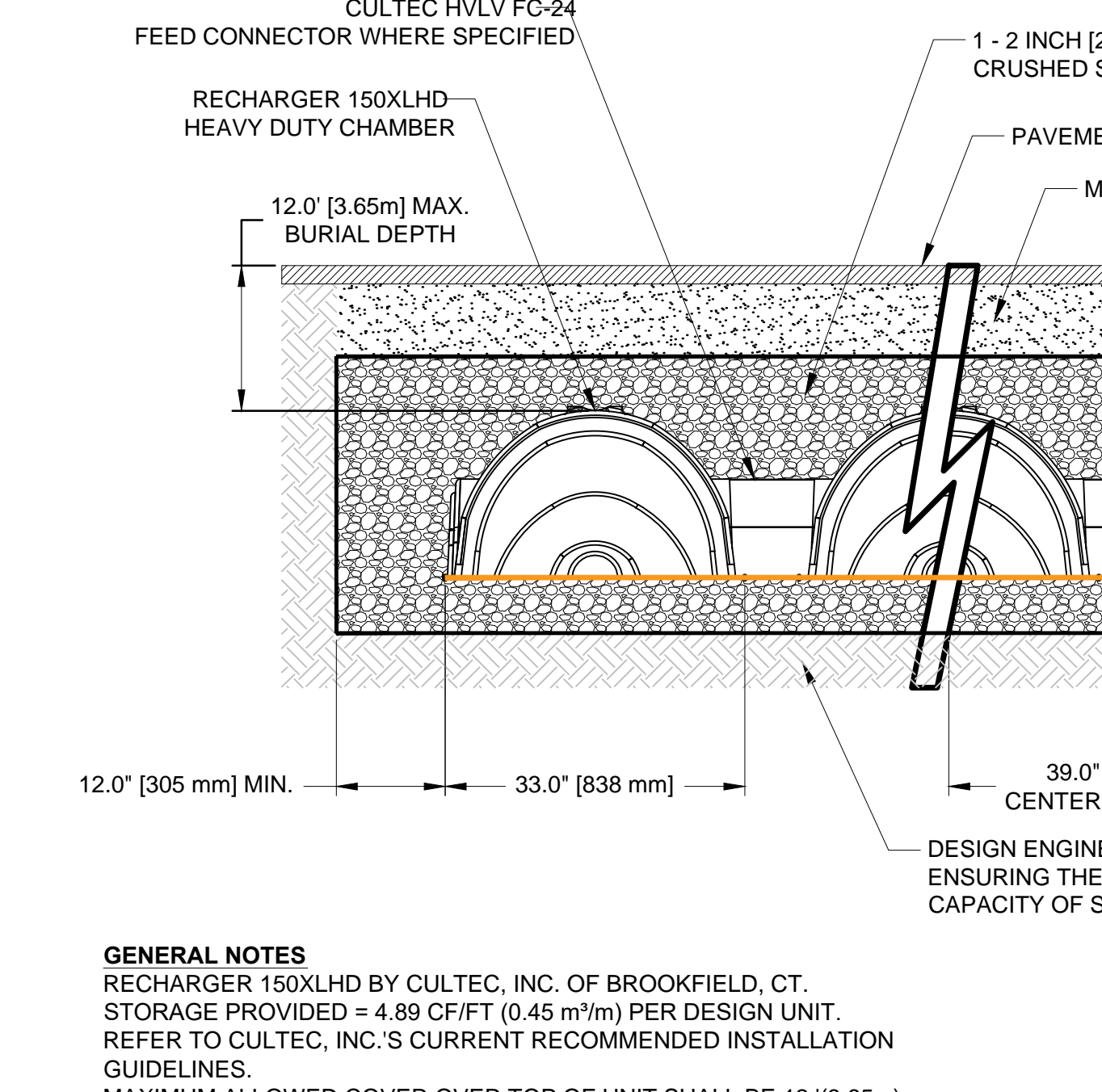
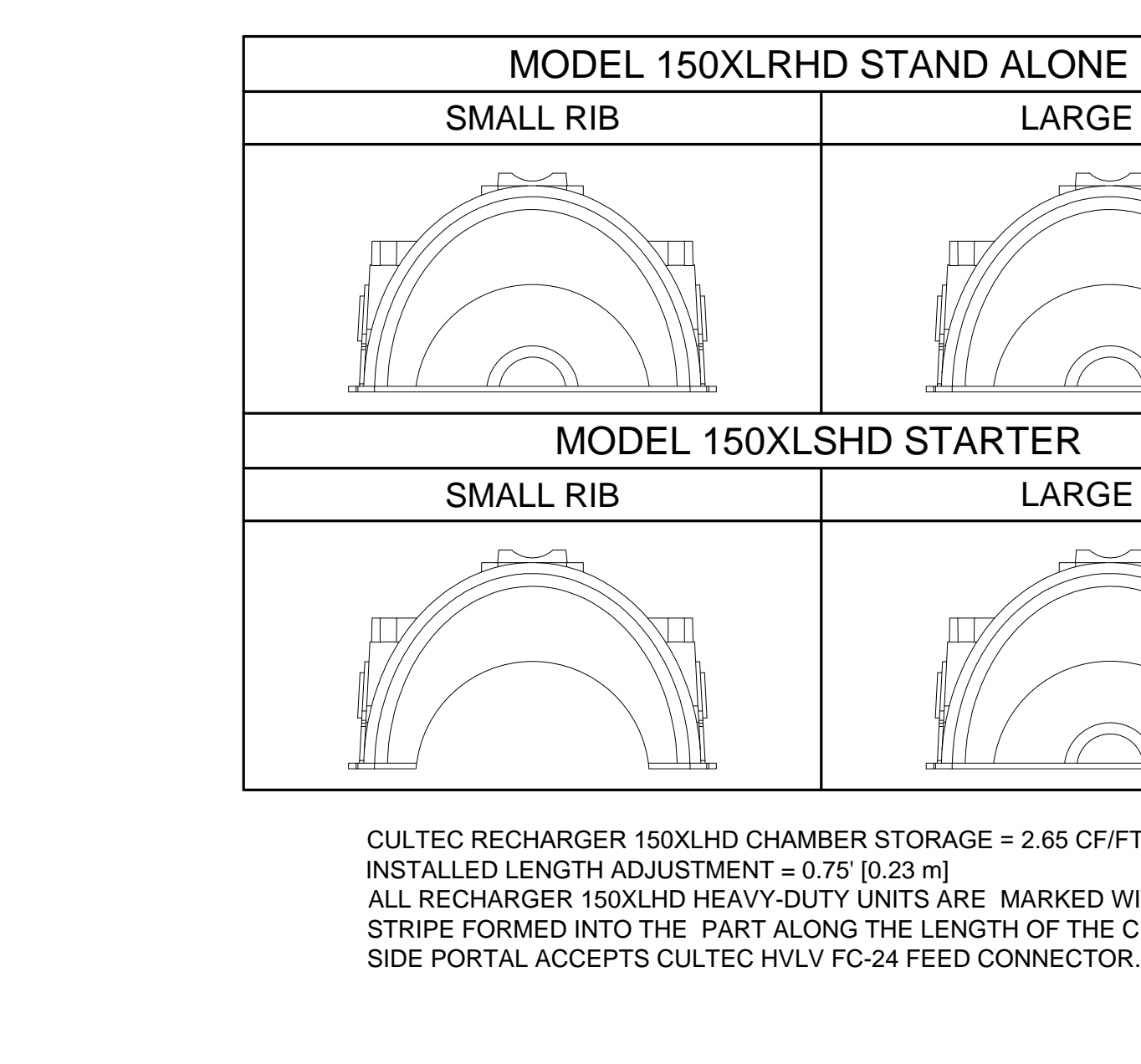
DETAIL # 806 CHAIN LINK FENCE (CLF) JDE



DETAIL # 101 DRAIN MANHOLE (DMH) JDE



DETAIL # 507 CATCH BASIN INLET PROTECTION JDE



DETAIL # 507 CATCH BASIN INLET PROTECTION JDE

GRADING AND DRAINAGE NOTES

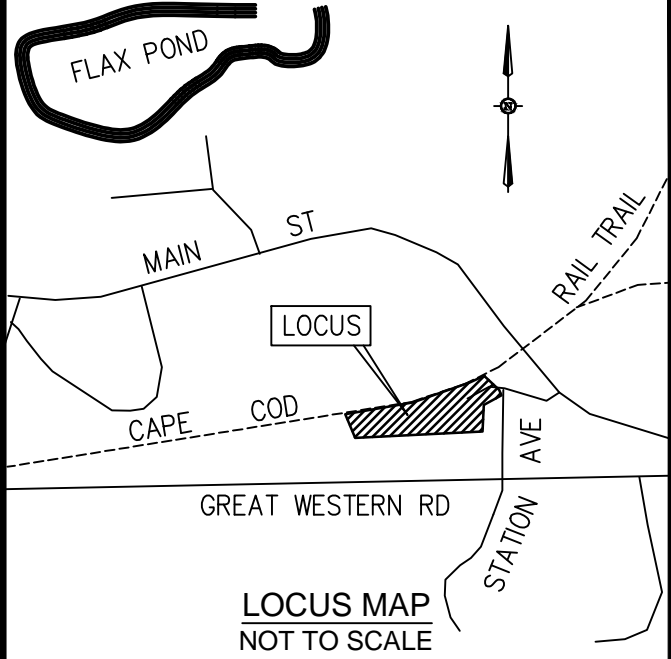
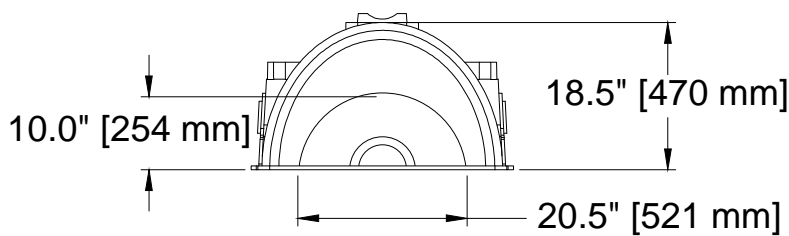
- THE PROJECT ELEVATIONS ARE BASED ON THE NAVD88 VERTICAL DATUM.
- DEMOLITION DEBRIS, EXCESS AND UNSUITABLE MATERIALS FROM THE DEMOLITION OPERATION SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN A LEGAL MANNER BY THE CONTRACTOR.
- DISTURBED AREAS SHALL BE PROTECTED AT ALL TIMES TO CONTROL SEDIMENT TRANSPORT BEYOND THE LIMIT OF WORK.
- DISTURBED AREAS SHALL BE TREATED WITH WATER DURING EXCAVATION, OR APPROVED ALTERNATIVE, FOR DUST CONTROL.
- ALL DISTURBED AREAS NOT OTHERWISE TREATED SHALL BE STABILIZED WITH 4" LOAM, SEED, & MULCH. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AREAS UNTIL VEGETATION HAS BEEN PERMANENTLY ESTABLISHED. SLOPES IN EXCESS OF 3:1 SHALL BE FURTHER STABILIZED WITH EROSION CONTROL BLANKETS (ECB) OF CURLEX OR EQUAL.
- ALL PIPE INSTALLATIONS SHALL FOLLOW PROJECT SPECIFICATIONS AND PIPE MANUFACTURER RECOMMENDATIONS.

UTILITY NOTES

- 12" MINIMUM VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN ALL UTILITY CROSSINGS.
- GAS, ELECTRIC, DATA/COM IS SHOWN SCHEMATICALLY HEREON. THESE UTILITIES SHALL BE INSTALLED WITH A MINIMUM COVER OF 3 FEET UNLESS OTHERWISE NOTED OR OTHERWISE DIRECTED BY THE CONTROLLING UTILITY COMPANY. CONTRACTOR SHALL COORDINATE FINAL LAYOUT WITH APPLICABLE UTILITY COMPANY.
- ALL COMMERCIAL LIGHTING SHALL DIRECT ALL LIGHT SO AS TO KEEP ALL LIGHTING WITHIN SUBJECT LOT.
- ALL UTILITY CUTS THROUGH EXISTING CONCRETE OR BITUMINOUS CONCRETE PAVED SURFACES SHALL BE SAW CUT. BACK FILLING OF TRENCH SHALL INCLUDE 12" IN DEPTH FLOWABLE FILL TO BE THE BASE COURSE OF THE SURFACE TREATMENT. THE SURFACE TREATMENT SHALL THEN BE REPLACED IN KIND. IF THE BITUMINOUS CONCRETE SURFACE IS WITHIN THE ROADWAY THE BITUMINOUS CONCRETE TOP COURSE SHALL BE FINISHED WITH INFRARED TREATMENT TO BLEND EXISTING & NEWLY PAVED SURFACES.

EROSION CONTROL NOTES

- MAINTAIN A STOCKPILE OF 50 HAY BALES, 100 FEET OF SILT FENCE AND 3 CUBIC YARDS OF RIP-RAP ON SITE AT ALL TIMES UNTIL A PERMANENT GROUND COVER HAS BEEN ESTABLISHED.
- STUMPS FROM THE CLEARING OPERATION SHALL BE REMOVED FROM SITE AND DISPOSED OF IN A LEGAL MANNER.
- DISTURBED AREAS SHALL BE PROTECTED AT ALL TIMES TO CONTROL SEDIMENT TRANSPORT BEYOND THE LIMIT OF WORK.
- DISTURBED AREAS SHALL BE TREATED WITH WATER DURING EXCAVATION, OR APPROVED ALTERNATIVE, FOR DUST CONTROL.



PERMITTING SET

REVISIONS		
No.	DATE	DESCRIPTION
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2	03-08-21	REVISE PER TOWN COMMENTS

DRAWN BY: TME
CHECKED BY: EPJ
DESIGNED BY: TME / GWD

CONSTRUCTION NOTES AND DETAILS

6 STATION AVENUE
IN
HARWICH
(BARNSTABLE COUNTY)
MASSACHUSETTS

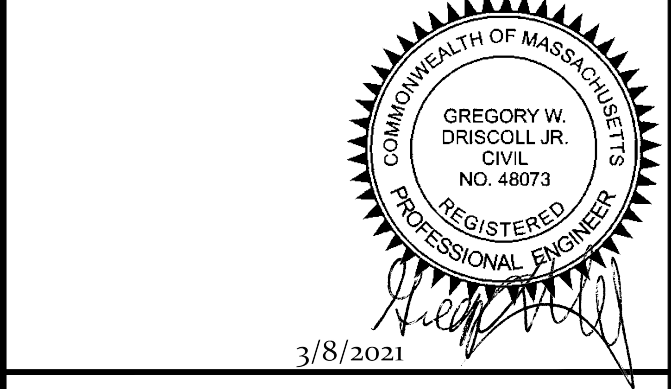
SEPTEMBER 24, 2020

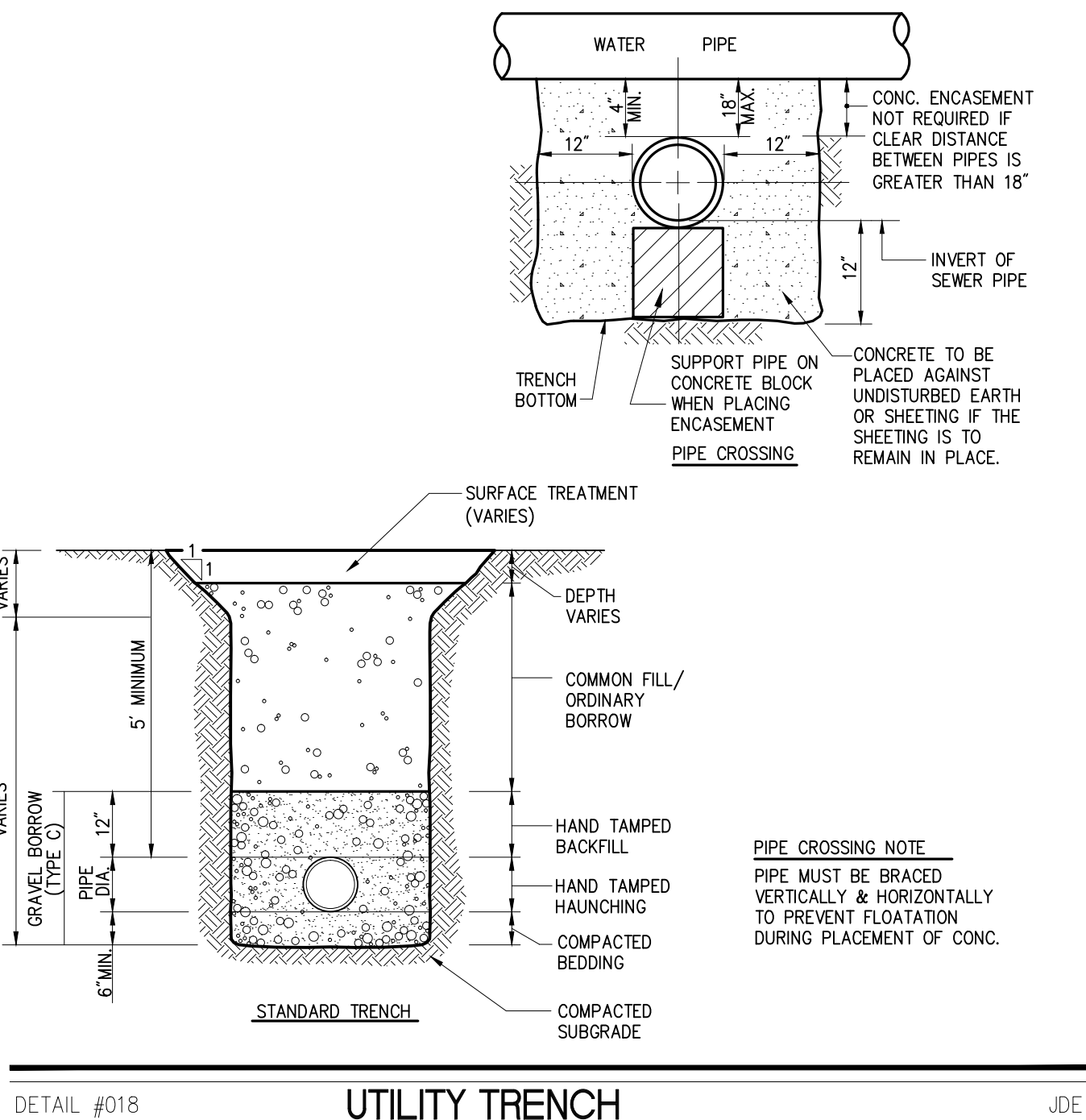
PREPARED FOR:
CAPE COD OIL
COMPANY
227 ROUTE 6
PROVINCETOWN
MASSACHUSETTS
02657

JDE

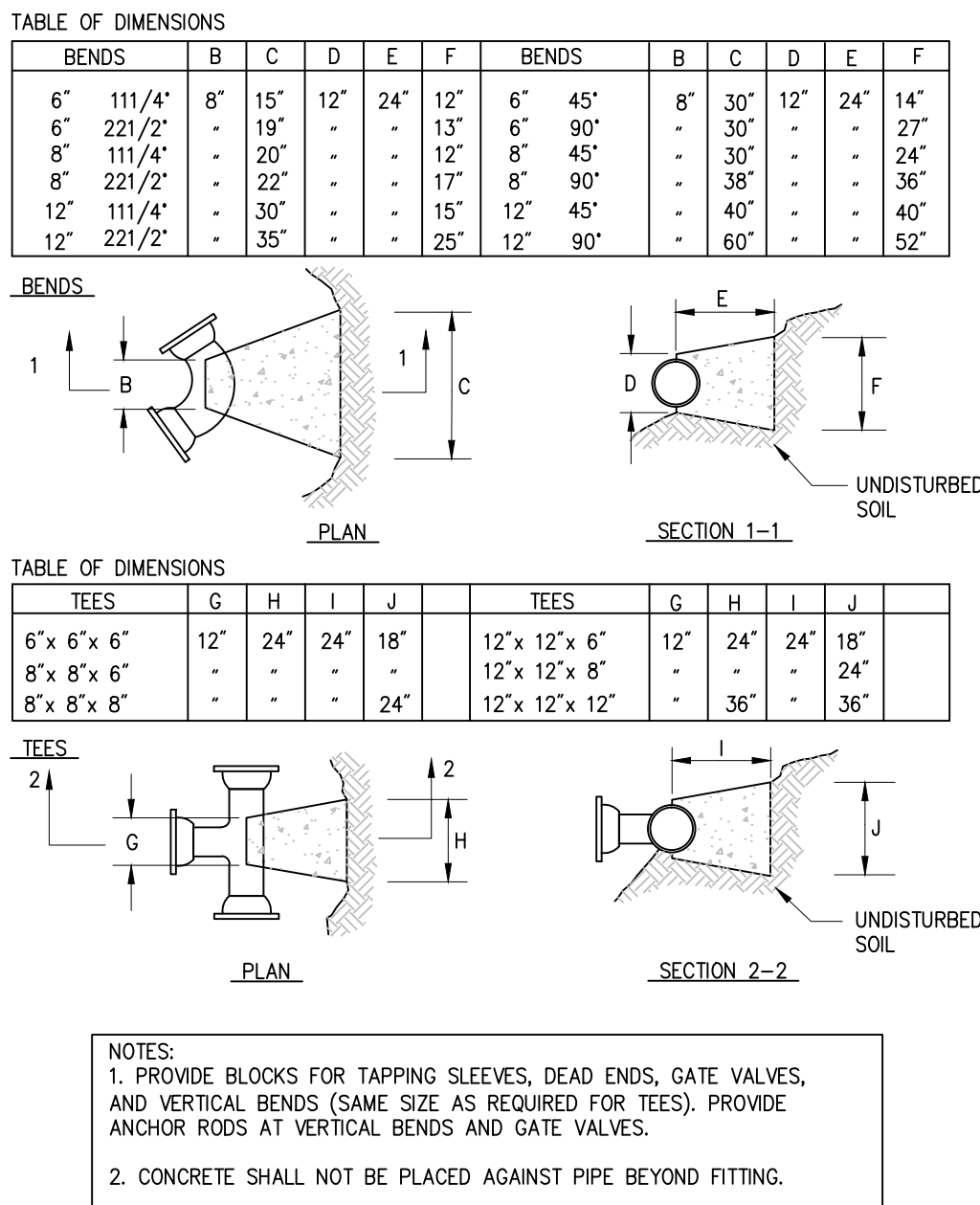
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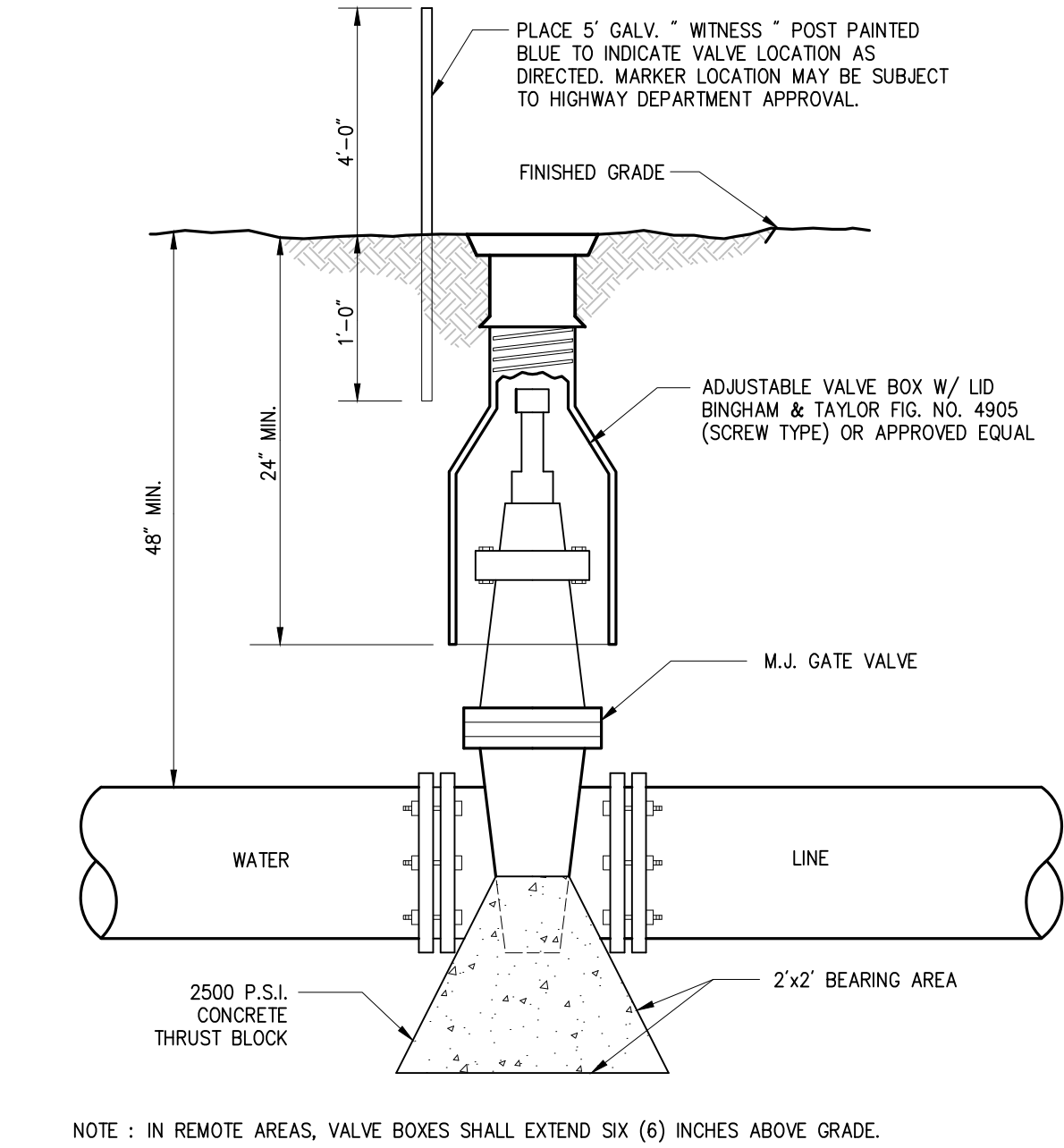




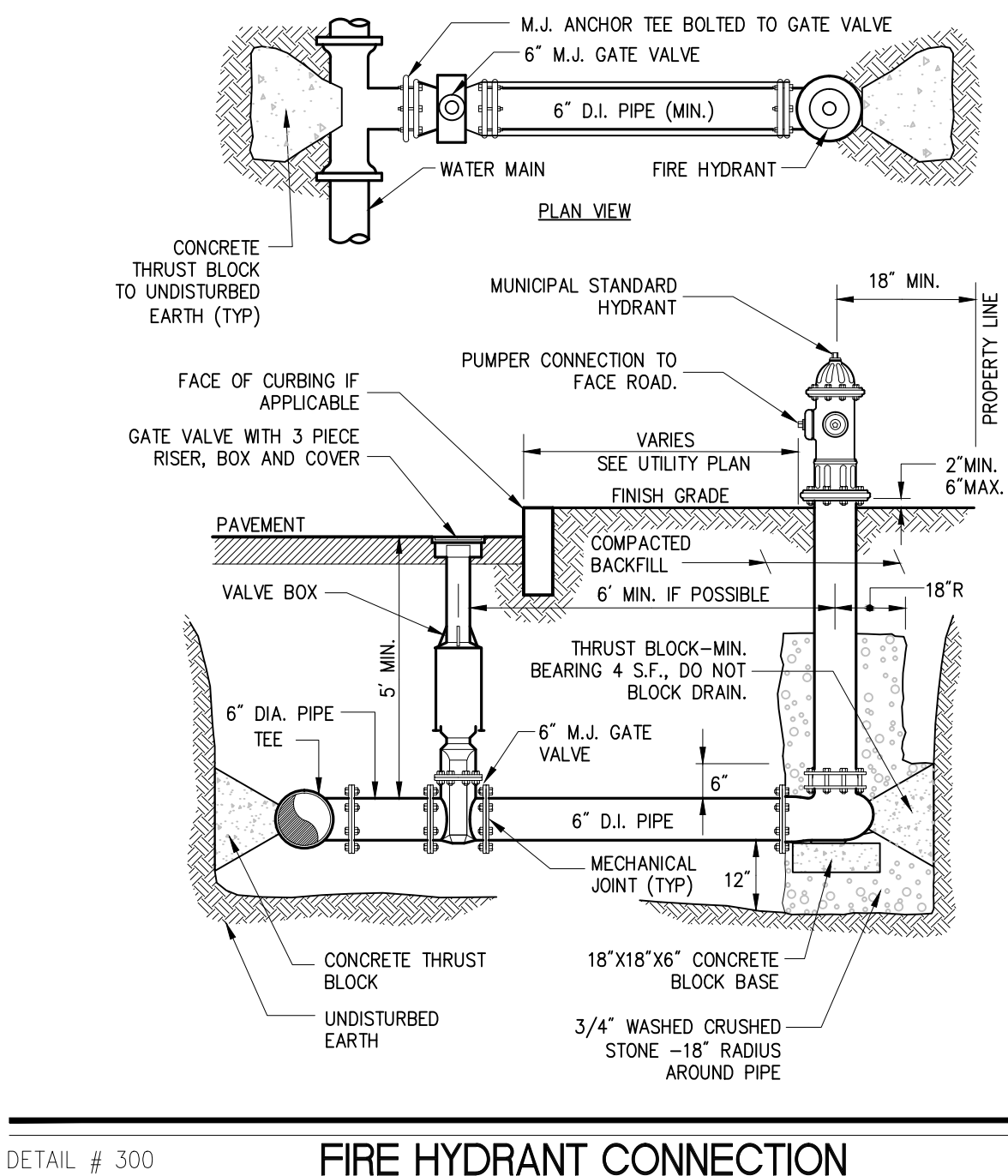
DETAIL #018 UTILITY TRENCH JDE



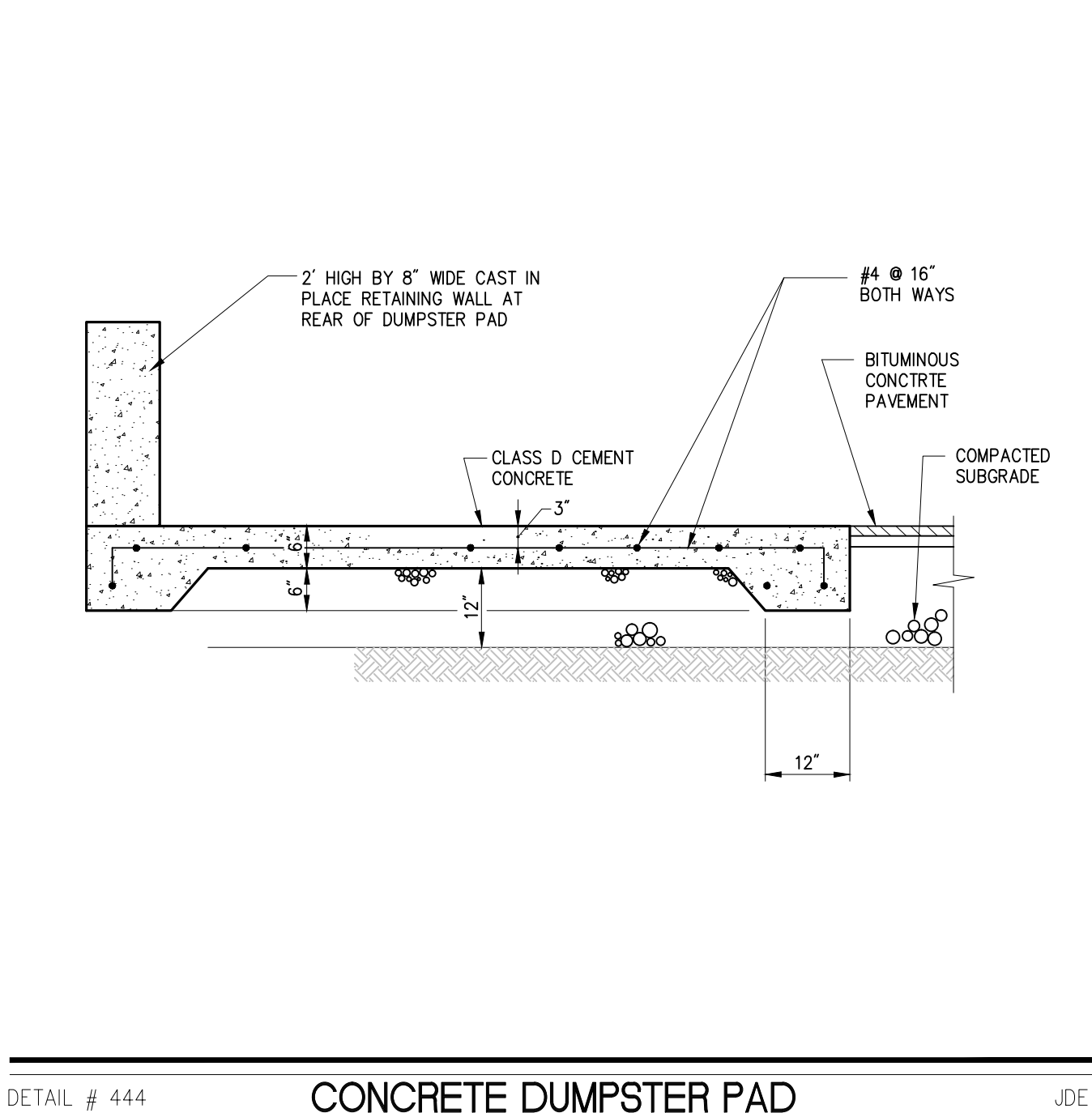
DETAIL # 301 CONCRETE THRUST BLOCK JDE



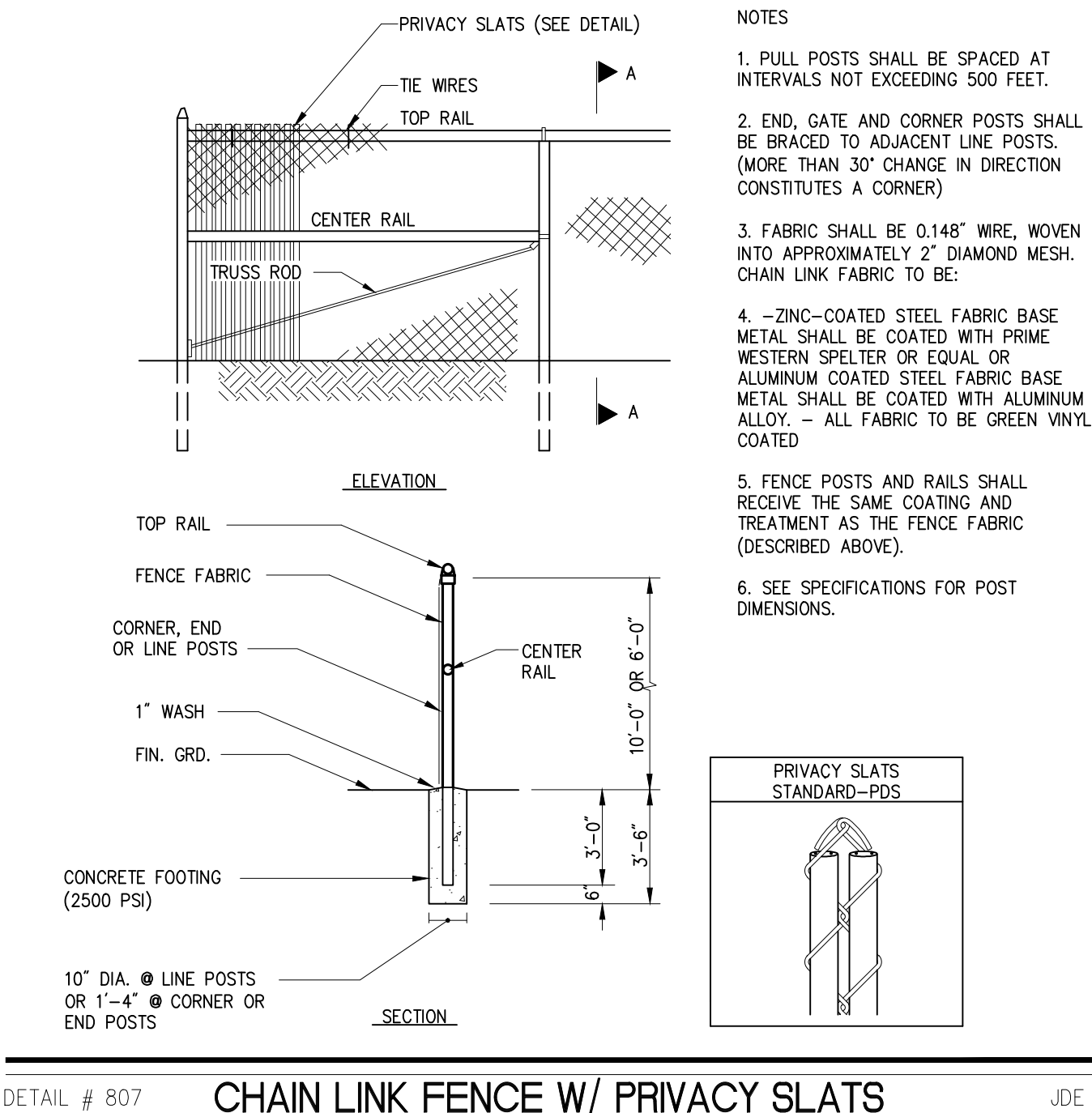
DETAIL # 303 WATER GATE VALVE JDE



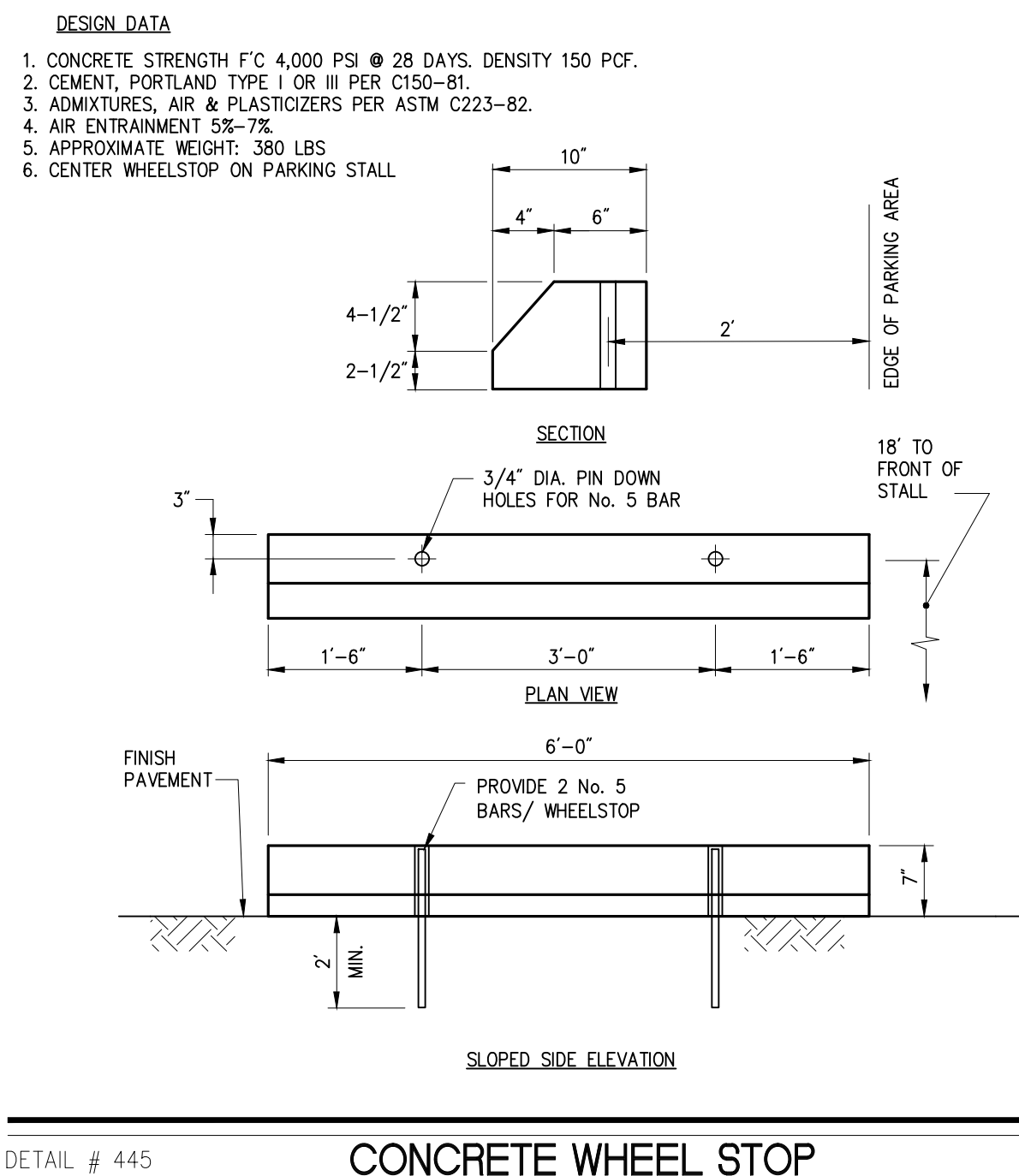
DETAIL # 300 FIRE HYDRANT CONNECTION JDE



