

CITY OF DOVER

PLANNING TECHNICAL REVIEW COMMITTEE –AGENDA

Meeting Type: Regular Meeting
Meeting Location: Council Conference Room, City Hall, 288 Central Ave, Dover NH 03820
Meeting Date: **Thursday, December 21, 2023**
Meeting Time: **10:30 AM**

1. 10:30 AM - 11:30 AM: Site Review for CESO (Owners: 914 Central Avenue, LLC), Assessor's Map 38, Lot 20, zoned C, located at 914 Central Avenue. (Proposal is for Hang Ten Car Wash development that will consist of a 4,400-sf building, sixteen (16) vacuum spaces, and two (2) employee parking spaces. Two (2) related Conditional Use Permit applications would also appear before the Planning Board. (SITE-2023-0008, COND-2023-0045, & COND-2023-0046)
[This item was previously heard on August 17, 2023 and December 21, 2023.]



PLAN SNAPSHOT REPORT SITE-2023-0008 FOR CITY OF DOVER, N.H.

Plan Type: Site Plan - Major
Work Class: New Construction
Status: Review Expired
Valuation: \$0.00
Description: Hang Ten car wash with parking and vacuums.

Project:
District: None
Square Feet: 0.00
Assigned To:

App Date: 07/25/2023
Exp Date: 09/28/2023
Completed: NOT COMPLETED
Approval Expire Date:

Parcel: 38020-000000	Main	Address: 914 Central Av Dover, NH	Main	Zone:
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Project Manager
Jason Rice
Mobile: (330) 807-1727

Applicant
Mandy Gauss
13060 S. US Hwy 27 Suite D
Suite D
Dewitt, MI 48820
Business: (517) 212-4185
Mobile: (586) 855-8130

Owner
Steve Lukin
Mobile: (508) 944-1450

Project Manager
Josh Lanzetta
601 Central Avenue
Dover, NH 03820
Home: (603) 777-0579
Business: (603) 777-0579
Mobile: (603) 777-0579

Plan Custom Fields

Total	0	Total2	0	Total3	0
Total4	0	Total5	0	Total6	0
Total7	0	Total8	0	Total9	0
Street Classification Type	Municipal	Net Change in # Parking Spaces (+/-)	24	Water Service	Municipal
Recording Number		Sewer Service	Municipal	Total Acres (GIS)	1.287
Deed Book		Total SQFT	56061.7	Deed Page	
Deed Date		Proposed Property Use	Hang Ten Car Wash	Area of Parcel to be Developed (SQFT)	56078
Number of Parking Spaces Existing	42	Number of Parking Spaces Proposed	18	Distance to City Water	0
Distance to City Sewer	0	Type of Building to be Built	Steel structure with infill wall material and structure	Estimated Construction Value	2500000.00
Refuse Removal	Public	Is there an existing Conservation Easement?	No	Existing Conservation Easement Details	
TotalImpactFeeSDTOD	0.00	TotalImpactFeeTHTOD	0.00	TotalImpactFee23FTOD	0.00
TotalImpactFeeA4TOD	0.00	TotalImpactFeeMHTOD	0.00	TotalImpactFeeADUTO	0.00
TotalImpactFeeAONRT	0.00	TotalImpactFeeAR55TC	0.00	TotalImpactFeeAR62TC	0.00
OD		D		D	
Sub Total Residential	0.00	TotalImpactFeeRIRCTC	0.00	TotalImpactFeeOCSTO	0.00
		D		D	
TotalImpactFeeITWCTC	0.00	TotalImpactFeeNHALTC	0.00	TotalImpactFeeOIUTOD	0.00
D		D			
TotalImpactFeeAFAOT	0.00	Sub Total	0.00	Total of Impact Fees to be Assessed	0.00
OD		Non-Residential			

Attachment File Name	Added On	Added By	Attachment Group	Notes
Signature_Mandy_Gauss_7/25/2023.jpg	07/25/2023 9:02	Gauss, Mandy		Uploaded via CSS
SITE-2023-0008 Snapshot Report.pdf	07/25/2023 13:04	Blonigen, Rachel		
2023.08.17_PlanningTechnicalReviewCommittee.Agenda.pdf	07/26/2023 12:32	Blonigen, Rachel		TRC Agenda
2023.08.17_PlanningTechnicalReviewCommittee.914Central_SITE-2023-0008.pdf	08/31/2023 15:00	Blonigen, Rachel		Final TRC Minutes

PLAN SNAPSHOT REPORT (SITE-2023-0008)

Note	Created By	Date and Time Created
1. Waiting for materials for 2nd TRC- RLB	Rachel Blonigen	08/17/2023 12:32

Invoice No.	Fee	Fee Amount	Amount Paid
INV-00004388	Planning General Application Fee	\$200.00	\$200.00
Total for Invoice INV-00004388		\$200.00	\$200.00
Grand Total for Plan		\$200.00	\$200.00

Meeting Type	Location	Scheduled Date	Subject
Technical Review Committee Meeting v.1	City Hall, Second Floor Conference Room	08/17/2023	Technical Review Committee Meeting
Meeting Custom Fields			
TRC Meeting Next Steps	Requires Resubmittal		

Submittal Name	Status	Received Date	Due Date	Complete Date	Resubmit	Completed
Land Use Plan Technical Review v.1	Requires Re-submit	09/14/2023	10/12/2023	09/14/2023	Yes	Yes

Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
Business Development	Business Development	Meyers, Kathleen	Requires Re-submit	09/14/2023	09/14/2023	09/14/2023

Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
City Engineer	Community Services - Engineering	Mavrogeorge, Kenneth	Requires Re-submit	09/14/2023	09/14/2023	09/14/2023

Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
IS Building Official	Fire / Inspection Services	Maxfield, Jim	Requires Re-submit	09/14/2023	09/14/2023	09/14/2023

Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
Planning	Planning	Benton, Donna	Requires Re-submit	09/14/2023	09/14/2023	09/14/2023

Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
Zoning Administrator	Planning	Kypfer, Natasha	Requires Re-submit	09/14/2023	10/12/2023	09/14/2023

Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
Traffic Bureau	Police	Speidel, Marn	Requires Re-submit	09/14/2023	09/14/2023	09/14/2023

Submittal Name	Status	Received Date	Due Date	Complete Date	Resubmit	Completed
Land Use Plan Technical Review v.2	In Review	12/08/2023	12/21/2023		No	No

Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
Business Development	Business Development	Meyers, Kathleen	In Review	12/08/2023	01/05/2024	

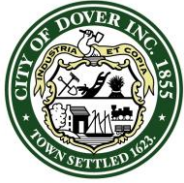
Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
City Engineer	Community Services - Engineering	Mavrogeorge, Kenneth	In Review	12/08/2023	12/21/2023	

Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
IS Building Official	Fire / Inspection Services	Maxfield, Jim	In Review	12/08/2023	12/21/2023	

Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
Planning	Planning	Kaspari, Jackson	In Review	12/08/2023	01/05/2024	

PLAN SNAPSHOT REPORT (SITE-2023-0008)

Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
Zoning Administrator	Planning	Crouser, Paul	In Review	12/08/2023	12/21/2023	
Item Review Name	Department	Assigned User	Status	Assigned Date	Due Date	Completed Date
Traffic Bureau	Police	Speidel, Marn	In Review	12/08/2023	12/21/2023	
Workflow Step / Action Name			Action Type	Start Date	End Date	
Review v.1				07/28/2023	11:25	
Confirm application complete v.1			Generic Action		07/28/2023 11:25	
Technical Review Committee Meeting Agenda v.1			Task	07/28/2023	11:25	07/28/2023 11:25
Land Use Plan Technical Review v.1			Receive Submittal	09/14/2023	0:00	09/14/2023 12:31
Land Use Plan Technical Review v.2			Receive Submittal	12/08/2023	0:00	
Technical Review Committee Meeting v.1			Hold Meeting	09/14/2023	12:30	09/14/2023 12:32
Planning Board v.1						
Planning Board Agenda v.1			Task			
Invoice for Notices v.1			Task			
Send Notices v.1			Task			
Planner Creates Staff Recommendations v.1			Plan Activity			
Distribute Planning Board Materials v.1			Task			
Planning Board Hearing v.1			Hold Hearing			
Planning Board Decision v.1			Plan Activity			
NOD Sent to Applicant v.1			Create Report			
Final Plan v.1						
Land Use Plan Final Review v.1			Receive Submittal			
Land Use Plan Stamped and Signed v.1			Generic Action			
Plans uploaded to Treeno v.1			Generic Action			
Recording v.1			Task			
Property Info Group v.1			Generic Action			
Building Official Notifies Address v.1			Generic Action			
Pre-Con Meeting v.1			Hold Meeting			
Create/Link to Records v.1						
Create / Link to Permit - Building Complex v.1			Create Sub Permit			
Create / Link to Permit - Site Work, Construction v.1			Create Sub Permit			



CITY OF DOVER

TECHNICAL REVIEW COMMITTEE MINUTES – SITE-2023-0008

***First Minute of Recording Not Available due to Technical Mistake**

Application Type: Site Review
Applicant(s): CESO
Owner(s): 914 Central Avenue, LLC
Location: 914 Central Avenue (Assessor's Map 38, Lot 20)
Date: August 17, 2023

INTENT: Proposal is for Hang Ten Car Wash development that will consist of a 4,400-s.f. building, sixteen (16) vacuum spaces, and two (2) employee parking spaces. Two (2) relates CUP applications would also appear before the Planning Board.

Yonathan Yehezkel, COO, Wash Equity
Hosea Cunningham, Engineer CESO

Approval of minutes from August 10, 2023:

J. Burdin moved to approve the August 10, 2023 minutes. Seconded by T.Clark. Vote: U/A.

UNITS PROPOSED:

AGENDA ITEM #: 1

ACREAGE: 1.29± ac.

ZONING DISTRICT: C, Secondary
Groundwater Protection District

EXISTING LAND USE: Vacant 3,559-s.f.
masonry building and parking lot, formerly a
restaurant

PROPOSED LAND USE: Car Wash facility

SURROUNDING LAND USE: Commercial,
Residential, City of Dover land

ZBA ACTION:

- Z01-05, Variance granted to allow apartment above restaurant
- H84-56, Variance granted allowing relief from sideyard setbacks

PERMITS REQUIRED: SWPP

RELIEF/WAIVERS REQUESTED:

- §170-28.3,D(3)(e) CUP, SGPD for use
- §170-28.3,D(5) CUP, Impervious Area >20%

ATTENDANCE:

Members: Donna Benton, Planning
Tom Clark, Planning Board
Marn Speidel, Police
James Burdin, Business Development
Jill Semprini, Engineering
Jackson Kaspari, Zoning

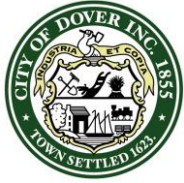
Others:

Jeff Gheysers, CEO Wash Equity

PLAN REVIEW:

Planning:

- Remove illegal signs from property as they violate the zoning ordinance.
- A lot of required information missing. Please ensure all items on check list, items outlined in 170, and all common notes are added.
- CUPs –need narrative and more information on how you meet the criteria for each CUP.
- Provide hydrogeological study per Chapter 170-28.3. D.(7) which may be peer reviewed
- Confirm D(5), D(6) are also satisfied.
- Reminder: Impact fees, Water/Sewer Investment fees
- Please provide a neighborhood plan with aerial underlay
- Hours of operation?—Usually 7am-7pm. Note on plan.
- Parking is 2 spots over maximum. Remove 2 vacuum spaces.
- Alternative traffic flow pattern considered?
- What is the building height?, not included on elevations
- Please remove business signage from elevations packet; sign permits will need to be separately sought by the ZA and is not part of PB approval
- Should 85 percentile be used for site distance? Does landscaping affect that?
- Provide letters to serve
- More substantial review once all required information is provided
- Provide overview of chemical transport and storage
- Add site plan sheet without topo and add:
 - Building is to be solar ready
 - Owner's signatures on the final plans
 - PE, LLS, LLA signature & stamp on the plans
 - Add File # SITE-2023-0008
 - Confirm all common notes are added
 - Consecutive page numbering for plan set
 - Add bike rack
 - EVSE readiness—2%
 - Dimension of aisle width
 - Dimension of egress/curb cut



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TECHNICAL REVIEW COMMITTEE MINUTES – SITE-2023-0008

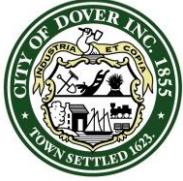
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- Dimension of parking space
- Total number of parking spaces including vacuum space
- Neighborhood plan with abutter information, aerial underlay, zoning districts
- Show dumpster enclosure detail
- Impervious pavement maintenance plan?
- Topo 100' beyond site (on separate sheet not true site plan)
- Note on plan entrance must always be right in, right out only
- Screen utilities
- Provide true streetscape rendering with landscaping, etc.
- Revise architecture to be more NE style
- Combine into one plan set
- Add lighting plan that meets 153-14.E.
- Provide zoning table note with provided column
- Ensure 2x2" blank space in lower right corner of site plan
- Project is located within the Secondary Groundwater Protection Zone; applicant shall coordinate with City's Environmental Project Manager and the Industrial Pretreatment Coordinator to establish a monitoring plan to conform with all reporting requirements. Provide written confirmation from the NHDES that groundwater monitoring wells are not necessary, as they are not shown on the site plans.
- Recommend providing 1 sf of snow storage per 10 sf of pavement to be cleared. Verify snow storage meets or exceeds this recommendation or provide note to remove excess snow when storage areas are filled.
- Provide photometric plan, and show light pole bases on site plan.