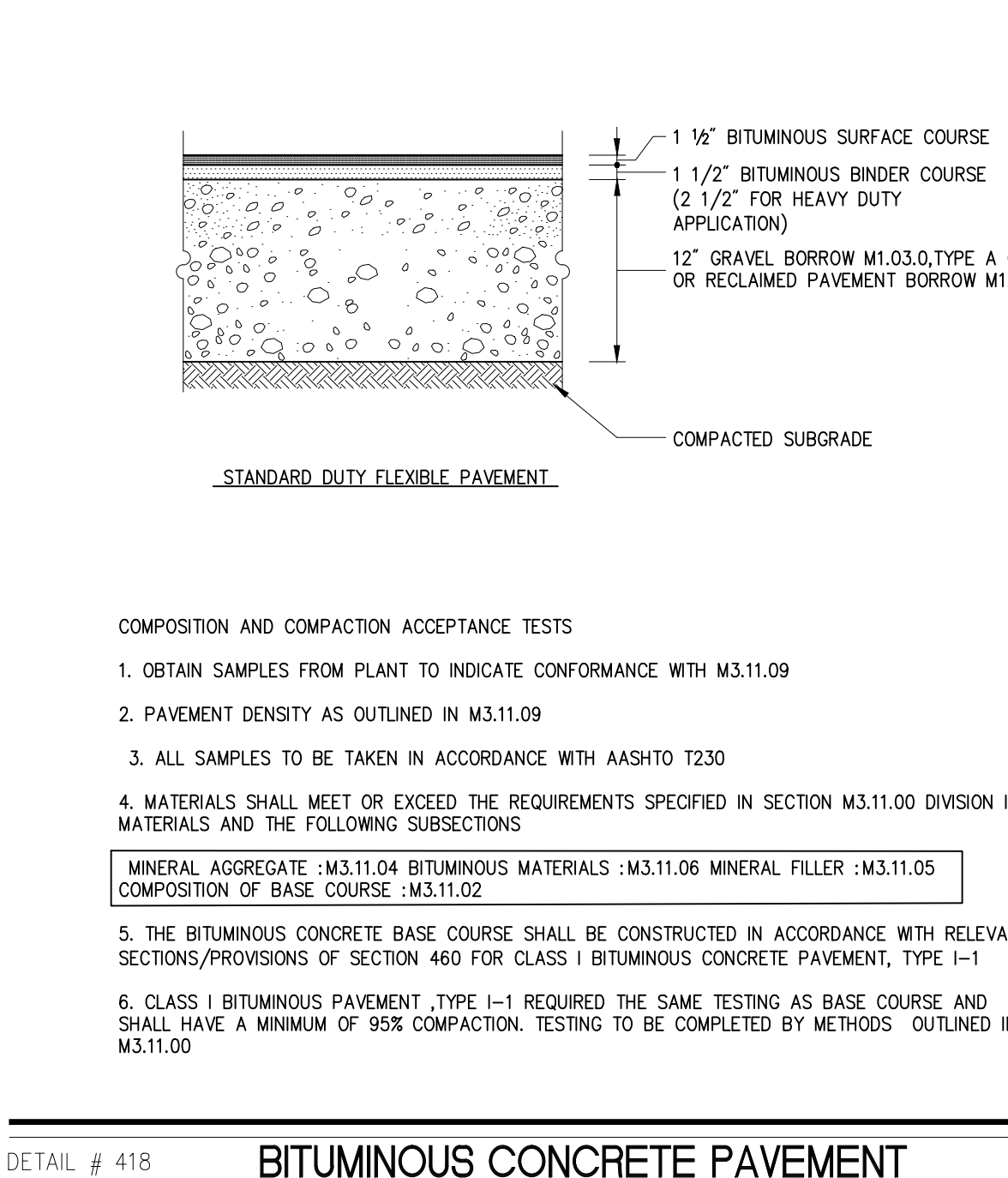
DETAIL # 444 CONCRETE DUMPSTER PAD JDE



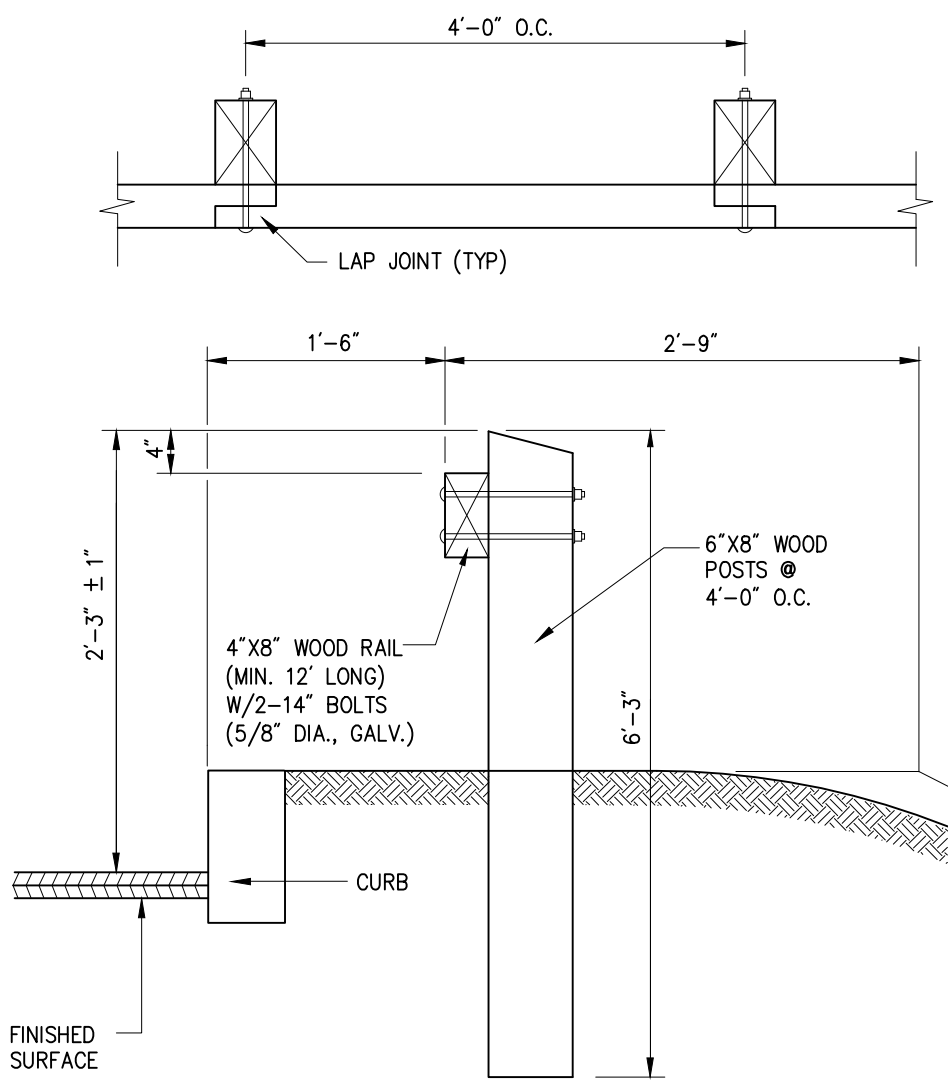
DETAIL # 807 CHAIN LINK FENCE W/ PRIVACY SLATS JDE



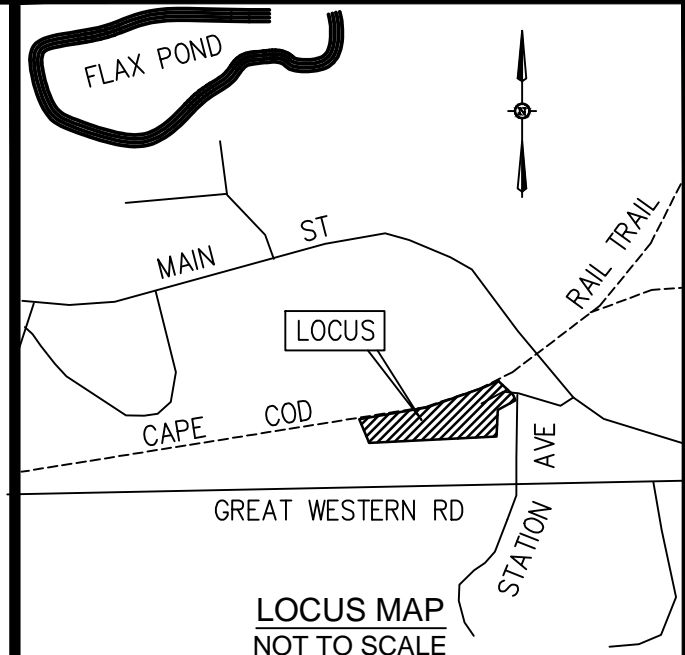
DETAIL # 445 CONCRETE WHEEL STOP JDE



DETAIL # 418 BITUMINOUS CONCRETE PAVEMENT JDE



DETAIL # 801 TIMBER GUARD RAIL JDE



PERMITTING SET

REVISIONS		
No.	DATE	DESCRIPTION
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2	03-08-21	REVISE PER TOWN COMMENTS

DRAWN BY:	TME
CHECKED BY:	EPJ
DESIGNED BY:	TME / GWD

CONSTRUCTION NOTES AND DETAILS

6 STATION AVENUE
IN
HARWICH
(BARNSTABLE COUNTY)
MASSACHUSETTS

SEPTEMBER 24, 2020

PREPARED FOR:
CAPE COD OIL
COMPANY
227 ROUTE 6
PROVINCETOWN
MASSACHUSETTS
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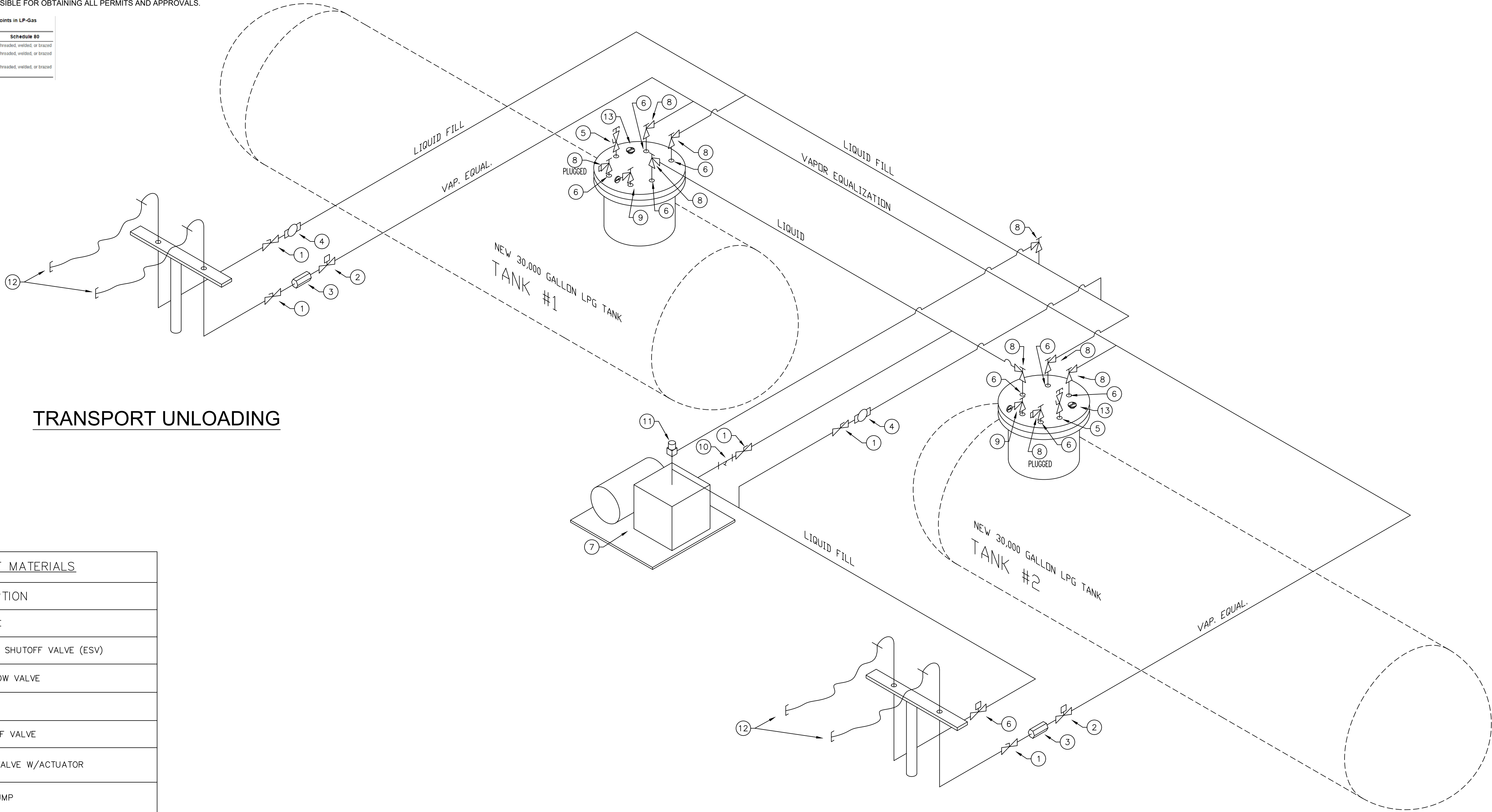
SCOPE OF WORK

1. INSTALLATION OF TWO NEW 30,000 GALLON UNDERGROUND STORAGE TANKS (UST) FOR STORAGE OF LIQUID PROPANE. TANKS TO BE CONSTRUCTED IN ACCORDANCE WITH NFPA 58.

GENERAL NOTES

1. REFERENCE FIRE SAFETY ANALYSIS FOR FURTHER DETAILS OF SITE AND INSTALLATION.
2. THE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND EXACT LOCATIONS AND ARRANGEMENTS OF EQUIPMENT SHALL BE DETERMINED IN FIELD.
3. DRAWING NOT TO SCALE. ORIENTATION MAY BE ALTERED FOR CLARITY.
4. THE INSTALLING CONTRACTOR SHALL ENSURE THAT THE DESIGN OF THE UST SYSTEM MEETS ALL REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
5. INSTALL EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND GOOD PRACTICE NORMAL TO THE TRADE. INSTALLATION SHALL INCLUDE PROVISIONS FOR ACCESS TO NORMAL MAINTENANCE ITEMS. PROVIDE ADEQUATE AND SECURE MOUNTING METHODS.
6. ALL PIPING TO BE IN ACCORDANCE WITH NFPA 58 TABLE 6.9.3.5(A).
7. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS AND APPROVALS.

Table 6.9.3.5(A) Types of Metallic Pipe Joints in LP-Gas Service		
Service	Schedule 40	Schedule 80
Liquid	Welded or brazed	Threaded, welded, or brazed
Vapor, <125 psig (incl. 9 MPa)	Threaded, welded, or brazed	Threaded, welded, or brazed
Vapor, >125 psig (incl. 9 MPa)	Welded or brazed	Threaded, welded, or brazed



TRANSPORT UNLOADING

BOBTAIL FILL STATION

BILL OF MATERIALS

ITEM	QTY	DESCRIPTION
1	5	BALL VALVE
2	2	EMERGENCY SHUTOFF VALVE (ESV)
3	2	EXCESS FLOW VALVE
4	2	SITE GLASS
5	2	TANK RELIEF VALVE
6	9	INTERNAL VALVE W/ACTUATOR
7	1	TURBINE PUMP
8	9	ANGLE VALVE
9	2	VENT/PRESSURE VALVE
10	1	Y STRAINER
11	1	BYPASS VALVE
12	4	ACME FITTINGS
13	2	THERMOMETER

PROPOSED PIPING SCHEMATIC - N.T.S

SFC
ENGINEERING
183 ROCKINGHAM RD
WINDHAM, NH 03087
(603) 647-8700
www.sfceng.com



ISSUED FOR:
PERMIT

REVISIONS		
NO.	DESCRIPTION	DATE

CAPE COD OIL
8 STATION AVENUE
HARWICH, MA

PROPANE SYSTEM
SCHEMATIC

PROJECT #: 661430
DESIGNED BY: GPB
DRAWN BY: GPB
CHECKED BY: GVR
DATE: 03/08/2021

SHEET NO.:

FX-001

SHEET 1 OF 1

DESCRIPTION

The Galleonaire LED luminaire features advanced thermally conductive polymer heatsinks and open frame endcaps for a sleek aesthetic with significant weight reduction. Patented, high-efficiency AccuLED Optics™ system provides uniform and energy conscious illumination to walkways, parking lots, roadways, building areas and security lighting applications. IP66 rated and UL/cUL Listed for wet locations.

SPECIFICATION FEATURES

Construction

Extruded aluminum driver enclosure thermally isolated from Light Squares for optimal thermal performance. Open frame die-cast aluminum end caps provide structural support for the housing and heatsinks. Thermally conductive polymer heatsinks offer significant weight reduction while fully maintaining thermal management of the Light Squares. 3G vibration tested and rated. Optional tool-less hardware available for ease of entry into electrical chamber. Housing is IP66 rated.

Optics

Patented, high-efficiency injection-molded AccuLED Optics technology. Optics are precisely designed to shape the distribution, maximizing efficiency and application spacing. AccuLED Optics create consistent distributions with the scalability to meet customized application requirements. Offered standard in 4000K (+/- 275K) CCT 70 CRI. Optional 2700K, 3000K, 5000K and 6000K CCT.

Electrical

LED drivers are mounted to removable tray assembly for ease of maintenance. 120-277V 50/60Hz, 347V 60Hz or 480V 60Hz operation. 480V is compatible for use with 480V Wye systems only. Standard with 0-10V dimming. Shipped standard with Cooper Lighting Solutions proprietary circuit module designed to withstand 10kV of transient line surge. The Galleonaire LED luminaire is suitable for operation in -40°C to 40°C ambient environments. Light Squares are IP66 rated. Greater than 90% lumen maintenance expected at 60,000 hours. Available in standard 1A drive current and optional 600mA and 800mA drive currents (nominal).

Mounting

STANDARD ARM MOUNT: Extruded aluminum arm includes internal bolt guides allowing for easy positioning of fixture during mounting. When mounting two or more luminaires at 90° and 120° apart, the EA extended arm may be required. Refer to the arm mounting requirement table. Round pole adapter included. For wall mounting, specify wall

mount bracket option. **QUICK MOUNT ARM:** Adapter is bolted directly to the pole. Quick mount arm slide into place on the adapter and is secured via two screws, facilitating quick and easy installation. The versatile, patent pending, quick mount arm accommodates multiple drill patterns ranging from 1-1/2" to 4-7/8". Removal of the door on the quick mount arm enables wiring of the fixture without having to access the driver compartment. A knock-out enables round pole mounting.

Finish

Housing finished in super durable TGIC polyester powder coat paint, 2.5 mil nominal thickness for superior protection against fade and wear. Heat sink is dark gray, non-paintable. Standard housing colors include black, bronze, grey, white, dark platinum and graphite metallic. RAL and custom color matches available.

Warranty

Five-year warranty.



GLNA GALLEONAIRE

1-10 Light Squares

Solid State LED

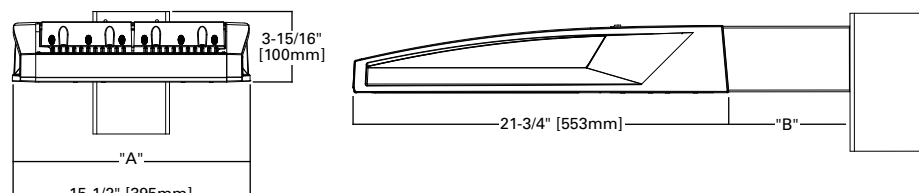
AREA/SITE LUMINAIRE



LumenSafe Technology
[CLICK HERE](#)

WaveLinx

DIMENSIONS



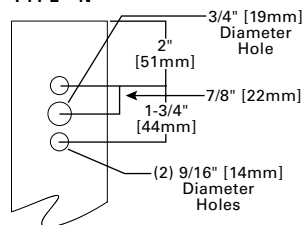
DIMENSION DATA

Number of Light Squares	"A" Width	"B" Standard Arm Length	"B" Optional Arm Length ¹	Weight with Arm (lbs.)	EPA with Arm ² (Sq. Ft.)
1-4	15-1/2" (394mm)	7" (178mm)	10" (254mm)	28 (12.7 kgs)	0.72
5-6	21-5/8" (549mm)	7" (178mm)	10" (254mm)	38 (16.3 kgs)	0.77
7-8	27-5/8" (702mm)	7" (178mm)	13" (330mm)	43 (19.5 kgs)	0.95
9-10	33-3/4" (857mm)	7" (178mm)	16" (406mm)	49 (22.2 kgs)	1.13

NOTES: 1. Optional arm length to be used when mounting two fixtures at 90° on a single pole. 2. EPA calculated with optional arm length.

DRILLING PATTERN

TYPE "N"



CERTIFICATION DATA

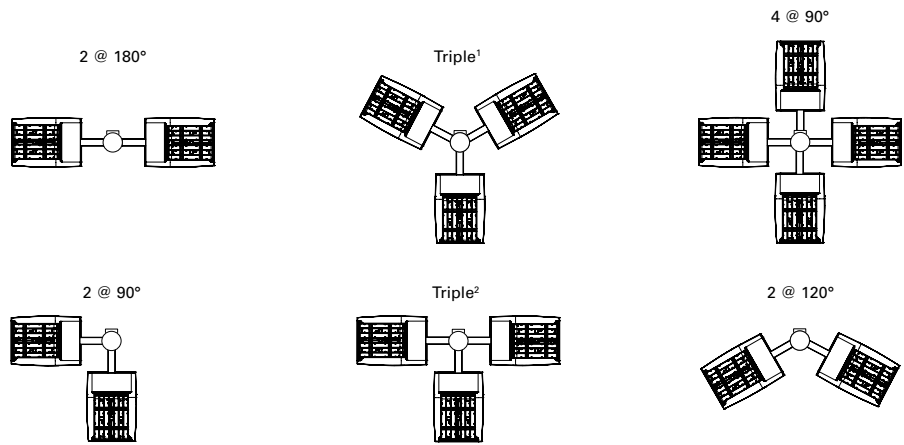
3G Vibration Rated
IP66 Rated
ISO 9001
LM79 / LM80 Compliant
UL/cUL Wet Location Listed

ENERGY DATA

Electronic LED Driver
>0.9 Power Factor
<20% Total Harmonic Distortion
120V-277V 50/60Hz
347V, 480V 60Hz
-40°C Min. Temperature
40°C Max. Temperature

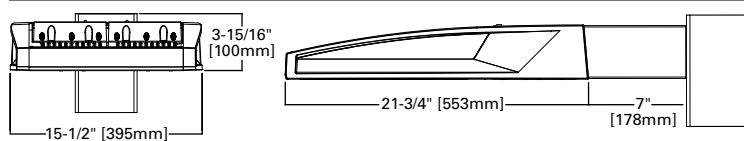
ARM MOUNTING REQUIREMENTS

Configuration	90° Apart	120° Apart
GLNA-AF-01	7" Arm (Standard)	7" Arm (Standard)
GLNA-AF-02	7" Arm (Standard)	7" Arm (Standard)
GLNA-AF-03	7" Arm (Standard)	7" Arm (Standard)
GLNA-AF-04	7" Arm (Standard)	7" Arm (Standard)
GLNA-AF-05	10" Extended Arm (Required)	7" Arm (Standard)
GLNA-AF-06	10" Extended Arm (Required)	7" Arm (Standard)
GLNA-AF-07	13" Extended Arm (Required)	13" Extended Arm (Required)
GLNA-AF-08	13" Extended Arm (Required)	13" Extended Arm (Required)
GLNA-AF-09	16" Extended Arm (Required)	16" Extended Arm (Required)
GLNA-AF-10	16" Extended Arm (Required)	16" Extended Arm (Required)

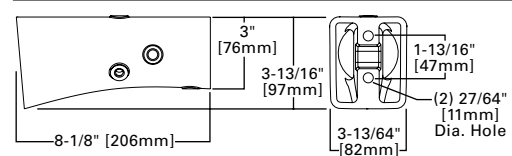


NOTES: 1 Round poles are 3 @ 120°. Square poles are 3 @ 90°. 2 Round poles are 3 @ 90°.

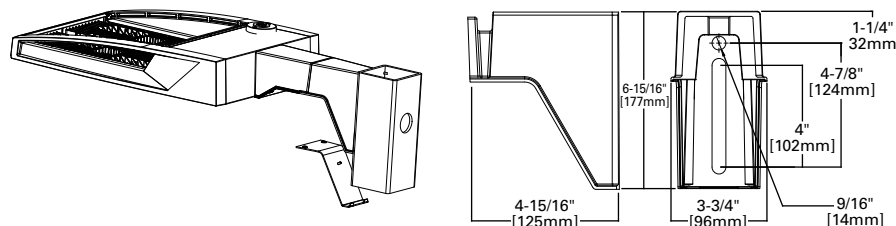
STANDARD WALL MOUNT



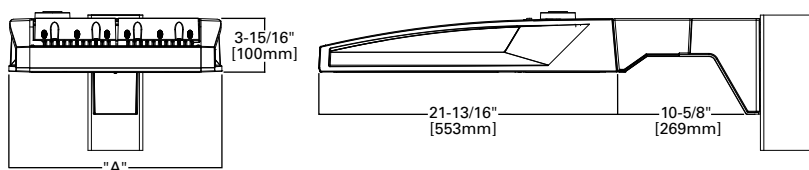
MAST ARM MOUNT



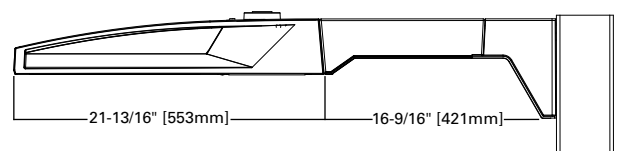
QUICK MOUNT ARM (INCLUDES FIXTURE ADAPTER)



QM Quick Mount Arm (Standard)



QMEA Quick Mount Arm (Extended)

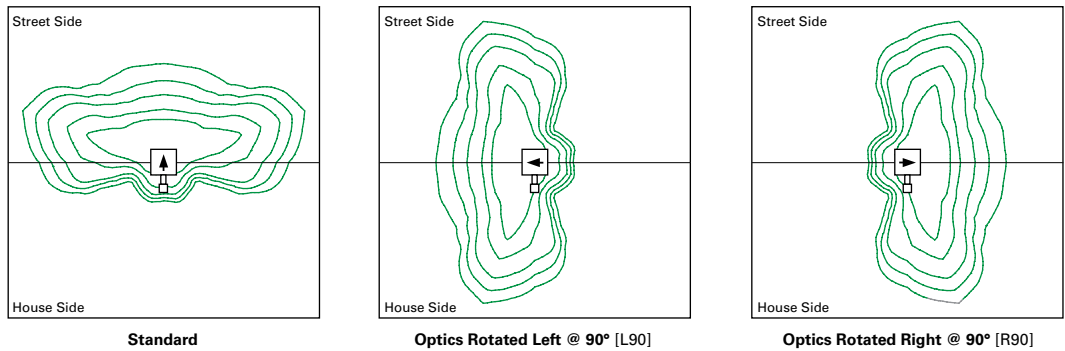


QUICK MOUNT ARM DATA

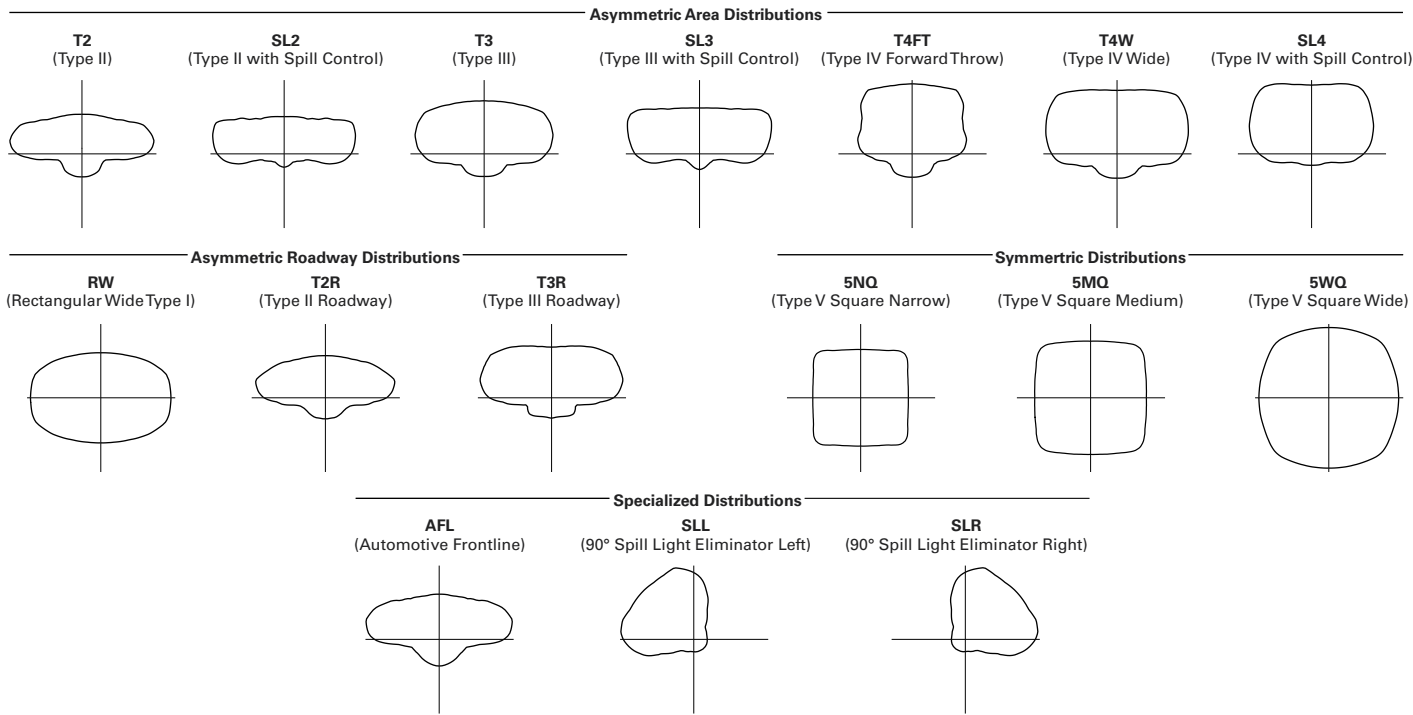
Number of Light Squares ^{1,2}	"A" Width	Weight with QM Arm (lbs.)	Weight with QMEA Arm (lbs.)	EPA with Arm ² (Sq. Ft.)
1-4	15-1/2" (394mm)	30 (13.6 kgs)	33 (15 kgs)	0.96
5-6 ³	21-5/8" (549mm)	38 (17.2 kgs)	41 (18.6 kgs)	
7-8 ⁴	27-5/8" (702mm)	45 (20.4 kgs)	--	

NOTES: 1. Optional arm length to be used when mounting two fixtures at 90° on a single pole. 2. EPA calculated with standard arm length. 3. QMEA arm to be used when mounting two fixtures at 90° on a single pole. 4. QM options not available for 90° or 120° configuration on a single pole.

OPTIC ORIENTATION

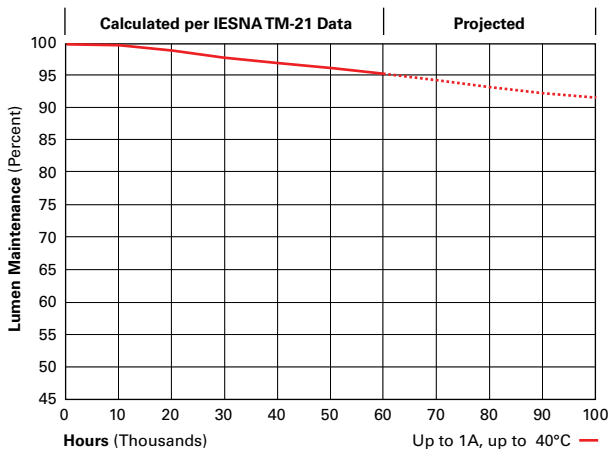


OPTICAL DISTRIBUTIONS



LUMEN MAINTENANCE

Drive Current	Ambient Temperature	TM-21 Lumen Maintenance (60,000 Hours)	Projected L70 (Hours)
Up to 1A	Up to 40°C	> 95%	416,000



LUMEN MULTIPLIER

Ambient Temperature	Lumen Multiplier
0°C	1.02
10°C	1.01
25°C	1.00
40°C	0.99

NOMINAL POWER LUMENS (1A)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		59	113	166	225	279	333	391	445	501	558
Input Current @ 120V (A)		0.51	1.02	1.53	2.03	2.55	3.06	3.56	4.08	4.60	5.07
Input Current @ 208V (A)		0.29	0.56	0.82	1.11	1.37	1.64	1.93	2.19	2.46	2.75
Input Current @ 240V (A)		0.26	0.48	0.71	0.96	1.19	0.41	1.67	1.89	2.12	2.39
Input Current @ 277V (A)		0.23	0.42	0.61	0.83	1.03	1.23	1.45	1.65	1.84	2.09
Input Current @ 347V (A)		0.17	0.32	0.50	0.64	0.82	1.00	1.14	1.32	1.50	1.68
Input Current @ 480V (A)		0.14	0.24	0.37	0.48	0.61	0.75	0.91	0.99	1.12	1.28
Optics											
T2	4000K/5000K Lumens	6,095	11,910	17,772	23,482	29,095	34,817	41,175	46,653	52,041	57,618
	3000K Lumens	5,763	11,261	16,803	22,202	27,509	32,920	38,931	44,111	49,205	54,478
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
T2R	4000K/5000K Lumens	6,470	12,642	18,864	24,926	30,884	36,958	43,707	49,522	55,241	61,161
	3000K Lumens	6,117	11,953	17,836	23,568	29,201	34,944	41,325	46,823	52,231	57,828
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4
T3	4000K/5000K Lumens	6,212	12,139	18,114	23,934	29,654	35,487	41,967	47,550	53,042	58,726
	3000K Lumens	5,874	11,477	17,126	22,629	28,038	33,553	39,680	44,959	50,152	55,526
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T3R	4000K/5000K Lumens	6,350	12,408	18,515	24,464	30,311	36,273	42,897	48,604	54,218	60,028
	3000K Lumens	6,004	11,732	17,506	23,131	28,660	34,296	40,559	45,955	51,263	56,757
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T4FT	4000K/5000K Lumens	6,249	12,210	18,220	24,074	29,828	35,695	42,213	47,829	53,353	59,071
	3000K Lumens	5,908	11,545	17,227	22,762	28,203	33,749	39,912	45,223	50,446	55,852
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	4000K/5000K Lumens	6,168	12,052	17,984	23,763	29,442	35,233	41,667	47,210	52,663	58,307
	3000K Lumens	5,832	11,395	17,004	22,468	27,838	33,313	39,396	44,638	49,793	55,129
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL2	4000K/5000K Lumens	6,084	11,889	17,741	23,441	29,044	34,756	41,103	46,571	51,950	57,517
	3000K Lumens	5,753	11,241	16,774	22,164	27,461	32,862	38,863	44,034	49,119	54,383
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL3	4000K/5000K Lumens	6,211	12,137	18,111	23,930	29,650	35,481	41,961	47,544	53,035	58,718
	3000K Lumens	5,873	11,476	17,124	22,626	28,034	33,548	39,674	44,953	50,145	55,518
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL4	4000K/5000K Lumens	5,901	11,532	17,207	22,736	28,170	33,711	39,867	45,171	50,388	55,788
	3000K Lumens	5,580	10,903	16,269	21,497	26,635	31,874	37,694	42,710	47,642	52,748
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	6,407	12,519	18,681	24,683	30,583	36,598	43,281	49,039	54,703	60,565
	3000K Lumens	6,058	11,837	17,663	23,338	28,916	34,603	40,922	46,367	51,722	57,265
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3
5MQ	4000K/5000K Lumens	6,525	12,750	19,025	25,138	31,146	37,272	44,079	49,943	55,712	61,682
	3000K Lumens	6,169	12,055	17,988	23,768	29,449	35,241	41,677	47,222	52,676	58,320
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
5WQ	4000K/5000K Lumens	6,542	12,783	19,074	25,203	31,227	37,369	44,193	50,072	55,856	61,841
	3000K Lumens	6,185	12,086	18,035	23,830	29,525	35,332	41,784	47,344	52,812	58,471
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
SLL/SLR	4000K/5000K Lumens	5,459	10,667	15,918	21,032	26,059	31,185	36,879	41,786	46,612	51,607
	3000K Lumens	5,162	10,086	15,050	19,886	24,639	29,485	34,870	39,509	44,072	48,795
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	6,349	12,406	18,512	24,461	30,307	36,268	42,891	48,597	54,210	60,019
	3000K Lumens	6,003	11,730	17,503	23,128	28,655	34,291	40,553	45,949	51,256	56,749
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3
AFL	4000K/5000K Lumens	6,372	12,451	18,580	24,550	30,417	36,400	43,047	48,774	54,407	60,238
	3000K Lumens	6,025	11,773	17,567	23,212	28,760	34,416	40,701	46,116	51,442	56,955
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (800MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		44	85	124	171	210	249	295	334	374	419
Input Current @ 120V (A)		0.39	0.77	1.13	1.54	1.90	2.26	2.67	3.03	3.39	3.80
Input Current @ 208V (A)		0.22	0.44	0.62	0.88	1.06	1.24	1.50	1.68	1.87	2.12
Input Current @ 240V (A)		0.19	0.38	0.54	0.76	0.92	1.08	1.30	1.46	1.62	1.84
Input Current @ 277V (A)		0.17	0.36	0.47	0.72	0.83	0.95	1.19	1.31	1.42	1.67
Input Current @ 347V (A)		0.15	0.24	0.38	0.49	0.63	0.77	0.87	1.01	1.15	1.52
Input Current @ 480V (A)		0.11	0.18	0.29	0.37	0.48	0.59	0.66	0.77	0.88	0.96
Optics											
T2	4000K/5000K Lumens	4,924	9,622	14,357	18,971	23,505	28,128	33,264	37,690	42,043	46,549
	3000K Lumens	4,656	9,097	13,575	17,937	22,224	26,595	31,452	35,636	39,752	44,012
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
T2R	4000K/5000K Lumens	5,227	10,213	15,240	20,137	24,950	29,857	35,310	40,008	44,629	49,411
	3000K Lumens	4,942	9,657	14,410	19,040	23,591	28,230	33,386	37,827	42,196	46,718
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4
T3	4000K/5000K Lumens	5,019	9,807	14,634	19,336	23,957	28,669	33,904	38,415	42,852	47,444
	3000K Lumens	4,745	9,272	13,836	18,282	22,652	27,107	32,057	36,322	40,517	44,859
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T3R	4000K/5000K Lumens	5,130	10,024	14,958	19,764	24,488	29,304	34,656	39,266	43,801	48,495
	3000K Lumens	4,850	9,478	14,143	18,687	23,153	27,707	32,767	37,126	41,415	45,853
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T4FT	4000K/5000K Lumens	5,048	9,864	14,719	19,449	24,098	28,837	34,103	38,640	43,103	47,722
	3000K Lumens	4,773	9,327	13,917	18,389	22,784	27,265	32,245	36,534	40,754	45,121
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	4000K/5000K Lumens	4,983	9,737	14,529	19,197	23,786	28,464	33,662	38,140	42,546	47,105
	3000K Lumens	4,711	9,206	13,737	18,151	22,490	26,913	31,827	36,062	40,227	44,538
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL2	4000K/5000K Lumens	4,915	9,605	14,332	18,937	23,464	28,079	33,206	37,624	41,970	46,467
	3000K Lumens	4,648	9,082	13,551	17,905	22,185	26,549	31,397	35,574	39,683	43,935
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL3	4000K/5000K Lumens	5,018	9,805	14,631	19,333	23,954	28,665	33,899	38,410	42,846	47,437
	3000K Lumens	4,745	9,271	13,834	18,279	22,648	27,103	32,052	36,316	40,511	44,852
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL4	4000K/5000K Lumens	4,768	9,316	13,901	18,368	22,758	27,234	32,208	36,493	40,708	45,070
	3000K Lumens	4,508	8,808	13,144	17,367	21,518	25,750	30,453	34,504	38,489	42,614
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	5,176	10,114	15,092	19,941	24,707	29,566	34,966	39,618	44,194	48,929
	3000K Lumens	4,894	9,563	14,269	18,854	23,361	27,955	33,060	37,459	41,785	46,263
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3
5MQ	4000K/5000K Lumens	5,271	10,300	15,370	20,309	25,163	30,112	35,610	40,348	45,008	49,831
	3000K Lumens	4,984	9,739	14,532	19,202	23,791	28,471	33,670	38,149	42,556	47,116
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
5WQ	4000K/5000K Lumens	5,285	10,327	15,410	20,361	25,228	30,189	35,702	40,452	45,125	49,960
	3000K Lumens	4,997	9,764	14,570	19,251	23,853	28,544	33,757	38,248	42,666	47,238
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
SLL/SLR	4000K/5000K Lumens	4,410	8,618	12,860	16,991	21,053	25,193	29,794	33,758	37,657	41,692
	3000K Lumens	4,170	8,148	12,159	16,066	19,906	23,820	28,170	31,918	35,605	39,420
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	5,129	10,023	14,956	19,761	24,485	29,300	34,651	39,261	43,795	48,488
	3000K Lumens	4,850	9,477	14,141	18,684	23,150	27,703	32,762	37,121	41,409	45,846
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3
AFL	4000K/5000K Lumens	5,148	10,059	15,010	19,833	24,574	29,407	34,777	39,404	43,955	48,665
	3000K Lumens	4,867	9,511	14,192	18,752	23,234	27,804	32,882	37,256	41,559	46,013
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (600MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		34	66	96	129	162	193	226	257	290	323
Input Current @ 120V (A)		0.30	0.58	0.86	1.16	1.44	1.73	2.03	2.33	2.59	2.89
Input Current @ 208V (A)		0.17	0.34	0.49	0.65	0.84	0.99	1.14	1.30	1.48	1.63
Input Current @ 240V (A)		0.15	0.30	0.43	0.56	0.74	0.87	1.00	1.13	1.30	1.43
Input Current @ 277V (A)		0.14	0.28	0.41	0.52	0.69	0.81	0.93	1.04	1.22	1.33
Input Current @ 347V (A)		0.11	0.19	0.30	0.39	0.49	0.60	0.69	0.77	0.90	0.99
Input Current @ 480V (A)		0.08	0.15	0.24	0.30	0.38	0.48	0.53	0.59	0.71	0.77
Optics											
T2	4000K/5000K Lumens	4,015	7,846	11,707	15,469	19,166	22,936	27,125	30,733	34,283	37,957
	3000K Lumens	3,796	7,418	11,069	14,626	18,122	21,686	25,646	29,059	32,415	35,888
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
T2R	4000K/5000K Lumens	4,262	8,328	12,427	16,420	20,345	24,346	28,792	32,623	36,391	40,291
	3000K Lumens	4,030	7,874	11,750	15,525	19,236	23,020	27,223	30,845	34,408	38,095
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4
T3	4000K/5000K Lumens	4,092	7,997	11,933	15,767	19,535	23,377	27,646	31,324	34,942	38,687
	3000K Lumens	3,869	7,561	11,282	14,907	18,471	22,103	26,140	29,617	33,038	36,579
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T3R	4000K/5000K Lumens	4,183	8,174	12,197	16,116	19,968	23,895	28,259	32,019	35,717	39,544
	3000K Lumens	3,955	7,728	11,532	15,238	18,880	22,593	26,719	30,274	33,770	37,389
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T4FT	4000K/5000K Lumens	4,116	8,044	12,002	15,859	19,650	23,514	27,808	31,508	35,147	38,914
	3000K Lumens	3,892	7,605	11,348	14,995	18,579	22,233	26,293	29,791	33,232	36,793
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	4000K/5000K Lumens	4,063	7,940	11,847	15,654	19,395	23,210	27,449	31,101	34,693	38,410
	3000K Lumens	3,842	7,507	11,202	14,801	18,339	21,945	25,953	29,406	32,802	36,317
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL2	4000K/5000K Lumens	4,008	7,832	11,687	15,442	19,133	22,896	27,077	30,680	34,223	37,890
	3000K Lumens	3,790	7,405	11,050	14,601	18,090	21,648	25,602	29,008	32,358	35,826
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL3	4000K/5000K Lumens	4,092	7,996	11,931	15,764	19,532	23,374	27,642	31,320	34,937	38,681
	3000K Lumens	3,869	7,560	11,281	14,905	18,468	22,100	26,136	29,613	33,034	36,573
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL4	4000K/5000K Lumens	3,888	7,597	11,335	14,978	18,558	22,208	26,263	29,757	33,194	36,751
	3000K Lumens	3,676	7,183	10,718	14,162	17,546	20,997	24,832	28,135	31,385	34,748
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	4,220	8,247	12,306	16,260	20,147	24,109	28,512	32,305	36,036	39,898
	3000K Lumens	3,991	7,798	11,635	15,374	19,049	22,795	26,958	30,545	34,073	37,724
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3
5MQ	4000K/5000K Lumens	4,298	8,399	12,533	16,560	20,518	24,554	29,037	32,901	36,701	40,634
	3000K Lumens	4,064	7,941	11,850	15,658	19,400	23,216	27,455	31,108	34,701	38,419
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
5WQ	4000K/5000K Lumens	4,309	8,421	12,565	16,603	20,571	24,617	29,113	32,986	36,796	40,739
	3000K Lumens	4,075	7,962	11,881	15,698	19,450	23,276	27,526	31,188	34,791	38,519
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
SLL/SLR	4000K/5000K Lumens	3,596	7,027	10,486	13,855	17,167	20,543	24,295	27,527	30,706	33,997
	3000K Lumens	3,400	6,644	9,915	13,100	16,231	19,424	22,971	26,027	29,033	32,144
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	4,182	8,173	12,195	16,114	19,965	23,892	28,255	32,014	35,712	39,539
	3000K Lumens	3,955	7,727	11,531	15,236	18,877	22,590	26,715	30,269	33,766	37,384
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3
AFL	4000K/5000K Lumens	4,198	8,203	12,240	16,172	20,038	23,979	28,358	32,131	35,842	39,682
	3000K Lumens	3,969	7,756	11,573	15,291	18,946	22,672	26,812	30,380	33,888	37,520
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 70 CRI.

CONTROL OPTIONS

0-10V (DIM)

This fixture is offered standard with 0-10V dimming driver(s). The DIM option provides 0-10V dimming wire leads for use with a lighting control panel or other control method.

Photocontrol (P, R and PER7)

Optional button-type photocontrol (P) and photocontrol receptacles (R and PER7) provide a flexible solution to enable "dusk-to-dawn" lighting by sensing light levels. Advanced control systems compatible with NEMA 7-pin standards can be utilized with the PER7 receptacle.

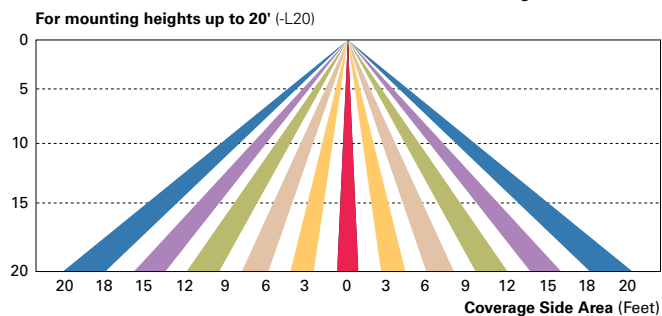
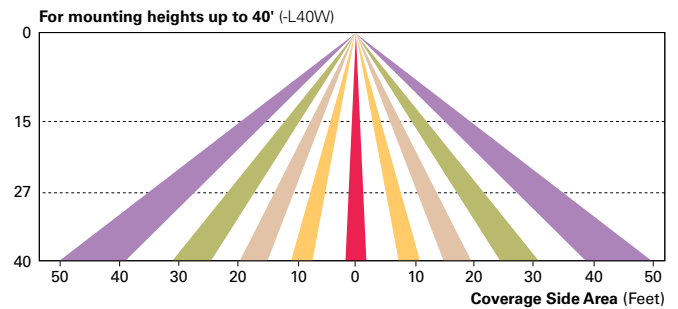
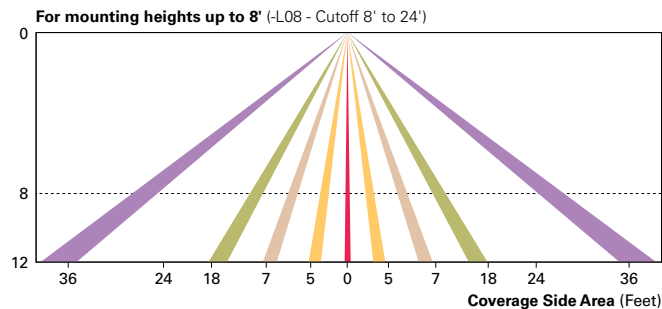
After Hours Dim (AHD)

This feature allows photocontrol-enabled luminaires to achieve additional energy savings by dimming during scheduled portions of the night. The dimming profile will automatically take effect after a "dusk-to-dawn" period has been calculated from the photocontrol input. Specify the desired dimming profile for a simple, factory-shipped dimming solution requiring no external control wiring. Reference the After Hours Dim supplemental guide for additional information.

Dimming Occupancy Sensor (MS/DIM-LXX, MS/X-LXX and MS-LXX)

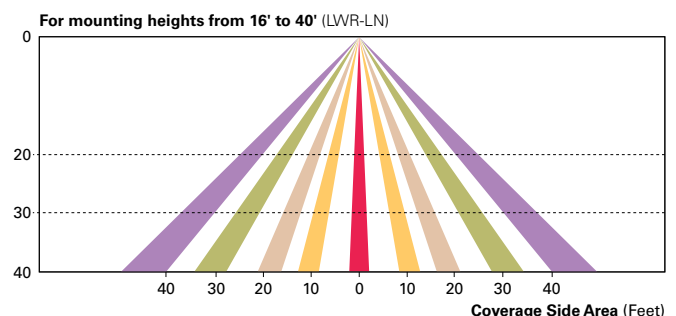
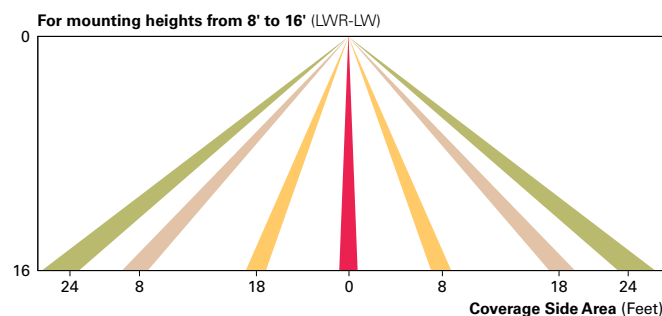
These sensors are factory installed in the luminaire housing. When the MS/DIM-LXX sensor option is selected, the occupancy sensor is connected to a dimming driver and the entire luminaire dims when there is no activity detected. When activity is detected, the luminaire returns to full light output. The MS/DIM sensor is factory preset to dim down to approximately 50 percent power with a time delay of five minutes. The MS-LXX sensor is factory preset to turn the luminaire off after five minutes of no activity. The MS/X-LXX is also preset for five minutes and only controls the specified number of light engines to maintain steady output from the remaining light engines.

These occupancy sensors includes an integral photocell that can be activated with the FSIR-100 accessory for "dusk-to-dawn" control or daylight harvesting - the factory preset is OFF. The FSIR-100 is a wireless tool utilized for changing the dimming level, time delay, sensitivity and other parameters. A variety of sensor lens are available to optimize the coverage. pattern for mounting heights from 8'-40'.



LumaWatt Pro Wireless Control and Monitoring System (LWR-LW and LWR-LN)

The Cooper Lighting Solutions' LumaWatt Pro powered by Enlighted is a connected lighting solution that combines a broad selection of energy-efficient LED luminaires with a powerful integrated wireless sensor system. The sensor controls the lighting system in compliance with the latest energy codes and collects valuable data about building performance and use. Software applications turn the granular data into information through energy dashboards and specialized apps that make it simple and help optimize the use of building resources, beyond lighting.



WaveLinx Wireless Outdoor Lighting Control Module (WOLC-7P-10A)

The 7-pin wireless outdoor lighting control module enables WaveLinx to control outdoor area, site and flood lighting. WaveLinx controls outdoor lighting using schedules to provide ON, OFF and dimming controls based on astronomic or time schedules based on a 7 day week.

LumenSafe Integrated Network Security Camera (LD)

Cooper Lighting Solutions brings ease of camera deployment to a whole new level. No additional wiring is needed beyond providing line power to the luminaire. A variety of networking options allows security integrators to design the optimal solution for active surveillance. As the ideal solution to meet the needs for active surveillance, the LumenSafe integrated network camera is a streamlined, outdoor-ready fixed dome that provides HDTV 1080p video. This IP camera is optimally designed for deployment in the video management system or security software platform of choice.

Synapse (DIM10)

SimplySNAP integrated wireless controls system by Synapse. Includes factory installed DIM10 Synapse control module and MS/DC power supply; requires additional Synapse system components for operation. Contact Synapse at www.synapsewireless.com for product support, warranty and terms and conditions.

ORDERING INFORMATION


Sample Number: GLNA-AF-04-LED-E1-T3-GM-QM

Product Family ¹	Light Engine	Number of Light Squares ³	Lamp Type	Voltage	Distribution	Color	Mounting
GLNA=Galleonaire	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 ⁴ 06=6 07=7 ⁵ 08=8 ⁵ 09=9 ⁶ 10=10 ⁶	LED=Solid State Light Emitting Diodes	E1=120-277V 347=347V ⁷ 480=480V ^{7,8}	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WO=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm ⁹ MA=Mast Arm Adapter ¹⁰ WM=Wall Mount QM=Quick Mount Arm (Standard Length) ¹¹ QMEA=Quick Mount Arm (Extended Length) ¹²
Options (Add as Suffix)					Accessories (Order Separately)		
7027=70 CRI 2700K ¹³ 7030=70 CRI 3000K ¹³ 8030=80 CRI 3000K ¹³ 7050=70 CRI 5000K ¹³ 7060=70 CRI 6000K ¹³ 600=Drive Current Factory Set to Nominal 600mA ¹⁵ 800=Drive Current Factory Set to Nominal 800mA ¹⁵ F=Single Fuse (120, 277 or 347V. Must Specify Voltage) FF=Double Fuse (208, 240 or 480V. Must Specify Voltage) 2L=Two Circuits ^{12,18} DIM=External 0-10V Dimming Leads ^{19,20} P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Voltage) ²¹ PER7=NEMA 7-PIN Photocontrol Receptacle ²¹ R=NEMA Twistlock Photocontrol Receptacle ²¹ AHD145=After Hours Dim, 5 Hours ²² AHD245=After Hours Dim, 6 Hours ²² AHD255=After Hours Dim, 7 Hours ²² AHD355=After Hours Dim, 8 Hours ²² MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height ^{24,25} MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height ^{24,26} MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) ^{24,27} MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height ^{24,25,29} MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height ^{24,26,29} MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) ^{24,27,29} MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height ^{24,25} MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height ^{24,26} MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) ^{24,27} LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height ³⁰ LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height ³⁰ L90=Optics Rotated 90° Left R90=Optics Rotated 90° Right TH=Tool-less Door Hardware LCF=Light Square Trim Plate Painted to Match Housing ³¹ HSS=Factory Installed House Side Shield ³² CE=CE Marking ³³ ZW=WaveLinx-enabled 4-PIN Twistlock Receptacle ^{19,23} ZW-SWPD4XX=Wavelinx Wireless Sensor, 7' - 15' Mounting Height ^{19,23,36} ZW-SWPD5XX=Wavelinx Wireless Sensor, 15' - 40' Mounting Height ^{19,23,36}					OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V OA/RA1027=NEMA Photocontrol - 480V OA/RA1201=NEMA Photocontrol - 347V OA/RA1013=Photocontrol Shorting Cap OA/RA1014=120V Photocontrol MA1252=10kV Surge Module Replacement MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon GLEON-QM=Quick Mount Arm Kit ¹¹ GLEON-QMEA=Quick Mount Extended Arm Kit ¹² BCS-GLNA=Bird Control Spike Kit ²⁸ LS/HSS=Field Installed House Side Shield ^{32,34} FSIR-100=Wireless Configuration Tool for Occupancy Sensor ²⁴ WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) ^{19,35} SWPD4-XX=Wavelinx Wireless Sensor, 7' - 15' Mounting Height ^{16,19,23,36} SWPD5-XX=Wavelinx Wireless Sensor, 15' - 40' Mounting Height ^{16,19,23,36}		

NOTES:

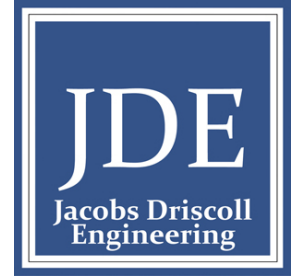
1 Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN. 2 Reserved 3 Standard 4000K CCT and minimum 70 CRI. 4 Not compatible with MS/4-LXX or MS/1-LXX sensors. 5 Not compatible with extended quick mount arm (QMEA). 6 Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA). 7 Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A. 8 Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems). 9 May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table. 10 Factory installed. 11 Maximum 8 light squares. 12 Maximum 6 light squares. 13 Extended lead times apply. Use dedicated IES files for 2700K, 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleonaire luminaire product page on the website. 14 Reserved 15 1 Amp standard. Use dedicated IES files for 600mA and 800mA when performing layouts. These files are published on the Galleonaire luminaire product page on the website. 16 Requires ZW. 17 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 18 Not available with LumaWatt Pro wireless sensors. 19 Cannot be used with other control options. 20 Low voltage control lead brought out 18" outside fixture. 21 Not available if any "MS" sensor is selected. Motion sensor has an integral photocell. 22 Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information. 23 WAC Gateway required to enable field-configurability: Order WAC-PoE and WPOE-120 (10V to PoE injector) power supply if needed. 24 The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay and cutoff. 25 Approximately 22' detection diameter at 8' mounting height. 26 Approximately 40' detection diameter at 20' mounting height. 27 Approximately 100' detection diameter at 40' mounting height. 28 Recommend one BCS kit per 4 light squares. 29 Replace X with number of Light Squares operating in low output mode. 30 LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.cooperlighting.com for LumaWatt Pro application information. 31 Not available with house side shield (HSS). 32 Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected. 33 CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only. 34 One required for each Light Square. 35 Requires PER7. 36 Replace XX with sensor color (WH, BZ, or BK).

LumenSafe Integrated Network Security Camera Technology Options (Add as Suffix)

Product Family	Camera Type	Data Backhaul
L=LumenSafe Technology [*] 	D=Dome Camera, Standard H=Dome Camera, Hi-Res Z=Dome Camera, Remote PTZ	C=Cellular, Customer Installed SIM Card A=Cellular, Factory Installed AT&T SIM Card V=Cellular, Factory Installed Verizon SIM Card S=Cellular, Factory Installed Sprint SIM Card R=Cellular, Factory Installed Rogers SIM Card W=Wi-Fi Networking w/ Omni-Directional Antenna E=Ethernet Networking

*Consult LumenSafe system pages for additional details and compatibility. Not available with 9-10 light square housing. Not available with 347V, 480V or high ambient options.

Application for Site Plan Approval



In Support of:
***Proposed Propane Tank Installation for
Propane Tank Distribution Facility
6 Station Avenue (Map 39, Plot K3)
Harwich, MA 02601***

Applicant:
M.J.T. Enterprises, Inc.
227 Route 6
Provincetown, MA 02657

Submitted to:
***Town of Harwich
Planning Board***

Dated: October 26, 2020

Prepared By:
Jacobs Driscoll Engineering, Inc.
50 Oliver Street
North Easton, MA 02356

JN: 01-2019-015

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- APPENDICES

- APPENDIX A: Property Deeds (Proof of Ownership)
 - Attachment: Site Development Plans dated September 24, 2020 and revised through October 19, 2020 by Jacobs Driscoll Engineering, Inc.

TOWN OF HARWICH PLANNING DEPARTMENT



PLANNING BOARD APPLICATION SPECIAL PERMITS & SITE PLAN REVIEW

FORM A

TO THE TOWN CLERK, HARWICH, MA

DATE October 26, 2020

PART A – APPLICANT INFORMATION/AUTHORIZATION

Applicant Name(s)	Cape Cod Oil Company c/o Hurst Tasha
Representative/Organization (Who will serve as the primary contact responsible for facilitating this application?)	Jacobs Driscoll Engineering, Inc. Gregory Driscoll, Jr. P.E.
Mailing address	50 Oliver Street
Town, ST, Zip	North Easton, MA 02356
Phone	508-928-4400
Fax	
E-mail	GDriscoll@Jacobsdriscoll.com

The applicant is one of the following: *(please check appropriate box)*

☒ Owner ☐ Prospective Buyer* ☐ Representative for Owner/Tenant/Buyer*
☐ Tenant* ☐ Other* _____

***Written permission of the owner(s) and a municipal lien certificate (where applicable) is required.**

All other forms and information as required in the Harwich Code Chapter 400, Rules and Regulations, shall be submitted as part of this application.

Authorization

Your signature hereby asserts, to the best of your knowledge, that the information submitted in this application is true and accurate; that you agree to fully comply with the Town of Harwich Zoning By-laws and the terms and conditions of any approval of this application by the Planning Board; and authorizes the Members of the Planning Board and/or Town Staff to visit and enter upon the subject property for the duration of the consideration of this application.

Applicant _____

See Attached

Owner(s) – Authorization must accompany application if the owner is not the applicant.

Official use only:

PLANNING DEPARTMENT	TOWN CLERK
---------------------	------------

Case # _____

PART B – PROJECT LOCATION

Legal Street Address	6 Station Avenue	Village/Zip Code	02645
Title Book/Page or L.C.C. #	Deed Book 13840 - Page 205		
Map(s) / Parcel(s)	39-K3		
Zoning & Overlay Districts	Industrial	*Historic?	No
Frontage (linear feet)	109.60'		
Total land area (s.f.)	114,382 s.f.		
Upland (s.f.)	111,978 s.f.	Wetlands (s.f.)	2,404 s.f.

PART C – PROJECT DESCRIPTION

Existing Floor Area in Sq. Ft	Gross: 4,750 s.f.	Net:
Proposed Floor Area in Sq. Ft	Gross: No proposed change	Net:
Change in Sq. Ft + / -	Gross: No proposed change	Net:
Existing # of parking spaces	Proposed # of parking spaces: N/A	
Existing Use(s)	Warehouse	
Proposed Use(s)	Propane distribution facility	
Attach a separate narrative if necessary.		

The undersign hereby files an application with the Harwich Planning Board for the following special permits as proposed under the provisions of the Harwich Zoning Code: **(check all that apply)**

Site Plan Review § 325-55:

- ☒ Any floor area expansion of any structure or expansion of exterior space, other than parking, serving any of the following: commercial, industrial, multi-family or educational use or personal wireless service facility or the creation of a drive-up or drive-through window
- ☐ Expansion or reconfiguration of an existing parking lot and/or driveway(s) serving said parking lot.
- ☒ Establishment of any new commercial, industrial, multi-family, educational, fast food/take out restaurant or personal wireless service facility.
- ☐ Establishment of any new retail use(s) in the Industrial (IL) Zone.
- ☐ Waiver of Site Plan § 325-55.F

Article V, Use Regulations:

- ☐ Paragraph____, sub-paragraph #____
- ☐ Paragraph____, sub-paragraph #____
- ☐ Paragraph____, sub-paragraph #____, supplemental regulation #____ § 325-14

Article X, Special Permits:

- ☐ Structures w/ gross floor area of 7,500+ s.f. § 325-51
- ☐ Structures requiring 20 or more new parking spaces § 325-51
- ☐ Accessory Apt./Shared Elderly Housing § 325-51.H
- ☐ Mixed Use § 325-51.M
- ☐ Drinking Water Resource Protection § 325-51.C
- ☐ Two Family § 325-51.N
- ☐ Village Commercial, Harwich Port § 325-51.L
- ☐ *Harwich Center Overlay § 325-51.O
- ☐ Signage § 325-27.F Additional Cluster, Excess SF, Non-entry Facades

Other Special Permits:

- ☐ Six Ponds Special District - Article XVI
- ☐ Wind Energy Systems - Article XVIII
- ☐ Large Scale Wind Generation – Article XIX
- ☐ Other (i.e. Alternate Access § 325-18.P, Special Cases § 325-44.B) _____
- ☐ Repetitive Petition (MGL Ch 40A, §16): Proposed project evolved from a previously denied plan submitted to the Planning Board on _____ Year/Case # _____

**Note: Projects within the Harwich Center Overlay District may also be within the Harwich Center Historic District. This requires separate filing with the Historic District and Historical Commission. Please inquire for forms and instructions.*

September 2011

TOWN OF HARWICH PLANNING DEPARTMENT

PLANNING BOARD APPLICATION SPECIAL PERMITS & SITE PLAN REVIEW

FORM A



TO THE TOWN CLERK, HARWICH, MA

DATE _____

PART A – APPLICANT INFORMATION/AUTHORIZATION

Applicant Name(s)	
Representative/Organization (Who will serve as the primary contact responsible for facilitating this application?)	Cape Cod Oil Company c/o Hurst Tasha
Mailing address	Jacobs Driscoll Engineering, Inc. Gregory Driscoll, Jr. P.E.
Town, ST, Zip	50 Oliver Street
Phone	North Easton, MA 02356
Fax	508-928-4400
E-mail	

The applicant is one of the following: (please check appropriate box) GDriscoll@jacobsdriscoll.com

- ☐ Owner ☐ Prospective Buyer* ☐ Representative for Owner/Tenant/Buyer*
☐ Tenant* ☐ Other* _____

***Written permission of the owner(s) and a municipal lien certificate (where applicable) is required.**

All other forms and information as required in the Harwich Code Chapter 400, Rules and Regulations, shall be submitted as part of this application.

Authorization

Your signature hereby asserts, to the best of your knowledge, that the information submitted in this application is true and accurate; that you agree to fully comply with the Town of Harwich Zoning By-laws and the terms and conditions of any approval of this application by the Planning Board; and authorizes the Members of the Planning Board and/or Town Staff to visit and enter upon the subject property for the duration of the consideration of this application.

Applicant

Hurst Tasha

Owner(s) – Authorization must accompany application if the owner is not the applicant.

Official use only:

PLANNING DEPARTMENT	TOWN CLERK
---------------------	------------

Case #

State Tax Form 290
Certificate: 364
Issuance Date: 10/07/2020

MUNICIPAL LIEN CERTIFICATE
TOWN OF HARWICH - LIVE DATA
COMMONWEALTH OF MASSACHUSETTS

Requested by JACOBS DRISCOLL ENGINEERING

I certify from available information that all taxes, assessments and charges now payable that constitute liens as of the date of this certificate on the parcel of real estate specified in your application received on 10/07/2020 are listed below.

DESCRIPTION OF PROPERTY

Parcel ID: 39/K3-R	6 STATION AV
TASHA MICHAEL J TRS	Land area : 2.63 AC
MARTHA REALTY TRUST	Land Value : 583,600
PO BOX 993	Impr Value : 183,300
PROVINCETOWN MA 02657-0993	Land Use : 0
	Exemptions : 0
	Taxable Value: 766,900

Deed date: 05/17/2001 Book/Page: 13840/205
Class: 3160-GENL

FISCAL YEAR	2021	2020	2019
DESCRIPTION			
COMMUNITY PRESERVATION ACT	\$100.43	\$200.85	\$193.07
REAL ESTATE TAX	\$3,347.52	\$6,695.04	\$6,435.74
TOTAL BILLED:	\$3,447.95	\$6,895.89	\$6,628.81
Charges/Fees	\$0.00	\$0.00	\$0.00
Abatements/Exemptions	\$0.00	\$0.00	\$0.00
Payments/Credits	-\$1,723.98	-\$6,895.89	-\$6,628.81
Interest to 10/07/2020	\$0.00	\$0.00	\$0.00
TOTAL BALANCE DUE:	\$1,723.97	\$0.00	\$0.00

NOTE: Actual 2021 taxes not yet issued.

OTHER UNPAID BALANCES:
2021 UTILITY BILLING \$142.87
TOTAL OTHER UNPAID BALANCES: \$142.87

IF CHECKED, contact Treasurer's Office at 508-430-7501 for update
[] This property is in TAX TITLE.
[] This property has a BETTERMENT.
[] This property has a DEFERRAL.
[] This property is currently EXEMPT.

Amy Bullock
AMY BULLOCK
TOWN COLLECTOR/TREASURER

Jacobs Driscoll Engineering, Inc.

REGISTERED PROFESSIONAL CIVIL ENGINEERS & LAND SURVEYORS

50 OLIVER STREET · NORTH EASTON, MA 02356

PHONE: 508-928-4400 · WWW.JACOBSDRISCOLL.COM



October 19, 2020

Mr. Duncan Berry, Chair
Harwich Planning Board
732 Main Street
Harwich, MA 02645

Re: Site Plan Review Waiver Request
JDE Project Number: 01-2020-015

Dear Mr. Berry and Members of the Board,

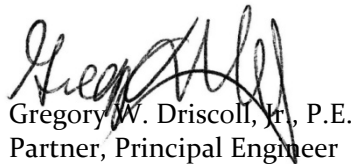
The purpose of this letter is to list the Waiver Request from the Site Plan Review requirements as listed in Appendix 4, Requirements for Applications and Plans.