Engineering:

- General Comments:
 - Applicant and Contractor shall review the Dover Construction Guidelines prior to scheduling a Preconstruction meeting with City staff. The guidelines can be found on the City of Dover Website on the Engineering page.
<https://www.dover.nh.gov/Assets/government/city-operations/1form/community-services/engineering/engineering-documents/Construction%20Guidelines.pdf>
 - Coordinate with Community Services (Engineering Department) for latest City Standard Details.
 - Add note that Design Engineer shall provide signed letter to City Engineer certifying that the stormwater management system has been installed in accordance with approved plans.
- C0.1:
 - Grading Note 18 – Storm pipe shall be in accordance with the City's code section 157-40.
 - Utility Note 15 – All water lines 4" or greater shall be DI with an 8 mil polyethylene wrap, including tee and other connections. Water service lines shall be copper tubing (type K) between main and curb stop. Services 3/4" may be copper or CTS, 1" may be copper or CTS, and 2" may be CTS, HDPE, or IPS. CTS shall be SDR 9 plastic polyethylene rated for 250 psi.
 - Utility Note 16 – SDR 26 shall not be used. Service to building shall be Schedule 40 PVC with 10' max length and no glued joints.
- C1.0:
 - Coded Note 6 – evaluate existing retaining wall to remain for structural integrity.
 - Coded Note 13 – Water meter terminology shall be revised to curb box.
- C3.0:
 - Call out existing paved sidewalk tipdowns to be reconstructed. Repair any and all damaged paved sidewalks.
 - Confirm condition of one-way sign located on Central Ave median.
 - Provide wayfinding and regulatory signs at entrance for internal vehicular circulation; consider adding markings on pavement to direct traffic flow.



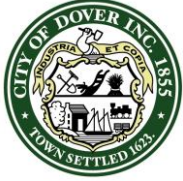
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- Provide pavement markings at exit to indicate right-turn out, and add stop bar.
- Evaluate if removable traffic cones (Coded Note 18) should be a gate. Consider adding a Do Not Enter Sign at this location, and pavement markings to deter wrong-way travel.
- Confirm if the vacuums, dog washing, and parking area are only accessible via the wash tunnel.
- Unclear how trash truck leaves site; appears to need to go through wash tunnel. Provide truck turning plan for trash truck and fire apparatus.
- Unclear what curb cut and pavement markings are for between drive aisle and near entrance to parking area.
- Indicate what the pervious paver space adjacent to drive aisle is to be used for. If for employee parking, please indicate anticipated number of employees in the cover letter/narrative.
- Provide a sign identifying porous asphalt is present and that there are restrictions on deicing materials on porous surfaces as noted in the inspection and maintenance plan that is provided. Per NHDES Stormwater Manual Volume 2 Section 4-3.4e, no winter sanding of permeable pavements is permitted.
- Provide dimensions of striping for the parking spaces.
- Provide dimensions of drive aisle, drive-thru, etc.
- Indicate what the aprons at the entrance and exist of the wash tunnel are. Are the aprons to be concrete pads?
- Indicate clearance of overhang near pay stations.
- Coded Note 4: Retaining walls greater than 4' shall be designed by a professional engineer licensed in the state of NH.
- Confirm if easement will be required to construct retaining wall as it's close to property line
- Coded Note 20 not shown.
- C4.0:
 - Confirm if there will be potential ponding at the entrance to the wash tunnel. Appears that there is a trench drain; confirm water goes to reclaim tank.
 - Provide grades at the exit of the wash tunnel; confirm that reclaimed water will be prevented from existing the wash tunnel. Appears that there is a trench drain; confirm water goes to reclaim tank.
 - Drainage easement will be needed on adjacent property for the emergency spillway.
 - Coded Note 1 - Provide detail of hydrodynamic separator, and list on Storm Sewer Structure Schedule and revise Storm Sewer Pipe Table as necessary.
 - Coded Note 2 - A detail of the subdrain has not been provided; there is no sheet C600. Show subdrain on Sewer Pipe Table, and revise Storm Sewer Structure Schedule as necessary to show inverts of subdrain. Extend subdrain full length of pervious paver areas.
 - Unclear what the lines with the two opposing arrows are; show on Grading Legend.
 - Confirm A3 inlet elevation; schedule conflicts with detail. Elevation noted in schedule appears to be lower than A2 S invert; confirm.
 - Recommend providing 0.1' drop within structures.
 - Bioretention pond shall have an impermeable liner installed along the side walls so as to separate the system from the group A soils.
- C5.0:
 - Existing sewer main is 12" VCP and existing water main is 12" DI; within Central Avenue.
 - City is obtaining quotes to evaluate capacity of existing sewer main; however, if the usage of the car wash is similar to the previous restaurant, then capacity will be adequate.
 - Existing water services is 2" from water main to curb box, and 1 1/2" from curb box to building.
 - Coded Note 1 - Water meter terminology shall be revised to curb box.
 - Coded Note 2 - proposed gas service line not shown.



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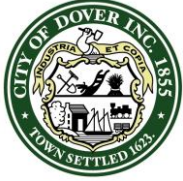
- Coded Note 7 – City discharge permit requires annual oil and grease sampling. BMPs shall be followed for proper maintenance of the oil/water separator. Provide proposed separator information to the City's Industrial Pretreatment Coordinator to ensure separator has accessibility for sampling.
- Coded Note 8 – Provide detail for reclaim tank, and provide O&M plan. Need to know flows from water and into sewer.
- Coded Note 11 - Cleanouts outside of the building are not permitted due to inflow and infiltration concerns; use SMH if necessary, in lieu of cleanout with flip top lid.
- C5.1:
 - Utility Pipe Trench and Bedding – Compare detail with City standard detail for public utilities
 - Clean Out and Cleanout Protection Box – Cleanouts outside of building are not permitted; remove details.
 - Downspout Collector Detail – Confirm where this detail is to be used, and where it is connected to.
- C6.0:
 - Accessible Parking Space Striping – Length of parking space shall meet City of Dover Code Section 153-14, and loading zone shall be 8' min. Detail should be shown as angled to match what is proposed.
 - Pervious Paver Detail – Detail does not appear to meet NHDES standard detail; please confirm. An impermeable liner shall be installed along the side walls so as to separate the system from the group A soils.
- C6.1: Indicate which grate is to be used; Type B is preferred.
- General Comment: Appears to be missing details; such as, catch basins, curb inlets, sewer connection, water service, etc.
- Stormwater Management Report:
 - Drainage report shall meet the requirements of the City's Code Section 153-14A(3)(f)[2]
 - Provide Operation and Maintenance manual per the City's Code Section 153-14A(3)(g)
 - Confirm pipe sizing calculations are for 10-year storm in accordance with City's Code Section 157-40.

Fire/Inspection Services:

- Provide elevation plans
- Provide kiosk detail to indicate compliance with accessibility requirements
- Provide van accessible parking space at vacuum
- Provide vertical clearance through vehicular travel pattern (i.e. delivery trucks)
- Will auto-detailing services be provided?--No
- Provide height at gate arms
- Clarify vehicle traffic pattern with turning capabilities
- Provide site specific streetscape
- Provide hours of operation
- Provide turning template

Police:

- Confirm that the One Way / No Left Turn sign on the Central Avenue traffic median is in serviceable condition, or replace with new sign(s)
- Is there a marked crosswalk shown internally near the back of the loop? This appears to connect two landscaped islands and seems unnecessary
- 24/7 operation? Comment on potential noise from vacuums relative to distance from nearest residential abutter(s)
- What is the fail-safe for a power outage if the automated wash tunnel is occupied?
- For the Chemical Data Sheets packet, provide an index, table of contents and page numbering. Are all of these chemicals likely to be employed at this site? (Noting that this is a Secondary Groundwater Protection Zone)
- Some of the materials listed in the Chemical Data Sheets packet lack specificity. For example, the products "TPR 100 2X, Results 2X, Results Ultra 3X and Graphene Xtreme" simply list "automotive care" as recommended use. What are these used for?



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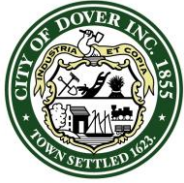
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- Any detailing services provided?
- Are trash receptacles provided only as shown in Note 14 on Sheet C3.0? These do not appear to be accessible to the ADA parking space.
- Can the dumpster enclosure be located toward the rear of the site?

Business Development:

- The current materials do not appear to meet all requirements of a complete application. Please provide or clarify which documents are intended to fulfill the following application requirements:
 - The provided materials do contain a variety of technical or expert materials regarding the operation of a car wash or potentially hazardous chemicals that may be located on site, but would benefit from a more direct narrative summarizing these documents and directly explaining how they support a claim that the requested car wash is consistent with the stated purpose of Chapter 170-28.3 – Groundwater Protection.
 - There does not appear to be any document identifying itself as an environmental protection plan as described in Groundwater Protection overlay section E.(4) regarding Conditional Use Permits.
 - There is currently very little discussion of the Conditional Use Permit to exceed impervious surface coverage. As above, please provide additional narrative demonstrating that the conditions as proposed are able to meet the purpose of the Groundwater Protection overlay.
 - Please clarify the capacity of the stormwater management system.
 - The introduction appears to state that the system was designed to mitigate and treat only 30% of existing impervious surface and 50% of proposed new impervious surface (which is dismissed because impervious surface is reducing).
- However, requirements of Groundwater Protection overlay section D.(5) appear to require stormwater drainage to require retention and treatment of all development-generated runoff from a ten year storm for a CUP to be issued. Is the system designed to meet this requirement?
- The safety data sheets include information about the composition of input products but do not currently appear to address the anticipated volume of waste requested in section D.(6).
- The application currently does not contain a hydrogeologic study as denoted under section D.(7).
- Recommend that CUP materials that provide a summary list of products, their environmental implications, and plans for storage/usage to prevent accidental release.
 - Suggest compiling a list of key information for each product such as product name, accidental release measures, ecotoxicity, and CERCLA, SARA, and/or CWA regulatory status.
 - Suggest that the narrative identify when and where products will be used – e.g. all applied by automated wash system within the building? Any applied manually at “vacuum spaces”? Figure 4 of the Velocity Water Works memo may provide a useful format.
 - Please address the ability of water reclamation systems to remove these products or identify which steps in the Velocity Water Works memo apply to removing which products from the reclaimed water/effluent.
 - Please speak to the disposal of contaminants removed from reclaimed water/effluent by the reclamation system.
 - Please speak to the potential for residual products to drip from cars exiting the wash tunnel and exiting through the parking lot and/or the ability of the proposed stormwater infrastructure to remove all such contaminants from runoff prior to release into surface or groundwater or municipal stormwater systems.



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- Please discuss the presence of PFAS in the identified products. PFAS does not appear to be listed on any safety data sheets despite common occurrence in cleaning products, polishes, hydraulic fluids, etc. – is PFAS currently required to be reported on safety data sheets under TSCA?
- Some chemical information sheets provide information that appears to be concerning, confusing, or contradictory and may require additional context. For example:
 - Many sheets note explicitly whether CERCLA and CWA apply, but some simply do not mention these regulations. Is that an assertion by the preparer that those regulations do not apply?
 - Fusion-wax notes that accidental release to environment must be avoided, but does not appear to identify CERCLA or CWA-regulated compounds. Are the accidental release notes an indication of regulatory status or do they also compile other information such as ecotoxicity?
 - Hydro Flow notes acute oral toxicity but also notes that the SARA regulation has not been determined. Is this a new product that has not been fully considered?
 - Several safety sheets appear to list 1, 4-Dioxane on their Proposition 65 disclosure but do not mention CERCLA regulation. It is my understanding from prior brownfields projects that CERCLA covers 1, 4-Dioxane is there a reason it would not be mentioned?
- Please discuss/address Groundwater Protection overlay section D.(2)(c):
 - Are any of the aforementioned products or chemicals defined by NHDES as hazardous or toxic materials pursuant to RSA 147A?
 - “Handling, disposal, storage, or recycling” appear to be descriptions of prohibited activities, which would preclude the presence of any such materials on site unless they meet the stated exception. If any materials are classified as hazardous or toxic per NHDES above, please discuss how the proposed activities meet this requirement.
- Contamination from one or more of the identified chemicals could have significant negative consequences on the groundwater protection zone, the future economic potential of this site, and the quality of Dover’s water resources. Protection of water resources is critical to Dover’s future economic growth, including operation and expansion of businesses throughout the City.
- Business Development feels that the information currently provided is not sufficient to demonstrate that the purpose of the groundwater protection district is met, either for the use or to exceed impervious surface limits, or to demonstrate that contamination by these chemicals would not be reasonably foreseeable.
- Based on the current materials as presented Business Development would oppose granting either CUP.