1. A waiver is requested from the requirement to provide two sets of drainage calculations and drainage area map prepared, stamped and signed by a registered professional engineer designed in compliance with Massachusetts Department of Environmental Protection Phase II Stormwater Regulations Best Management Practice.

Reason: We are requesting a waiver from the requirement to provide drainage calculations due to the fact that the project will not result in an increase in impervious area. The proposal is to install two (2) 30,000 gallon propane tanks at the property so that the Applicant may expand his business into the propane delivery sector. The Applicant currently operates Cape Cod Oil, a home heating oil delivery service out of the abutting 2 Station Avenue property. The addition of the propane heating fuel delivery service will complement the heating oil business as propane becomes more in demand as a heating fuel. The proposed installation of the two 30,000 gallon tanks will not result in the expansion of impervious area on the site. The existing surface treatments of either pavement or gravel will remain with no increase or alterations. Therefore, the property will not generate any more runoff than its current condition.

We look forward to presenting the project to the Harwich Planning Board at your next available meeting. Please contact me immediately at 508-928-4400 if you have any questions or require additional information.

Thank you,
Jacobs Driscoll Engineering, Inc.



Gregory W. Driscoll, Jr., P.E.
Partner, Principal Engineer

Site Plan Application
For
Proposed Propane Distribution Facility
6 Station Avenue, Harwich, MA 02601

2.0 PROJECT NARRATIVE

Introduction

The applicant, Mr. Hurst Tasha of M.J.T. Enterprises, proposes to install two (2) 30,000 gallon propane tanks on his property at 6 Station Avenue in Harwich. The existing parcel can be identified on Assessor's Map 39, Plot K3 with a total area of approximately 2.57 +/- acres.

The installation of the propane tanks will expand their business into the delivery of propane to residences and businesses as a heating fuel and thereby establishing a new Heating Fuel Resale and Storage use (Table 1 Use Regulations, Paragraph IV, #13). The establishment of a new allowed use in the Industrial Limited (IL) zone requires Site Plan Approval pursuant to Section 325-55 (1) and (3). The Applicant currently operates a Heating Fuel Resale and Storage use on the abutting 2 Station Avenue property for their home heating oil delivery business.

Locus

The site is located on the westerly side of Station Avenue in Harwich. Station Avenue intersects with Main Street to the north east and Great Western Road to the south. The property is bordered by residential uses to the south and west and other industrial uses to the north and east. The Cape Cod Rail Trail abuts the property to the north. Refer to Figure 1 – USGS Map for the location of the site.

Resource Areas

The locus property contains a Bordering Vegetated Wetland (BVW) on the westerly side of the property (flags WF₁ – WF₂₀), also BVW was located on the Rail Trail property as well as the property north of the Rail trail (B-series wetland flags). The property is located outside of NHESP Estimate & Priority Habitat for Rare Species. This property is also located outside of any critical area, FEMA flood zone, etc. The work area is located outside of the 100' buffer zones to the BVW's. We have coordinated with the Conservation office and a Conservation filing will not be required.

Proposed Project

The Applicant proposes to obtain the necessary permits to install two (2) 30,000 gallon propane tanks on the existing 6 Station Avenue property. Currently, the 6 Station Avenue property contains a warehouse building and the business parks trucks on the property as well. The proposed site construction will include the tank foundations, installing the tanks on the foundations, running electrical to the tank area, installation of bollards and a fence around the tanks, and a small amount of grading to flatten out the tank area.

Erosion and Sedimentation Control Plan

Sedimentation and erosion controls are included on the site plan along with details of the measures utilized for the project. Silt fence and straw wattles will be installed at the perimeter of

the limit of work to prevent sedimentation from entering the resource areas. Additional erosion control materials will be stored onsite to be utilized for repairs, if necessary.

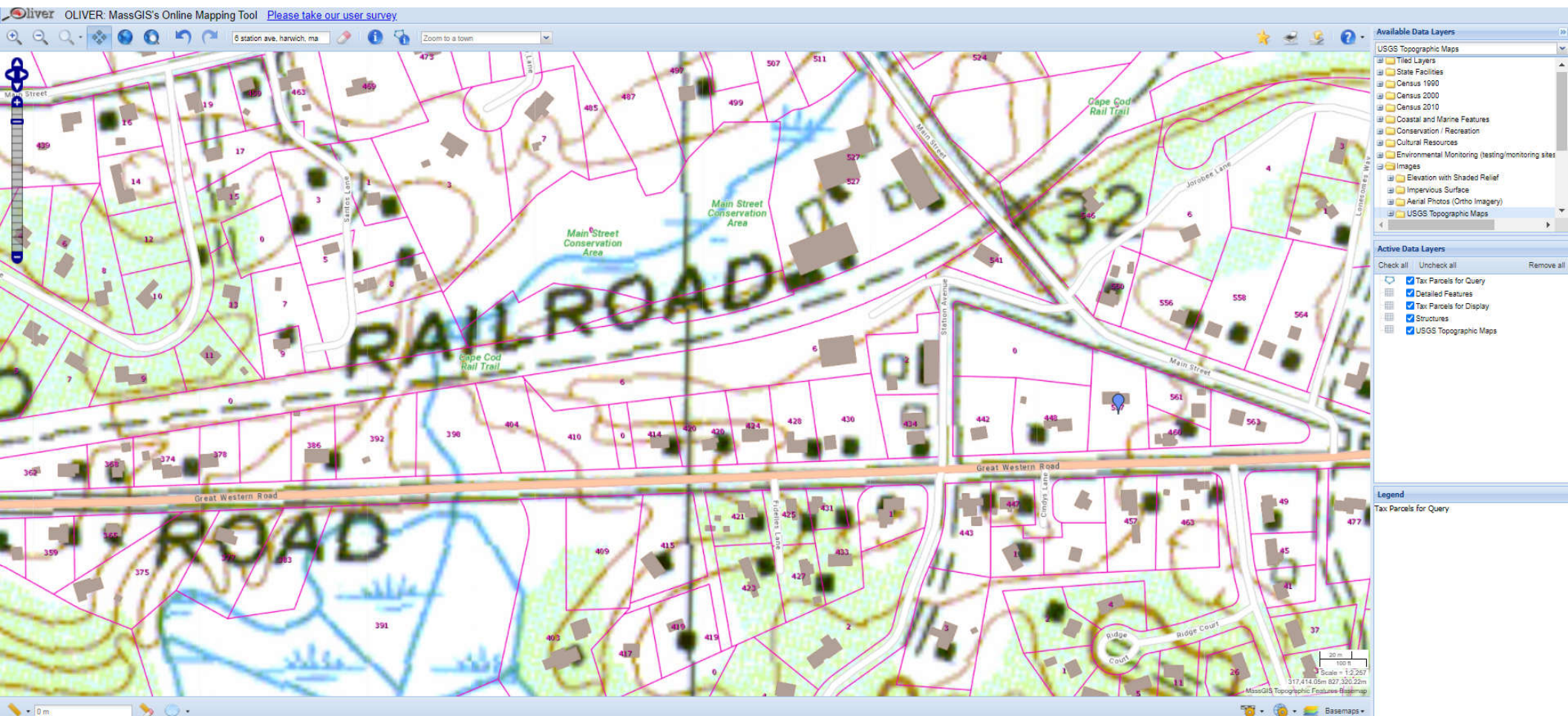
Construction Sequence

The following Construction Sequence shall be followed by the contractor and is also outlined on the Notice of Intent Plan:

1. Install erosion control device to establish the limit of work as shown on plan.
2. Install silt sacks in catch basins.
3. Sweep existing paved driveway at the end of each work day.
4. Discharges from dewatering of excavations shall not be diverted directly into any wetlands or existing storm drains without pretreatment via settling basins.
5. Clear and grub site within the limit of work.
6. Establish rough grades for tank area.
7. Perform tank installation and install tank area appurtenances.
8. Inspect and maintain erosion control measures after rainfall events and a minimum of once per week.
9. Remove sediment buildup at erosion control devices as needed. Redistribute material over site in conformance with earthwork specifications.
10. Complete finish grading and stabilization of site.
11. Remove sediment from all drainage structures, drain manholes, pipes after completion of construction. Remove and regrade temporary berms, swales, check dams, etc. Stabilize disturbed areas, if necessary.
12. Remove erosion control devices & silt fence upon establishment of permanent ground cover. Stabilize all areas where straw wattles (erosion control device) were removed.

Conclusion

It is our opinion that with the mitigation provided and the strict compliance to the plans and standard procedures that are required by the Planning Board. We look forward working with the Planning Board during the permitting process to satisfy any concerns that may arise.

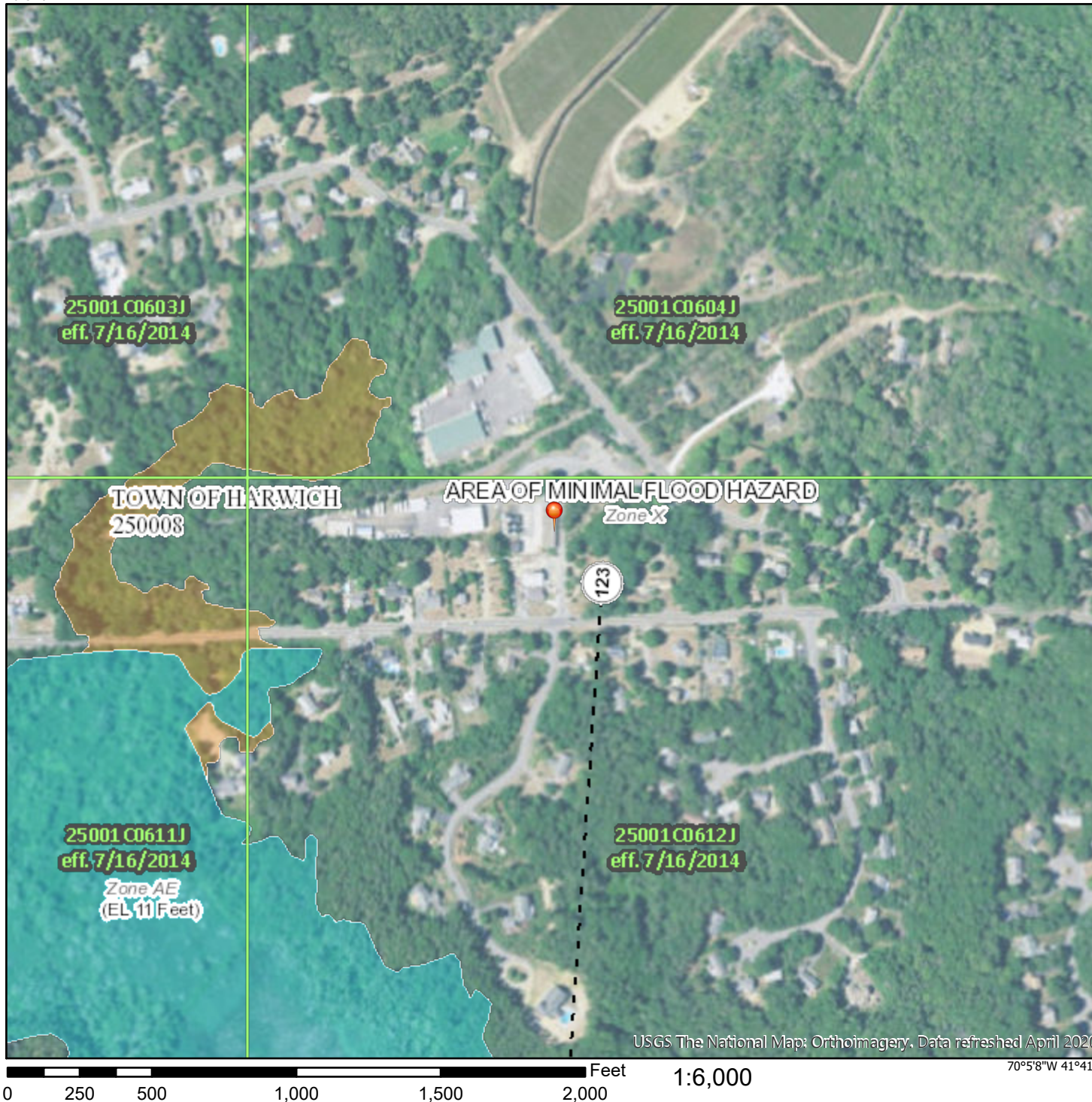


USGS TOPOGRAPHIC MAP

National Flood Hazard Layer FIRMMette



70°5'46"W 41°41'27"N



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 Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
OTHER FEATURES		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped
		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 6/18/2020 at 4:37 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.

USGS The National Map: Orthoimagery. Data refreshed April 2020

70°5'8"W 41°41'N

0 250 500 1,000 1,500 2,000 Feet 1:6,000

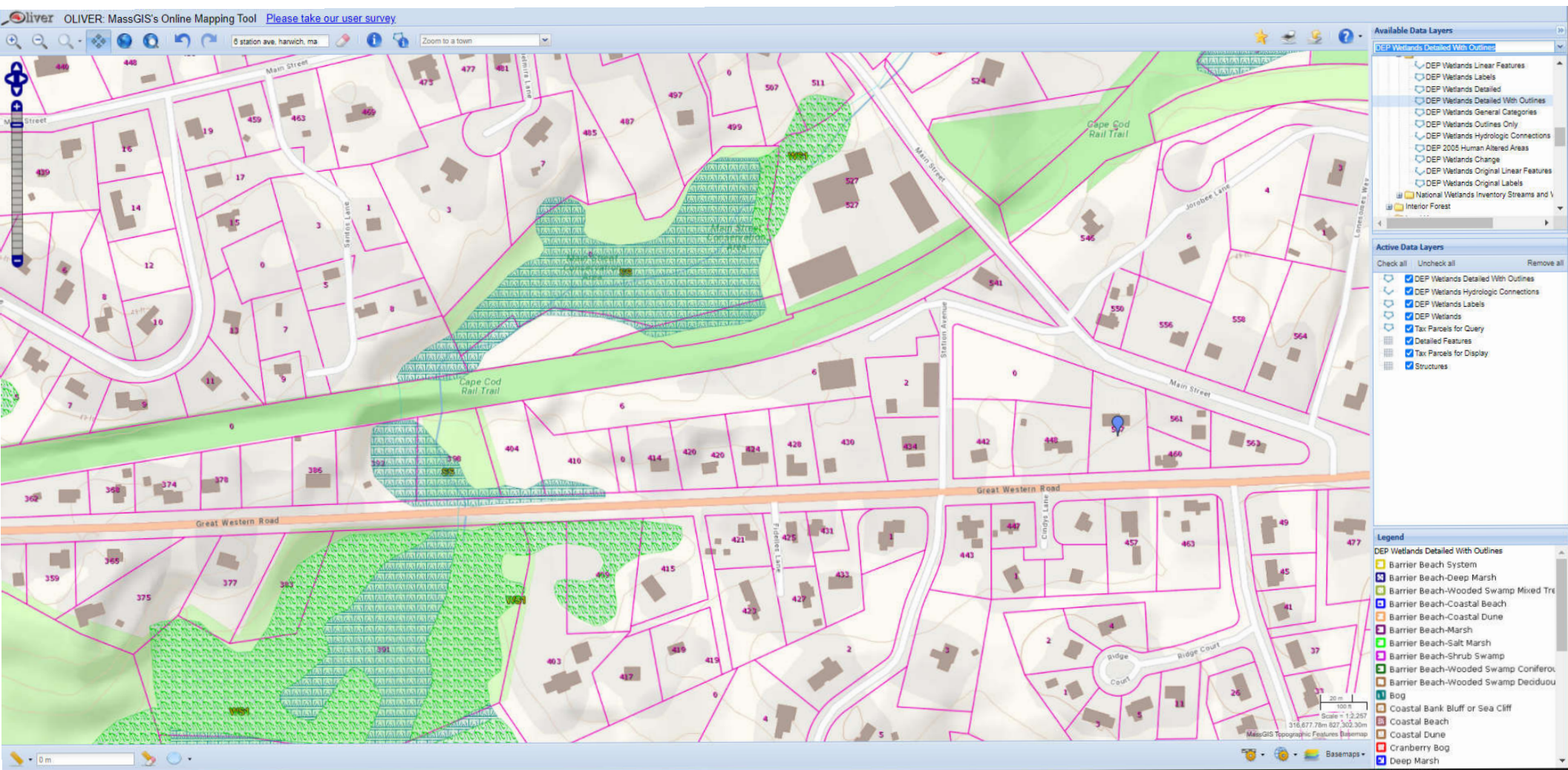




SUBSURFACE WATER SUPPLY PROTECTION AREAS



OUTSTANDING RESOURCE WATERS & SURFACE WATER SUPPLY PROTECTION AREA



MASS GIS WETLANDS MAPPING

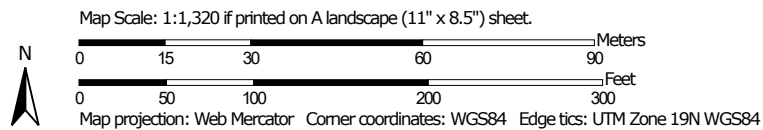


AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Hydrologic Soil Group—Barnstable County, Massachusetts



Soil Map may not be valid at this scale.



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

10/26/2020
Page 1 of 4

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 1:25,000.

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: Barnstable County, Massachusetts
 Survey Area Data: Version 17, Jun 9, 2020

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

Date(s) aerial images were photographed: Jul 10, 2018—Nov 17, 2018

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
55A	Freetown coarse sand, 0 to 3 percent slopes, sanded surface	B/D	0.3	5.3%
252B	Carver coarse sand, 3 to 8 percent slopes	A	5.1	88.7%
252C	Carver coarse sand, 8 to 15 percent slopes	A	0.3	6.1%
Totals for Area of Interest			5.8	100.0%

Description

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.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX A

Property Deeds (Proof of Ownership)

NOT NOT QUITCLAIM DEED NOT
AN AN AN AN

Property Address: Depot Road, Harwich, MA OFFICIAL OFFICIAL

COPY COPY COPY COPY

N.S. Realty, Inc., a Massachusetts corporation, with a mailing address of 558
Cedar Street, West Barnstable, Massachusetts NOT NOT

AN AN AN AN

for consideration of Sixty-Five Thousand and 00/100 (\$65,000.00) Dollars paid,

COPY COPY COPY COPY

grant to Michael J. Tasha as Trustee of the Martha Realty Trust u/d/t dated
August 22, 1992 and recorded with the Barnstable County Registry District of Land
Court as Document No. 57723. NOT NOT NOT NOT

AN AN AN AN

WITH QUITCLAIM COVENANTS OFFICIAL OFFICIAL OFFICIAL OFFICIAL

COPY COPY COPY COPY

The land with any buildings thereon situated on Depot Road, Harwich, Barnstable

County, Massachusetts, being bound and described as follows:

AN AN AN AN

BEGINNING at a point at the intersection of the Southwesterly line of Main
Street with the Southerly railroad right-of-way line of the former Penn Central
Transportation Company South Dennis Secondary Track which was conveyed to the
Commonwealth of Massachusetts Department of Environmental Management by
Instrument dated September 21, 1978, said point being on a line 41.25 feet measured
Southeastwardly at right angles from the centerline of said railroad right-of-way; thence
extending from said Beginning Point the following eleven (11) courses and distances:

NOT NOT NOT NOT

(1) South 27° 41' 53" East along the Southwesterly line of Main Street for a distance of
10.75 feet to a point; thence

AN AN AN AN

(2) South 23° 14' 53" East continuing along said line of Main Street for a distance of
77.10 feet to a point in the Westerly line of Depot Road; thence

NOT NOT NOT NOT

(3) South 0° 05' 17" West along said line of Depot Road for a distance of 21.75 feet to a
corner of land now or formerly of Thomas R. Eldredge; thence

COPY COPY COPY COPY

(4) South 72° 54' 31" West, 43.55 feet; thence

NOT NOT NOT NOT

(5) South 02° 59' 43" East, 38.00 feet to a point; thence by land of others by the
following four (4) courses and distance:

AN AN AN AN

(6) South 87° 00' 17" West, 119.00 feet;

NOT NOT NOT NOT

(7) South 08° 13' 56" East, 100.00 feet;

AN AN AN AN

(8) South 83° 20' 12" West, 700.00 feet; and

NOT NOT NOT NOT

- (9) North 51° 39' 48" West 133.63 feet to a point in the aforesaid Southerly railroad right-of-way line and distant 41.25 feet measured Southeastwardly at right angles from the centerline of said right-of-way, the following two (2) courses and distances being along said Southerly line and parallel with the centerline of said right-of-way;
- (10) North 80° 27' 07" East 318.68 feet to a point of curvature; and
- (11) Northeastwardly along a curve to the left having a radius of 1,951.33 feet and a central angle of 18° 31' 12" and arc distance of 630.72 feet to the Place of Beginning.

CONTAINING 2.63 acres, more or less

The grantor represents and warrants to this grantee that the conveyance of this property does not constitute a sale or transfer of all or substantially all of grantor's assets.

For title reference see deed dated March 28, 1997 and recorded at the Barnstable County Registry of Deeds at Book 10674, Page 305.

IN WITNESS WHEREOF, the said N.S. REALTY, INC. has caused its corporate seal to be hereto affixed and these presents to be signed and acknowledged in its name and behalf by JAMES NORTON, its President and Treasurer, thereunto duly authorized, this 11 day of May, 2001.

N.S. REALTY, INC.

AKA N.S. Realty, Inc.

JAMES NORTON
It's President and Treasurer

DATE OF REG. '01 THU
TAX \$148.20
TOTAL \$148.20
CHECK \$148.20
FEE \$205.45
TIME 19:35
NOV 11 1111

BARNSTABLE COUNTY
REGISTRY OF DEEDS
COUNTY EXCISE TAX

COMMONWEALTH OF MASSACHUSETTS

Barnstable, ss

MAY 11, 2001

Then personally appeared before me the above-named James Norton, as President and Treasurer of N.S. Realty, Inc. and acknowledged the foregoing instrument to be the corporations duly authorized free act and deed as aforesaid, before me.

REG OF DEEDS
REG # 01
BARNSTABLE

g\deeds\depot.dd

CANCELLED
7701 10:36AM 01
000000 #4149

FEE \$222.30

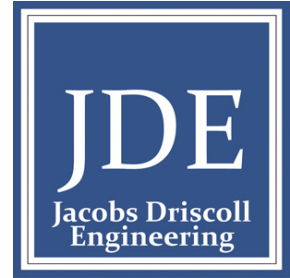
CASH \$222.30

Notary Public
My commission expires: Sept 3, 2004



BARNSTABLE REGISTRY OF DEEDS

Drainage Calculations and Stormwater Management Plan



In Support of:
Site Plan Review

For:
Proposed Propane Distribution Facility

6 Station Ave (Map 39, Lot K3)
Harwich, Massachusetts 02645

Applicant:
Cape Cod Oil Company
227 Route 6
Provincetown, Massachusetts 02657

Submitted to:
Town of Harwich Planning Board

Dated: March 8, 2021

Prepared By:
Jacobs Driscoll Engineering, Inc.
50 Oliver Street
North Easton, MA 02356

JN: 01-2020-015

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Checklist for Stormwater Report

A. Introduction

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



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

¹ The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

² For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

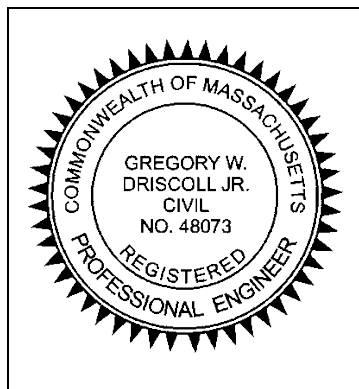
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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


A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature




Signature and Date

3/8/2021

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☐ New development
- ☒ Redevelopment
- ☐ Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
 - ☐ Credit 1
 - ☐ Credit 2
 - ☐ Credit 3
- ☐ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☐ Soil Analysis provided.
- ☒ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - ☐ Static
 - ☒ Simple Dynamic
 - ☐ Dynamic Field¹
- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
 - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
 - ☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- ☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - ☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - ☐ is within the Zone II or Interim Wellhead Protection Area
 - ☐ is near or to other critical areas
 - ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - ☐ involves runoff from land uses with higher potential pollutant loads.
 - ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - ☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- ☒ The BMP is sized (and calculations provided) based on:
 - ☒ The ½" or 1" Water Quality Volume or
 - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- ☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- ☐ The NPDES Multi-Sector General Permit does **not** cover the land use.
- ☒ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☒ All exposure has been eliminated.
- ☐ All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- ☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☐ Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- ☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - ☐ Limited Project
 - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.
- ☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- ☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☒ The project is **not** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- ☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - ☒ Name of the stormwater management system owners;
 - ☒ Party responsible for operation and maintenance;
 - ☒ Schedule for implementation of routine and non-routine maintenance tasks;
 - ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
 - ☒ Description and delineation of public safety features;
 - ☒ Estimated operation and maintenance budget; and
 - ☒ Operation and Maintenance Log Form.
- ☐ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

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

Drainage Calculations and Stormwater Management Plan
For
Cape Cod Oil Company
Proposed Propane Distribution Facility
6 Station Ave., Harwich, MA 02645

2.0 PROJECT NARRATIVE

Introduction

The applicant, Cape Cod Oil Company, proposes to install two 30,000 gallon underground propane storage tanks for the purpose of operating a propane distribution facility on their land located at 6 Station Ave., in Harwich, MA. The existing parcel can be identified on assessor's map 39, plot K3 with a total area of approximately 2.626 +/- acres.

Locus

The site is located on the westerly side of Station Ave in Harwich. The property is surrounded by residential and industrial uses. The locus also abuts the Cape Cod Rail Trail. Refer to Figure 1 – USGS Map for the location of the site. This report contains calculations of stormwater runoff for the pre-development and post-development conditions and includes the design of the proposed drainage system and stormwater best management practices (BMPs).

Resource Areas

The locus property contains a bordering vegetated wetland (BVW) on the western portion of the property. The B wetland series is associated with a Bordering Vegetated Wetland (BVW) which is located off the locus property and to the north of the Cape Cod Rail Trail. The property is located outside of NHESP Estimate & Priority Habitat for Rare Species. This property is also located outside of any critical area, FEMA flood zone, etc.

Pre-Development Condition

The existing site ground cover consists of approximately 1.06 acres of existing woodlands, .28 acres of existing gravel, 0.99 acres of existing pavement areas and 0.20 acres of existing building area. The limits of the drainage study include the southern property line and the wetlands and property lines to the west and north respectively. The topography of the property consists of moderate slopes with no major breaks or drop-offs.

The existing conditions HydroCAD model was used to calculate the runoff associated with the limits of the site as stated above and establish the baseline data to compare the future improvements to. Two design points were identified and utilized in the HydroCAD analysis. Identified as DP-1, which is the existing wetlands line to the west of the property and DP-2 which is the southern property line.

Soils information was obtained from the USDA Natural Resources Conservation Service's (NRCS) Web Soil Survey mapping. Site soils are classified as the following SCS Hydrologic Soil Groups: Carver Coarse Sand (252B - SCS Hydrologic Soil Group A), Freetown Coarse Sand (55A - SCS Hydrologic Soil Group B/D). Refer to Figure 8, Soil Survey Map, for a delineation of the boundaries of the soils with respect to the study area.

Refer to the site plan set for the plan view of the proposed subdivision, roadways, buildings and associated utilities. The watershed area analyzed was approximately 3.08 acres. Also, refer to Appendix A for computer results, soil characteristics, cover descriptions and time of concentrations for all subareas.

Post-Development Condition

In the post-development condition, stormwater watershed areas were analyzed for purposes of designing drainage systems to accommodate the existing building #6 Station Ave. The watershed areas analyzed was approximately 3.08 acres. The objective in designing the proposed drainage facilities for the project was to maintain existing drainage patterns to the extent practicable and to ensure that the post-development rates of runoff are equal or less than pre-development rates. Refer to the Proposed Watershed Delineation Plan, in Appendix B for a delineation of drainage subareas for the post-development design condition. The design points for the post-development design conditions correspond to those analyzed for the pre-development design condition.

Stormwater Management Facilities

The proposed stormwater facilities were designed to attenuate peak flows generated by all storm events to ensure that post-development peak flows generated by all storm events are less than pre-development flows at the design point and allow for recharge to groundwater. The proposed facilities were analyzed using the SCS TR-20 computer program (HydroCAD). The proposed design realizes reductions in peak flow rate as well as discharge volume for all storm events.

Conclusion

It is our opinion that with the mitigation provided and the strict compliance to the plans and standard procedures that are required by the Conservation Commission, there will be no adverse impacts to any resource areas. We look forward working with the Planning Board the permitting process to satisfy any concerns that may arise.

3.0 COMPLIANCE WITH STORMWATER MANAGEMENT STANDARDS

Standard 1 – No New Untreated Discharges

The proposed improvements to the property are designed so that new stormwater conveyances do not discharge untreated pavement runoff into, or cause erosion to, wetlands.

Standard 2 – Peak Rate Attenuation

A hydrologic study was performed to determine the rate of runoff for the 2, 10, 25, and 100-year storm events under the pre-development (present) conditions. This value was established as the future (post-development) maximum allowable rate. Two (2) discharge study point was compared at the western wetlands line (DP-1), and the southern property lines (DP-2) where the drainage is conveyed. From these analyses the proposed site improvements and stormwater management system were designed to reduce the future peak runoff rate for the area discharging to the design point. This was accomplished by implementing subsurface infiltration system to attenuate flows and recharges the groundwater for all of the design storms. Appendix A contains the delineation and discharge point(s) of drainage subareas for the pre-development design condition. Appendix B contains the delineation and discharge point of drainage subareas for the post-development design condition.

In the pre-development stormwater analysis, the watershed area analyzed was approximately 3.08 acres consisting of the project property. Refer to the site plan set for the plan view of the study area.

In the post-development condition, the stormwater watershed areas were analyzed for purposes of designing a stormwater management system to accommodate the runoff generated by the existing building roof area. The watershed areas analyzed was approximately 3.08 acres. The objective in designing the proposed drainage facilities for the project was to maintain existing drainage patterns to the extent practicable and to ensure that the post-development rates of runoff are equal or less than pre-development rates.

Stormwater management computations for this redevelopment project were performed by Jacobs Driscoll Engineering using an SCS based computer program, HydroCAD 10, for existing and proposed conditions for the 2, 10, 25, and 100-year Type III storm events. The stormwater detention facilities were designed to accommodate peak flows generated by a 100-year storm event with outflow less than the existing condition.

Subcatchment Data Summary

Design Point Subcatchment	Time of Concentration (Tc) (Minutes)	Weighted Curve Number (CN)
DP-1		
EDA-1	16.5	67
PDA-1A	16.5	66
PDA-1B	6	98
EDA-2	12.4	31
PDA2	12.4	31

Pre-Development vs. Post-Development Peak Rates of Runoff

Design Point	<u>2 Year Storm (3.26 Inches)</u>		<u>10 Year Storm (4.74 Inches)</u>		<u>25 Year Storm (5.88 Inches)</u>		<u>100 Year Storm (8.15 Inches)</u>	
	Exist. (CFS)	Prop. (CFS)	Exist. (CFS)	Prop. (CFS)	Exist. (CFS)	Prop. (CFS)	Exist. (CFS)	Prop. (CFS)
DP-1 (West Wetlands)	1.53	1.33	3.90	3.56	6.00	5.54	10.58	9.90
DP-2 (South PL)	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03

A comparison of the pre-development and post-development peak rates of runoff indicates that the peak rates of runoff for the post-development conditions will be equal to or less than the pre-development condition for all storm events.

Pre-Development vs. Post-Development Peak Volumes of Runoff

Design Point	<u>2 Year Storm (3.26 Inches)</u>		<u>10 Year Storm (4.74 Inches)</u>		<u>25 Year Storm (5.88 Inches)</u>		<u>100 Year Storm (8.15 Inches)</u>	
	Exist. (ac-ft)	Prop. (ac-ft)	Exist. (ac-ft)	Prop. (ac-ft)	Exist. (ac-ft)	Prop. (ac-ft)	Exist. (ac-ft)	Prop. (ac-ft)
DP-1(West Wetlands)	0.171	0.154	0.386	0.355	0.580	0.538	1.009	0.944
DP-2 (South PL)	0.000	0.000	0.000	0.000	0.002	0.002	0.010	0.010

A comparison of the pre-development and post-development peak volumes of runoff indicates that the peak volumes of runoff for the post-development conditions will be equal to or less than the pre-development condition for all storm events.

Standard 3 – Groundwater Recharge

Runoff will be infiltrated by the infiltration system which will meet the Stormwater Guidelines for infiltration to include:

- Infiltration structures will be a minimum of two feet above seasonal high groundwater.

- Utilize the “Simple Dynamic method for sizing the storage volume, which takes into account the fact that stormwater is exfiltrating from the infiltration basin at the same time that the basin is filling.
- Hydraulic conductivity are based on soil survey information and values developed from Rawls, Brakensiek and Saxton, 1982, Estimation of Soil Water Properties, *Transactions of the American Society of Agricultural Engineers*, vol. 25, no.5.
- Refer to Appendix D for infiltration and drawdown calculations and Appendix C for soil testing results.

Groundwater Recharge Volumes by Basins

Infiltration Basin	Soil Type	Target Depth Factor (F) (in)	Total Impervious Area (sf)	Required Recharge Volume (cf)¹	Provided Recharge Volume (cf)²
1P	Sand	0.6 (HSG A)	52,675	31,605	3136

1. Required Recharge Volume = Target Depth Factor (ft) x Impervious Area (sf) [simple dynamic method]
2. Provided Recharge Volume = Volume as calculated by the HydroCAD model

The project is providing a groundwater recharge component to meet the Stormwater Management Standards to the maximum extent practicable per Standard 7. See the appendices for the 72-hour drawdown calculation report generated by the HydroCAD software.

Standard 4 – Water Quality

The Long-Term Pollution Prevention Plan has been incorporated into the Post-Development Operation and Maintenance Plan. Refer to Appendices for BMP Operation and Maintenance Plans.

The proposed stormwater infiltration chamber system is only receiving flow from the proposed building roof. Since roof runoff is clean runoff no TSS treatment is needed.

Required Water Quality Volume = Impervious Area (sq.ft) x (1.0"/1 acre) x (1ft/12")

Water Quality Volumes by Basins

Infiltration Basin	Target Depth Factor (F) (in)	Total Impervious Area (sf)	Required Water Quality Volume (cf)¹	Provided Water Quality Volume (cf)²
1P	1.0 (HSG A)	52,675	4,214	910

The Water Quality Volume for the building roof subcatchment is already clean runoff and does not need any TSS treatment prior to discharging to the infiltration chambers. The infiltration

system provides water quality volume on a redevelopment site that currently has none therefore improving the existing conditions and the Standard is met to the extent practicable.

Standard 5 – Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

The proposed project is a land use with higher potential pollutant loads as a propane distribution facility with underground tanks. The standard states that a minimum of 44% TSS is to be removed prior to any infiltration device. To address Standard 5, the project has been designed to provide a minimum of 44% TSS removal prior to the infiltration devices. As the chamber system is designed to take the roof runoff from the building only, there is no TSS removal required.

The Standard also states that through a long term pollution prevention plan, the proponent shall include measures that eliminate or minimize any discharges that come into contact with the particular land uses that have the potential to generate high concentrations of pollutants. A proponent can fulfill this requirement by placing all industrial materials or activities in a storm-resistant shelter to prevent exposure to rain, snow, snow melt and runoff, or by placing all materials and wastes stored outside in sealed containers on impervious surfaces with adequate containment. The existing facility currently has all of these provisions implemented. The Standard is met.

Standard 6 – Critical Areas

The proposed project is not located within a critical area. The Standard is met.

Standard 7 – Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

As the existing area where the propane tanks will be located is already developed, this is considered a redevelopment project. The Standards have been met to the extent practicable and the existing conditions on the site are being improved. The Standard is met.

Standard 8 – Construction Period Pollution Prevention and Erosion and Sedimentation Control

Straw wattle proprietary erosion control devices will be utilized in place of hay bales and siltation fence and will be placed at the down-gradient limit of work prior to the commencement of any construction activity. The integrity of the Straw wattle will be maintained by periodic inspection and replacement as necessary. The Straw wattle will remain in place for the duration of the project. Refer to the Layout & Materials Plan for the locations of the erosion and sedimentation controls as well as the Construction Detail Plans of the plan set for details.

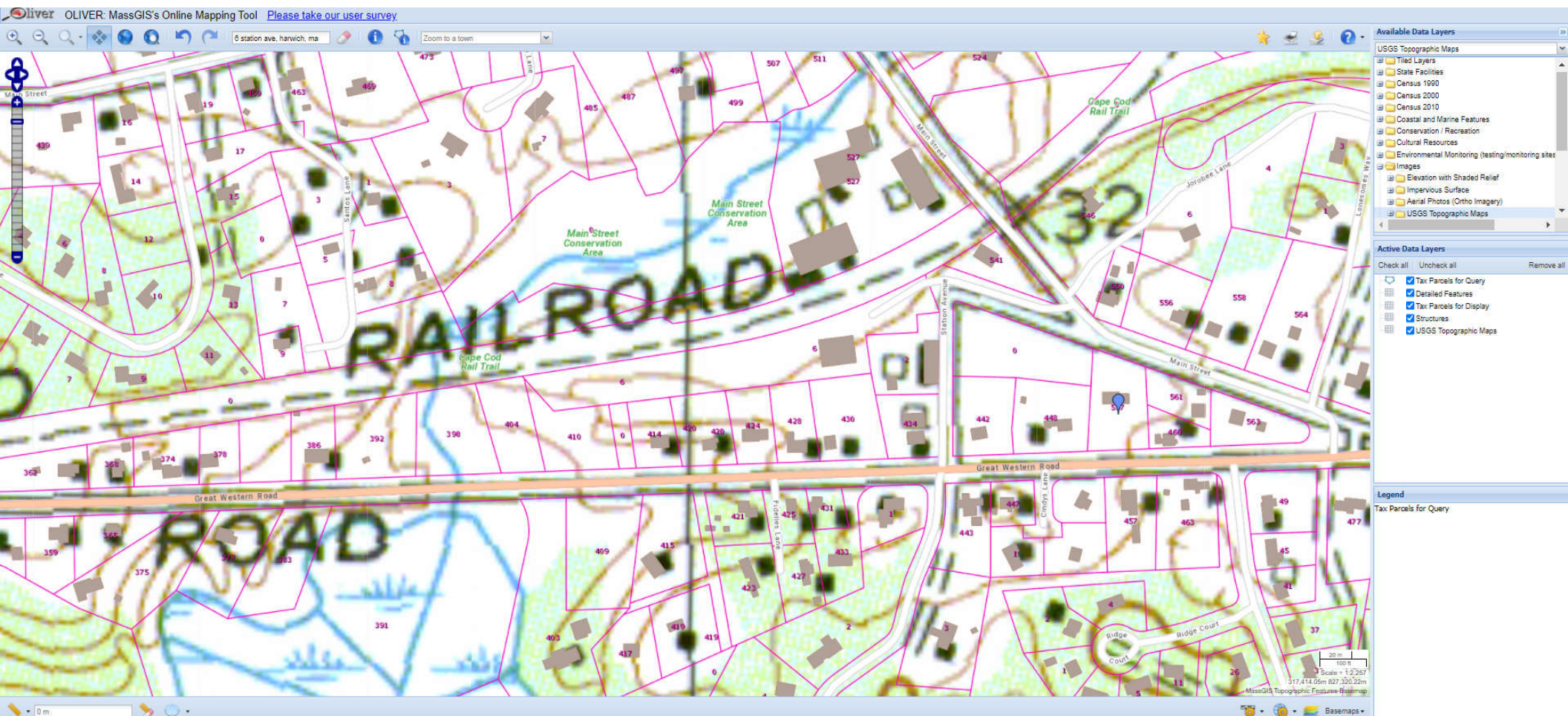
Also, a Construction Phase Pollution Prevention and Erosion and Sedimentation Plan has been developed for the project and is attached to this report, see the Appendices. The Standard is met.

Standard 9 – Operation and Maintenance Plan

The Post Construction Operation and Maintenance Plan is provided as part of this application and is included in the Appendices. The Standard is met.

Standard 10 – Prohibition of Illicit Discharges

No illicit discharges have been observed on site. Furthermore, measures to prevent illicit discharges are included in the Long-Term Pollution Prevention Plan. Therefore, provisions have been made to prevent illicit discharges and the Standard is met.

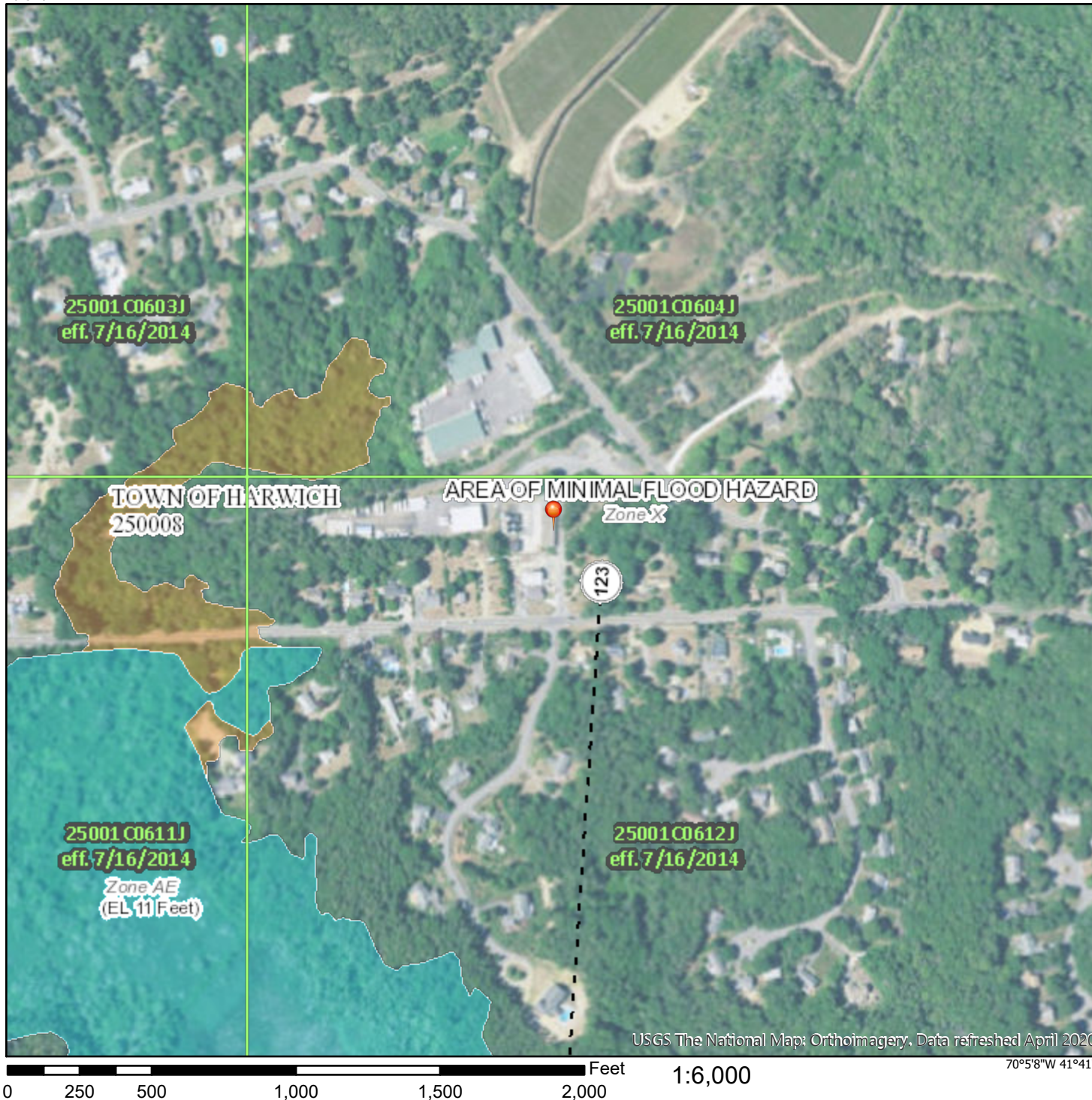


USGS Topographic Map

National Flood Hazard Layer FIRMMette



70°5'46"W 41°41'27"N



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
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
OTHER FEATURES		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

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 6/18/2020 at 4:37 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.

USGS The National Map: Orthoimagery. Data refreshed April 2020

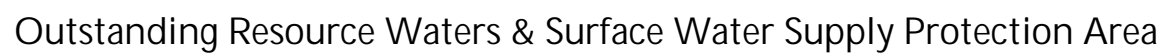
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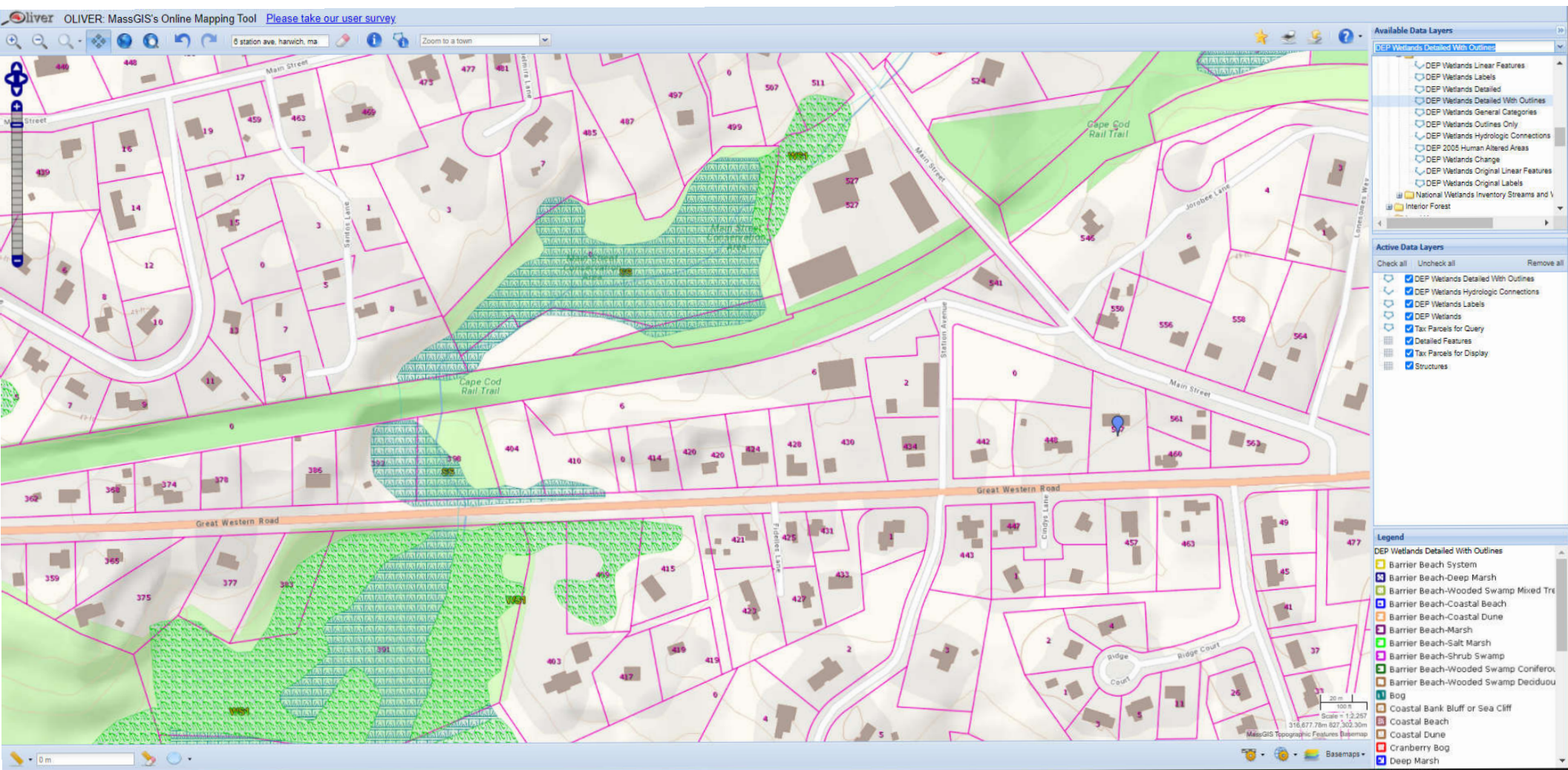
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Subsurface Water Supply Protection Areas





MassGIS Wetlands Mapping

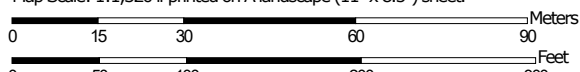


Areas of Critical Environmental Concern

Hydrologic Soil Group—Barnstable County, Massachusetts



Map Scale: 1:1,320 if printed on A landscape (11" x 8.5") sheet.



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



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

10/26/2020
Page 1 of 4

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 1:25,000.

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: Barnstable County, Massachusetts
 Survey Area Data: Version 17, Jun 9, 2020

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

Date(s) aerial images were photographed: Jul 10, 2018—Nov 17, 2018

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
55A	Freetown coarse sand, 0 to 3 percent slopes, sanded surface	B/D	0.3	5.3%
252B	Carver coarse sand, 3 to 8 percent slopes	A	5.1	88.7%
252C	Carver coarse sand, 8 to 15 percent slopes	A	0.3	6.1%
Totals for Area of Interest			5.8	100.0%

Description

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.

Rating Options

Aggregation Method: Dominant Condition

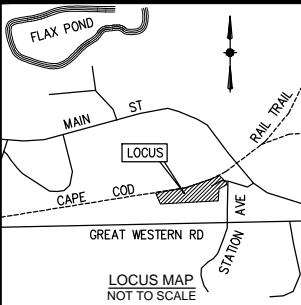
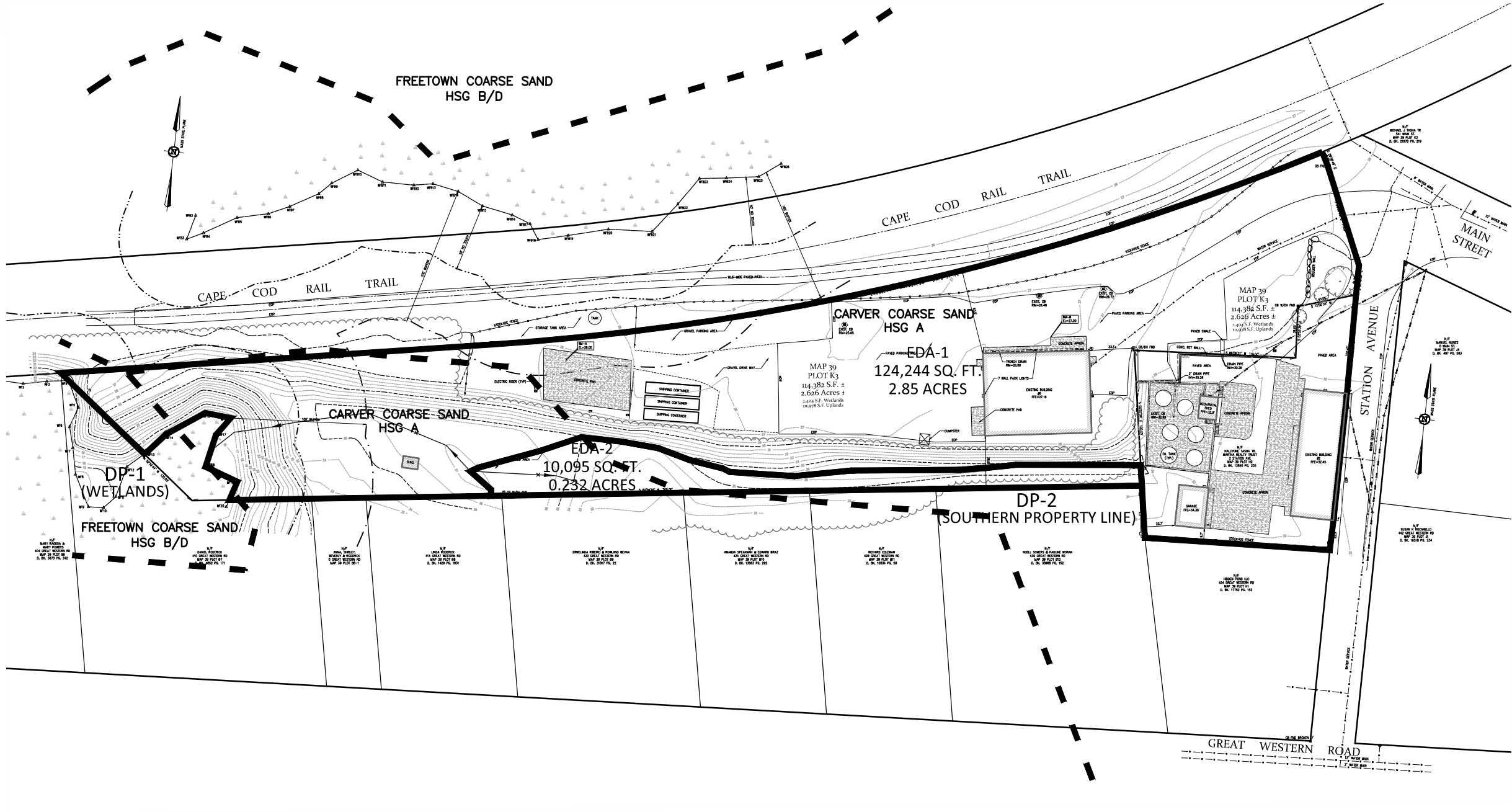
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX A

Pre-Development Design Condition

X:\2020\01-2020-015 MJT - 2 & 6 Station Ave, Harwich\CIVIL\DESIGN\01-2020-015 EDA.dwg



PERMITTING SET		
REVISIONS		
No.	DATE	DESCRIPTION
1	10-19-20	REVISE PER TOWN COMMENTS
2	03-08-21	REVISE PER TOWN COMMENTS

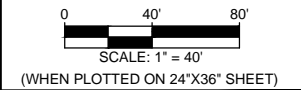
DRAWN BY: TME
CHECKED BY: EPJ
DESIGNED BY: TME / GWD

EXISTING DRAINAGE
AREAS PLAN

6 STATION AVENUE
IN
HARWICH
(BARNSTABLE COUNTY)
MASSACHUSETTS

SEPTEMBER 24, 2020

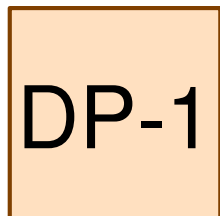
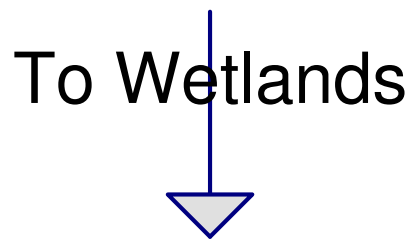
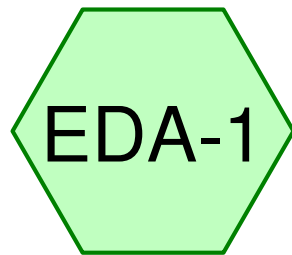
PREPARED FOR:
CAPE COD OIL
COMPANY
227 ROUTE 6
PROVINCETOWN
MASSACHUSETTS
02657



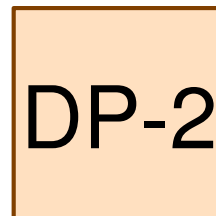
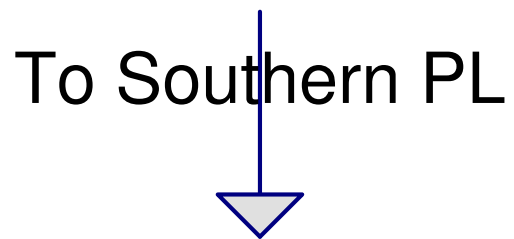
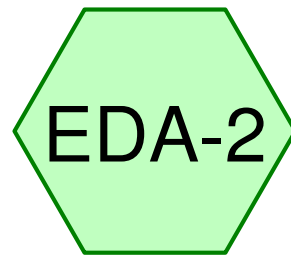
JDE

Jacobs Driscoll
Engineering

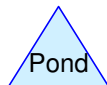
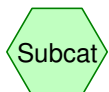
50 Oliver Street
North Easton, Massachusetts 02356
Phone: 508-928-4400
www.JacobsDriscoll.com



Wetlands



Southern PL



01-2020-015 Existing Ro

NRCC 24-hr C 2-Year Rainfall=3.26"

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Page 2

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: To Wetlands

Runoff Area=124,244 sf 41.77% Impervious Runoff Depth=0.72"

Flow Length=210' Tc=16.5 min CN=67 Runoff=1.53 cfs 0.171 af

Subcatchment EDA-2: To Southern PL

Runoff Area=10,095 sf 0.00% Impervious Runoff Depth=0.00"

Flow Length=108' Tc=12.4 min CN=31 Runoff=0.00 cfs 0.000 af

Reach DP-1: Wetlands

Inflow=1.53 cfs 0.171 af

Outflow=1.53 cfs 0.171 af

Reach DP-2: Southern PL

Inflow=0.00 cfs 0.000 af

Outflow=0.00 cfs 0.000 af

Total Runoff Area = 3.084 ac Runoff Volume = 0.171 af Average Runoff Depth = 0.66"
61.37% Pervious = 1.893 ac 38.63% Impervious = 1.191 ac

01-2020-015 Existing Ro

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NRCC 24-hr C 2-Year Rainfall=3.26"

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Summary for Subcatchment EDA-1: To Wetlands

Runoff = 1.53 cfs @ 12.27 hrs, Volume= 0.171 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

NRCC 24-hr C 2-Year Rainfall=3.26"

Area (sf)	CN	Description
2,328	55	Woods, Good, HSG B
34,401	30	Woods, Good, HSG A
43,151	98	Paved parking, HSG A
23,318	39	>75% Grass cover, Good, HSG A
12,298	96	Gravel surface, HSG A
8,748	98	Roofs, HSG A
124,244	67	Weighted Average
72,345		58.23% Pervious Area
51,899		41.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	50	0.0120	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
1.5	160	0.1310	1.81		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.5	210	Total			

Summary for Subcatchment EDA-2: To Southern PL

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

NRCC 24-hr C 2-Year Rainfall=3.26"

Area (sf)	CN	Description
9,513	30	Woods, Good, HSG A
582	39	>75% Grass cover, Good, HSG A
10,095	31	Weighted Average
10,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0230	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
0.8	58	0.0530	1.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.4	108	Total			

Summary for Reach DP-1: Wetlands

Inflow Area = 2.852 ac, 41.77% Impervious, Inflow Depth = 0.72" for 2-Year event
Inflow = 1.53 cfs @ 12.27 hrs, Volume= 0.171 af
Outflow = 1.53 cfs @ 12.27 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Southern PL

Inflow Area = 0.232 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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NRCC 24-hr C 10-Year Rainfall=4.74"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: To WetlandsRunoff Area=124,244 sf 41.77% Impervious Runoff Depth=1.62"
Flow Length=210' Tc=16.5 min CN=67 Runoff=3.90 cfs 0.386 af**Subcatchment EDA-2: To Southern PL**Runoff Area=10,095 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=108' Tc=12.4 min CN=31 Runoff=0.00 cfs 0.000 af**Reach DP-1: Wetlands**Inflow=3.90 cfs 0.386 af
Outflow=3.90 cfs 0.386 af**Reach DP-2: Southern PL**Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af**Total Runoff Area = 3.084 ac Runoff Volume = 0.386 af Average Runoff Depth = 1.50"**
61.37% Pervious = 1.893 ac 38.63% Impervious = 1.191 ac

01-2020-015 Existing Ro

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NRCC 24-hr C 10-Year Rainfall=4.74"

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Summary for Subcatchment EDA-1: To Wetlands

Runoff = 3.90 cfs @ 12.26 hrs, Volume= 0.386 af, Depth= 1.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

NRCC 24-hr C 10-Year Rainfall=4.74"

Area (sf)	CN	Description
2,328	55	Woods, Good, HSG B
34,401	30	Woods, Good, HSG A
43,151	98	Paved parking, HSG A
23,318	39	>75% Grass cover, Good, HSG A
12,298	96	Gravel surface, HSG A
8,748	98	Roofs, HSG A
124,244	67	Weighted Average
72,345		58.23% Pervious Area
51,899		41.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	50	0.0120	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
1.5	160	0.1310	1.81		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.5	210	Total			

Summary for Subcatchment EDA-2: To Southern PL

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

NRCC 24-hr C 10-Year Rainfall=4.74"

Area (sf)	CN	Description
9,513	30	Woods, Good, HSG A
582	39	>75% Grass cover, Good, HSG A
10,095	31	Weighted Average
10,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0230	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
0.8	58	0.0530	1.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.4	108	Total			

Summary for Reach DP-1: Wetlands

Inflow Area = 2.852 ac, 41.77% Impervious, Inflow Depth = 1.62" for 10-Year event
Inflow = 3.90 cfs @ 12.26 hrs, Volume= 0.386 af
Outflow = 3.90 cfs @ 12.26 hrs, Volume= 0.386 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Southern PL

Inflow Area = 0.232 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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NRCC 24-hr C 25-Year Rainfall=5.88"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: To Wetlands

Runoff Area=124,244 sf 41.77% Impervious Runoff Depth=2.44"
Flow Length=210' Tc=16.5 min CN=67 Runoff=6.00 cfs 0.580 af

Subcatchment EDA-2: To Southern PL

Runoff Area=10,095 sf 0.00% Impervious Runoff Depth=0.09"
Flow Length=108' Tc=12.4 min CN=31 Runoff=0.00 cfs 0.002 af

Reach DP-1: Wetlands

Inflow=6.00 cfs 0.580 af
Outflow=6.00 cfs 0.580 af

Reach DP-2: Southern PL

Inflow=0.00 cfs 0.002 af
Outflow=0.00 cfs 0.002 af

Total Runoff Area = 3.084 ac Runoff Volume = 0.582 af Average Runoff Depth = 2.26"
61.37% Pervious = 1.893 ac 38.63% Impervious = 1.191 ac

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NRCC 24-hr C 25-Year Rainfall=5.88"

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Summary for Subcatchment EDA-1: To Wetlands

Runoff = 6.00 cfs @ 12.26 hrs, Volume= 0.580 af, Depth= 2.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

NRCC 24-hr C 25-Year Rainfall=5.88"

Area (sf)	CN	Description
2,328	55	Woods, Good, HSG B
34,401	30	Woods, Good, HSG A
43,151	98	Paved parking, HSG A
23,318	39	>75% Grass cover, Good, HSG A
12,298	96	Gravel surface, HSG A
8,748	98	Roofs, HSG A
124,244	67	Weighted Average
72,345		58.23% Pervious Area
51,899		41.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	50	0.0120	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
1.5	160	0.1310	1.81		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.5	210	Total			

Summary for Subcatchment EDA-2: To Southern PL

Runoff = 0.00 cfs @ 16.80 hrs, Volume= 0.002 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

NRCC 24-hr C 25-Year Rainfall=5.88"

Area (sf)	CN	Description
9,513	30	Woods, Good, HSG A
582	39	>75% Grass cover, Good, HSG A
10,095	31	Weighted Average
10,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0230	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
0.8	58	0.0530	1.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.4	108	Total			

Summary for Reach DP-1: Wetlands

Inflow Area = 2.852 ac, 41.77% Impervious, Inflow Depth = 2.44" for 25-Year event
Inflow = 6.00 cfs @ 12.26 hrs, Volume= 0.580 af
Outflow = 6.00 cfs @ 12.26 hrs, Volume= 0.580 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Southern PL

Inflow Area = 0.232 ac, 0.00% Impervious, Inflow Depth = 0.09" for 25-Year event
Inflow = 0.00 cfs @ 16.80 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 16.80 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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NRCC 24-hr C 100-Year Rainfall=8.15"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: To WetlandsRunoff Area=124,244 sf 41.77% Impervious Runoff Depth=4.25"
Flow Length=210' Tc=16.5 min CN=67 Runoff=10.58 cfs 1.009 af**Subcatchment EDA-2: To Southern PL**Runoff Area=10,095 sf 0.00% Impervious Runoff Depth=0.53"
Flow Length=108' Tc=12.4 min CN=31 Runoff=0.03 cfs 0.010 af**Reach DP-1: Wetlands**Inflow=10.58 cfs 1.009 af
Outflow=10.58 cfs 1.009 af**Reach DP-2: Southern PL**Inflow=0.03 cfs 0.010 af
Outflow=0.03 cfs 0.010 af**Total Runoff Area = 3.084 ac Runoff Volume = 1.019 af Average Runoff Depth = 3.97"**
61.37% Pervious = 1.893 ac 38.63% Impervious = 1.191 ac

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NRCC 24-hr C 100-Year Rainfall=8.15"

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Summary for Subcatchment EDA-1: To Wetlands

Runoff = 10.58 cfs @ 12.25 hrs, Volume= 1.009 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.15"

Area (sf)	CN	Description
2,328	55	Woods, Good, HSG B
34,401	30	Woods, Good, HSG A
43,151	98	Paved parking, HSG A
23,318	39	>75% Grass cover, Good, HSG A
12,298	96	Gravel surface, HSG A
8,748	98	Roofs, HSG A
124,244	67	Weighted Average
72,345		58.23% Pervious Area
51,899		41.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	50	0.0120	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
1.5	160	0.1310	1.81		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.5	210	Total			

Summary for Subcatchment EDA-2: To Southern PL

Runoff = 0.03 cfs @ 12.45 hrs, Volume= 0.010 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.15"

Area (sf)	CN	Description
9,513	30	Woods, Good, HSG A
582	39	>75% Grass cover, Good, HSG A
10,095	31	Weighted Average
10,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0230	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
0.8	58	0.0530	1.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.4	108	Total			

Summary for Reach DP-1: Wetlands

Inflow Area = 2.852 ac, 41.77% Impervious, Inflow Depth = 4.25" for 100-Year event
Inflow = 10.58 cfs @ 12.25 hrs, Volume= 1.009 af
Outflow = 10.58 cfs @ 12.25 hrs, Volume= 1.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Southern PL

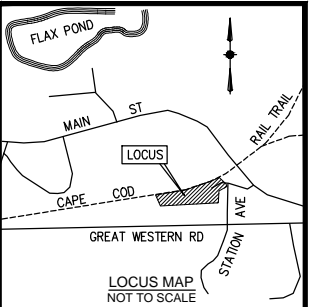
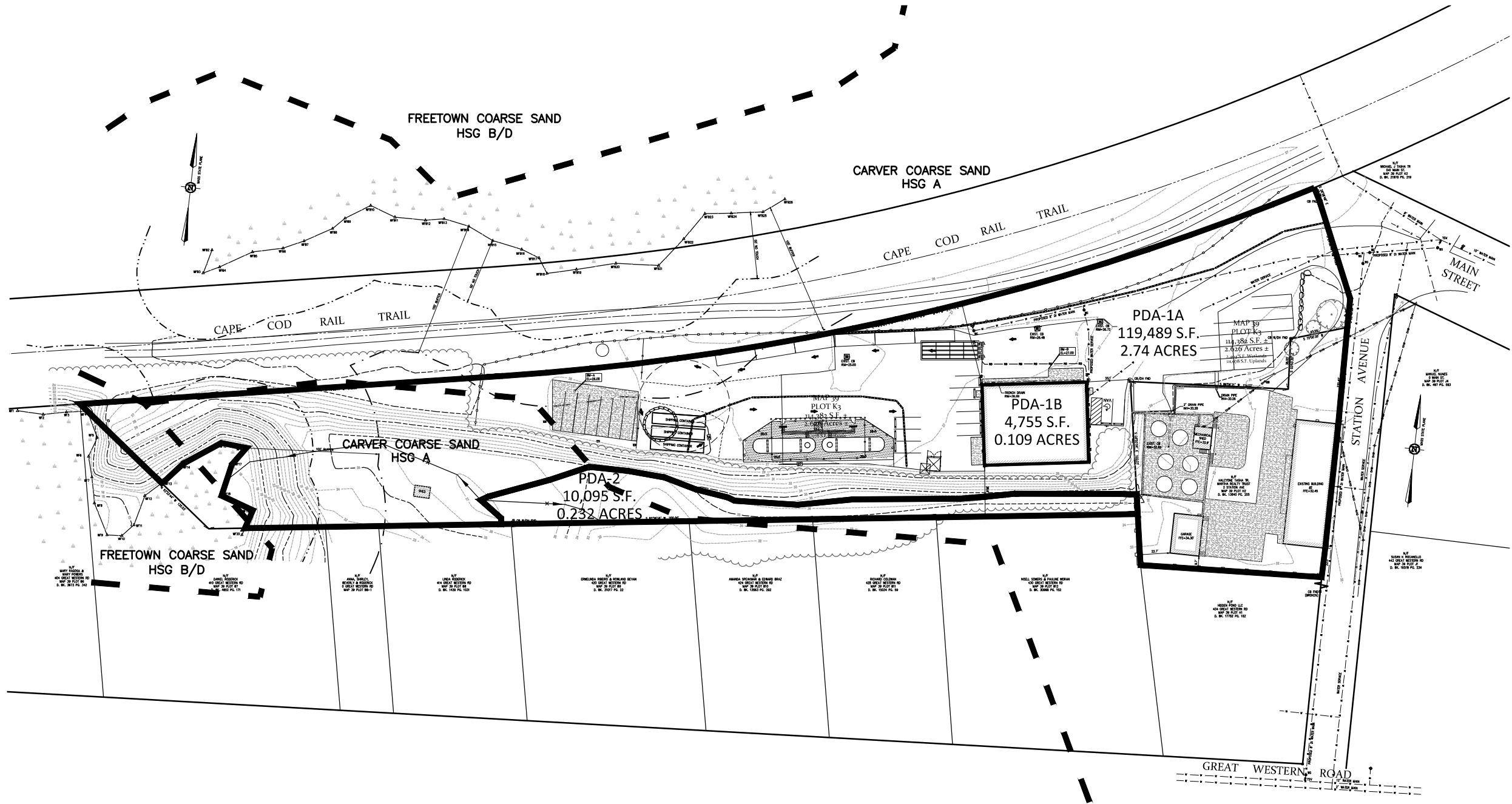
Inflow Area = 0.232 ac, 0.00% Impervious, Inflow Depth = 0.53" for 100-Year event
Inflow = 0.03 cfs @ 12.45 hrs, Volume= 0.010 af
Outflow = 0.03 cfs @ 12.45 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

APPENDIX B

Post-Development Design Condition

X:\2020\01-2020-015 MJT - 2 & 6 Station Ave, Harwich\CIVIL\DESIGN\01-2020-015 PDA.dwg



PERMITTING SET		
REVISIONS		
No.	DATE	DESCRIPTION
1	10-19-20	REVISE PER TOWN COMMENTS
2	03-08-21	REVISE PER TOWN COMMENTS

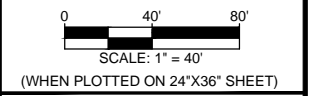
DRAWN BY: TME
CHECKED BY: EPJ
DESIGNED BY: TME / GWD

**PROPOSED DRAINAGE
AREAS PLAN**

6 STATION AVENUE
IN
HARWICH
(BARNSTABLE COUNTY)
MASSACHUSETTS

SEPTEMBER 24, 2020

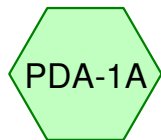
PREPARED FOR:
CAPE COD OIL
COMPANY
227 ROUTE 6
PROVINCETOWN
MASSACHUSETTS
02657



JDE

Jacobs Driscoll
Engineering

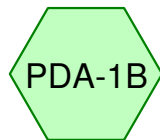
50 Oliver Street
North Easton, Massachusetts 02356
Phone: 508-928-4400
www.JacobsDriscoll.com



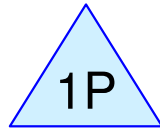
To Wetlands



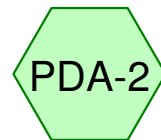
Wetlands



Building Roof



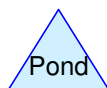
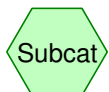
Chamber System



To Southern PL



Southern PL



Routing Diagram for 01-2020-015 Proposed R0

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NRCC 24-hr C 2-Year Rainfall=3.26"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: To WetlandsRunoff Area=119,489 sf 40.10% Impervious Runoff Depth=0.67"
Flow Length=210' Tc=16.5 min CN=66 Runoff=1.33 cfs 0.154 af**Subcatchment PDA-1B: Building Roof**Runoff Area=4,755 sf 100.00% Impervious Runoff Depth=3.03"
Tc=6.0 min CN=98 Runoff=0.35 cfs 0.028 af**Subcatchment PDA-2: To Southern PL**Runoff Area=10,095 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=108' Tc=12.4 min CN=31 Runoff=0.00 cfs 0.000 af**Reach DP-1: Wetlands**Inflow=1.33 cfs 0.154 af
Outflow=1.33 cfs 0.154 af**Reach DP-2: Southern PL**Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af**Pond 1P: Chamber System**Peak Elev=20.52' Storage=138 cf Inflow=0.35 cfs 0.028 af
Outflow=0.13 cfs 0.028 af**Total Runoff Area = 3.084 ac Runoff Volume = 0.182 af Average Runoff Depth = 0.71"**
60.79% Pervious = 1.875 ac 39.21% Impervious = 1.209 ac

01-2020-015 Proposed Ro

NRCC 24-hr C 2-Year Rainfall=3.26"

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Summary for Subcatchment PDA-1A: To Wetlands

Runoff = 1.33 cfs @ 12.28 hrs, Volume= 0.154 af, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 2-Year Rainfall=3.26"