Planning Board:

- Narrative/justification for CUP needed

Next Steps:

Revise and add to materials, resubmit with narrative outlining how each comment was addressed for another TRC.

TRC Paused.

11/30/2023

City of Dover
Technical Review Committee
288 Central Ave.
Dover, NH 03820

RE: Hang Ten Car Wash - 914 Central Ave.

Technical Review Committee:

We are in receipt of your review comment letter dated 08/17/2023 for the above-reference project, to which we provide the following responses. Your comments are reiterated below with corresponding responses for each. Please review these responses, along with revised drawings identified as Revision 1, dated 11/30/2023, at your earliest opportunity so Hang Ten may obtain the permits necessary to begin construction.

Planning:

- 1) Remove illegal signs from property as they violate the zoning ordinance.
Response: Noted. Signage will be removed.
- 2) A lot of required information missing. Please ensure all items on check list, items outlined in 170, and all common notes are added.
Response: Common notes have been added to the new sheet C0.2.
- 3) CUPs –need narrative and more information on how you meet the criteria for each CUP.
Response: See attached cover letter.
- 4) Provide hydrogeological study per Chapter 170-28.3. D.(7) which may be peer reviewed
Response: Currently being prepared and will be sent under separate cover.
- 5) Confirm D(5), D(6) are also satisfied.
Response: D(5) is satisfied. The information for D(6) will be submitted with the building permit application.
- 6) Reminder: Impact fees, Water/Sewer Investment fees
Response: Impact fees and investment fees will be paid later prior to start of construction.
- 7) Please provide a neighborhood plan with aerial underlay
Response: See sheet C3.2
- 8) Hours of operation?—Usually 7am-7pm. Note on plan.
Response: Note added to sheet C0.0
- 9) Parking is 2 spots over maximum. Remove 2 vacuum spaces.
Response: The two pervious paver spaces in the drive thru have been removed. Two vacuum spaces have been converted into employee spaces by removing vacuum booms.
- 10) Alternative traffic flow pattern considered?
Response: Yes, the alternative traffic patterns have been considered and the current plan is the best fit for the site.
- 11) What is the building height? not included on elevations
Response: 26' to the top of the tower. See building elevation for detailed height information.
- 12) Please remove business signage from elevations packet; sign permits will need to be separately sought by the ZA and is not part of PB approval
Response: Signs are shown for reference only and will be submitted separately to the ZA for approval.
- 13) Should 85 percentile be used for site distance? Does landscaping affect that?
Response: Landscaping has been shifted near the driveway to meet the 85 percentile site distance. The updates are being prepared and will be sent under separate cover.

14) Provide letters to serve

Response: See will serve letter attached from Until Gas company. Electric service is available through Eversource, but no specific letter was provided. City of Dover confirmed that there is water and sanitary available.

15) More substantial review once all required information is provided

Response: Comment noted.

16) Provide overview of chemical transport and storage

Response: Chemicals are stored on a shelf. And delivered by a box truck.

17) Add site plan sheet without topo and add:

a. Building is to be solar ready

Response: There are no plans to have solar onsite at this time. If this is required, this can be addressed with the building plan submittal for the building permit.

b. Owner's signatures on the final plans

Response: Owner's signature is provided on the sheet C0.2 of the plans.

c. PE, LLS, LLA signature & stamp on the plans

Response: Plans have been signed and sealed accordingly.

d. Add File # SITE-2023-0008

Response: Note has been added to the Cover Sheet plan.

e. Confirm all common notes are added

Response: Common notes have been added to new sheet C0.2.

f. Consecutive page numbering for plan set

Response: The plans have been combined into one set with consecutive page numbers added.

g. Add bike rack

Response: Bike rack has been added. See sheet C4.0.

h. EVSE readiness—2%

Response: One EV space has been called out.

i. Dimension of aisle width

Response: Aisle width dimensions are shown on sheet C3.0.

j. Dimension of egress/curb cut Comment (copy from plan review letter, overwriting all red text, then change to black)

Response: The ingress/egress has been updated.

k. Dimension of parking space

Response: Length of space and angle was added to C3.0.

l. Total number of parking spaces including vacuum space

Response: Total number of spaces is shown on Sheet C0.2, note 12.

m. Neighborhood plan with abutter information, aerial underlay, zoning districts

Response: See sheet C3.2

n. Show dumpster enclosure detail

Response: See sheet C0.2 for dumpster enclosure detail.

o. Impervious pavement maintenance plan?

Response: The pervious pavement maintenance plan can be found in the O&M Manual, included.

p. Topo 100' beyond site (on separate sheet not true site plan)

Response: See ALTA Survey prepared by Blew.

q. Note on plan entrance must always be right in, right out only

Response: Note has been added to plan entrance.

r. Screen utilities

Response: Utilities have been screened.

s. Provide true streetscape rendering with landscaping, etc.

Response: Rendering has been added to the submittal package.

- t. Revise architecture to be more NE style
Response: After further discussions with the City the building elevation is remaining as previously submitted.
- u. Combine into one plan set
Response: The plans have been combined into one set with consecutive page numbers added.
- v. Add lighting plan that meets 153-14.E.
Response: Lighting plan has been added.
- w. Provide zoning table note with provided column
Response: Notes added to plans
- x. Ensure 2x2" blank space in lower right corner of site plan
Response: Moved dig note, north arrow and scale to make room on C3.0.

Engineering:

1) General Comments:

- a. Applicant and Contractor shall review the Dover Construction Guidelines prior to scheduling a Preconstruction meeting with City staff. The guidelines can be found on the City of Dover Website on the Engineering page.
<https://www.dover.nh.gov/Assets/government/city-operations/1form/community-services/engineering/engineering-documents/Construction%20Guidelines.pdf>
Response: Comment noted.
- b. Coordinate with Community Services (Engineering Department) for latest City Standard Details.
Response: Details have been added to the plan set.
- c. Add note that Design Engineer shall provide signed letter to City Engineer certifying that the stormwater management system has been installed in accordance with approved plans.
Response: Added note to C4.0 below coded notes.
- d. Project is located within the Secondary Groundwater Protection Zone; applicant shall coordinate with City's Environmental Project Manager and the Industrial Pretreatment Coordinator to establish a monitoring plan to conform with all reporting requirements. Provide written confirmation from the NHDES that groundwater monitoring wells are not necessary, as they are not shown on the site plans.
Response: Comment noted. This will be provided with technical permit submittals.
- e. Recommend providing 1 sf of snow storage per 10 sf of pavement to be cleared. Verify snow storage meets or exceeds this recommendation or provide note to remove excess snow when storage areas are filled.
Response: The recommended 1 sf of snow storage area per 10 sf of pavement is available along the perimeter of the paved areas.
- f. Provide photometric plan, and show light pole bases on site plan.
Response: Photometric plan has been provided, and light poles are located on the site plan.

2) C0.1:

- a. Grading Note 18 – Storm pipe shall be in accordance with the City's code section 157-40.
Response: Added compliance and code section to general note.
- b. Utility Note 15 – All water lines 4" or greater shall be DI with an 8 mil polyethylene wrap, including tee and other connections. Water service lines shall be copper tubing (type K) between main and curb stop. Services ¾" may be copper or CTS, 1" may be copper or CTS, and 2" may be CTS, HDPE, or IPS. CTS shall be SDR 9 plastic polyethylene rated for 250 psi.
Response: Added required information to note.
- c. Utility Note 16 – SDR 26 shall not be used. Service to building shall be Schedule 40 PVC with 10' max length and no glued joints.
Response: Removed SDR 26 from table and added note for SDR 40 and length.

- 3) C1.0:
 - a. Coded Note 6 – evaluate existing retaining wall to remain for structural integrity.
Response: Added comment to note.
 - b. Coded Note 13 – Water meter terminology shall be revised to curb box.
Response: Performed revision as requested by city.
- 4) C3.0:
 - a. Call out existing paved sidewalk tipdowns to be reconstructed. Repair any and all damaged paved sidewalks.
Response: Added coded note 22 with information from comment.
 - b. Confirm condition of one-way sign located on Central Ave median.
Response: Added note 21 to check sign condition and replace if needed.
 - c. Provide wayfinding and regulatory signs at entrance for internal vehicular circulation; consider adding markings on pavement to direct traffic flow.
Response: Wayfinding signs have been added. See Sheet C3.0
 - d. Provide pavement markings at exit to indicate right-turn out, and add stop bar.
Response: Pavement markings and stop bar have both been added to C3.0.
 - e. Evaluate if removable traffic cones (Coded Note 18) should be a gate. Consider adding a Do Not Enter Sign at this location, and pavement markings to deter wrong-way travel.
Response: Do not enter side has been added on the Central Ave side of pavement.
 - f. Confirm if the vacuums, dog washing, and parking area are only accessible via the wash tunnel.
Response: They are not. They are also accessible via the curb cut located near the entrance to the parking area.
 - g. Unclear how trash truck leaves site; appears to need to go through wash tunnel. Provide truck turning plan for trash truck and fire apparatus.
Response: Autoturn plan added to the plans.
 - h. Unclear what curb cut and pavement markings are for between drive aisle and near entrance to parking area.
Response: Marked area is a bypass available for people to access the site exit or vacuum area without going through the car wash tunnel.
 - i. Indicate what the pervious paver space adjacent to drive aisle is to be used for. If for employee parking, please indicate anticipated number of employees in the cover letter/narrative.
Response: Pervious paver spaces have been removed.
 - j. Provide a sign identifying porous asphalt is present and that there are restrictions on deicing materials on porous surfaces as noted in the inspection and maintenance plan that is provided. Per NHDES Stormwater Manual Volume 2 Section 4-3.4e, no winter sanding of permeable pavements is permitted.
Response: Note added to the site plan, Sheet C3.0.
 - k. Provide dimensions of striping for the parking spaces.
Response: Dimensions provided on C3.0.
 - l. Provide dimensions of drive aisle, drive-thru, etc.
Response: Dimensions provided on C3.0.
 - m. Indicate what the aprons at the entrance and exist of the wash tunnel are. Are the aprons to be concrete pads?
Response: The exit will be concrete pavement. The entrance is to be concrete pavement with a fiber reinforcement.
 - n. Indicate clearance of overhang near pay stations.
Response: The clearance of the small overhang on the building is 8'2".
 - o. Coded Note 4: Retaining walls greater than 4' shall be designed by a professional engineer licensed in the state of NH. Confirm if easement will be required to construct retaining wall as it's close to property line
Response: Added comment to coded note 4.

- p. Coded Note 20 not shown.
Response: Coded note is shown on northern face of the building towards Central Ave.
- 5) C4.0:
 - a. Confirm if there will be potential ponding at the entrance to the wash tunnel. Appears that there is a trench drain; confirm water goes to reclaim tank.
Response: Water flows towards trench drain located near exit of wash tunnel. Drain connects to storm system.
 - b. Provide grades at the exit of the wash tunnel; confirm that reclaimed water will be prevented from exiting the wash tunnel. Appears that there is a trench drain; confirm water goes to reclaim tank.
Response: Water flows towards trench drain near exit of wash tunnel. Drain connects to reclaim tank.
 - c. Drainage easement will be needed on adjacent property for the emergency spillway.
Response: Per comments from Jill Semprini, our emergency spillway is activated at the 50 year storm.
 - d. Coded Note 1 - Provide detail of hydrodynamic separator, and list on Storm Sewer Structure Schedule and revise Storm Sewer Pipe Table as necessary.
Response: Hydrodynamic separator detail added.
 - e. Coded Note 2 - A detail of the subdrain has not been provided; there is no sheet C600. Show subdrain on Sewer Pipe Table, and revise Storm Sewer Structure Schedule as necessary to show inverts of subdrain. Extend subdrain full length of pervious paver areas.
Response: Subdrain is no longer proposed on plans.
 - f. Unclear what the lines with the two opposing arrows are; show on Grading Legend.
Response: This linetype is shown on the grading legend.
 - g. Confirm A3 inlet elevation; schedule conflicts with detail. Elevation noted in schedule appears to be lower than A2 S invert; confirm.
Response: This has been updated.
 - h. Recommend providing 0.1' drop within structures.
Response: Recommendation noted.
 - i. Bioretention pond shall have an impermeable liner installed along the side walls so as to separate the system from the group A soils.
Response: Added coded note 2 stating the information provided in the comment.
- 6) C5.0:
 - a. Existing sewer main is 12" VCP and existing water main is 12" DI; within Central Avenue.
Response: Note 12 calls out sanitary main size. Proposed water is connecting only after curb box so main is not shown.
 - b. City is obtaining quotes to evaluate capacity of existing sewer main; however, if the usage of the car wash is similar to the previous restaurant, then capacity will be adequate.
Response: Sanitary capacity to be provided at a later date.
 - c. Existing water services is 2" from water main to curb box, and 1 ½" from curb box to building.
Response: Plan includes new water from curb box into proposed wash. The new line is to be 2" which matches the existing line size from main to curb box.
 - d. Coded Note 1 - Water meter terminology shall be revised to curb box.
Response: Terminology revised as requested.
 - e. Coded Note 2 - proposed gas service line not shown.
Response: Gas service line has been added to the Utility Plan.
 - f. Coded Note 7 - City discharge permit requires annual oil and grease sampling. BMPs shall be followed for proper maintenance of the oil/water separator. Provide proposed separator information to the City's Industrial Pretreatment Coordinator to ensure separator has accessibility for sampling.
Response: Comment noted.

- g. Coded Note 8 – Provide detail for reclaim tank, and provide O&M plan. Need to know flows from water and into sewer.
Response: See O&M Manual included in resubmittal.
- h. Coded Note 11 - Cleanouts outside of the building are not permitted due to inflow and infiltration concerns; use SMH if necessary, in lieu of cleanout with flip top lid.
Response: All cleanouts have been replaced with SSMH.
- 7) C5.1:
 - a. Utility Pipe Trench and Bedding – Compare detail with City standard detail for public utilities
Response: Added detectable warning tape with required depth and insulation if cover is less than 5' and height from crown of pipe. Adjusted table depths from invert of pipe.
 - b. Clean Out and Cleanout Protection Box – Cleanouts outside of building are not permitted; remove details.
Response: Details have been removed.
 - c. Downspout Collector Detail – Confirm where this detail is to be used, and where it is connected to.
Response: This detail will be used anywhere there is a building downspout and it will be connected to the storm system. These will be shown on the Utility Plan during technical permitting submittals once the building plans are prepared and downspout locations are confirmed.
- 8) C6.0:
 - a. Accessible Parking Space Striping – Length of parking space shall meet City of Dover Code Section 153-14, and loading zone shall be 8' min. Detail should be shown as angled to match what is proposed.
Response: Detail has been altered to be angled. And ADA space has been adjusted to include 8' wide loading area.
 - b. Pervious Paver Detail – Detail does not appear to meet NHDES standard detail; please confirm. An impermeable liner shall be installed along the side walls so as to separate the system from the group A soils.
Response: Detail has been added and note about impervious liner has been included.
- 9) C6.1:
 - a. Indicate which grate is to be used; Type B is preferred.
Response: A bold rectangle has been drawn around the type B grate to specify its use.
 - b. General Comment: Appears to be missing details; such as, catch basins, curb inlets, sewer connection, water service, etc.
Response: Precast curb inlet detail has been added to sheet C6.0. Water and sewer connection details have been added to sheet C5.1.
 - c. Stormwater Management Report:
 - i. Drainage report shall meet the requirements of the City's Code Section 153-14A(3)(f)[2]
Response: See Drainage Report
 - ii. Provide Operation and Maintenance manual per the City's Code Section 153-14A(3)(g)
Response: See O&M Manual included in resubmittal
 - d. Confirm pipe sizing calculations are for 10-year storm in accordance with City's Code Section 157-40.
Response: Confirmed, the pipe sizing is per the 10-year storm.

Fire/Inspection Services:

- 1) Provide elevation plans
Response: See elevation plans included in resubmittal.
- 2) Provide kiosk detail to indicate compliance with accessibility requirements
Response: The kiosks are drive up and will have the pay window for employees to help anyone that needs assistance.

Provide van accessible parking space at vacuum

Response: Accessible space at vacuums has been made van accessible.

- 3) Provide vertical clearance through vehicular travel pattern (i.e. delivery trucks)

Response: Delivery vehicles will not go through the pay station

- 4) Will auto-detailing services be provided?--No

Response: No

- 5) Provide height at gate arms

Response: The gate arms of the dumpster enclosure are 6'-2".

- 6) Clarify vehicle traffic pattern with turning capabilities

Response: Arrows included on pavement to show circulation. Autoturn plan has been added, see Sheet C3.1.

- 7) Provide site specific streetscape

Response: See attached Landscape Plan and Renderings

- 8) Provide hours of operation

Response: Note added to cover sheet – "Typical hours of operation are 7 am to 7 pm"

- 9) Provide turning template

Response: Autoturn plan added, see sheet C3.1

Police:

- 1) Confirm that the One Way / No Left Turn sign on the Central Avenue traffic median is in serviceable condition, or replace with new sign(s)

Response: Added note 21 to sheet C3.0 to check sign condition and replace if needed.

- 2) Is there a marked crosswalk shown internally near the back of the loop? This appears to connect two landscaped islands and seems unnecessary

Response: Marked area is a bypass available for people to access the site exit or vacuum area without going through the car wash tunnel.

- 3) 24/7 operation? Comment on potential noise from vacuums relative to distance from nearest residential abutter(s)

Response: Note added to cover sheet – "Typical hours of operation are 7 am to 7 pm"

- 4) What is the fail-safe for a power outage if the automated wash tunnel is occupied?

Response: If the tunnel loses power the vehicle in the wash tunnel can drive out of the tunnel.

- 5) For the Chemical Data Sheets packet, provide an index, table of contents and page numbering. Are all of these chemicals likely to be employed at this site? (Noting that this is a Secondary Groundwater Protection Zone)

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- 6) Some of the materials listed in the Chemical Data Sheets packet lack specificity. For example, the products "TPR 100 2X, Results 2X, Results Ultra 3X and Graphene Xtreme" simply list "automotive care" as recommended use. What are these used for?

Response: Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- 7) Any detailing services provided?

Response: No

- 8) Are trash receptacles provided only as shown in Note 14 on Sheet C3.0? These do not appear to be accessible to the ADA parking space.

Response: The receptacles shown by coded note 14 are the only proposed trash receptacles. One can be added near the building so it is ADA accessible if required.

- 9) Can the dumpster enclosure be located toward the rear of the site?

Response: The dumpster is currently set far enough back from the road to have the existing tree line provide screening from the oncoming traffic. If the dumpster was moved to the rear of the site the trash truck would not be able to circulate to empty the dumpster.

Business Development:

1) The current materials do not appear to meet all requirements of a complete application. Please provide or clarify which documents are intended to fulfill the following application requirements:

- a. The provided materials do contain a variety of technical or expert materials regarding the operation of a car wash or potentially hazardous chemicals that may be located on site, but would benefit from a more direct narrative summarizing these documents and directly explaining how they support a claim that the requested car wash is consistent with the stated purpose of Chapter 170-28.3 – Groundwater Protection.

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- b. There does not appear to be any document identifying itself as an environmental protection plan as described in Groundwater Protection overlay section E.(4) regarding Conditional Use Permits.

Response: The chemicals are not toxic and the Hydro plan will be complete in a week and submitted under a separate cover.

- c. There is currently very little discussion of the Conditional Use Permit to exceed impervious surface coverage. As above, please provide additional narrative demonstrating that the conditions as proposed are able to meet the purpose of the Groundwater Protection overlay.

Response: The proposed plan has less impervious area than the existing site today. There are also storm water measures proposed, which do not exist on the existing site. See cover letter and drainage report for specific numbers on what is existing and what is proposed.

- d. Please clarify the capacity of the stormwater management system.

- i. The introduction appears to state that the system was designed to mitigate and treat only 30% of existing impervious surface and 50% of proposed new impervious surface (which is dismissed because impervious surface is reducing).

Response: Understood.

- ii. However, requirements of Groundwater Protection overlay section D.(5) appear to require stormwater drainage to require retention and treatment of all development-generated runoff from a ten year storm for a CUP to be issued. Is the system designed to meet this requirement?

Response: The system is designed to hold the entire site for the 10 year storm. The area of the site that does not drain to the pond will route through a hydrodynamic separator for treatment.

- e. The safety data sheets include information about the composition of input products but do not currently appear to address the anticipated volume of waste requested in section D.(6).

Response: The waste calculations will be provided with the building permit submittals.

- f. The application currently does not contain a hydrogeologic study as denoted under section D.(7).

Response: Hydrogeologic Study will be provided under a separate submittal.

- g. Recommend that CUP materials that provide a summary list of products, their environmental implications, and plans for storage/usage to prevent accidental release.

- i. Suggest compiling a list of key information for each product such as product name, accidental release measures, ecotoxicity, and CERCLA, SARA, and/or CWA regulatory status.

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- ii. Suggest that the narrative identify when and where products will be used – e.g. all applied by automated wash system within the building? Any applied manually at "vacuum spaces"? Figure 4 of the Velocity Water Works memo may provide a useful format.

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- iii. Please address the ability of water reclamation systems to remove these products or identify which steps in the Velocity Water Works memo apply to removing which products from the reclaimed water/effluent.

Response: There are no toxic chemicals being used for the car wash.

- iv. Please speak to the disposal of contaminants removed from reclaimed water/effluent by the reclamation system.

Response: The reclaim system is pumped out a couple times a year.

- v. Please speak to the potential for residual products to drip from cars exiting the wash tunnel and exiting through the parking lot and/or the ability of the proposed stormwater infrastructure to remove all such contaminants from runoff prior to release into surface or groundwater or municipal stormwater systems.

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- vi. Please discuss the presence of PFAS in the identified products. PFAS does not appear to be listed on any safety data sheets despite common occurrence in cleaning products, polishes, hydraulic fluids, etc. – is PFAS currently required to be reported on safety data sheets under TSCA?

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- 2) Some chemical information sheets provide information that appears to be concerning, confusing, or contradictory and may require additional context. For example:

- a. Many sheets note explicitly whether CERCLA and CWA apply, but some simply do not mention these regulations. Is that an assertion by the preparer that those regulations do not apply?

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- b. Fusion-wax notes that accidental release to environment must be avoided, but does not appear to identify CERCLA or CWA-regulated compounds. Are the accidental release notes an indication of regulatory status or do they also compile other information such as ecotoxicity?

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- c. Hydro Flow notes acute oral toxicity but also notes that the SARA regulation has not been determined. Is this a new product that has not been fully considered?

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- d. Several safety sheets appear to list 1, 4-Dioxane on their Proposition 65 disclosure but do not mention CERCLA regulation. It is my understanding from prior brownfields projects that CERCLA covers 1, 4-Dioxane is there a reason it would not be mentioned?

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- 3) Please discuss/address Groundwater Protection overlay section D.(2)(c):

- a. Are any of the aforementioned products or chemicals defined by NHDES as hazardous or toxic materials pursuant to RSA 147A?

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- b. "Handling, disposal, storage, or recycling" appear to be descriptions of prohibited activities, which would preclude the presence of any such materials on site unless they meet the stated exception. If any materials are classified as hazardous or toxic per NHDES above, please discuss how the proposed activities meet this requirement.

Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.

- 4) Contamination from one or more of the identified chemicals could have significant negative consequences on the groundwater protection zone, the future economic potential of this site, and the quality of Dover's water resources. Protection of water resources is critical to Dover's future economic growth, including operation and expansion of businesses throughout the City.
Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.
- 5) Business Development feels that the information currently provided is not sufficient to demonstrate that the purpose of the groundwater protection district is met, either for the use or to exceed impervious surface limits, or to demonstrate that contamination by these chemicals would not be reasonably foreseeable.
Response: Please refer to safety and Hazard Overview from Sonny's Car Wash Chemistry. No hazardous chemicals will be used for the car wash development.
- 6) Based on the current materials as presented Business Development would oppose granting either CUP.
Response: Comment noted. The additional information provided will help support the granting of the CUP's being requested.

Planning Board:

- 1) Narrative/justification for CUP needed
Response: See cover letter provided with the submittal.

We greatly appreciate your partnership through your prompt review of these responses and for working with us and Hang Ten to make the Permit(s) available as soon as possible, so construction may begin on this project.

Should you have any further questions, please do not hesitate to contact me.