Area (sf)	CN	Description
2,328	55	Woods, Good, HSG B
34,330	30	Woods, Good, HSG A
43,927	98	Paved parking, HSG A
23,357	39	>75% Grass cover, Good, HSG A
11,554	96	Gravel surface, HSG A
3,993	98	Roofs, HSG A
119,489	66	Weighted Average
71,569		59.90% Pervious Area
47,920		40.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	50	0.0120	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
1.5	160	0.1310	1.81		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.5	210	Total			

Summary for Subcatchment PDA-1B: Building Roof

Runoff = 0.35 cfs @ 12.13 hrs, Volume= 0.028 af, Depth= 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 2-Year Rainfall=3.26"

Area (sf)	CN	Description
4,755	98	Roofs, HSG A
4,755		100.00% Impervious Area

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

Summary for Subcatchment PDA-2: To Southern PL

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 2-Year Rainfall=3.26"

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NRCC 24-hr C 2-Year Rainfall=3.26"

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Area (sf)	CN	Description
9,513	30	Woods, Good, HSG A
582	39	>75% Grass cover, Good, HSG A
10,095	31	Weighted Average
10,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0230	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
0.8	58	0.0530	1.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.4	108	Total			

Summary for Reach DP-1: Wetlands

Inflow Area = 2.743 ac, 40.10% Impervious, Inflow Depth = 0.67" for 2-Year event
 Inflow = 1.33 cfs @ 12.28 hrs, Volume= 0.154 af
 Outflow = 1.33 cfs @ 12.28 hrs, Volume= 0.154 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Southern PL

Inflow Area = 0.232 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: Chamber System

Inflow Area = 0.109 ac, 100.00% Impervious, Inflow Depth = 3.03" for 2-Year event
 Inflow = 0.35 cfs @ 12.13 hrs, Volume= 0.028 af
 Outflow = 0.13 cfs @ 12.27 hrs, Volume= 0.028 af, Atten= 62%, Lag= 8.9 min
 Discarded = 0.13 cfs @ 12.27 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 20.52' @ 12.27 hrs Surf.Area= 634 sf Storage= 138 cf

Plug-Flow detention time= 4.1 min calculated for 0.028 af (100% of inflow)

Center-of-Mass det. time= 4.1 min (762.1 - 758.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.00'	468 cf	14.50'W x 43.75'L x 2.54'H Field A 1,612 cf Overall - 442 cf Embedded = 1,170 cf x 40.0% Voids
#2A	20.50'	442 cf	Cultec R-150XLHD x 16 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 4 rows

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NRCC 24-hr C 2-Year Rainfall=3.26"

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910 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.13 cfs @ 12.27 hrs HW=20.52' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

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NRCC 24-hr C 10-Year Rainfall=4.74"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: To WetlandsRunoff Area=119,489 sf 40.10% Impervious Runoff Depth=1.55"
Flow Length=210' Tc=16.5 min CN=66 Runoff=3.56 cfs 0.355 af**Subcatchment PDA-1B: Building Roof**Runoff Area=4,755 sf 100.00% Impervious Runoff Depth=4.50"
Tc=6.0 min CN=98 Runoff=0.51 cfs 0.041 af**Subcatchment PDA-2: To Southern PL**Runoff Area=10,095 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=108' Tc=12.4 min CN=31 Runoff=0.00 cfs 0.000 af**Reach DP-1: Wetlands**Inflow=3.56 cfs 0.355 af
Outflow=3.56 cfs 0.355 af**Reach DP-2: Southern PL**Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af**Pond 1P: Chamber System**Peak Elev=20.82' Storage=284 cf Inflow=0.51 cfs 0.041 af
Outflow=0.14 cfs 0.041 af**Total Runoff Area = 3.084 ac Runoff Volume = 0.396 af Average Runoff Depth = 1.54"**
60.79% Pervious = 1.875 ac 39.21% Impervious = 1.209 ac

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NRCC 24-hr C 10-Year Rainfall=4.74"

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Summary for Subcatchment PDA-1A: To Wetlands

Runoff = 3.56 cfs @ 12.26 hrs, Volume= 0.355 af, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.74"

Area (sf)	CN	Description
2,328	55	Woods, Good, HSG B
34,330	30	Woods, Good, HSG A
43,927	98	Paved parking, HSG A
23,357	39	>75% Grass cover, Good, HSG A
11,554	96	Gravel surface, HSG A
3,993	98	Roofs, HSG A
119,489	66	Weighted Average
71,569		59.90% Pervious Area
47,920		40.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	50	0.0120	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
1.5	160	0.1310	1.81		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.5	210	Total			

Summary for Subcatchment PDA-1B: Building Roof

Runoff = 0.51 cfs @ 12.13 hrs, Volume= 0.041 af, Depth= 4.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.74"

Area (sf)	CN	Description
4,755	98	Roofs, HSG A
4,755		100.00% Impervious Area

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

Summary for Subcatchment PDA-2: To Southern PL

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.74"

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NRCC 24-hr C 10-Year Rainfall=4.74"

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Area (sf)	CN	Description
9,513	30	Woods, Good, HSG A
582	39	>75% Grass cover, Good, HSG A
10,095	31	Weighted Average
10,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0230	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
0.8	58	0.0530	1.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.4	108	Total			

Summary for Reach DP-1: Wetlands

Inflow Area = 2.743 ac, 40.10% Impervious, Inflow Depth = 1.55" for 10-Year event
 Inflow = 3.56 cfs @ 12.26 hrs, Volume= 0.355 af
 Outflow = 3.56 cfs @ 12.26 hrs, Volume= 0.355 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Southern PL

Inflow Area = 0.232 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
 Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: Chamber System

Inflow Area = 0.109 ac, 100.00% Impervious, Inflow Depth = 4.50" for 10-Year event
 Inflow = 0.51 cfs @ 12.13 hrs, Volume= 0.041 af
 Outflow = 0.14 cfs @ 12.35 hrs, Volume= 0.041 af, Atten= 73%, Lag= 13.2 min
 Discarded = 0.14 cfs @ 12.35 hrs, Volume= 0.041 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 20.82' @ 12.35 hrs Surf.Area= 634 sf Storage= 284 cf

Plug-Flow detention time= 8.9 min calculated for 0.041 af (100% of inflow)

Center-of-Mass det. time= 8.9 min (759.2 - 750.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.00'	468 cf	14.50'W x 43.75'L x 2.54'H Field A 1,612 cf Overall - 442 cf Embedded = 1,170 cf x 40.0% Voids
#2A	20.50'	442 cf	Cultec R-150XLHD x 16 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 4 rows

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NRCC 24-hr C 10-Year Rainfall=4.74"

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910 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.14 cfs @ 12.35 hrs HW=20.82' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

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NRCC 24-hr C 25-Year Rainfall=5.88"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: To WetlandsRunoff Area=119,489 sf 40.10% Impervious Runoff Depth=2.35"
Flow Length=210' Tc=16.5 min CN=66 Runoff=5.54 cfs 0.538 af**Subcatchment PDA-1B: Building Roof**Runoff Area=4,755 sf 100.00% Impervious Runoff Depth=5.64"
Tc=6.0 min CN=98 Runoff=0.64 cfs 0.051 af**Subcatchment PDA-2: To Southern PL**Runoff Area=10,095 sf 0.00% Impervious Runoff Depth=0.09"
Flow Length=108' Tc=12.4 min CN=31 Runoff=0.00 cfs 0.002 af**Reach DP-1: Wetlands**Inflow=5.54 cfs 0.538 af
Outflow=5.54 cfs 0.538 af**Reach DP-2: Southern PL**Inflow=0.00 cfs 0.002 af
Outflow=0.00 cfs 0.002 af**Pond 1P: Chamber System**Peak Elev=21.09' Storage=412 cf Inflow=0.64 cfs 0.051 af
Outflow=0.15 cfs 0.051 af**Total Runoff Area = 3.084 ac Runoff Volume = 0.591 af Average Runoff Depth = 2.30"**
60.79% Pervious = 1.875 ac 39.21% Impervious = 1.209 ac

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NRCC 24-hr C 25-Year Rainfall=5.88"

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Summary for Subcatchment PDA-1A: To Wetlands

Runoff = 5.54 cfs @ 12.26 hrs, Volume= 0.538 af, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 25-Year Rainfall=5.88"

Area (sf)	CN	Description
2,328	55	Woods, Good, HSG B
34,330	30	Woods, Good, HSG A
43,927	98	Paved parking, HSG A
23,357	39	>75% Grass cover, Good, HSG A
11,554	96	Gravel surface, HSG A
3,993	98	Roofs, HSG A
119,489	66	Weighted Average
71,569		59.90% Pervious Area
47,920		40.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	50	0.0120	0.06		Sheet Flow,
					Woods: Light underbrush n= 0.400 P2= 3.26"
1.5	160	0.1310	1.81		Shallow Concentrated Flow,
					Woodland Kv= 5.0 fps
16.5	210	Total			

Summary for Subcatchment PDA-1B: Building Roof

Runoff = 0.64 cfs @ 12.13 hrs, Volume= 0.051 af, Depth= 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 25-Year Rainfall=5.88"

Area (sf)	CN	Description
4,755	98	Roofs, HSG A
4,755		100.00% Impervious Area

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

Summary for Subcatchment PDA-2: To Southern PL

Runoff = 0.00 cfs @ 16.80 hrs, Volume= 0.002 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 25-Year Rainfall=5.88"

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NRCC 24-hr C 25-Year Rainfall=5.88"

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Area (sf)	CN	Description
9,513	30	Woods, Good, HSG A
582	39	>75% Grass cover, Good, HSG A
10,095	31	Weighted Average
10,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0230	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
0.8	58	0.0530	1.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.4	108	Total			

Summary for Reach DP-1: Wetlands

Inflow Area = 2.743 ac, 40.10% Impervious, Inflow Depth = 2.35" for 25-Year event
 Inflow = 5.54 cfs @ 12.26 hrs, Volume= 0.538 af
 Outflow = 5.54 cfs @ 12.26 hrs, Volume= 0.538 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Southern PL

Inflow Area = 0.232 ac, 0.00% Impervious, Inflow Depth = 0.09" for 25-Year event
 Inflow = 0.00 cfs @ 16.80 hrs, Volume= 0.002 af
 Outflow = 0.00 cfs @ 16.80 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: Chamber System

Inflow Area = 0.109 ac, 100.00% Impervious, Inflow Depth = 5.64" for 25-Year event
 Inflow = 0.64 cfs @ 12.13 hrs, Volume= 0.051 af
 Outflow = 0.15 cfs @ 12.39 hrs, Volume= 0.051 af, Atten= 77%, Lag= 16.0 min
 Discarded = 0.15 cfs @ 12.39 hrs, Volume= 0.051 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 21.09' @ 12.39 hrs Surf.Area= 634 sf Storage= 412 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 13.4 min (760.0 - 746.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.00'	468 cf	14.50'W x 43.75'L x 2.54'H Field A 1,612 cf Overall - 442 cf Embedded = 1,170 cf x 40.0% Voids
#2A	20.50'	442 cf	Cultec R-150XLHD x 16 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 4 rows

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NRCC 24-hr C 25-Year Rainfall=5.88"

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910 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.15 cfs @ 12.39 hrs HW=21.09' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

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NRCC 24-hr C 100-Year Rainfall=8.15"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: To WetlandsRunoff Area=119,489 sf 40.10% Impervious Runoff Depth=4.13"
Flow Length=210' Tc=16.5 min CN=66 Runoff=9.90 cfs 0.944 af**Subcatchment PDA-1B: Building Roof**Runoff Area=4,755 sf 100.00% Impervious Runoff Depth=7.91"
Tc=6.0 min CN=98 Runoff=0.89 cfs 0.072 af**Subcatchment PDA-2: To Southern PL**Runoff Area=10,095 sf 0.00% Impervious Runoff Depth=0.53"
Flow Length=108' Tc=12.4 min CN=31 Runoff=0.03 cfs 0.010 af**Reach DP-1: Wetlands**Inflow=9.90 cfs 0.944 af
Outflow=9.90 cfs 0.944 af**Reach DP-2: Southern PL**Inflow=0.03 cfs 0.010 af
Outflow=0.03 cfs 0.010 af**Pond 1P: Chamber System**Peak Elev=21.75' Storage=697 cf Inflow=0.89 cfs 0.072 af
Outflow=0.16 cfs 0.072 af**Total Runoff Area = 3.084 ac Runoff Volume = 1.026 af Average Runoff Depth = 3.99"**
60.79% Pervious = 1.875 ac 39.21% Impervious = 1.209 ac

01-2020-015 Proposed Ro

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NRCC 24-hr C 100-Year Rainfall=8.15"

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Summary for Subcatchment PDA-1A: To Wetlands

Runoff = 9.90 cfs @ 12.25 hrs, Volume= 0.944 af, Depth= 4.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.15"

Area (sf)	CN	Description
2,328	55	Woods, Good, HSG B
34,330	30	Woods, Good, HSG A
43,927	98	Paved parking, HSG A
23,357	39	>75% Grass cover, Good, HSG A
11,554	96	Gravel surface, HSG A
3,993	98	Roofs, HSG A
119,489	66	Weighted Average
71,569		59.90% Pervious Area
47,920		40.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	50	0.0120	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
1.5	160	0.1310	1.81		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.5	210	Total			

Summary for Subcatchment PDA-1B: Building Roof

Runoff = 0.89 cfs @ 12.13 hrs, Volume= 0.072 af, Depth= 7.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.15"

Area (sf)	CN	Description
4,755	98	Roofs, HSG A
4,755		100.00% Impervious Area

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

Summary for Subcatchment PDA-2: To Southern PL

Runoff = 0.03 cfs @ 12.45 hrs, Volume= 0.010 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.15"

01-2020-015 Proposed Ro

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NRCC 24-hr C 100-Year Rainfall=8.15"

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Area (sf)	CN	Description
9,513	30	Woods, Good, HSG A
582	39	>75% Grass cover, Good, HSG A
10,095	31	Weighted Average
10,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0230	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.26"
0.8	58	0.0530	1.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.4	108	Total			

Summary for Reach DP-1: Wetlands

Inflow Area = 2.743 ac, 40.10% Impervious, Inflow Depth = 4.13" for 100-Year event
 Inflow = 9.90 cfs @ 12.25 hrs, Volume= 0.944 af
 Outflow = 9.90 cfs @ 12.25 hrs, Volume= 0.944 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Southern PL

Inflow Area = 0.232 ac, 0.00% Impervious, Inflow Depth = 0.53" for 100-Year event
 Inflow = 0.03 cfs @ 12.45 hrs, Volume= 0.010 af
 Outflow = 0.03 cfs @ 12.45 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: Chamber System

Inflow Area = 0.109 ac, 100.00% Impervious, Inflow Depth = 7.91" for 100-Year event
 Inflow = 0.89 cfs @ 12.13 hrs, Volume= 0.072 af
 Outflow = 0.16 cfs @ 12.50 hrs, Volume= 0.072 af, Atten= 82%, Lag= 22.6 min
 Discarded = 0.16 cfs @ 12.50 hrs, Volume= 0.072 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 21.75' @ 12.50 hrs Surf.Area= 634 sf Storage= 697 cf

Plug-Flow detention time= 23.5 min calculated for 0.072 af (100% of inflow)

Center-of-Mass det. time= 23.5 min (765.4 - 741.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.00'	468 cf	14.50'W x 43.75'L x 2.54'H Field A 1,612 cf Overall - 442 cf Embedded = 1,170 cf x 40.0% Voids
#2A	20.50'	442 cf	Cultec R-150XLHD x 16 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 4 rows

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NRCC 24-hr C 100-Year Rainfall=8.15"

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910 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.16 cfs @ 12.50 hrs HW=21.75' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

APPENDIX C

72-Hour Drawdown Calculation

Illicit Discharge Compliance Statement

72-Hour Drawdown Calculation

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NRCC 24-hr C 100-Year Rainfall=8.15"

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Hydrograph for Pond 1P: Chamber System

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Discarded (cfs)	Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Discarded (cfs)
0.00	0.00	0	20.00	0.00	52.00	0.00	0	20.00	0.00
1.00	0.00	0	20.00	0.00	53.00	0.00	0	20.00	0.00
2.00	0.01	0	20.00	0.01	54.00	0.00	0	20.00	0.00
3.00	0.01	1	20.00	0.01	55.00	0.00	0	20.00	0.00
4.00	0.01	1	20.00	0.01	56.00	0.00	0	20.00	0.00
5.00	0.01	1	20.00	0.01	57.00	0.00	0	20.00	0.00
6.00	0.01	1	20.00	0.01	58.00	0.00	0	20.00	0.00
7.00	0.02	1	20.00	0.02	59.00	0.00	0	20.00	0.00
8.00	0.02	1	20.00	0.02	60.00	0.00	0	20.00	0.00
9.00	0.03	1	20.01	0.03	61.00	0.00	0	20.00	0.00
10.00	0.04	2	20.01	0.04	62.00	0.00	0	20.00	0.00
11.00	0.07	4	20.01	0.07	63.00	0.00	0	20.00	0.00
12.00	0.49	166	20.58	0.13	64.00	0.00	0	20.00	0.00
13.00	0.09	615	21.54	0.16	65.00	0.00	0	20.00	0.00
14.00	0.04	290	20.83	0.14	66.00	0.00	0	20.00	0.00
15.00	0.03	2	20.01	0.03	67.00	0.00	0	20.00	0.00
16.00	0.02	1	20.01	0.02	68.00	0.00	0	20.00	0.00
17.00	0.02	1	20.00	0.02	69.00	0.00	0	20.00	0.00
18.00	0.02	1	20.00	0.02	70.00	0.00	0	20.00	0.00
19.00	0.01	1	20.00	0.01	71.00	0.00	0	20.00	0.00
20.00	0.01	1	20.00	0.01	72.00	0.00	0	20.00	0.00
21.00	0.01	1	20.00	0.01					
22.00	0.01	1	20.00	0.01					
23.00	0.01	1	20.00	0.01					
24.00	0.01	1	20.00	0.01					
→ 25.00	0.00	0	20.00	0.00					
26.00	0.00	0	20.00	0.00					
27.00	0.00	0	20.00	0.00					
28.00	0.00	0	20.00	0.00					
29.00	0.00	0	20.00	0.00					
30.00	0.00	0	20.00	0.00					
31.00	0.00	0	20.00	0.00					
32.00	0.00	0	20.00	0.00					
33.00	0.00	0	20.00	0.00					
34.00	0.00	0	20.00	0.00					
35.00	0.00	0	20.00	0.00					
36.00	0.00	0	20.00	0.00					
37.00	0.00	0	20.00	0.00					
38.00	0.00	0	20.00	0.00					
39.00	0.00	0	20.00	0.00					
40.00	0.00	0	20.00	0.00					
41.00	0.00	0	20.00	0.00					
42.00	0.00	0	20.00	0.00					
43.00	0.00	0	20.00	0.00					
44.00	0.00	0	20.00	0.00					
45.00	0.00	0	20.00	0.00					
46.00	0.00	0	20.00	0.00					
47.00	0.00	0	20.00	0.00					
48.00	0.00	0	20.00	0.00					
49.00	0.00	0	20.00	0.00					
50.00	0.00	0	20.00	0.00					
51.00	0.00	0	20.00	0.00					

APPENDIX D

Construction Phase Pollution Prevention and Erosion and Sedimentation Plan

Post-Development BMP Operation and Maintenance Plan – including Long-Term Pollution Prevention Plan

***Construction Phase Pollution
Prevention and Erosion and
Sedimentation Control Plan***



In Support of:
Site Plan Review

For:
Proposed Propane Distribution Facility

6 Station Ave (Map 39, Lot K3)
Harwich, Massachusetts 02645

Applicant:
Cape Cod Oil Company
227 Route 6
Provincetown, Massachusetts 02657

Submitted to:
Town of Harwich Planning Board

Dated: March 8, 2021

Prepared By:
Jacobs Driscoll Engineering, Inc.
50 Oliver Street
North Easton, MA 02356

JN: 01-2020-015

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- Construction Detail Plan (within Plan Set)	

Construction Phase Pollution Prevention & Erosion and Sedimentation Control Plan

Erosion and sedimentation will be controlled at the site by utilizing Structural Practices, Stabilization Practices, and Dust Control. These practices correspond with plans entitled “Site Development Plans” dated September 24, 2020, prepared by Jacobs Driscoll Engineering hereinafter referred to as the Site Plans.

Responsible Party/Property Owner/Developer contact information:

Hurst Tasha
MJT Trucking/Cape Cod Oil
227 Route 6
Provincetown, MA 02657
Phone: (508) 432-0513

Town of Harwich Contact Information:

Town of Harwich
Engineering Department
Griffin Ryder, P.E., Town Engineer
723 Main Street
Harwich, MA 02645
Phone: (508) 430-7508

Narrative:

Project Description:

The applicant, Cape Cod Oil Company, proposes to install two 30,000 gallon underground propane storage tanks for the purpose of operating a propane distribution facility on their land located at 6 Station Ave., in Harwich, MA. The existing parcel can be identified on assessor’s map 39, plot K3 with a total area of approximately 2.626 +/- acres.

Site Description:

The site is located on the westerly side of Station Ave in Harwich. The property is surrounded by residential and industrial uses. The locus also abuts the Cape Cod Rail Trail. Refer to Figure 1 – USGS Map for the location of the site. This report contains calculations of stormwater runoff for the pre-development and post-development conditions and includes the design of the proposed drainage system and stormwater best management practices (BMPs).

Resource Areas:

The locus property contains a bordering vegetated wetland (BVW) on the western portion of the property. The B wetland series is associated with a Bordering Vegetated Wetland (BVW) which is located off the locus property and to the north of the Cape Cod Rail Trail. The property is located outside of NHESP Estimate & Priority Habitat for Rare Species. This property is also located outside of any critical area, FEMA flood zone, etc.

Soils:

Soils information was obtained from the USDA Natural Resources Conservation Service's (NRCS) Web Soil Survey mapping. Site soils are classified as the following SCS Hydrologic Soil Groups: Carver Coarse Sand (252B - SCS Hydrologic Soil Group A), Freetown Coarse Sand (55A - SCS Hydrologic Soil Group B/D).

Erosion and Sedimentation Control Practices:

Structural Practices:

- 1) **Straw Wattles and/or Filter Sock Barrier Controls** –Filter sock erosion control barrier will be constructed along downward slopes at the limit of work in locations shown on the plans. This control will be installed prior to major soil disturbance on the site. The barrier control shall be installed as shown on the Erosion Control Detail Plan and the manufacturer's recommendations. Also, a stockpile of 100' of straw wattles shall be kept onsite for any emergency repairs to the filter sock erosion control barrier.

Straw Wattles and/or Filter Sock Design/Installation Requirements *

* (included on Inspection/Evaluation Checklist)

- a) Wattles or sock should be placed lengthwise on the contour, with the ends of adjacent wattles/sock tightly abutting one another and overlapping on the ground surface (not one over another) per manufacturer instructions.
- b) The barrier should be placed on natural ground and staked on either side or through the barrier per manufacturer requirements.
- c) Wattles/sock barriers should be removed when they have served their usefulness, but not before the upslope areas have been permanently stabilized.

Straw Wattles and/or Filter Sock Barrier Inspection/Maintenance *

- a) Straw wattles and/or filter sock barriers should be inspected within 24 hours after a runoff-producing rainfall event of 0.5" or greater and a minimum of 1 time per week.

- b) Close attention should be paid to the repair of damaged barriers, undercutting beneath the barrier, and flow around the ends of the barrier.
 - c) Necessary repairs to barriers or replacement of bales should be completed promptly.
 - d) Sediment deposits should be checked after each runoff-producing rainfall. They must be removed when the level of deposition reaches approximately one-half the height of the barrier.
 - e) Any sediment deposits remaining in place after the hay bale barrier is no longer required should be dressed to conform to the existing grade, prepared and seeded.
- 2) **Inlet Protection** – Inlet Protection will be utilized around the catch basin grates. The inlet protection will allow the storm drain inlets to be used before final stabilization. This structural practice will allow early use of the drainage system. Siltsack or equivalent will be utilized for the inlet protection. Siltsack is manufactured by ACF Environmental. The telephone number is 1-800-437-6746. Regular flow siltsack will be utilized, and if it does not allow enough storm water flow, hi-flow siltsack will be utilized. Furthermore, the newly installed catch basins shall also have haybales set around the inlet to further protect the inlet from sedimentation.

Silt Sack (or equivalent) Inlet Protection Inspection/Maintenance Requirements *

- a) All trapping devices and the structures they protect should be inspected after every rain storm and repairs made as necessary.
- b) Sediment should be removed from the trapping devices after the sediment has reached a maximum depth of one-half the depth of the trap.
- c) Oil build-up should be removed by using a small portable pump and disposed of in accordance with all applicable local, state, and federal regulations.
- d) Sediment should be disposed of in a suitable area outside of the wetland buffers and protected from erosion by either structural or vegetative means. Sediment removed shall be disposed of in accordance with all applicable local, state, and federal regulations.
- e) The silt sack must be replaced if it is ripped or torn in any way.
- f) Temporary traps should be removed and the area repaired as soon as the contributing drainage area to the inlet has been completely stabilized.

Stabilization Practices:

Stabilization measures shall be implemented as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased. Vegetative stabilization measures shall be employed. All perimeter dikes and slopes, basin or trap embankments shall be stabilized with sod, seed, and anchored straw mulch within seven calendar days of disturbance. All other disturbed areas shall be stabilized with sod, seed, and anchored straw mulch within fourteen calendar days after disturbing activities have ceased. Topsoil shall be stripped from disturbed areas and stockpiled in an approved area and stabilized with temporary vegetative cover if left for more than thirty calendar days. Perimeter sediment controls shall be installed around stockpiled topsoil. During the months of October through March, when seeding and sodding may be impractical, anchored mulch shall be applied as approved by the Conservation Commission.

- 1) **Temporary Seeding** – Temporary seeding will allow a short-term vegetative cover on disturbed site areas that may be in danger of erosion. Temporary seeding will be done at stock piles and disturbed portions of the site where construction activity will temporarily cease for at least 21 days. The temporary seedings will stabilize cleared and unvegetated areas that will not be brought into final grade for several weeks or months.

Temporary Seeding Planting Procedures *

- a) Planting should preferably be done between April 1st and June 30th, and September 1st through September 31st. If planting is done in the months of July and August, irrigation may be required. If planting is done between October 1st and March 31st, anchored mulch should be applied immediately after planting. If seeding is done during the summer months, irrigation of some sort will probably be necessary.
- b) Before seeding, install structural practice controls. Utilize Amoco supergro or equivalent.
- c) The seedbed should be firm with a fairly fine surface. Perform all cultural operations across or at right angles to the slope. A minimum of 4-inches of tilled topsoil is required. The topsoil must have a sandy loam to silt loam texture with 15% to 20% organic content.
- d) Apply uniformly 2 tons of ground limestone per acre (100 lbs. Per 1,000 sq.ft.) or according to soil test. Apply uniformly 10-10-10 analysis fertilizer at the rate of 400 lbs. per acre (14 lbs. per 1,000 sq.ft.) or as indicated by soil test. Forty percent of the nitrogen should be in organic form. Work in lime and fertilizer to a depth of 4-inches using any suitable equipment.
- e) Select the appropriate seed species for temporary cover from the following table.

Species	Seeding Rate (lbs/1,000 sq.ft.)	Seeding Rate (lbs/acre)	Recommended Seeding Dates	Seed Cover required
Annual Ryegrass	1	40	April 1 st to June 1 st August 15 th to Sept. 15 th	¼ inch
Foxtail Millet	0.7	30	May 1 st to June 30 th	½ to ¾ inch
Oats	2	80	April 1 st to July 1 st August 15 th to Sept. 15 th	1 to 1-½ inch
Winter Rye	3	120	August 15 th to Oct. 15 th	1 to 1-½ inch

Apply the seed uniformly by hydroseeding, broadcasting, or by hand.

- f) Use an effective mulch, such as clean grain straw; tacked and/or tied with netting to protect seedbed and encourage plant growth.

Temporary Seeding Inspection/Maintenance *

- a) Inspect within 4 weeks of planting to see if stands are adequate. Check for damage within 24 hours of a rainfall event of 0.5 inches or greater and a minimum of 1 time per week. Stands should be uniform and dense. Fertilize, reseed, and mulch damaged and sparse areas immediately. Tack or tie down mulch as necessary.
- b) Seeds should be supplied with adequate moisture. Furnish water as needed, especially in abnormally hot or dry weather. Water application rates should be controlled to prevent runoff.
- 2) **Geotextiles** - Geotextiles such as jute netting will be used in combination with other practices such as mulching to stabilize slopes. The following geotextile materials or equivalent are to be utilized for structural and nonstructural controls as shown in the following table.

Practice	Manufacturer	Product	Remarks
Sediment Fence	Amoco	Woven polypropylene 1198 or equivalent	0.425 mm opening
Construction Entrance	Amoco	Woven polypropylene 2002 or equivalent	0.300 mm opening
Outlet Protection	Amoco	Nonwoven polypropylene 4551 or equivalent	0.150 mm opening
Erosion Control (slope stability)	Amoco	Supergro or equivalent	Erosion control revegetation mix, open polypropylene fiber on degradable

			polypropylene net scrim
--	--	--	-------------------------

Amoco may be reached at (800) 445-7732

Geotextile Installation

- a) Netting and matting require firm, continuous contact between the materials and the soil. If there is no contact, the material will not hold the soil and erosion will occur underneath the material.

Geotextile Inspection/Maintenance *

- a) In the field, regular inspections should be made to check for cracks, tears, or breaches in the fabric. The appropriate repairs should be made.
- 3) **Mulching and Netting** – Mulching will provide immediate protection to exposed soils during the period of short construction delays, or over winter months through the application of plant residues, or other suitable materials, to exposed soil areas. In areas, which have been seeded either for temporary or permanent cover, mulching should immediately follow seeding. On steep slopes (slopes greater than 3:1), mulch must be supplemented with netting. The preferred mulching material is straw.

Mulch (Hay or Straw) Materials and Installation

- a) Straw has been found to be one of the most effective organic mulch materials. The specifications for straw are described below, but other material may be appropriate. The straw should be air-dried; free of undesirable seeds & coarse materials. The application rate per 1,000 sq.ft. is 90-100 lbs. (2-3 bales) and the application rate per acre is 2 tons (100-120 bales). The application should cover about 90% of the surface. The use of straw mulch is appropriate where mulch is maintained for more than three months. Straw mulch is subject to wind blowing unless anchored, is the most commonly used mulching material, and has the best microenvironment for germinating seeds.

Mulch Maintenance *

- a) Inspect after rainstorms to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, repair surface, reseed, remulch, and install new netting.
- b) Straw or grass mulches that blow or wash away should be repaired promptly.
- c) If plastic netting is used to anchor mulch, care should be taken during initial mowings to keep the mower height high. Otherwise, the netting can wrap up on

the mower blade shafts. After a period of time, the netting degrades and becomes less of a problem.

- d) Continue inspections until vegetation is well established.
- 4) **Land Grading** – Grading on fill slopes, cut slopes, and stockpile areas will be done with full siltation controls in place.

Land Grading Design/Installation Requirements

- a) Areas to be graded should be cleared and grubbed of all timber, logs, brush, rubbish, and vegetated matter that will interfere with the grading operation. Topsoil should be stripped and stockpiled for use on critical disturbed areas for establishment of vegetation. Cut slopes to be topsoiled should be thoroughly scarified to a minimum depth of 3-inches prior to placement of topsoil.
- b) Fill materials should be generally free of brush, rubbish, rocks, and stumps. Frozen materials or soft and easily compressible materials should not be used in fills intended to support buildings, parking lots, roads, conduits, or other structures.
- c) Earth fill intended to support structural measures should be compacted to a minimum of 90 percent of Standard Proctor Test density with proper moisture control, or as otherwise specified by the engineer responsible for the design. Compaction of other fills should be to the density required to control sloughing, erosion or excessive moisture content. Maximum thickness of fill layers prior to compaction should not exceed 9 inches.
- d) The uppermost one foot of fill slopes should be compacted to at least 85 percent of the maximum unit weight (based on the modified AASHTO compaction test). This is usually accomplished by running heavy equipment over the fill.
- e) Fill should consist of material from borrow areas and excess cut will be stockpiled in areas shown on the Site Plans. All disturbed areas should be free draining, left with a neat and finished appearance, and should be protected from erosion.

Land Grading Stabilization Inspection/Maintenance *

- a) All slopes should be checked periodically to see that vegetation is in good condition. Any rills or damage from erosion and animal burrowing should be repaired immediately to avoid further damage.
- b) If seeps develop on the slopes, the area should be evaluated to determine if the seep will cause an unstable condition. Subsurface drains or a gravel mulch may be required to solve seep problems. However, no seeps are anticipated.

- c) Areas requiring revegetation should be repaired immediately. Slopes should be limed and fertilized as necessary to keep vegetation healthy. Control undesirable vegetation such as weeds and woody growth to avoid bank stability problems in the future.
- 5) **Topsoiling** * – Topsoiling will help establish vegetation on all disturbed areas throughout the site during the seeding process. The soil texture of the topsoil to be used will be a sandy loam to a silt loam texture with 15% to 20% organic content.

Topsoiling Placement

- a) Topsoil should not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed seeding.
 - b) Do not place topsoil on slopes steeper than 3:1 without mulching and netting. Slopes greater than 2:1 will require rip rap surface treatment for stabilization.
 - c) If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method is to actually work the topsoil into the layer below for a depth of at least 6 inches.
- 6) **Preserving Natural Vegetation** – The trees to be saved will be clearly flagged or marked with a bright colored ribbon. Snow fencing will be set at the drip/spread line of the trees and shrubs to be protected. Machinery will be kept away from tree roots.
- 7) **Permanent Seeding** – Permanent Seeding should be done immediately after the final design grades are achieved. Native species of plants should be used to establish perennial vegetative cover on disturbed areas. The revegetation should be done early enough in the fall so that a good cover is established before cold weather comes and growth stops until the spring. A good cover is defined as vegetation covering 75 percent or more of the ground surface.

Permanent Seeding Seedbed Preparation

- a) In infertile or coarse-textured subsoil, it is best to stockpile topsoil and respread it over the finished slope at a minimum 2 to 6-inch depth and roll it to provide a firm seedbed. The topsoil must have a sandy loam to silt loam texture with 15% to 20% organic content. If construction fill operations have left soil exposed with a loose, rough, or irregular surface, smooth with blade and roll.
- b) Loosen the soil to a depth of 3-5 inches with suitable agricultural or construction equipment.

- c) Areas not to receive topsoil shall be treated to firm the seedbed after incorporation of the lime and fertilizer so that it is depressed no more than $\frac{1}{2}$ - 1 inch when stepped on with a shoe. Areas to receive topsoil shall not be firmed until after topsoiling and lime and fertilizer is applied and incorporated, at which time it shall be treated to firm the seedbed as described above.

Permanent Seeding Grass Selection/Application

- a) Select an appropriate cool or warm season grass based on site conditions and seeding date. Apply the seed uniformly by hydroseeding, broadcasting, or by hand. Uniform seed distribution is essential. On steep slopes, hydroseeding may be the most effective seeding method. Surface roughening is particularly important when preparing slopes for hydroseeding.
- b) Lime and fertilize. Organic fertilizer shall be utilized in areas within the 100 foot buffer zone to a wetland resource area.
- c) Mulch the seedings with straw applied at the rate of $\frac{1}{2}$ tons per acre. Anchor the mulch with erosion control netting or fabric on sloping areas. Amoco supergro or equivalent should be utilized.

Permanent Seeding Inspection/Maintenance *

- a) Frequently inspect seeded areas for failure and make necessary repairs and reseed immediately. Conduct or follow-up survey after one year and replace failed plants where necessary.
- b) If vegetative cover is inadequate to prevent rill erosion, overseed and fertilize in accordance with soil test results.
- c) If a stand has less than 40% cover, reevaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand following seedbed preparation and seeding recommendations, omitting lime and fertilizer in the absence of soil test results. If the season prevents resowing, mulch or jute netting is an effective temporary cover.
- d) Seeded areas should be fertilized during the second growing season. Lime and fertilize thereafter at periodic intervals, as needed. Organic fertilizer shall be utilized in areas within the 100 foot buffer zone to a wetland resource area.

Dust Control *:

Dust control will be utilized throughout the entire construction process of the site. For example, keeping disturbed surfaces moist during windy periods will be an effective control measure, especially for construction haul roads. The use of dust control will prevent the movement of soil to offsite areas. However, care must be taken to not create runoff from excessive use of water to control dust. The following are methods of Dust Control that may be used on-site:

- Vegetative Cover – The most practical method for disturbed areas not subject to traffic.
- Calcium Chloride – Calcium chloride may be applied by mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist but not so high as to cause water pollution or plant damage.
- Sprinkling – The site may be sprinkled until the surface is wet. Sprinkling will be effective for dust control on haul roads and other traffic routes.
- Stone – Stone will be used to stabilize construction roads; will also be effective for dust control.

Non-Stormwater Discharges:

During construction activities at the site, some water from the site will be suitable for discharge to the detention areas and/or temporary sediment basin areas. Non-stormwater discharges will be directed to recharge groundwater and to replenish wetland resource areas.