Respectfully,



Mandy Gauss
Senior Project Manager
gauss@cesoinc.com
(517) 212-4185

cc: Jason Rice - WEA

Hang Ten Car Wash - TRC Resubmittal - Index

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- C. Stormwater Operation and Maintenance Manual (Pages 24-58)**
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- E. Safety & Hazard Overview (Pages 61-65)**
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CITY OF DOVER, STRAFFORD COUNTY, NEW HAMPSHIRE

SITE PLANS

FOR

HANG TEN CAR WASH

914 CENTRAL AVENUE

DOVER, NH 03820

CITY OF DOVER # SITE-2023-0008

OWNER/DEVELOPER:

HANG TEN CAR WASH
1380 SOLDIERS FIELD ROAD
BOSTON, MA 02135
CONTACT: STEVE LUKIN

ENGINEER:

CESO, INC.
216 CENTERVIEW DRIVE, SUITE 150
BRENTWOOD, TN 37027
PHONE: (615) 932-5187
CONTACT: HOSEA CUNNINGHAM

GOVERNING AGENCIES AND UTILITY COMPANIES:

ZONING:

CITY OF DOVER
288 CENTER AVE.
DOVER, NH 03820
PHONE: (603) 516-6008

GAS SERVICE:

UNITIL NORTHERN UTILITIES, INC.
325 WEST RD.
PORTSMOUTH, NH 03801
PHONE: (603) 534-2379

WATER & SEWER:

CITY OF DOVER PUBLIC WORKS
271 MAST RD.
DOVER, NH 03820
PHONE: (603) 516-6450

ELECTRIC:

EVERSOURCE SERVICE SUPPORT
BRAMBER II
ROCHESTER, NH 03867
PHONE: (800) 362-7764

STORMWATER:

CITY OF DOVER
271 MAST RD.
DOVER, NH 03820
PHONE: (603) 516-6450

PROPERTY DATA:

PARCEL ID: #38020-000000
ADDRESS: 914 CENTRAL AVE.
DOVER, NH 03820
PROPERTY AREA: 1.287 AC.

ZONING: COMMERCIAL DISTRICT (C)
PROPOSED USE: CAR WASH

	REQUIRED	PROPOSED
BUILDING SETBACKS		
FRONTAGE ALONG STREET:	30'	68.09
SIDE:	12'	31.91
REAR:	15'	100.26

BUILDING AREA: 4,400 SF

PARKING:
TOTAL PARKING SPACES: 19 18
ADA PARKING SPACES: 1 1

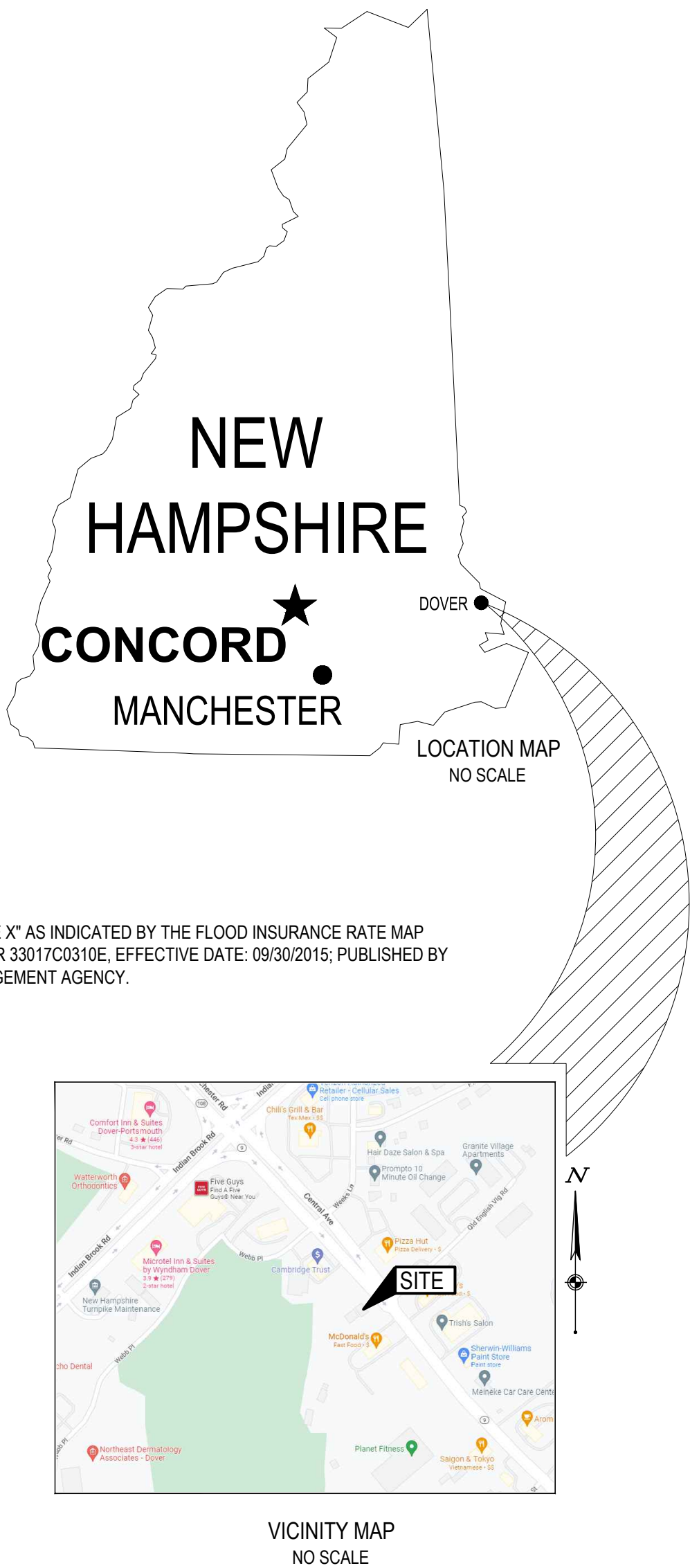
FLOODPLAIN DESIGNATION: PARCEL IS LOCATED WITHIN "ZONE X" AS INDICATED BY THE FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY PANEL NUMBER 33017C0310E, EFFECTIVE DATE: 09/30/2015; PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

TYPICAL HOURS OF OPERATION 7 AM - 7 PM

SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
C0.0	COVER SHEET
C0.1	GENERAL NOTES
C0.2	DOVER NH NOTES
C1.0	EXISTING COND. & DEMO PLAN
C2.0	SWPPP NOTES
C2.1	SWPPP PHASE 1 PLAN
C2.2	SWPPP PHASE 2 PLAN
C2.3	SWPPP DETAILS
C3.0	SITE PLAN
C3.1	AUTOTURN PLAN
C3.2	EXTENDED SITE PLAN
C4.0	GRADING & DRAINAGE PLAN
C5.0	UTILITY PLAN
C5.1	UTILITY DETAILS
C6.0	CONSTRUCTION DETAILS
C6.1	NHDOT DETAILS
C6.2	NHDOT DETAILS
C6.3	NHDOT DETAILS
C7.0	PHOTOMETRIC PLAN
1 OF 2	LANDSCAPE PLAN
2 OF 2	LANDSCAPE DETAILS

BENCHMARK				
	ELEVATION*	NORTHING**	EASTING**	DESCRIPTION
TBM#1	194.2300	263586.5800	1192294.1300	SET MAG NAIL IN POWER POLE
TBM#2	189.6400	263450.2500	1192159.9700	SET MAG NAIL IN POWER POLE

* VERTICAL DATUM: NAVD88
** HORIZONTAL DATUM: NAD83



PARCEL IS LOCATED WITHIN "ZONE X" AS INDICATED BY THE FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY PANEL NUMBER 33017C0310E, EFFECTIVE DATE: 09/30/2015; PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

VICINITY MAP
NO SCALE

SURVEY PROVIDED BY:

BLEW & ASSOCIATES
3825 N. SHILOH DRIVE
FAYETTEVILLE, AR 72703
PHONE: 479.443.4506
DATED: 11/30/2022

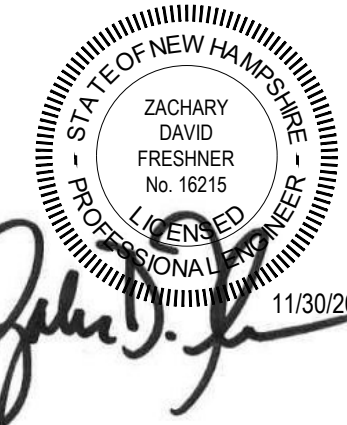
CESO PROVIDES NO GUARANTEE TO THE ACCURACY OF THE SURVEY PROVIDED BY BLEW AND ASSOCIATES. CONTRACTOR TO VERIFY EXISTING CONDITIONS PRIOR TO BID AND CONSTRUCTION.



SEVENTY-TWO (72) HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTORS SHALL NOTIFY THE FOLLOWING AGENCIES: NEW HAMPSHIRE UTILITIES PROTECTION SERVICE AT 811 OR 888-344-7233 AND ALL OTHER AGENCIES WHICH MIGHT HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NONMEMBERS OF STATE UTILITIES PROTECTION SERVICE.



3601 Rigby Rd., Suite 300
Merrimack, NH 03042
Phone: 937.435.8584 Fax: 888.208.4826



HANG TEN CAR WASH

DOVER, NH

914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions		
ID	Description	Date
1	TRC RESUBMITTAL	2023/11/30

Project Number: 761766
Scale: 1"=20'
Drawn By: NTV
Checked By: HGC
Date: 06/28/2023
Issue: PERMIT

Drawing Title:
COVER SHEET

C0.0

W:\PROJECTS\WEA761766-01 - Hang 10_Dover_NH\03-CIVIL\PLAN\PLAN\03-C COVER.dwg - 11/30/2023 - Paige Waldner

GENERAL NOTES

DEMOLITION NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FOR DEMOLITION AND DISPOSAL. THE DEMOLITION, REMOVAL, AND DISPOSAL IS TO BE APPROVED BY ALL GOVERNING AUTHORITIES, OF ALL FACILITIES SUCH AS: STRUCTURES, PADS, WALLS, FLUMES, FOUNDATIONS, PARKING, DRIVES, DRAINAGE, STRUCTURES, UTILITIES, WELLS, ETC., SUCH THAT THE IMPROVEMENTS SHOWN ON THE REMAINING PLANS CAN BE CONSTRUCTED. ALL FACILITIES TO BE REMOVED SHALL BE UNDERCUT TO SUITABLE MATERIAL AND BROUGHT TO GRADE WITH SUITABLE COMPACTED FILL MATERIAL AS SPECIFIED BY A QUALIFIED PROFESSIONAL GEOTECHNICAL ENGINEER. IF UNDOCUMENTED FACILITIES ARE FOUND ON SITE, CONTRACTOR SHALL CONTACT THE OWNER AND UTILITY COMPANY PRIOR TO REMOVAL. ALL FACILITIES SHALL BE PLUGGED, ABANDONED, OR REMOVED PER STATE AND LOCAL REQUIREMENTS.
2. FEDERAL, STATE AND LOCAL CODE REQUIREMENTS SHALL GOVERN THE DISPOSAL OF DEBRIS INCLUDING ANY POTENTIALLY HAZARDOUS AND TOXIC MATERIALS. ALL MATERIALS AND STRUCTURES DESIGNATED AS "TO BE REMOVED" SHALL BE DISPOSED OF OFF SITE AND AT THE COST OF THE CONTRACTOR.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING JOB SITE SAFETY PER OSHA REQUIREMENTS AT ALL TIMES.
4. PRIOR TO DEMOLITION, IT IS THE CONTRACTOR'S RESPONSIBILITY TO CALL THE STATE 811 AND NOTIFY ALL UTILITY COMPANIES TO SCHEDULE UTILITY SERVICE REMOVAL AND/OR ABANDONMENT. ALL UTILITIES SHALL BE REMOVED/RELOCATED PER THE SPECIFICATIONS OF THE UTILITY COMPANIES. THE CONTRACTOR IS RESPONSIBLE TO PAY ALL FEES AND CHARGES ASSOCIATED WITH THIS WORK.
5. CONTRACTOR SHALL MAINTAIN ALL UTILITY SERVICES TO INHABITED BUILDINGS ON SITE AND ADJACENT PROPERTIES AT ALL TIMES. INTERRUPTIONS SHALL BE APPROVED BY THE OWNERS OF THE BUILDINGS/PROPERTIES.
6. THE LOCATIONS OF ALL EXISTING UTILITIES SHOWN ON THIS PLAN HAVE BEEN DETERMINED FROM THE BEST INFORMATION AVAILABLE AND ARE GIVEN FOR THE CONVENIENCE OF THE CONTRACTOR. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THEIR ACCURACY. PRIOR TO THE START OF ANY DEMOLITION ACTIVITY, THE CONTRACTOR SHALL NOTIFY THE UTILITY COMPANIES FOR ONSITE LOCATIONS OF EXISTING UTILITIES. IF THE LOCATION OR ELEVATION OF THE EXISTING UTILITIES ARE FOUND TO BE DIFFERENT FROM THE PLANS, CONTRACTOR SHALL CONTACT THE ENGINEER IMMEDIATELY.
7. CONTRACTOR SHALL PROTECT EXISTING SITE FEATURES TO REMAIN INSIDE AND OUTSIDE CONSTRUCTION LIMITS. CONTRACTOR IS RESPONSIBLE TO DOCUMENT ALL EXISTING DAMAGES AND NOTIFY THE CITY/COUNTY PRIOR TO CONSTRUCTION START. ANY EXISTING SITE FEATURE TO REMAIN THAT IS DAMAGED DURING CONSTRUCTION, SUCH AS, BUT NOT LIMITED TO, DRAINAGE, UTILITIES, PAVEMENT, CURB, ETC., SHALL BE REPAIRED TO A CONDITION THAT IS EQUAL TO, OR BETTER THAN, THE EXISTING CONDITIONS. PRIOR TO BEING DAMAGED, THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY DAMAGE TO THE SATISFACTION OF THE OWNER AT NO ADDITIONAL COST.
8. CONTINUOUS ACCESS SHALL BE MAINTAINED TO THE SURROUNDING PROPERTIES AT ALL TIMES DURING DEMOLITION OF THE EXISTING FACILITIES.
9. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING TRAFFIC CONTROL. ALL TRAFFIC CONTROL MEASURES SHALL BE IN ACCORDANCE WITH STATE DEPARTMENT OF TRANSPORTATION REGULATIONS AND LOCAL REGULATIONS.
10. THE CONTRACTOR IS RESPONSIBLE FOR PLACING AND MAINTAINING CONSTRUCTION FENCE, SIGNS, ETC. TO WARN AND KEEP UNAUTHORIZED PEOPLE OFF SITE FOR THE DURATION OF THE PROJECT.
11. PRIOR TO DEMOLITION, ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED PER THE GOVERNING AGENCIES GUIDELINES AND STANDARDS. DUST CONTROL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
12. SAWCUT LINE PROVIDED IS FOR REFERENCE ONLY. CONTRACTOR WILL BE RESPONSIBLE FOR DETERMINING THE EXTENT OF THE SAWCUT THAT WILL BE REQUIRED AS WELL AS PAVEMENT REPAIRS TO INSTALL UTILITY TRENCHING. IF ANY DAMAGE OCCURS ON ANY OF THE SURROUNDING PAVEMENT, ETC. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ITS REMOVAL AND REPAIR. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING THAT WHICH IS NECESSARY TO COMPLETE THE INTENT OF THE PROPOSED IMPROVEMENTS. SAWCUT EXISTING PAVEMENT TO FULL DEPTH, USING CARE TO CUT NEAT, STRAIGHT LINES. CUT AT EXISTING JOINTS WHERE POSSIBLE.
13. THE CONTRACTOR SHALL MAINTAIN A WELL-DRAINED SITE, FREE OF STANDING WATER DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY DRAINAGE MEASURES DURING CONSTRUCTION.
14. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO STUDY THE PLANS AND VISIT THE SITE TO DETERMINE THE ITEMS THAT MUST BE REMOVED TO COMPLY WITH THE SITE DEVELOPMENT PLANS. NO EXTRA FEE WILL BE PAID FOR THE REMOVAL OF ANY ITEM NOT LISTED THAT IS VISIBLE UPON A SITE VISIT. THE DEMOLITION PLAN IS INTENDED TO PRESENT THE SCOPE OF THE DEMOLITION, AND DOES NOT GUARANTEE THAT ALL ITEMS ARE ADDRESSED.
15. THE CONTRACTOR SHALL OBTAIN ALL PERMITS FOR ALL SITE DEVELOPMENT WORK, PAY ALL FEES FOR PERMITS AND CHECK ALL GOVERNING AUTHORITIES' SPECIFICATIONS FOR BUT NOT LIMITED TO, GUTTERS, SIDEWALKS, POLES, AND OTHER STRUCTURES, INCLUDING THE REMOVAL OR RELOCATION OF EXISTING UTILITIES OR OTHER PHYSICAL OBJECTS SHOWN ON PLANS OR NOTED OTHERWISE.
16. THE CONTRACTOR SHALL CREATE AND IMPLEMENT AN EROSION AND SEDIMENTATION CONTROL PLAN FOR ALL SITE CONSTRUCTION ACTIVITIES ASSOCIATED WITH THE PROJECT. THE PLAN MUST CONFORM TO THE EROSION AND SEDIMENTATION REQUIREMENTS OF THE CONSTRUCTION GENERAL PERMIT OR LOCAL STANDARDS AND CODES, WHICHEVER IS MORE STRINGENT.
17. ALL COSTS FOR INSPECTIONS AND/OR TESTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR UNLESS NOTED OTHERWISE.

SITE NOTES

1. ALL WORK AND MATERIALS SHALL COMPLY WITH ALL CITY/COUNTY REGULATIONS AND CODES AND O.S.H.A. STANDARDS.
2. ALL MATERIAL NOTED ON DRAWINGS WILL BE SUPPLIED BY THE CONTRACTOR UNLESS OTHERWISE NOTED.
3. CONTRACTOR SHALL REFER TO THE ARCHITECTURAL PLANS TO COORDINATE ACCESS POINTS AND ELEVATIONS. REFER TO ARCHITECTURAL PLANS. FOR EXACT LOCATIONS AND DIMENSIONS OF DOORS, ENTRY RAMP, AND CANOPY.
4. THE CONTRACTOR SHALL OBTAIN ALL PERMITS FOR ALL SITE DEVELOPMENT WORK, PAY ALL FEES FOR PERMITS AND CHECK ALL GOVERNING AUTHORITIES' SPECIFICATIONS FOR BUT NOT LIMITED TO, GUTTERS, SIDEWALKS, POLES, AND OTHER STRUCTURES, INCLUDING THE REMOVAL OR RELOCATION OF EXISTING UTILITIES OR OTHER PHYSICAL OBJECTS SHOWN ON PLANS OR NOTED OTHERWISE.
5. THE CONTRACTOR SHALL CREATE AND IMPLEMENT AN EROSION AND SEDIMENTATION CONTROL PLAN FOR ALL SITE CONSTRUCTION ACTIVITIES ASSOCIATED WITH THE PROJECT. THE PLAN MUST CONFORM TO THE EROSION AND SEDIMENTATION REQUIREMENTS OF THE CONSTRUCTION GENERAL PERMIT OR LOCAL STANDARDS AND CODES, WHICHEVER IS MORE STRINGENT.
6. ALL COSTS FOR INSPECTIONS AND/OR TESTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR UNLESS NOTED OTHERWISE.
7. ACCESSIBILITY STANDARDS SHALL BE IN ACCORDANCE WITH FEDERAL AND LOCAL REQUIREMENTS FOR HANDICAP ACCESSIBILITY, INCLUDING BUT NOT LIMITED TO THE AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES. ADA PARKING STALLS SHALL MEET ADA GRADE GUIDELINES. CONTRACTOR SHALL FIELD VERIFY EXISTING GRADES AT ACCESS POINTS, ACCESSIBLE ROUTES, AND EXISTING PARKING TO REMAIN TO DETERMINE COMPLIANCE WITH STANDARDS.
8. ALL DISTURBED AREAS ARE TO RECEIVE 6" OF TOPSOIL, SEED, MULCH AND WATER UNTIL A HEALTHY STAND OF GRASS IS ESTABLISHED.
9. ALL DIMENSIONS AND RADII ARE TO THE FACE OF THE CURB OR EDGE OF PAVEMENT, AS APPLICABLE, UNLESS OTHERWISE NOTED.
10. ALL CURB RADII ARE 5 FEET UNLESS OTHERWISE NOTED.
11. PROVIDE SIGNAGE AND STRIPING AS SHOWN. ALL SIGNAGE AND PAVEMENT MARKINGS SHALL COMPLY WITH THE GOVERNING MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.). PAVEMENT MARKINGS ON ASPHALT SHALL BE WHITE. PAVEMENT MARKINGS ON CONCRETE SHALL BE YELLOW.
12. REFER TO ARCHITECTURAL PLANS FOR PROPOSED BUILDING SIGNAGE.
13. REFER TO MECHANICAL PLANS FOR EQUIPMENT LAYOUT.
14. REFER TO ELECTRICAL PLANS FOR ELECTRICAL WORK.
15. REFER TO GEOTECHNICAL ENGINEERING REPORT FOR SITE WORK PREPARATION/RECOMMENDATIONS AND PAVEMENT SECTIONS.
16. REFER TO ORIGINAL SURVEY PROVIDED BY BLEW & ASSOCIATES DATED NOVEMBER 30, 2022; REVISED DECEMBER 07, 2022.
17. ALL LIGHT POLES TO BE LOCATED 3' FROM THE BACK OF CURB, AS MEASURED FROM THE FACE OF POLE FOUNDATION, UNLESS OTHERWISE DENOTED ON PLANS.

GRADING NOTES

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
2. THE TOPOGRAPHIC SURVEY WAS PERFORMED BY A REGISTERED LAND SURVEYOR. IF CONTRACTOR DOES NOT ACCEPT EXISTING TOPOGRAPHY AS SHOWN ON THE PLANS, WITHOUT EXCEPTION, HE SHALL HAVE MADE, AT HIS EXPENSE, A TOPOGRAPHIC SURVEY BY A REGISTERED LAND SURVEYOR AND SUBMIT IT TO THE OWNER FOR REVIEW.
3. CONSTRUCTION SHALL COMPLY WITH ALL APPLICABLE GOVERNING CODES AND BE CONSTRUCTED TO SAME.
4. THE CONTRACTOR SHALL ADHERE TO ALL TERMS & CONDITIONS AS OUTLINED IN THE EPA OR APPLICABLE STATE GENERAL N.P.D.E.S. PERMIT FOR STORM WATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITIES.
5. EXISTING AND PROPOSED GRADE CONTOUR INTERVALS ARE SHOWN AT 1 FOOT INTERVALS.
6. ALL SPOT ELEVATIONS REFER TO FINISHED PAVEMENT ELEVATIONS UNLESS OTHERWISE NOTED.
7. ALL ADA ACCESSIBLE PARKING SPACES AND LOADING AREAS SHALL BE GRADED WITH A 2.0% MAXIMUM SLOPE IN ALL DIRECTIONS. ALL ADA ACCESSIBLE ROUTES SHALL BE GRADED WITH A 2.0% MAXIMUM CROSS SLOPE AND 5.0% MAXIMUM RUNNING SLOPE.
8. MAINTAIN EXISTING DRAINAGE PATTERN THROUGHOUT THE SITE, EXCEPT WITHIN THE LIMITS OF DISTURBANCE (LOD).
9. COORDINATE GRADES AT BUILDING ENTRIES WITH ARCHITECTURAL PLANS.
10. EXISTING DRAINAGE STRUCTURES SHALL BE INSPECTED AND REPAIRED AS NEEDED, AND EXISTING PIPES ARE TO BE CLEANED TO REMOVE ALL SILT AND DEBRIS AFTER CONSTRUCTION IS COMPLETE.
11. IF ANY EXISTING STRUCTURES TO REMAIN ARE DAMAGED DURING CONSTRUCTION IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR AND/OR REPLACE THE EXISTING STRUCTURE AS NECESSARY TO RETURN IT TO A CONDITION EQUAL TO OR BETTER THAN ITS CONDITION PRIOR TO DAMAGE.
12. CONTRACTOR SHALL ASSURE POSITIVE DRAINAGE AWAY FROM BUILDING AND WITHIN PAVED AREAS.
13. ALL TOPSOIL MUST BE REMOVED BEFORE FILL MATERIAL IS PLACED.
14. ALL WET, OR OTHERWISE UNSUITABLE SOILS MUST BE STABILIZED, THIS MAY BE ACCOMPLISHED BY DRYING, REMOVAL & REPLACEMENT, REMOVAL & DRYING & RECOMPACTION, OR SOIL TREATMENT (LIME/CEMENT) UNDER THE SUPERVISION OF A QUALIFIED PROFESSIONAL GEOTECHNICAL ENGINEER.
15. ALL UNSURFACED AREAS, DISTURBED BY GRADING, OPERATION SHALL RECEIVE 6" OF TOPSOIL. CONTRACTOR SHALL APPLY STABILIZATION FABRIC TO ALL SLOPES 3H:1V OR STEEPER AND SEED WITH LOW MAINTENANCE GRASS SEED MIX. CONTRACTOR SHALL SEED DISTURBED AREAS IN ACCORDANCE WITH SPECIFICATIONS UNTIL A HEALTHY STAND OF GRASS IS OBTAINED. ALL EXPOSED SURFACE AREAS SHALL BE STABILIZED PER THE SWPPP AND LANDSCAPE REQUIREMENTS AS PART OF THIS PLAN SET.
16. ALL STORM PIPE ENTERING STRUCTURES SHALL BE GROUTED TO ASSURE CONNECTION AT STRUCTURE IS SOIL TIGHT.
17. ALL STORM STRUCTURES SHALL HAVE A SMOOTH UNIFORM POURED MORTAR INVERT FROM INVERT IN TO INVERT OUT.
18. STORM PIPE SHALL BE AS FOLLOWS UNLESS OTHERWISE NOTED:

MATERIAL	TYPE	PIPE SPEC	JOINT SPEC	INSTALLATION	ACCEPTABLE AREAS OF USE
REINFORCED CONCRETE PIPE (RCP)	CLASS III, IV, V	ASTM C-76	ASTM C443	ASTM C1479	WITHIN R/W, COVER VARIES WITH PIPE CLASS
HIGH DENSITY POLY-ETHYLENE (HDPE)	SMOOTH-WALLED CORRUGATED ADS-N12 OR EQUAL	AASHTO M294 (TYPE S)	ASTM F477	ASTM D2321	ON SITE, 12" TO 60" DIA.
POLY VINYL CHLORIDE (PVC)	SDR 35	ASTM D3034	ASTM D3212	ASTM D2321	ON SITE, 4" TO 10"

STORM PIPE SHALL BE IN ACCORDANCE WITH THE CITY'S CODE: SECTION 157-40.