The construction de-watering and all non-stormwater discharges will be directed into a sediment dirt bag (or equivalent inlet protection) or a sediment basin. Sediment material removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

The developer and site general contractor will comply with the E.P.A.'s Final General Permit for Construction De-watering Discharges, (N.P.D.E.S., Section 402 and 40 C.F.R. 122.26(b)(14)(x)).

Soil Stockpiling *:

Topsoil and subsoil from the roadway grading will be stockpiled in locations shown on the plans.

Stockpile Material Construction Procedure

1. Topsoil and subsoil that are stripped will be stockpiled for later distribution on disturbed areas.

2. The stockpiles will be located as shown on the plans. These locations will allow them to not interfere with work on the site.
3. Seed the stockpiles with a temporary erosion control mix if the stockpile is to remain undisturbed for more than 30 days. The stockpiles must be stable and the side slopes should not exceed 2:1.
4. Sediment Fence/Hay Bale Barrier erosion control measures should be placed surrounding each stockpile.
5. As needed, the stockpiled topsoil and subsoil are redistributed throughout the site.

Construction Sequence:

To prevent excessive erosion and silting, the following construction sequence coupled with other widely accepted principals for reducing erosion and sedimentation shall be implemented in the development of the site.

1. Install erosion control devices to establish the limit of work as shown on plan.
2. Construct temporary construction exit area as shown on detail #509.
3. Discharges from dewatering of excavations shall not be diverted directly into any wetlands or existing storm drains without pretreatment via settling basins.
4. Clear and grub site within the limit of work.
5. Sweep existing paved driveway at the end of each work day.
6. Establish rough sub grades for parking lot and building platform.
7. Perform building and site construction.
8. Inspect and maintain erosion control measures after rainfall events and a minimum of once per week.
9. Remove sediment buildup at erosion control devices as needed. Redistribute material over site in conformance with earthwork specifications.
10. As drainage structures are installed, install filter fabric and hay bales around new structures in accordance with detail #507 and maintain them until pavement is in place and vegetation is established. All outfalls shall be immediately stabilized with stone protection as required.
11. All cut and fill slopes shall be temporarily stabilized with top soil, seed and mulch or curlex as required if construction activity ceases on said slopes for a period of seven days or greater. All slopes shall be permanently stabilized as required immediately upon completion of final grading.
12. Complete finish grading and stabilization of site. Place final paving course.
13. Remove sediment from all drainage structures, drain manholes, pipes after completion of construction. Remove and regrade temporary berms, swales, check dams, etc. Stabilize disturbed areas.

14. Clean out all sediment from storm water management basin and outlet structures. Regrade to contours per design. Stabilize all slopes as required. Replace filter fabric and 1" clean stone around low flow outlet pipe.
15. Remove erosion control devices & silt fence upon establishment of permanent ground cover. Stabilize all areas where straw wattles (erosion control device) were removed.

Inspection/Maintenance:

Operator personnel must inspect the construction site at least once every 14 calendar days and within 24 hours of a storm event of ½-inch or greater. The applicant shall be responsible to secure the services of a licensed engineer or similar professional (inspector) on an on-going basis throughout all phases of the project. Refer to the Inspection/Maintenance Requirements presented earlier in the "Structural and Stabilization Practices." The inspector should review the erosion and sediment controls with respect to the following:

- Whether or not the measure was installed/performed correctly.
- Whether or not there has been damage to the measure since it was installed or performed.
- What should be done to correct any problems with the measure.

The inspector should complete the Stormwater Management Construction Phase BMP Inspection Schedule and Evaluation Checklist, as attached, for documenting the findings and should request the required maintenance or repair for the pollution prevention measures when the inspector finds that it is necessary for the measure to be effective. The inspector should notify the appropriate person to make the changes and submit copies of the form to the local Planning Board upon request.

It is essential that the inspector document the inspection of the pollution prevention measures. These records will be used to request maintenance and repair and to prove that the inspection and maintenance were performed. The forms list each of the measures to be inspected on the site, the inspector's name, the date of the inspection, the condition of the measure/area inspected, maintenance or repair performed and any changes which should be made to the Pollution Prevention & Erosion and Sedimentation Control Plan to control or eliminate unforeseen pollution of storm water.

Stormwater Construction Site Inspection Report

General Information			
Project Name			
NPDES Tracking No.		Location	
Date of Inspection		Start/End Time	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection: <input type="checkbox"/> Regular <input type="checkbox"/> Pre-storm event <input type="checkbox"/> During storm event <input type="checkbox"/> Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, provide: Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? <input type="checkbox"/> Clear <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Sleet <input type="checkbox"/> Fog <input type="checkbox"/> Snowing <input type="checkbox"/> High Winds <input type="checkbox"/> Other: Temperature:			
Have any discharges occurred since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe:			
Are there any discharges at the time of inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe:			

Site-specific BMPs

- Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.
- Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
1		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
13		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
14		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
15		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
16		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
17		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
18		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
19		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
20		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4	Are discharge points and receiving waters free of any sediment deposits?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	Are storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6	Is the construction exit preventing sediment from being tracked into the street?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12	(Other)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Non-Compliance

Describe any incidents of non-compliance not described above:

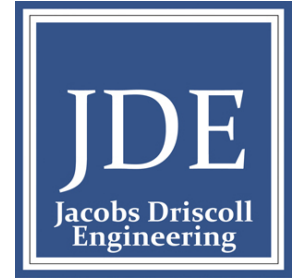
CERTIFICATION STATEMENT

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

Print name and title: _____

Signature: _____ **Date:** _____

***Post-Construction Phase Best
Management Practices Operation
& Maintenance Plan and Long-
Term Pollution Prevention Plan***



In Support of:
Site Plan Review

For:
Proposed Propane Distribution Facility
6 Station Ave (Map 39, Lot K3)
Harwich, Massachusetts 02645

Applicant:
Cape Cod Oil Company
227 Route 6
Provincetown, Massachusetts 02657

Submitted to:
Town of Harwich Planning Board

Dated: March 8, 2021

Prepared By:
Jacobs Driscoll Engineering, Inc.
50 Oliver Street
North Easton, MA 02356

JN: 01-2020-015

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Post-Construction Best Management Practices (BMPs) Operation and Maintenance Plan

Responsible Party/Property Owner/Developer contact information:

Hurst Tasha
MJT Trucking/Cape Cod Oil
227 Route 6
Provincetown, MA 02657
Phone: (508) 432-0513

Town of Harwich Contact Information:

Town of Harwich
Engineering Department
Griffin Ryder, P.E., Town Engineer
723 Main Street
Harwich, MA 02645
Phone: (508) 430-7508

See Appendix A for subsequent Owner and Responsible party information in the case of ownership transfer or establishment of homeowners' association.

Best Management Practices (BMPs) of the Commonwealth of Massachusetts Department of Environmental Protection's (DEP's) Stormwater Management Policy (SMP) have been implemented and utilized for the project. The following information provided is to be used as a guideline for monitoring and maintaining the performance of the drainage facilities and to ensure that the quality of water runoff meets the standards set forth by the SMP. The structural Best Management Practices (BMPs) shall be inspected during rainfall conditions during the first year of operation to verify functionality.

BMPs currently installed on the property include:

- Infiltration System (See Cultec Guidance in Appendix E)

Operation:

Once the proposed new drainage, grading and pavement has been constructed and the site has been permanently stabilized and the stormwater facilities are online, the operation of the stormwater management system will function as intended. In the primary train of stormwater treatment, the stormwater runoff from the paved areas is directed off the pavement, through the sediment forebay then to the infiltration basin where it will recharge the groundwater table.

Comprehensive Stormwater Management Regulations

Provisions for the Stormwater Authority or its designee to enter the property at reasonable times and in a reasonable manner for the purpose of inspection. (CSMR Sec. 6.E.)

1. **First Year Operation** - Inspection and maintenance, as outlined herein, shall be performed four times within the first year of operation. An inspection report shall be maintained. See also the general ongoing maintenance operations below as these tasks will apply in the first year of operation as well.

A visual inspection shall be made of all stormwater management system components for the entire storm drainage system. The general condition of these structures should be reviewed and accumulated debris shall be removed. The condition of all outlets shall be noted and a description of the drainage structures shall be included in the report. Deleterious materials shall be removed from these structures in order for the system to function properly.

All outlets, draining channels, and slopes shall be kept stabilized. Any erosion shall be repaired immediately.

Maintenance:

1. **Parking Lot & Driveway Maintenance** – Vacuum sweepers shall sweep paved areas periodically during dry weather to remove excess sediments to reduce the amount of sediments that the drainage system shall have to remove from the runoff. The sweeping should be conducted on a semiannual basis before April 30th and after November 15th.

Salt used for de-icing on the pavement during winter months shall be limited as much as possible as this will reduce the need for removal and treatment. Sand containing the minimum amount of calcium chloride (or approved equivalent) needed for handling may be applied as part of the routine winter maintenance activities.

Estimated annual budget \$1,000.

2. **Subsurface Infiltration System** – The infiltration system shall be checked for debris accumulation on a quarterly basis. Additional inspections should be scheduled during the first few months after construction to make sure that the vegetation becomes adequately established. Trash, leaves, branches, etc. shall be removed from facility. Silt, sand and sediment, if significant accumulation occurs, shall be removed by hand annually. Material removed from the basin or forebay shall be disposed of in accordance with all applicable local, state, and federal regulations. Accumulated sediment shall be removed from the infiltration basin before it exceeds 1' in depth, or at least once every 5 years. The low flow outlet shall be cleaned and inspected for proper functioning.

In the case that water remains in the infiltration section of the basin for greater than three (3) days after a storm event, an inspection is warranted and necessary maintenance repairs to the subsurface layers of the basin to restore the infiltration function are required.

The inspections shall be conducted by a licensed engineer or qualified professional (inspector). Estimated annual budget \$1,500.

3. **Cultec Chambers** – See Cultec O&M document, attached.

Maintenance Responsibilities:

All post construction maintenance activities will be documented and kept on file. Annual inspection reports in the form of an Evaluation Checklist and a cover letter (see attached form) **shall be submitted to the local Planning Board on an annual basis.**

Inspections shall be performed by a licensed engineer or similar professional (inspector).

The following minimum information shall be recorded:

- Date of inspection
- General condition of the entire system
- Corrective maintenance actions taken to ensure adequate function and when performed.
- A copy of these inspection reports shall be furnished to the appropriate agency upon request.
- Maintain a minimum of 3 years of O&M activity records.

Long-Term Pollution Prevention Plan

Good Housekeeping:

To develop and implement an operation and maintenance program with the goal of preventing or reducing pollutant runoff by keeping potential pollutants from coming into contact with stormwater or being transported off site without treatment, the following efforts will be made:

- Property Management awareness and training on how to incorporate pollution prevention techniques into maintenance operations.
- Follow appropriate best management practices (BMPs) by proper maintenance and inspection procedures.

Storage and Disposal of Household Waste and Toxics:

This management measure involves educating the general public on the management considerations for hazardous materials. Failure to properly store hazardous materials dramatically increases the probability that they will end up in local waterways. Many people have hazardous chemicals stored throughout their homes, especially in garages and storage sheds. Practices such as covering hazardous materials or even storing them properly, can have dramatic impacts. Property owners are encouraged to contract with a hazardous waste collection company as required for removal of the waste.

MADEP has prepared several materials for property owners on how to properly use and dispose of household hazardous materials:

<http://www.mass.gov/dep/recycle/reduce/househol.htm>

For consumer questions on household hazardous waste call the following number:

DEP Household Hazardous Waste Hotline 800-343-3420

The following is a list of management considerations for hazardous materials as outlined by the EPA:

- Ensuring sufficient aisle space to provide access for inspections and to improve the ease of material transport;
- Storing materials well away from high-traffic areas to reduce the likelihood of accidents that might cause spills or damage to drums, bags, or containers.
- Stacking containers in accordance with the manufacturers' directions to avoid damaging the container or the product itself;
- Storing containers on pallets or equivalent structures. This facilitates inspection for leaks and prevents the containers from coming into contact with wet floors, which can cause corrosion. This consideration also reduces the incidence of damage by pests.

The following is a list of commonly used hazardous materials used in the storage building:

Batteries – automotive and rechargeable
.....nickel cadmium batteries
.....(no alkaline batteries)
Gasoline
Oil-based paints
Fluorescent light bulbs and lamps
Pool chemicals
Propane tanks
Lawn chemicals,
fertilizers and weed killers

Disinfectant
Drain clog dissolvers
Driveway sealer
Flea dips, sprays and collars
Houseplant insecticides
Metal polishes
Mothballs
Motor oil and filters
Muriatic acid (concrete cleaner)
Nail polishes and nail polish removers

Turpentine
Bug sprays
Antifreeze
Paint thinners, strippers, varnishes and ...stains
Arts and crafts chemicals
Charcoal lighter fluid

Oven cleaner
Household pest and rat poisons
Rug and upholstery cleaners
Shoe polish
Windshield wiper fluid

Landscape Maintenance:

This management measure seeks to control the storm water impacts of landscaping and lawn care practices through education and outreach on methods that reduce nutrient loadings and the amount of storm water runoff generated from lawns. Nutrient loads generated by fertilizer use on suburban lawns can be significant, and recent research has shown that lawns produce more surface runoff than previously thought. Only slow release organic fertilizers may be used in wetland buffer zone areas and only after testing the soil and consultation with the Conservation Agent. See the attached Lawn Management Plan for sustainable lawn establishment and maintenance practices in sensitive areas.

Using proper landscaping techniques can effectively increase the value of a property while benefiting the environment. These practices can benefit the environment by reducing water use; decreasing energy use (because less water pumping and treatment is required); minimizing runoff of storm and irrigation water that transports soils, fertilizers, and pesticides; and creating additional habitat for plants and wildlife. The following lawn and landscaping management practices will be encouraged:

- Mow lawns at the highest recommended height, 3" plus.
- Minimize lawn size and maintain existing native vegetation.
- Collect rainwater for landscaping/gardening needs (rain barrels and cisterns to capture roof runoff).
- Raise public awareness for promoting the water efficient maintenance practices by informing users of water efficient irrigation techniques and other innovative approaches to water conservation.
- Abide by water restrictions and other conservation measures implemented by the City of Brockton.
- Water only when necessary.
- Use automatic irrigation systems with rain sensors to reduce water use.

The developer shall provide each homeowner with a copy of this document as well as the attached Lawn Management Plan. It is anticipated that the Conservation Commission will require a perpetual Special Condition within the Order of Conditions that require each homeowner, and every homeowner thereafter as ownership of the properties transfers from time to time, to receive a copy of the Order of Conditions as well as this document and the attached Lawn Management Plan.

Integrated Pest Management (IPM):

This management measure seeks to limit the adverse impacts of insecticides and herbicides by providing information on alternative pest control techniques other than chemicals or explaining how to determine the correct dosages needed to manage pests. Be advised that the use of pesticides, herbicides and fungicides are not allowed within wetland buffer zones without first consulting with the Conservation Agent.

The presence of pesticides in stormwater runoff has a direct impact on the health of aquatic organisms and can present a threat to humans through contamination of drinking water supplies. The pesticides of greatest concern are insecticides, such as diazinon and chlorpyrifos, which even at very low levels can be harmful to aquatic life. The major source of pesticides to urban streams is home application of products designed to kill insects and weeds in the lawn and garden. The following IPM practices will be encouraged:

- Lawn care and landscaping management programs including appropriate pesticide use management as part of program.
- Raise public awareness by referring homeowners to “A Homeowner’s Guide to Environmentally Sound Lawn care, Maintaining a Healthy Lawn the IPM Way”, Massachusetts Department of Food and Agriculture, Pesticide Bureau or link <http://www.mass.gov/dep/water/resources/nonpoint.htm#megaman>>
- Proper implementation of the Lawn Maintenance Plan will reduce the need for pesticides, herbicides or fungicides in the first place and is therefore the best management practice for lawn and pest management.

Proper Management of Deicing Chemicals and Snow:

The following deicing chemicals and snow storage practices will be encouraged:

- Select effective snow disposal sites adjacent to or on pervious surfaces in upland areas away from water resources and wells. At these locations, the snow meltwater can filter in to the soil, leaving behind sand and debris, which can be removed in the springtime.
- No roadway deicing materials shall be stockpiled on site unless all storage areas are protected from exposure to rain, snow, snowmelt and runoff.
- Avoid dumping snow into any waterbody, including wetlands, cranberry bogs, detention/infiltration basins, forebays, and grassed swales/channels.
- Avoid disposing of snow on top of storm drain catch basins.

Property Location: 6 Station Ave., Harwich, MA 02657

Date: _____

Stormwater Management – Long-Term Operation and Maintenance

Best Management Practices – Inspection Schedule and Evaluation Checklist

Long Term Practices

Best Management Practice	Inspection Frequency (1)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check (1)	Cleaning/Repair Needed: <input type="checkbox"/> yes <input type="checkbox"/> no (List Items)	Date of Cleaning/Repair	Performed by
Infiltration System				Sediment level, trash removal			
Parking Lot & Driveway Maintenance				Pavement sweeping/vacuuming			

(1) Refer to the Massachusetts Stormwater Management, Volume Two: MA Stormwater Handbook (Feb. 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP's.

Contactor® & Recharger® Stormwater Chambers



Operation and Maintenance Guidelines for CULTEC Stormwater Management Systems

The Founder of Plastic Chamber Technology

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Operations and Maintenance Guidelines

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Contact Information:

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

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

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

Introduction

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

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

Operation and Maintenance Requirements

I. Operation

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

II. Inspection and Maintenance Options

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

2. StormFilter Access

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

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

III. Maintenance Guidelines

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

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

IV. Suggested Maintenance Schedules

A. Minor Maintenance

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

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

B. Major Maintenance

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

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

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

WQMP

Operation & Maintenance (O&M) Plan

Project Name: _____

Prepared for:

Project Name: _____

Address: _____

City, State Zip: _____

Prepared on:

Date: _____

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

8.1.1 Project Information

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

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

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

8.1.3 Record Keeping

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

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

8.1.4 Electronic Data Submittal

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

Appendix ____

BMP SITE PLAN

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



BMP OPERATION & MAINTENANCE LOG

Project Name: _____

Today’s Date:_____

Name of Person Performing Activity (Printed):_____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

Minor Maintenance

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

Major Maintenance

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

Major Maintenance

Frequency		Action
CULTEC Stormwater Chambers	9 years after commissioning every 9 years following	<input type="checkbox"/> Clean stormwater management chambers and feed connectors of any debris. <input type="checkbox"/> Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	Notes	
	<input type="checkbox"/> Year 9	Date:
	<input type="checkbox"/> Year 18	Date:
	<input type="checkbox"/> Year 27	Date:
	<input type="checkbox"/> Year 36	Date:
	45 years after commissioning	<input type="checkbox"/> Clean stormwater management chambers and feed connectors of any debris. <input type="checkbox"/> Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. <input type="checkbox"/> Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. <input type="checkbox"/> Attain the appropriate approvals as required. <input type="checkbox"/> Establish a new operation and maintenance schedule.
	Notes	
	<input type="checkbox"/> Year 45	Date:

Major Maintenance

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

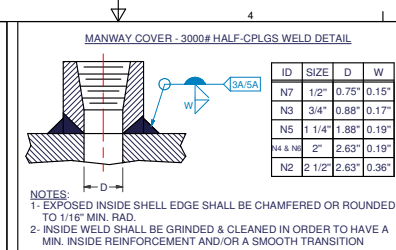


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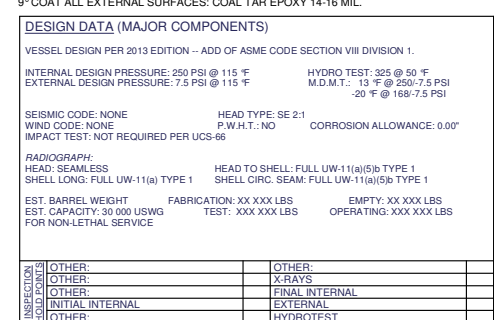
878 Federal Road | P.O. Box 280 | Brookfield, CT 06804 USA


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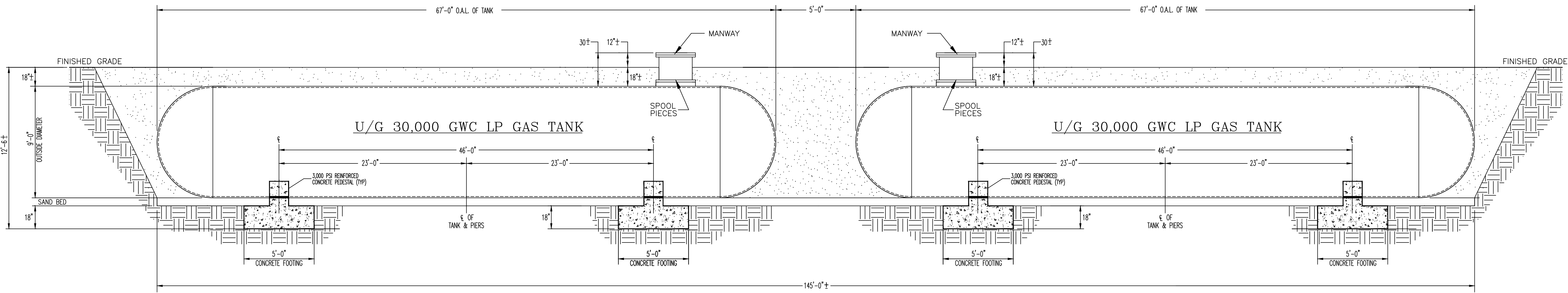


GENERAL NOTES:

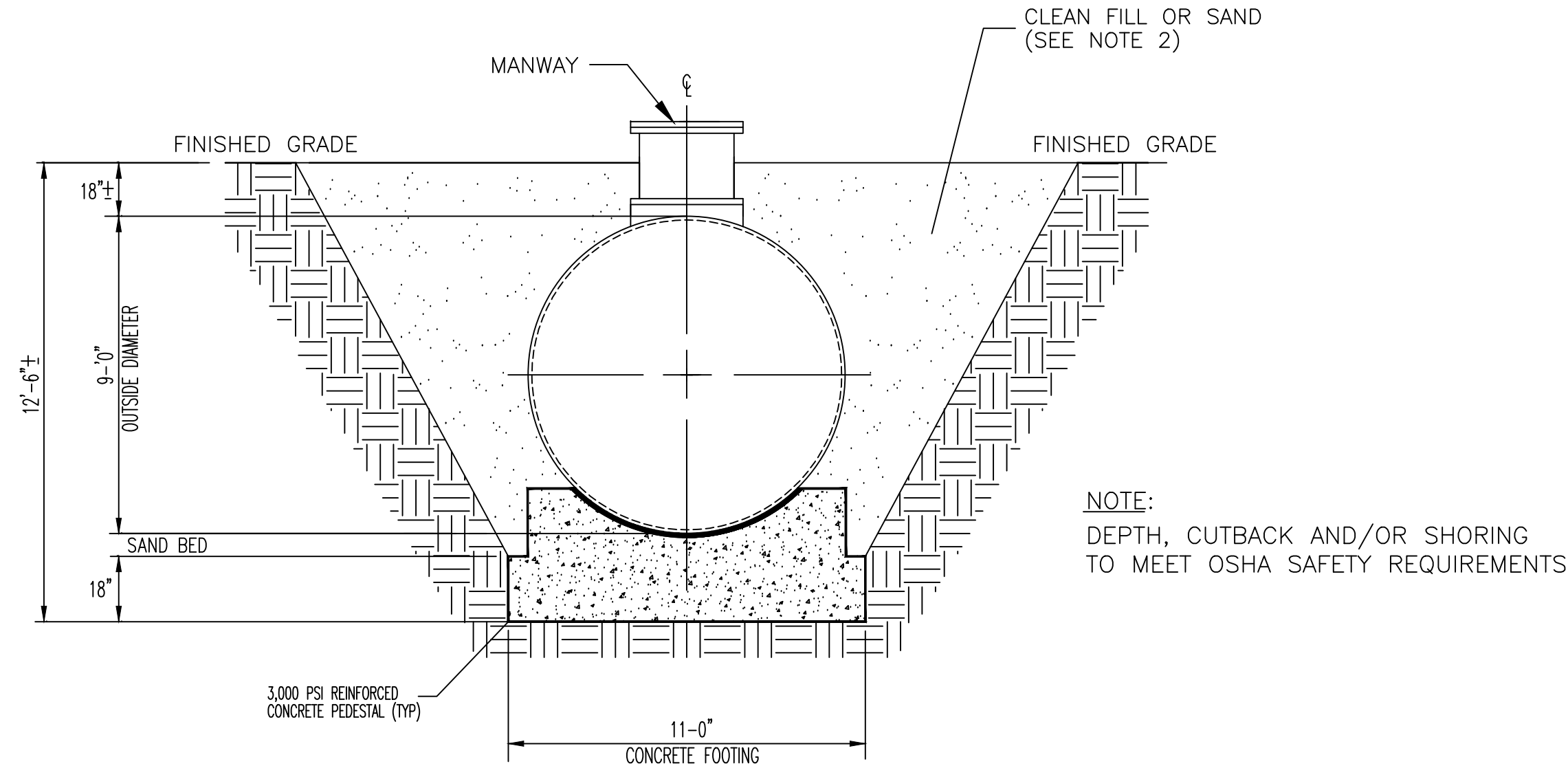
- 1. WELDS SHALL BE NEAT IN APPEARANCE, FREE OF SLAG, UNDERCUTS AND OTHER DEFECTS.
- 2. NOZZLE AND TAIL DIMENSION TOLERANCES SHALL BE $\pm 1/8"$ UNLESS OTHERWISE NOTED.
- 3. VESSEL SHALL BE CLEANED OF SCALE, OIL, WELD SPATTER AND ALL OTHER FOREIGN MATTER BEFORE HYDROSTATIC TEST.
- 4. COAT NOZZLE GASKET SURFACE WITH PROTECTIVE LUBRICANT BEFORE BLANKING FOR SHIPMENT.
- 5. PROTECT ALL MACHINED SURFACES AND THREADED CONNECTIONS WITH WOOD OR OTHER PROTECTIVE PREVENT BEFORE SHIPMENT.
- 6. FLANGE BOLT HOLES SHALL STRADDLE NORMAL VESSEL CENTERLINES UNLESS NOTED.
- 7. ALL PAD SHALL HAVE A 0.018 WEEP HOLE.
- 8. ALL INTERNAL SURFACES SHALL BE COATED WITH AN ANTI-ROST UNDERLASH TO SSPC SP10.
- 9. COAT ALL EXTERNAL SURFACES, COAT TAIL EPOXY 14-18 MIL.



0	DESCRIPTION	DATE	BY	APPROVED
REV	REVISIONS			
		131" ID UNDERGROUND HORIZONTAL PROPANE STORAGE VESSEL 30000 USWG QTY: : 1X		
MANUFACTURING TOLERANCES DIAMETER WITHIN 1% OF DIAMETER OF VESSEL UNLESS NOTED UNSPECIFIED TOLERANCE METAL WORK DIM JOX JOXX FILLET WELD ±20% .015 UNDERLAY ±.13 ±.015 BUT AND UP ±.25 ±.020 ANGLES ±.1		DWG 144066-1	REV. 0	DATE 14-0666 01/07/2014
CRN REF. DWG P1090C004		CRN REV 0	CUSTOMER QUALITY GAS	
SIGNATURE		SIZE D	SCALE N.T.S.	
DATE		SHEET 1 OF 1		



U/G 30,000 GWC TANKS
SIDE VIEW CROSS SECTION DETAIL
SCALE: NONE

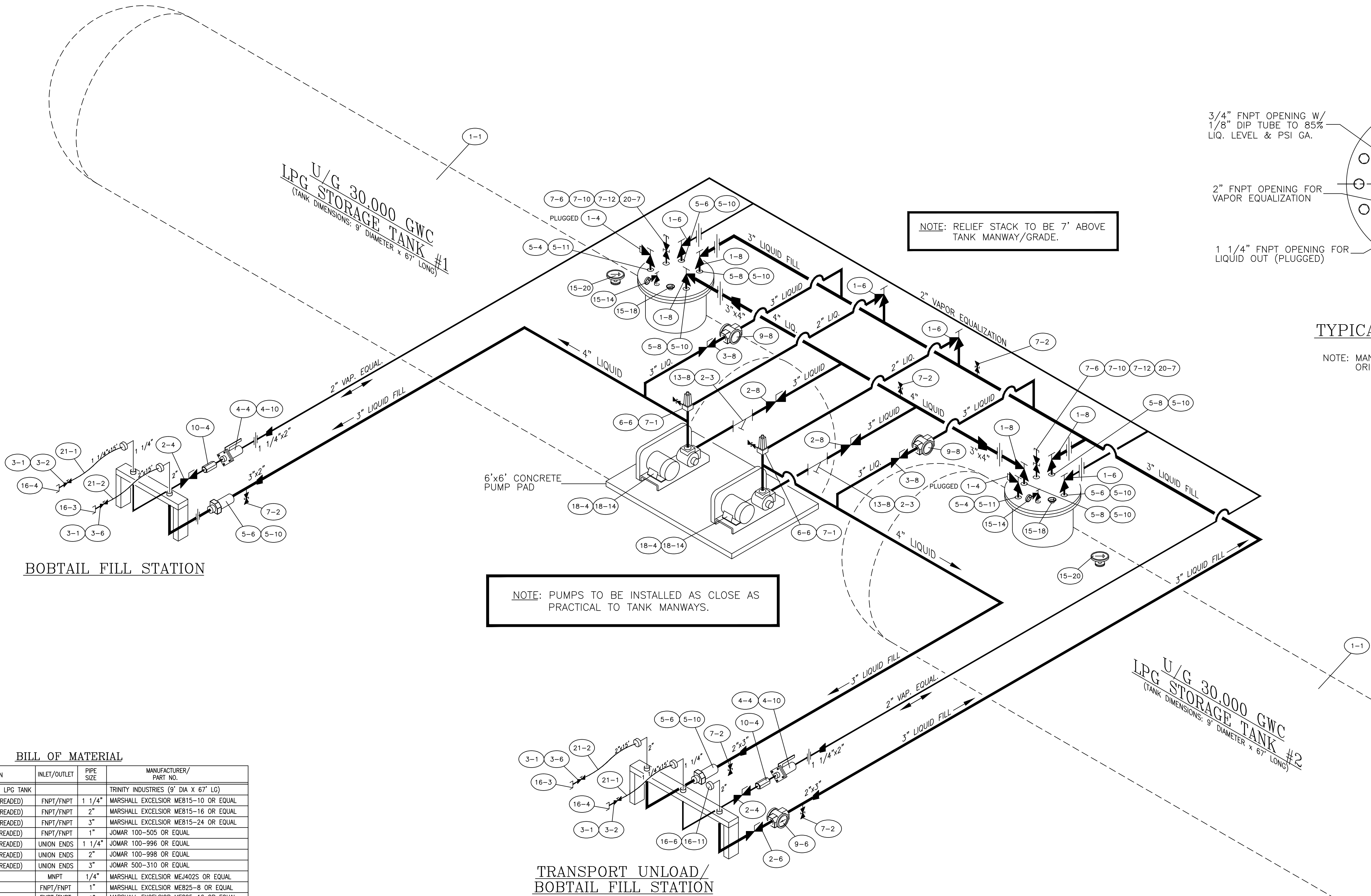


U/G 30,000 GWC TANKS
END VIEW CROSS SECTION DETAIL
SCALE: NONE

TANK INSTALLATION DETAIL
SCALE: NONE

- GENERAL NOTES:
- 1.) IN THE EVENT HIGH WATER TABLE ELEVATIONS EXCEED THE BOTTOM TANK INVERT ELEVATION THEN A CONCRETE BALLAST PAD COMPLETE WITH HOLD DOWN EQUIPMENT MAY BE REQUIRED.
 - 2.) ALL FILL SHALL BE FREE OF STONES OR MATTER THAT MAY DAMAGE COATING OF TANK, OR CLEAN SAND BACKFILL.
 - 3.) CONTAINER SHALL BE GIVEN A ANTI-CORROSIVE PROTECTION COATING AND CATHODIC PROTECTION PRIOR TO BEING BACKFILLED.
 - 4.) BACKFILL IS TO BE COMPACTED BY MECHANICAL MEANS (VIBRATION & TAMPERED) IN INCREMENTS OF ONE FOOT UP TO GRADE.

U/G TANK DETAIL	REFERENCES				CROWN ENERGY SOLUTIONS, LLC	
	DRAWN	J.P.Y.	DATE	2/22/19		
	SCALE	NONE	CHECKED			
	THIS DRAWING IS THE PROPERTY OF CROWN ENERGY SOLUTIONS WINDHAM, NH AND SHALL NOT BE COPIED OR DUPLICATED WITHOUT THEIR WRITTEN PERMISSION.					
	DWG.NO. 1902-007 Sheet 2 of 2					
19 GARDNER ROAD					WINDHAM, NEW HAMPSHIRE 03087 PHONE: (603) 425-9393	
MARK					DATE	BY



BILL OF MATERIAL

SYMBOL	QTY.	DESCRIPTION	INLET/OUTLET	PIPE SIZE	MANUFACTURER/PART NO.
1-1	2	U/G 30,000 GWC LPG TANK			TRINITY INDUSTRIES (9' DIA X 67' LG)
1-4	2	ANGLE VALVE (THREADED)	FNPT/FNPT	1 1/4"	MARSHALL EXCELSIOR ME815-10 OR EQUAL
1-6	4	ANGLE VALVE (THREADED)	FNPT/FNPT	2"	MARSHALL EXCELSIOR ME815-16 OR EQUAL
1-8	4	ANGLE VALVE (THREADED)	FNPT/FNPT	3"	MARSHALL EXCELSIOR ME815-24 OR EQUAL
2-3	2	BALL VALVE (THREADED)	FNPT/FNPT	1"	JOMAR 100-505 OR EQUAL
2-4	2	BALL VALVE (THREADED)	UNION ENDS	1 1/4"	JOMAR 100-996 OR EQUAL
2-6	1	BALL VALVE (THREADED)	UNION ENDS	2"	JOMAR 100-998 OR EQUAL
2-8	2	BALL VALVE (THREADED)	UNION ENDS	3"	JOMAR 500-310 OR EQUAL
3-1	4	BLEEDER VALVE	MNPT	1/4"	MARSHALL EXCELSIOR ME1402S OR EQUAL
3-2	2	GLOBE VALVE	FNPT/FNPT	1"	MARSHALL EXCELSIOR ME825-8 OR EQUAL
3-6	2	GLOBE VALVE	FNPT/FNPT	2"	MARSHALL EXCELSIOR ME825-16 OR EQUAL
3-8	2	GLOBE VALVE	FNPT/FNPT	3"	MARSHALL EXCELSIOR ME825-24 OR EQUAL
4-4	2	EMERGENCY SHUT-OFF VALVE	MNPT/FNPT	1 1/4"	MARSHALL EXCELSIOR ME880-10 OR EQUAL
4-10	2	PNEUMATIC ACTUATOR			MARSHALL EXCELSIOR ME552 OR EQUAL
5-4	2	INTERNAL VALVE (250 GPM)	MNPT/FNPT	1 1/4"	MARSHALL EXCELSIOR ME992-10 OR EQUAL
5-6	4	INTERNAL VALVE (250 GPM)	MNPT/FNPT	2"	MARSHALL EXCELSIOR ME990AR-16 OR EQUAL
5-8	4	INTERNAL VALVE (400 GPM)	MNPT/FNPT	3"	MARSHALL EXCELSIOR ME990AR-24 OR EQUAL
5-10	8	PNEUMATIC ACTUATOR			MARSHALL EXCELSIOR ME206 OR EQUAL
5-11	2	PNEUMATIC ACTUATOR			MARSHALL EXCELSIOR ME205 OR EQUAL
6-6	2	BYPASS VALVE (25-75 PSI)	FNPT/FNPT	2"	MARSHALL EXCELSIOR ME840-16 OR EQUAL
7-1	2	HYDRO. RELIEF VALVE(450 PSI)	MNPT	1/4"	MARSHALL EXCELSIOR MEH25 OR EQUAL
7-2	5	HYDRO. RELIEF VALVE(450 PSI)	MNPT	1/2"	MARSHALL EXCELSIOR MEH50 OR EQUAL
7-6	2	TANK RELIEF VALVE (250 PSI)	MNPT	2"	MARSHALL EXCELSIOR MEV200SRV/250 OR EQ.
7-10	2	PIPE-AWAY ADAPTOR	MNPT	3"	MARSHALL EXCELSIOR MEP104-24 OE EQUAL
7-12	2	RAINCAP	-	3"	
9-6	1	BACKCHECK w/ SIGHT GLASS	MNPT	2"	MARSHALL EXCELSIOR ME875S-16
9-8	2	BACKCHECK w/ SIGHT GLASS	MNPT	3"	MARSHALL EXCELSIOR ME875S-24
10-4	2	EXCESS FLOW VALVE	MNPT/FNPT	1 1/4"	MARSHALL EXCELSIOR ME880-10 OR EQUAL
13-8	2	STRAINER	FLANGE	3"	MARSHALL EXCELSIOR ME656S OR EQUAL
15-14	2	VENT/PRESSURE VALVE	MNPT/FNPT	3/4"	MARSHALL EXCELSIOR MEJ415G OR EQUAL
15-18	2	THERMOMETER	-	1/2"	MARSHALL EXCELSIOR MEJ701 OR EQUAL
15-20	2	LIO. FLOAT GA. w/ 4" DIAL	-	2 1/2"	SQUIBB TAYLOR OR EQUAL
16-3	2	ACME ADAPTOR	FACME/MNPT	3 1/4"	REGO 3195 OR EQUAL (3 1/4" FACME x 3" MNPT)
16-4	2	ACME ADAPTOR	FACME/MNPT	1 3/4"	REGO 3175A OR EQUAL (1 3/4" FACME x 1" MNPT)
16-6	1	STEEL CAP w/ CHAIN			REGO A3194-90 OR EQUAL
16-11	1	ACME ADAPTOR	MACME/MNPT	3 1/4"x2"	REGO 5785F OR EQUAL
18-4	2	PUMP (BOBTAIL FILL)	-	3"	CORKEN Z3500 (780 RPM) OR EQUAL
18-14	2	10 HP EXPLOSIONPROOF MOTOR	-	-	1750 RPM(208/230/460V-3PH)
20-7	2	3"x 7" GALVANIZED STACKS	-	-	
21-1	2	LP GAS HOSE 1 1/4"x 15'	MNPT/MNPT	1 1/4"	CRIMPED ENDS/STAMP DATE
21-2	2	LP GAS HOSE 2"x 15'	MNPT/MNPT	2"	CRIMPED ENDS/STAMP DATE

LPG TANK PIPING DIAGRAM

SCALE: NONE

NOTE: PIPING DIAGRAM ONLY ACTUAL PIPING LAYOUT MAY VARY.