19. ALL STORM SEWER STRUCTURE GRATES AND FRAMES WITHIN PAVEMENT SHALL BE HEAVY DUTY.
20. ALL STORM DRAINAGE SHALL BE PERFORMED IN ACCORDANCE WITH ALL LOCAL COUNTY AND DOT STANDARDS.
21. ALL DOWNSPOUT DRAIN LINES OR ROOF LEADERS SHALL HAVE A 1.0% MINIMUM SLOPE, UNLESS OTHERWISE NOTED. CONNECT ALL DOWNSPOUTS AND ROOF LEADERS TO THE STORM SEWER SYSTEM. REFER TO ARCHITECTURAL PLANS FOR DOWNSPOUT AND ROOF LEADER LOCATIONS. PROVIDE POSITIVE DRAINAGE AND PAVEMENT REPAIR AS NEEDED.
22. ROOF DRAINS, FOUNDATION DRAINS, AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER SYSTEM ARE PROHIBITED.
23. THE STORM SEWER GRADE WILL BE SUCH THAT A MINIMUM COVER IS MAINTAINED TO WITHSTAND AASHTO HS-25 LOADING ON THE PIPE. PROVIDE MINIMUM 2.0 FEET OF COVER FOR ALL STORM SEWERS UNLESS OTHERWISE NOTED.
24. WHEN A SANITARY SEWER MAIN LIES ABOVE A STORM SEWER, OR WITHIN 18 INCHES BELOW, THE SANITARY SEWER WILL HAVE AN IMPERVIOUS ENCASEMENT OR BE CONSTRUCTED OF STRUCTURAL SEWER PIPE FOR A MINIMUM OF 10 FEET ON EACH SIDE OF WHERE THE STORM SEWER CROSSES.
25. IF EXISTING FIELD TILES ARE ENCOUNTERED DURING CONSTRUCTION THEY SHALL BE REPAIRED AND/OR TIED INTO A STORM SEWER SYSTEM AS NEEDED TO MAINTAIN POSITIVE DRAINAGE.

UTILITY NOTES

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE.
2. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
3. CONTRACTOR SHALL COMPLY TO THE FULLEST EXTENT WITH THE LATEST STANDARDS OF O.S.H.A. DIRECTIVES OR ANY OTHER AGENCY HAVING JURISDICTION FOR EXCAVATION AND TRENCHING PROCEDURES. THE CONTRACTOR SHALL USE SUPPORT SYSTEMS, SLOPING, BENCHING, AND OTHER MEANS OF PROTECTION. THIS TO INCLUDE BUT NOT LIMITED FOR ACCESS AND EGRESS FROM ALL EXCAVATION AND TRENCHING. CONTRACTOR IS RESPONSIBLE TO COMPLY WITH PERFORMANCE CRITERIA FOR O.S.H.A.
4. CONTRACTOR IS RESPONSIBLE FOR REPAIRS OF DAMAGE TO ANY EXISTING UTILITY DURING CONSTRUCTION AT NO COST TO THE OWNER.
5. ALL FILL MATERIAL IS TO BE IN PLACE AND COMPACTED BEFORE INSTALLATION OF PROPOSED UTILITIES.
6. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES FOR INSTALLATION REQUIREMENTS AND SPECIFICATIONS. THE CONTRACTOR SHALL CONDUCT ALL REQUIRED TESTS TO THE SATISFACTION OF THE RESPECTIVE UTILITY REGULATIONS AND THE OWNER'S INSPECTION AUTHORITIES.
7. CONTRACTOR SHALL NOTIFY THE UTILITY AUTHORITY'S INSPECTORS 72 HOURS BEFORE CONNECTING TO ANY EXISTING LINE.
8. WATER AND SANITARY UTILITIES SHALL HAVE TEN (10) FEET OF HORIZONTAL CLEARANCE WHEN PARALLEL OR 18" VERTICAL CLEARANCE WHEN CROSSING. ALL CLEARANCE DISTANCES SHALL BE MEASURED FROM OUTSIDE EDGE OF PIPE TO OUTSIDE EDGE OF PIPE. THE CROSSING SHALL BE ARRANGED SO THAT THE SANITARY SEWER JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE WATER LINE JOINTS.
9. IF A WATER LINE PASSES UNDER THE SANITARY SEWER LINE, THE SEWER LINE SHOULD BE CONSTRUCTED OF A WATERTIGHT MATERIAL APPROVED BY THE REGULATORY AGENCY FOR USE IN WATER MAIN CONSTRUCTION AND SHALL EXTEND TEN (10) FEET ON BOTH SIDES OF THE CROSSING, AS MEASURED PERPENDICULAR TO THE WATER LINES. ADEQUATE STRUCTURAL SUPPORT SHALL BE PROVIDED FOR THE SEWER TO MAINTAIN LINE AND GRADE.
10. UNDERGROUND LINES SHALL BE INSTALLED, INSPECTED AND APPROVED BEFORE BACKFILLING.
11. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES FOR INSTALLATION REQUIREMENTS AND SPECIFICATIONS. THE CONTRACTOR SHALL CONDUCT ALL REQUIRED TESTS TO THE SATISFACTION OF THE RESPECTIVE UTILITY REGULATIONS AND THE OWNER'S INSPECTION AUTHORITIES.

12. UTILITY TRENCHES WITHIN PAVED AREAS TO BE BACKFILLED PER UTILITY TRENCH DETAIL PROVIDED WITHIN THE CONSTRUCTION DETAILS SHEET.
13. ALL WATER LINE WORK SHALL BE PERFORMED IN ACCORDANCE WITH CITY OF DOVER PUBLIC WORKS' CONSTRUCTION STANDARDS AND STATE REGULATIONS.
14. INSTALL ALL WATER LINES WITH A MINIMUM COVER PER THE CITY OF DOVER PUBLIC WORKS.
15. ON-SITE WATER LINE MATERIAL SHALL BE AS FOLLOWS:
ALL WATER LINES 4" OR GREATER SHALL BE DI WITH AN 8 MIL. POLYETHYLENE WRAP, INCLUDING TEE AND OTHER CONNECTIONS. WATER SERVICE LINES SHALL BE COPPER TUBING (TYPE K) BETWEEN MAIN AND CURB STOP. SERVICES 3/4" MAY BE COPPER OR CTS, HDPE, OR IPS. CTS SHALL BE SDR 9 PLASTIC POLYETHYLENE RATED FOR 250 PSI.

MATERIAL	PRESSURE RATING	PIPE SPEC	FITTINGS	INSTALLATION	ACCEPTABLE AREAS OF USE
HIGH-DENSITY POLY-ETHYLENE (HPDE TUBING)	SDR 9 P.C. = 250 PSI	ASTM D2239 AWWA C901 ASTM F714	ASTM D3350 ASTM D3261	ASTM D2774	ON SITE, < 3" DIA.
COPPER 1"-3"	TYPE "K"	ASTM B88	AWWA C800	AWWA C800	DOMESTIC WATERLINES 1"-3"
PE 4710 POLY-ETHYLENE PLASTIC (IPS)	SDR 11 P.C. = 200 PSI	ASTM D3035 AWWA C901	ASTM D3350 ASTM D3261	ASTM D2774	ON SITE, 2" TO 3" DIA.
P.V.C. POLY VINYL CHLORIDE 4"- 8" C900	C900	AWWA C901 (RATED DR 14)	ASTM F-477 ASTM D3139	AWWA C900 C651	ON SITE, 4"-8" WATER LINES & FIRE LINES INSTALL W/ TRACER & TAPE #12 COPPER
DUCTILE IRON PIPE 4"-12"	CLASS 52 P.C. = 350PSI	AWWA C104, C110, C151, C500	AWWA C111	AWWA C800, C651	6" FIRE HYDRANT LEADS
PE 4710 POLY-ETHYLENE PLASTIC (DIPS)	SDR 9 P.C. = 250 PSI	ASTM D2239 ASTM F714 AWWA C906	ASTM D3350 ASTM D3261	ASTM D2774	ON SITE, 4" DIA. AND LARGER

16. ON-SITE SANITARY SEWER LINE MATERIAL SHALL BE AS FOLLOWS:
SERVICE TO BUILDING WILL BE SCHEDULE 40 PVC WITH 10" MAX LENGTH AND NO GLUED JOINTS.

MATERIAL	PRESSURE RATING	PIPE SPEC	FITTINGS	INSTALLATION	ACCEPTABLE AREAS OF USE
POLY VINYL CHLORIDE (PVC)	SDR 35	ASTM D3034	ASTM D3212	ASTM D2321 WITH TYPE 1 BEDDING	ON SITE, 6" TO 8" DIA., LESS THAN 8.5' OF COVER

17. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT BUILDING UTILITY CONNECTION LOCATIONS, SERVICE SIZES TO BE DETERMINED BY ARCHITECT.
18. CLEAN OUTS AND CURB BOXES WITHIN THE PAVED AREAS MUST HAVE TRAFFIC LOADING FRAMES AND COVERS.

EXISTING FEATURES LEGEND

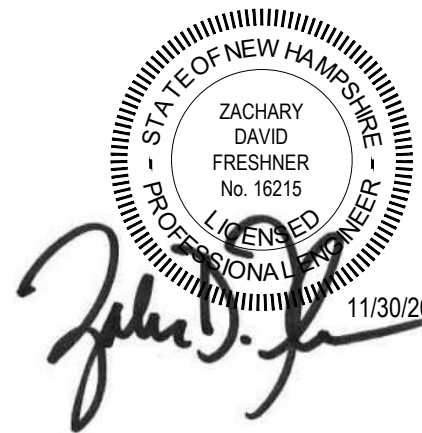
APPLIES TO ALL CIVIL SHEETS

	RIGHT OF WAY		STORM CATCH BASIN
	PARCEL LINE		STORM INLET BASIN
	PROPERTY BOUNDARY		STORM MANHOLE
	EASEMENT		STORM CLEANOUT
	CURB		SANITARY MANHOLE
	EDGE OF PAVEMENT		SANITARY CLEANOUT
	EDGE OF WALK		TRAFFIC MANHOLE
	PAVEMENT MARKINGS		SIGN
	GAS LINE		TELEPHONE POLE
	WATER LINE		
	UNDERGROUND ELECTRIC		
	UNDERGROUND TELE		
	OVERHEAD LIGHTING		
	STORM SEWER		
	SANITARY SEWER		
	MAJOR CONTOURS		
	MINOR CONTOURS		
	WATER METER		
	WATER VALVE		
	POWER/TELE POLE		
	POWER POLE		
	AIR CONDITIONER		
	ELECTRIC BOX		
	LIGHT POLE		
	GAS VALVE		
	GAS METER		



CESO
WWW.CESOINC.COM

3601 Rigby Rd., Suite 300
Merrimack, NH 03042
Phone: 937.435.8584 Fax: 988.208.4826



HANG TEN CAR WASH

DOVER, NH

914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions		
ID	Description	Date
1	TRC RESUBMITTAL	2023/11/30

Project Number:	761766
Scale:	1"=20'
Drawn By:	NTV
Checked By:	HGC
Date:	06/28/2023
Issue:	PERMIT

Drawing Title:
GENERAL NOTES

C0.1

CITY OF DOVER NOTES

COMMON SITE PLAN NOTES

1.

THE INTENT OF THIS SITE PLAN IS TO CONSTRUCT A CAR WASH FACILITY.
2.

CURRENT OWNER:
914 CENTRAL AVENUE LLC
1380 SOLDIERS FIELD RD. SUITE 2100
BOSTON, MA 02135

Steve Yukin

REGISTERED PROFESSIONAL ENGINEER

AUTHORIZED SIGNATURE
3.

THE PROJECT PARCEL IS SHOWN AS LOT NO. 38020, MAP 38 OF THE CITY OF DOVER TAX ASSESSOR'S MAPS.
4.

THE PROJECT PARCEL CONTAINS ±1.29 ACRES OR ±56,078 SQUARE FEET AREA OF LAND.
5.

TITLE REFERENCE FOR THE PROJECT PARCEL IS THE STAFFORD COUNTY REGISTRY OF DEEDS, BOOK NO. ____, PAGE NO. ____.
6.