TYPICAL MANWAY DETAIL

SCALE: NONE

NOTE: MANWAY OPENINGS AND/OR OPENING ORIENTATION MAY VARY

NOTE: PROPANE STORAGE INSTALLATION MEETS REQUIREMENTS OF NFPA 58 CURRENT EDITION

NOTE: THE FOLLOWING SIGNAGE WILL BE INSTALLED ON PROPANE TANKS & FENCING:

NO SMOKING
FLAMMABLE GAS
PROPANE
NFPA 1075 (OSHA)

NOTE: LPG PIPING TO BE LABELED LIQUID/VAPOR & SHOW FLOW DIRECTION.

REFERENCES	DRAWN	J.P.Y.
	DATE	2/20/19
	SCALE	NONE
	CHECKED	

THIS DRAWING IS THE PROPERTY OF CROWN ENERGY SOLUTIONS. UNLESS SHOWN OTHERWISE, IT IS NOT TO BE REPRODUCED OR COPIED WITHOUT THEIR WRITTEN PERMISSION.

REVISION	DATE	BY	DESCRIPTION
1.	2/23/19	JY	ADDED 3" LINE FROM PUMP DISCHARGE TO LIQUID FILL LINE

WARRANT ART.
39

Amend Zoning Article XXIV by adding a new Section - §325-160 Design Guidelines

Article 39: To see if the Town will vote to amend the Code of the Town of Harwich – Zoning Article XXIV West Harwich Special District by adding a new §325-160 as follows:

§325-160 Design Guidelines

For the purpose of this section the Harwich Planning Board, after a public hearing, shall adopt “*West Harwich Special District Site and Architectural Design Guidelines*” which shall constitute rules and regulations guiding historic structures and new construction within the WHSD. And to act fully thereon. By request of the Planning Board

***Explanation:** The new section 325-160 references design guidelines for the West Harwich Special District, which will be created and adopted by the Harwich Planning Board through a separate public hearing process. These guidelines will assist property owners and applicants with the development and redevelopment of properties within the West Harwich Special District (aka the West Harwich DCPC).*

FINANCE COMMITTEE RECOMMENDS THIS ARTICLE BE ACCEPTED AND ADOPTED. VOTE: YES-7, NO-0

ROLL CALL VOTES:

Finance Committee:

To accept and adopt:

Yeas: 7 (seven): Mark Ameres, Mary Anderson, Jon Chorey, Dale Kennedy, Angelo LaMantia, Dan Tworek, Brian Weiner

Nays: 0 (zero): none

Board of Selectmen:

To accept and adopt:

Yeas: 4 (four): Larry Ballantine, Don Howell, Michael MacAskill, Ed McManus

Nays: 0 (zero): none

Article ____: To see if the Town will vote to amend the Code of the Town of Harwich – Zoning Article XXIV West Harwich Special District by adding a new §325-160 as follows:

§325-160 Design Guidelines

For the purpose of this section the Harwich Planning Board shall adopt “*West Harwich Special District Site and Architectural Design Guidelines*” which shall constitute rules and regulations guiding historic structures and new construction within the WHSD.

Explanation: *The new section 325-160 references design guidelines for the West Harwich Special District, which will be created and adopted by the Harwich Planning Board through a separate public hearing process. These guidelines will assist property owners and applicants with the development and redevelopment of properties within the West Harwich Special District (aka the West Harwich DCPC).*

Article ____: To see if the Town will vote to amend the Code of the Town of Harwich – Zoning by amending §325-42.L by making the following changing (new text shown in **bold underline** and deleted language shown in ~~strike-out~~):

Parking and loading zone setbacks for all uses except single-family, two-family and single-family with accessory apartment shall be as follows. For commercial structures, wheel stops for parking spaces perpendicular to or at an angle to a structure shall be located so as to provide a clear area of three feet between the end of a vehicle parked in the space and the nearest structure.

Zone	Parking Setbacks ¹ (feet)		
	Street	Side Line	Rear
RR, RM, RL, RH-1, RH-2 and RH-3	20	10	10
CV, CH-1 and CH-2	20	10	10
IL	15	5	5
MRL and MRL-1	50	50	50
	<u>Note 2</u>	<u>Note 2</u>	<u>Note 2</u>

Notes:

¹ No parking area containing more than four spaces or loading area shall be located within a required front yard, except that those buildings utilizing the provisions of §325-51L (Village Commercial Overlay District) shall not locate any parking within the front yard.

²(1) On already improved properties, the setbacks for parking shall be established at the time of the site plan review.

(2) For vacant lands to be developed for any purpose (other than single-family, two-family and single-family with accessory apartment) the minimum setbacks for parking shall be 25 feet from the street and rear property line and 20 feet from the side property line.

Explanation: *These changes would allow for creativity and flexibility for parking within the MRL and MRL-1 zoning district, particularly for already improved properties.*

OFFICE OF THE TOWN ADMINISTRATOR

Joseph F. Powers, *Town Administrator*
Meggan M. Eldredge, *Assistant Town Administrator*

Phone (508) 430-7513

Fax (508) 432-5039

732 MAIN STREET, HARWICH, MA 02645



Memo

To: Planning Board

From: Joseph F. Powers, *Town Administrator*

RE: Zoning By-Law Article for ATM '21

Date: April 5, 2021

Dear Members of the Planning Board,

At a regularly scheduled meeting of the Board of Selectmen on March 24, 2021, the proposed zoning amendment "Parking Setbacks MRL and MRL-1 Zoning Districts" was discussed. The Board voted to not include this zoning amendment in the warrant for the 2021 Annual Town Meeting.

TOWN OF HARWICH PLANNING DEPARTMENT

PLANNING BOARD APPLICATION SPECIAL PERMITS & SITE PLAN REVIEW

FORM A



TO THE TOWN CLERK, HARWICH, MA

DATE _____

PART A – APPLICANT INFORMATION/AUTHORIZATION

Applicant Name(s)	Allen Harbor Yacht Club
Representative/Organization (Who will serve as the primary contact responsible for facilitating this application?)	by their Architect Joseph F. Fournier, Jr., AIA JFF Design, Architects
Mailing address	24 Warwick Avenue
Town, ST, Zip	Waltham, MA 02452
Phone	781-899-6908
Fax	781-899-3050
E-mail	architects@jffdesign.com

The applicant is one of the following: (please check appropriate box)

- ☐ Owner ☐ Prospective Buyer* ☒ Representative for Owner/Tenant/Buyer*
☐ Tenant* ☐ Other* _____

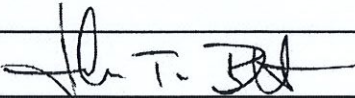
***Written permission of the owner(s) and a municipal lien certificate (where applicable) is required.**

All other forms and information as required in the Harwich Code Chapter 400, Rules and Regulations, shall be submitted as part of this application.

Authorization

Your signature hereby asserts, to the best of your knowledge, that the information submitted in this application is true and accurate; that you agree to fully comply with the Town of Harwich Zoning By-laws and the terms and conditions of any approval of this application by the Planning Board; and authorizes the Members of the Planning Board and/or Town Staff to visit and enter upon the subject property for the duration of the consideration of this application.

Allen Harbor Yacht Club

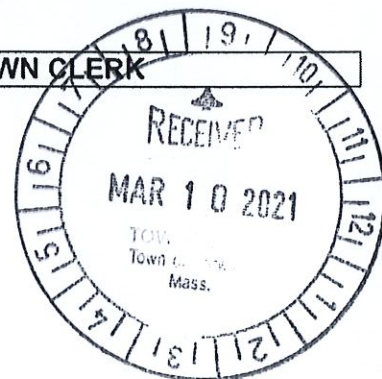
Applicant John T. Blute, Commodore AHYC 

Owner(s) – Authorization must accompany application if the owner is not the applicant.

Official use only:

PLANNING DEPARTMENT	TOWN CLERK
Case #	

PB 2021-05



PART B – PROJECT LOCATION

Legal Street Address	371 Lower County Road	Village/Zip Code	02671
Title Book/Page or L.C.C. #	Book 4836 Page 285		
Map(s) / Parcel(s)	Assessors Map 13 Parcel P1-3		
Zoning & Overlay Districts	RH-1	*Historic?	NO
Frontage (linear feet)	Required: 150' Actual: 693.45'		
Total land area (s.f.)	85,050 +/- square feet		
Upland (s.f.)	15,830 +/- square feet	Wetlands (s.f.)	

DECK & HANDICAPPED RAMP
REPLACEMENT & EXTENSION

PART C – PROJECT DESCRIPTION

Existing Floor Area in Sq. Ft	Gross: 861 SF DECK - 772 PATIO	Net:
Proposed Floor Area in Sq. Ft	Gross: 1755 SF DECK - 1406 PATIO	Net:
Change in Sq. Ft + / -	+Gross: 894 SF DECK - 647 SF PATIO	
Existing # of parking spaces	60 onsite 38 adj.	Proposed # of parking spaces: 60 onsite 38 adj.
Existing Use(s)	Private Club	
Proposed Use(s)	Private Club	
Attach a separate narrative if necessary.		

The undersign hereby files an application with the Harwich Planning Board for the following special permits as proposed under the provisions of the Harwich Zoning Code: **(check all that apply)**

Site Plan Review § 325-55:

- ☐ Any floor area expansion of any structure or expansion of exterior space, other than parking, serving any of the following: commercial, industrial, multi-family or educational use or personal wireless service facility or the creation of a drive-up or drive-through window
- ☐ Expansion or reconfiguration of an existing parking lot and/or driveway(s) serving said parking lot.
- ☐ Establishment of any new commercial, industrial, multi-family, educational, fast food/take out restaurant or personal wireless service facility.
- ☐ Establishment of any new retail use(s) in the Industrial (IL) Zone.
- ☒ Waiver of Site Plan § 325-55.F

Article V, Use Regulations:

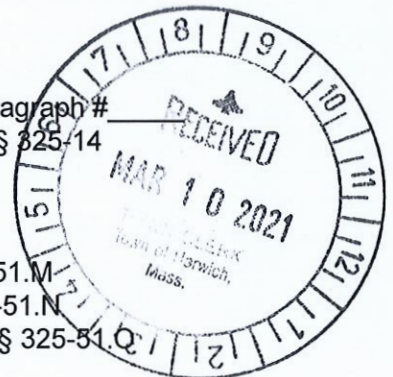
- ☐ Paragraph _____, sub-paragraph # _____
- ☐ Paragraph _____, sub-paragraph # _____
- ☐ Paragraph _____, sub-paragraph # _____, supplemental regulation # _____ § 325-14

Article X, Special Permits:

- ☐ Structures w/ gross floor area of 7,500+ s.f. § 325-51
- ☐ Structures requiring 20 or more new parking spaces § 325-51
- ☐ Accessory Apt./Shared Elderly Housing § 325-51.H
- ☐ Mixed Use § 325-51.M
- ☐ Drinking Water Resource Protection § 325-51.C
- ☐ Two Family § 325-51.N
- ☐ Village Commercial, Harwich Port § 325-51.L
- ☐ *Harwich Center Overlay § 325-51.Q
- ☐ Signage § 325-27.F Additional Cluster, Excess SF, Non-entry Facades

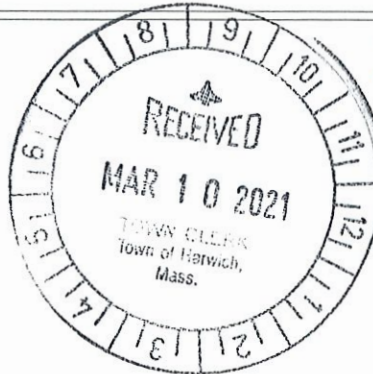
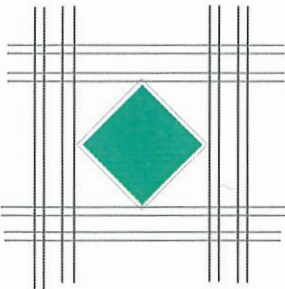
Other Special Permits:

- ☐ Six Ponds Special District - Article XVI
- ☐ Wind Energy Systems - Article XVIII
- ☐ Large Scale Wind Generation – Article XIX
- ☐ Other (i.e. Alternate Access § 325-18.P, Special Cases § 325-44.B) _____
- ☐ Repetitive Petition (MGL Ch 40A, §16): Proposed project evolved from a previously denied plan submitted to the Planning Board on _____ Year/Case # _____



**Note: Projects within the Harwich Center Overlay District may also be within the Harwich Center Historic District. This requires separate filing with the Historic District and Historical Commission. Please inquire for forms and instructions.*

September 2011



JFF DESIGN
ARCHITECTS AND PLANNERS

March 8, 2021

Town of Harwich
Planning Department
732 Main Street
Harwich Center, MA 02645

Re: Site Plan Review Waiver Request
Allen Harbor Yacht Club, 371 Lower County Road, West Harwich, MA 02671

Dear Members of the Harwich Planning Board:

On behalf of our client, Flag Officers of the Allen Harbor Yacht Club, we humbly request a waiver of site plan review pursuant to our proposed deck extension project. The waiver request is based on the minimal impact our proposed project of deck and handicapped ramp replacement and extension will have to the client's parcel. The proposed extension is fully compliant with all zoning setbacks.

The current deck is constructed of pressure treated decking on an open pressure treated frame. The condition of this deck has deteriorated to end of life and presents a safety concern. Our proposed deck is to be constructed of composite material over a fully covered roof deck system and internal gutter drainage system enabling complete capture of water run-off for transfer to our proposed on-site water management system approved by the Conservation Commission. We also want to take advantage of this deck replacement to include our new handicapped ramp. The current ramp is not compliant with standards set forth in the Massachusetts Architectural Access Board (MAAB). The intent of our proposed design is to make all doors entering from the deck level fully accessible to the upper lounge.

The lower patio will also be replaced and enlarged slightly from existing. This work is necessary to provide adequate structural support for the deck / roof structure above. We propose to improve this patio space for the use of the club but equally to manage any surface water into the drainage system. The size of the patio space is only a portion of the deck space above to accommodate new supporting walls and columns for the super structure above and earth retainage.

The increase of the deck and handicapped ramp area is 894 square feet but when we remove the circulation area for egress and the handicapped ramp and required maneuvering area, the increase is only 525 square feet or 60% increase. The patio space increase is a higher percentage due to the support required for deck above. We feel this increase is consistent with the current use and will not adversely impact nor will be more detrimental to the neighborhood.

In all, the amount of extension proposed can be classified as minimal and more in keeping with current social distancing protocol. If we have learned anything over this past year, it is better to have the option to distance our seating if required and this additional space will accommodate that measure for the safety of the membership.

The proposed use of composite material will serve the club well for many years of use and will limit the amount of maintenance required in such an environmentally sensitive area as Allen Harbor. It is our opinion; the use of these materials will offer less of an environmental impact due to the longevity and pre-finished benefit.

This project has been reviewed and approved by the Conservation Commission and has been reviewed and signed off by the Harwich Health Department as part of the permit review process. We thank you for your time in reviewing our waiver request. We have submitted the requested material in support to our claims and look forward to your favorable reply.

Very truly yours,

Joseph F. Fournier, Jr., AIA
JFF Design, Architects



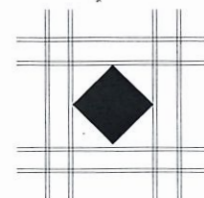
PROPOSED ADDITIONS/RENOVATIONS FOR:

ALLEN HARBOR YACHT CLUB

ALLEN HARBOR YACHT CLUB
371 LOWER COUNTY ROAD
WEST HARWICH, MA 02671

MARCH 8, 2021

PLANNING
BOARD WAIVER
SUBMITTAL



VC: 781-899-6908
FAX: 781-899-3050
EMAIL: ARCHITECTS@JFFDESIGN.COM

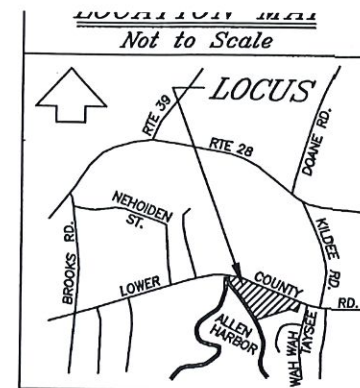
JFF DESIGN
ARCHITECTS & PLANNERS

24 WARWICK AVENUE
WALTHAM, MA 02452



LIST OF DRAWINGS - PLANNING BOARD WAIVER

A0.001	COVER SHEET PLANNING BOARD
A1.00	PROPOSED SURVEY PLAN
A1.02	LOWER LEVEL PLAN - PHASE I
A1.03	FIRST FLOOR PLAN - PHASE I



Site Coverage
 Existing = 48,431 s.f.± (56.9%)
 Proposed = 49,373 s.f.± (58.0%)

Building Coverage
 4,709 s.f.± (5.5%)

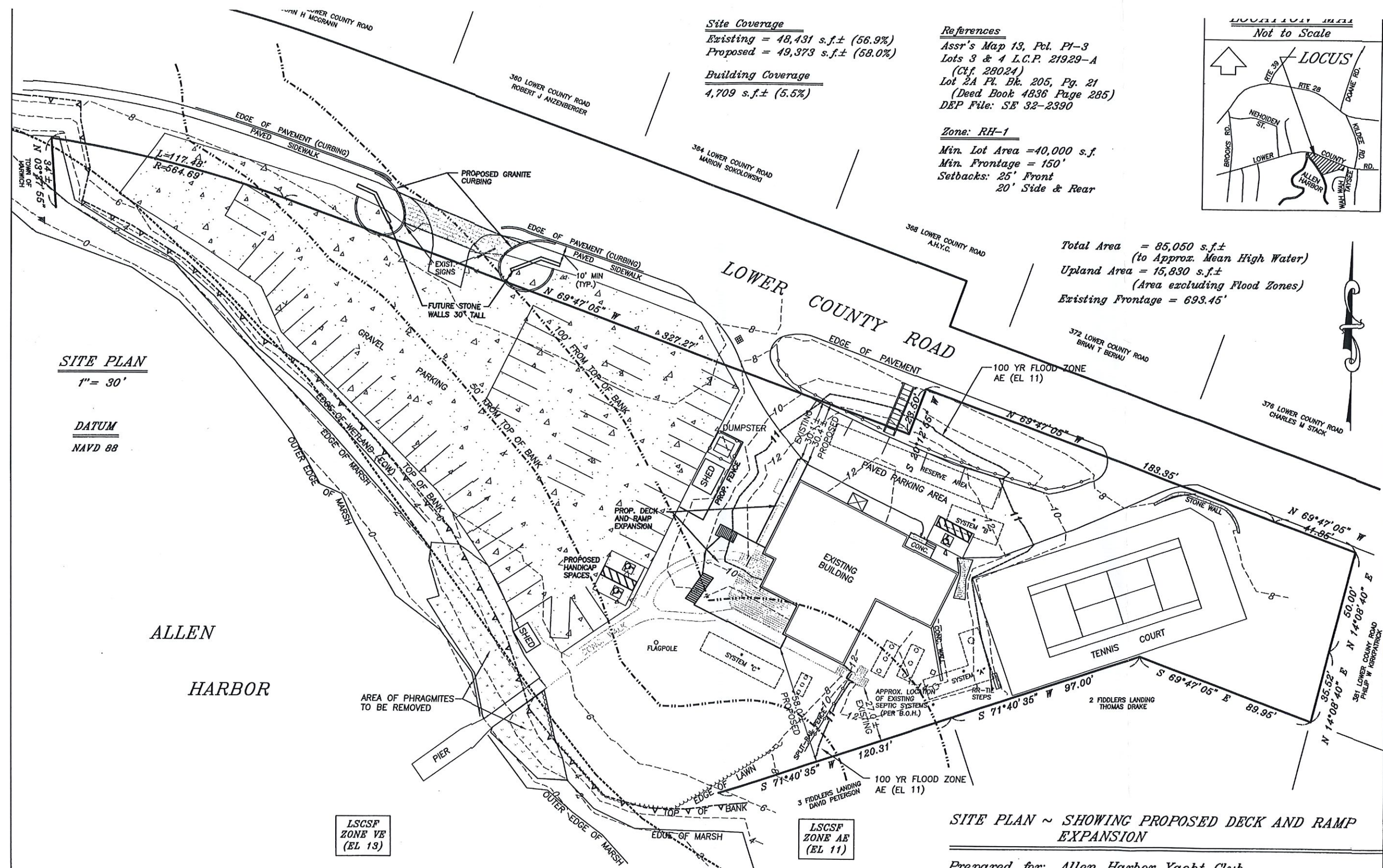
References
 Assr's Map 13, Pct. P1-3
 Lots 3 & 4 L.C.P. 21929-A
 (Ct. 28024)
 Lot 2A Pl. Bk. 205, Pg. 21
 (Deed Book 4836 Page 285)
 DEP File: SE 32-2390

Zone: RH-1
 Min. Lot Area = 40,000 s.f.
 Min. Frontage = 150'
 Setbacks: 25' Front
 20' Side & Rear

Total Area = 85,050 s.f.±
 (to Approx. Mean High Water)
 Upland Area = 15,830 s.f.±
 (Area excluding Flood Zones)
 Existing Frontage = 693.45'

SITE PLAN
 1" = 30'

DATUM
 NAVD 88



PARKING CALCULATION TABLE

Restaurant, lunchroom, bar, tavern, private club or other similar use 1 per 4 seats, including outdoor seating, plus 1 per employee maximum shift

OCCUPANCY:

UPPER LOUNGE & DECK- 189

LOWER LOUNGE & PATIO - 75

TOTAL OCCUPANCY 264 / 4 = 66 PARKING SPACES. - 3 SPACES REQUIRED UNIVERSALLY ACCESSIBLE.

TOTAL SPACES OFFERED ONSITE 57 + 3 HANDICAPPED SPACES = 60. ADJACENT LOT 368 LOWER COUNTY ROAD OFFERS 38 ADDITIONAL SPACES.

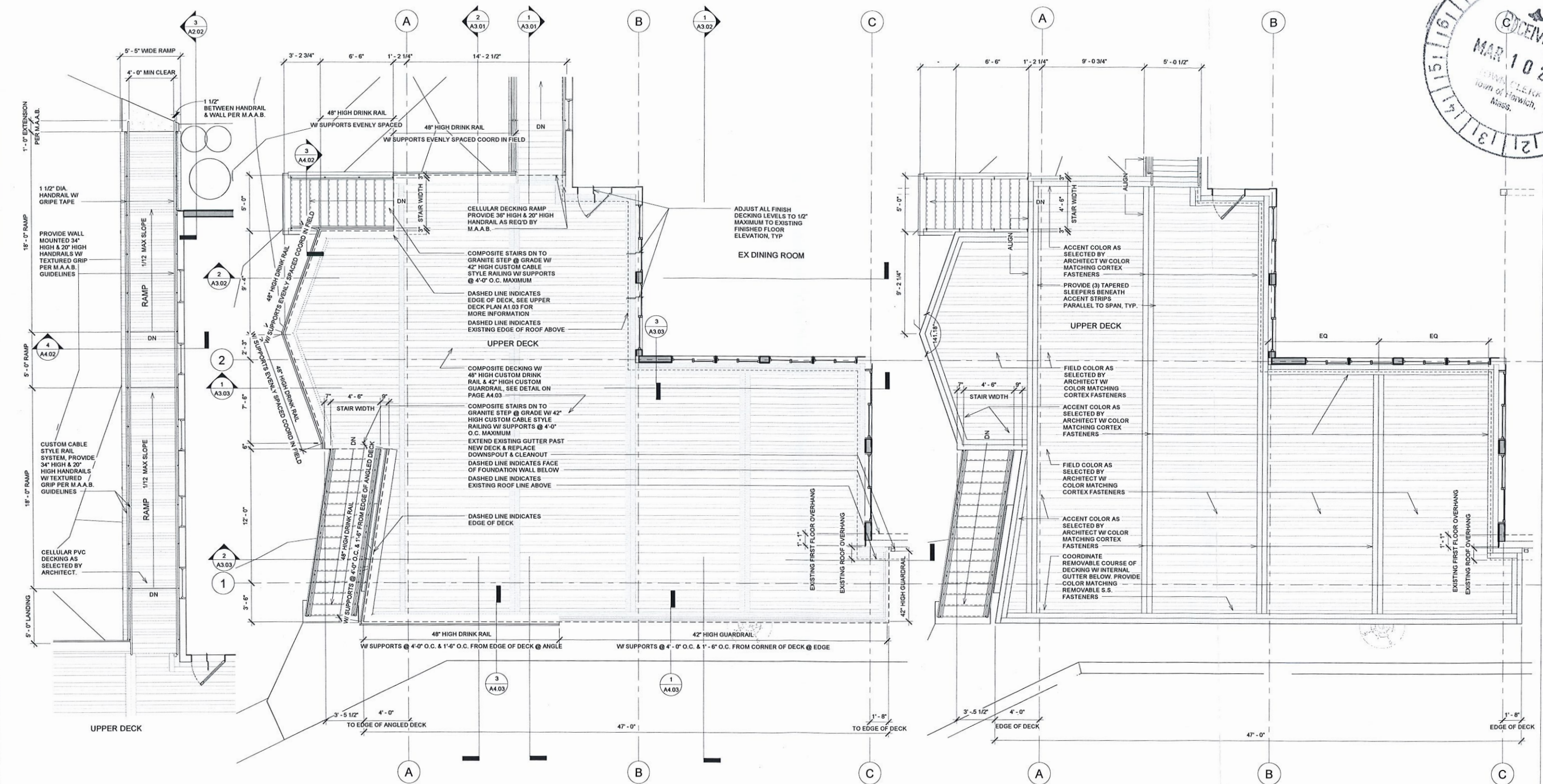
SITE PLAN ~ SHOWING PROPOSED DECK AND RAMP EXPANSION

Prepared for: Allen Harbor Yacht Club
 Location: 371 Lower County Rd., Harwich, MA

Ryder & Wilcox, Inc., P.E. & P.L.S.
 3 Ciddiah Hill Rd.
 P.O. Box 439
 So. Orleans, MA, 02662
 Tel. (508) 255-8312
 Fax. (508) 240-2306

Scale: 1" = 30'
 Drawn by DJC
 Date - July 29, 2019
 Rev. - January 22, 2021
 Rev. - March 5, 2021 (septic locations & zoning data)





1 C1.1 - FIRST FLOOR RAMP
1/4" = 1'-0"

2 C1 - FIRST FLOOR UPPER DECK - PHASE I
1/4" = 1'-0"

3 C1.2 - UPPER DECK
1/4" = 1'-0"

REV#	DESCRIPTION	REV DATE
1	DESCRIPTION	REV DATE
2	DESCRIPTION	REV DATE
3	DESCRIPTION	REV DATE
4	DESCRIPTION	REV DATE
5	DESCRIPTION	REV DATE
6	DESCRIPTION	REV DATE
7	DESCRIPTION	REV DATE
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18	DESCRIPTION	REV DATE
19	DESCRIPTION	REV DATE
20	DESCRIPTION	REV DATE

PROJECT:	PROPOSED ADDITIONS/RENOVATIONS FOR: ALLEN HARBOR YACHT CLUB 371 LOWER COUNTY ROAD HARWICH PORT, MA 02646
DRAWING TITLE:	FIRST FLOOR PLAN - PHASE I
DRAWING NUMBER:	A1.03
JOB #	201919

Planning Board Agenda Item III.B.1
April 13, 2021
Limited Staff Report #2
Covenant Release PB2007-36 Chapman; Zippo

White Rock Partners LLC, current owner, Mark Zippo, managing member, is seeking a partial release of the seven (7) or the remaining eight (8) lots at South Westgate Road held under the Agreement and Covenant (Bk/Pg: 22501/266). The subdivision is a 2007 Open Space Residential Development (OSRD) Definitive Subdivision.

Interdepartmental Staff Comments from March 23, 2021 report:

The Water Superintendent, Dan Pelletier, noted that the department has no outstanding issues. The Town Engineer, Griffin Ryder reviewed the documents and plans submitted. I reviewed the site on 3.16.21 and offer the following comments:

- The vacant lots adjacent to the subdivision roadway have been completely cleared with the soil exposed. There doesn't appear to be erosion controls or vegetation installed/applied to the cleared/disturbed areas.
- Section 400-14.D.4. Permanent erosion control installation states that, "Permanent (final) vegetation and mechanical measures to stabilize the land surface and control erosion shall be installed as soon as practicable after construction ends".
- Stockpiled material is being stored adjacent to the stormwater basin on what appears to be lot 4. The stockpiled material should be removed.
- The Stormwater basin has not yet been vegetated.

Based on the commented included above I suggest that one of the lots continue to be held my covenant until the work described herein is completed.

(Documents submitted for Engineering and Water departments reviews: Down Cape Engineering - Inspection Report and Road As-Built plan)

Planning Staff Comments:

Elaine Banta: ***The Planning Board continued the case and requested a copy of the Open Space Residential Subdivision plan. The plan is included with this report. The lot outlined in red and marked #4 is the lot being held.***

The in-lieu-of sidewalk fee payment has been collected. All other administrative issues have been meet.

Staff concurs with the Town Engineer and recommends partial release. One lot, Lot # 4 will continue to be held under the Agreement and Covenant until all requirements have been satisfied.

Recommended Motion:

Move to approve a partial release of Agreement & Covenant for seven (7) lots; being Lots #1-3 and Lots #5-8 of the South Westgate Road subdivision, PB2007-36.

[illegible]

Planning Board Agenda Item III.B.2
April 13, 2021
Limited Staff Report #2
Covenant Release PB2016-05 Tonka Girl LLC

Michael Escher, Manger is seeking a full release of the three (3) lots at Denwich Road under the Agreement and Covenant (Bk/Pg: 29732/12)

The Town Engineer, Griffin Ryder reviewed the documents and plans submitted. His offers the following comments:

- The vacant lots adjacent to the subdivision roadway have been completely cleared with the soil exposed. There doesn't appear to be erosion controls or vegetation installed/applied to the cleared/disturbed areas.
- Section 400-14.D.4. Permanent erosion control installation states that, "Permanent (final) vegetation and mechanical measures to stabilize the land surface and control erosion shall be installed as soon as practicable after construction ends".
- Stockpiled material is being stored on at least two of the vacant properties.
- The fire hydrants don't appear to be shown on the As-Built Plan.

Based on the comments included above I suggest that one of the lots continue to be held by covenant until the work is completed.

The Water Superintendent, Dan Pelletier, noted that the department has no outstanding issues.

Planning Staff Comments:

Elaine Banta: *The Planning Board continued the meeting and asked for a copy of the Subdivision Plan. The Plan is attached for review. Lot #4 was released in 2019.*

The three lots are as follows:

Lot #1: 3 Denwich Rd (55-G8-1), Lot #2: 7 Denwich Rd (55-G8-2),
Lot #3: 11 Denwich Rd (55-G8-4)

The in-lieu-of sidewalk fee payment has been satisfied. *All administrative requirements have been met.*

A stamped As-Built plan showing the fire hydrants shall be submitted before the final lot release.

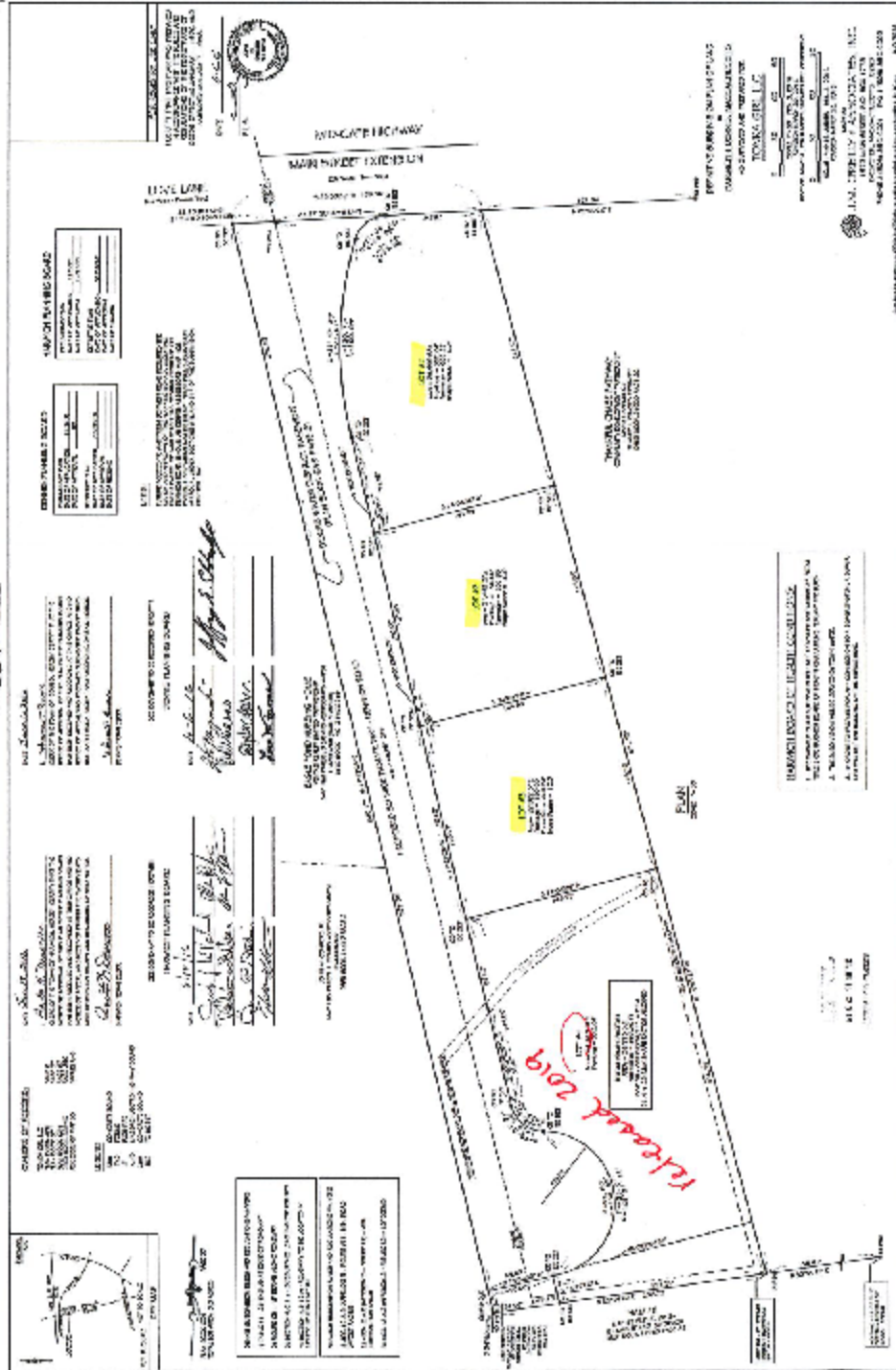
Staff concurs and recommends that one (1) lot, being Lot #1 – 3 Denwich Rd continued to be held under the Agreement and Covenant until the above issues have been satisfied.

Recommended Motion:

Move to approve a partial release of Agreement & Covenant for two (2) lots; Lots #2 and #3 of the Denwich Road subdivision, PB2016-05.



ENCLOSURE 87



L8-159