PROJECT PLAN REFERENCES: (LIST ALL REFERENCE PLANS AND THEIR SCRD #)
7.

ALL APPLICABLE RIGHT-OF-WAY, CONSERVATION, SLOPE, CONSTRUCTION, UTILITY, ACCESS, OR OTHER EASEMENTS SHALL BE REFERENCED IN A NOTE.
8.

ZONING DIMENSIONAL AND DENSITY REQUIREMENTS ARE AS FOLLOWS:

a.

ZONING DISTRICT COMMERCIAL (C)

b.

MINIMUM LOT SIZE: 0.46 ACRES (20,000 SQ. FT.)

c.

MINIMUM LOT FRONTAGE: 125 FT.

d.

MINIMUM YARD SETBACKS:

FRONT 30 FT.

SIDE 12 FT.

REAR 15 FT.

ABUT-A-STREET 30 FT.

MAXIMUM LOT COVERAGE 50%

MAXIMUM BLDG. HEIGHT 40 FT.

8.

THIS PROPERTY FALLS WITHIN THE FOLLOWING ZONING OVERLAY DISTRICTS: N/A

9.

PROPERTY LINE INFORMATION HAS BEEN OBTAINED FROM A SURVEY PERFORMED BY (BLEW & ASSOCIATES) ON (11/07/2022) WITH AN ERROR NOT GREATER THAN 1 IN 10,000.

10.

SUBJECT PARCEL IS NOT LOCATED WITHIN A FEDERALLY DESIGNATED FLOOD HAZARD AREA (COMMUNITY PANEL NUMBER 33017C0310E, EFFECTIVE DATE: SEPTEMBER 30, 2015).

11.

WETLANDS WERE DELINEATED BY _____, CERTIFIED WETLANDS SCIENTIST, CERTIFICATION NUMBER _____, IN ACCORDANCE WITH CHAPTER 170:27.1 OF THE ZONING ORDINANCE, ON _____, 20____.

12.

PARKING SPACES REQUIRED BY THE PROPOSED USE (OR BY THE SQ. FT. INVOLVED) ARE 16. PARKING SPACES PROVIDED BY THIS PLAN ARE 16.

13.

AS-BUILT PLANS OF THE SITE SHALL BE SUBMITTED ON A REPRODUCIBLE MYLAR MEDIUM AND IN A DIGITAL DXF FORMAT ON DISK TO THE CITY OF DOVER ENGINEER'S OFFICE UPON COMPLETION OF PROJECT. AS-BUILT PLANS SHALL BE PREPARED AND CERTIFIED CORRECT BY A L.L.S. OR P.E.

14.

EXTERIOR LIGHTING SHALL BE CUT-OFF TYPE FIXTURES PER CHAPTER 149:14-E AND SHALL PROVIDE LIGHTING DIRECTED ON-SITE ONLY.

15.

TOPOGRAPHIC SURVEY PERFORMED BY BLEW & ASSOCIATES ON 11/07/2022.

16.

ELEVATIONS ARE BASED ON U.S.G.S. DATUM.

17.

THE (EXISTING OR PROPOSED) STRUCTURE SHALL BE SERVED BY A SPRINKLER SYSTEM AS REQUIRED UNDER CHAPTER 109-30 OF THE CODE OF THE CITY OF DOVER AND THE 2009 STATE BUILDING CODES.

18.

SPRINKLER CONNECTIONS MUST BE FLUSHED IN ACCORDANCE WITH NFPA 24 AND A CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR UNDERGROUND PIPING FORM MUST BE COMPLETED.

19.

FIRE DEPARTMENT CONNECTIONS SHALL BE LOCATED ON THE STREET SIDE OF THE BUILDING PER NFPA 13.

20.

A SECURITY SYSTEM SHALL BE INSTALLED AS REQUIRED BY CHAPTER 58, ARTICLE I, SECTION 58-2 OF THE CODE OF THE CITY OF DOVER. (IF A BUSINESS ESTABLISHMENT OR MULTI-FAMILY DWELLING CONTAINED IN A NEW, ALTERED OR REPAIRED STRUCTURE)

21.

ALL ON-SITE UTILITIES SHALL BE INSTALLED UNDERGROUND.

22.

THE SUBJECT PARCEL(S) IS (ARE) SERVED BY MUNICIPAL WATER AND SEWER (OR IS SERVED BY ON-SITE WELL AND SEPTIC SYSTEM).

23.

ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO APPLICABLE CITY AND STATE CODES.

24.

BACKFLOW PREVENTORS SHALL BE PROVIDED FOR BOTH FIRE AND DOMESTIC WATER LINES.

25.

ALL EROSION CONTROL NOTES SHALL INCLUDE PROVISIONS FOR CONSTRUCTION SEQUENCING, TEMPORARY EROSION CONTROL MEASURES, AND PERMANENT STANDARDS SUCH AS LOAM SPREAD RATE FOR DISTURBED AREAS, RATES OF LIME, TYPE AND RATES FOR FERTILIZER, AND SEED AND MULCH MIXTURE WITH RATES OF APPLICATION.

26.

THE LIMITS OF CONSTRUCTION DISTURBANCE THAT ARE LOCATED IN OR WITHIN THE 50 FT. OF CONSERVATION AND WETLAND DISTRICTS SHALL BE STAKED, FLAGGED AND CLEARLY IDENTIFIED PRIOR TO THE COMMENCEMENT OF SITE WORK.

27.

ALL TREATMENT SWALES TO BE CONSTRUCTED SHALL HAVE SOD BOTTOMS.

28.

A LETTER OF CREDIT FOR THE COST OF REVEGETATING ALL DISTURBED AREAS ON THE SITE SHALL BE SUBMITTED PRIOR TO ANY EARTH DISTURBING ACTIVITY OCCURS.

29.

A PRE-CONSTRUCTION CONFERENCE WITH THE DEVELOPER, THE DESIGN ENGINEER, THE EARTHWORK CONTRACTOR AND THE CITY ENGINEER SHALL OCCUR PRIOR TO ANY EARTH DISTURBING ACTIVITY.

30.

BUILDING ADDRESSES SHALL BE ASSIGNED BY THE BUILDING INSPECTOR AT THE TIME OF ISSUANCE OF A BUILDING PERMIT.

31.

THE PROPOSED USE FOR THE SITE (STRUCTURE) IS A CAR WASH WITH VACUUM CLEANER SPACES. (MORE SPECIFIC USES ARE ENCOURAGED, SUCH AS RESTAURANT, HOTEL, DOCTOR'S OFFICE, ETC. SHOULD MORE THAN ONE USE BE PROPOSED, AN INDICATION OF THE PERCENTAGE OF EACH USE IS SUGGESTED.)

32.

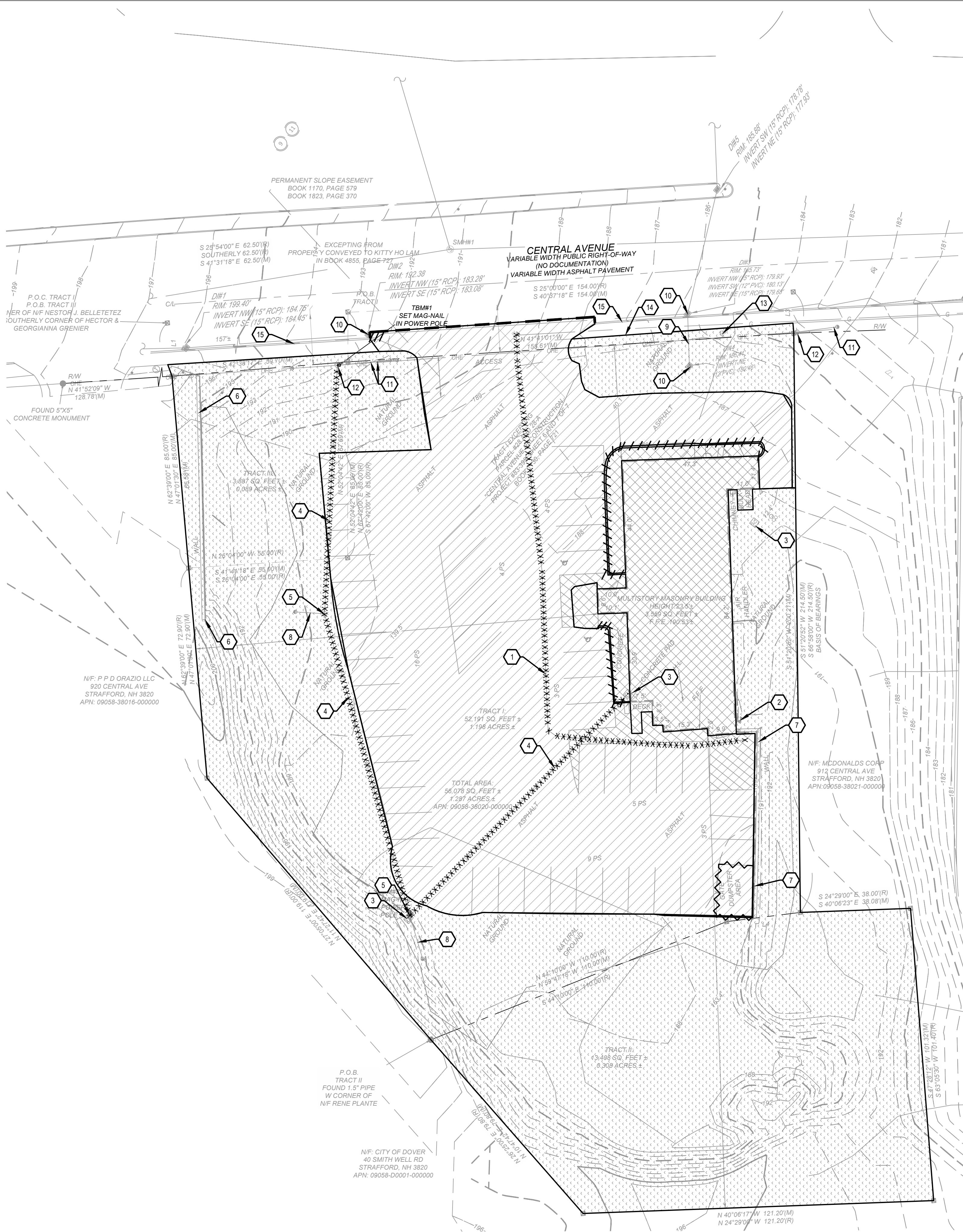
THE FOLLOWING FEDERAL AND STATE PERMITS HAVE BEEN ISSUED FOR THE SUBJECT PROPERTY: (LIST PERMIT TYPE, NUMBER AND DATE OF ISSUANCE.)

33.

LIST ANY VARIANCES OR SPECIAL EXCEPTIONS GRANTED BY THE ZONING BOARD OF ADJUSTMENT FOR THE PROPOSED USE OR STRUCTURE, INCLUDING THE CASE NUMBER AND DATE OF DECISION.
- Diagram illustrating the Trash Enclosure Plan. The plan shows a rectangular structure with dimensions: 12'-0" overall width, 10'-8" internal width, and 12'-0" overall depth. The structure is composed of CMU with concave tolled joints. Key features include:

 - PROVIDE 24" W X 8" HIGH OPENING IN CMU WALL, RE: STRUCTURAL
 - CMU WITH CONCAVE TOLLED JOINTS
 - 6" DIA. X 4'-0" HIGH CONCRETE FILLED PIPE BOLLARD, TYP. (2), BOLLARD TO BE 3'-0" BELOW GRADE FULLY ENCASED IN 24" DIA. CONCRETE
 - 4" X 4" X 1/4" STEEL POST EMBEDDED 2'-0" MIN. INTO CONCRETE FOOTING. WELD PLATE ON TOP, MAKE WATER TIGHT AND PAINT TO MATCH ADJ. MASONRY
 - 6" DIA. X 4'-0" HIGH CONCRETE FILLED PIPE BOLLARD, TYP. (2), BOLLARD TO BE 3'-0" BELOW GRADE FULLY ENCASED IN 24" DIA. CONCRETE
 - CONCRETE PAD, RE: CIVIL
 - SLOPE 1/8" PER FT.
 - Annotations: 3 AS-101, 4 AS-1.01, 5 AS-1.01, 2 AS-101

1 TRASH ENCLOSURE PLAN
SCALE: 1/4" = 1'-0"
FOR REFERENCE ONLY
-
- WWW.CESOINC.COM
- 3601 Rigby Rd., Suite 300
Merrimack, NH 03042
Phone: 937.435.8584 Fax: 888.208.4826
-
- HANG TEN CAR WASH
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- Drawing Title:
DOVER NH NOTES
- C0.2
- W:\PROJECTS\WEA761766-01_Hang 10_Dover_NH\03-CIVIL\PLAN\PLAN\001-COVER.dwg - 11/29/2023 - Paige Weidner
- 3



DEMOLITION LEGEND

EXISTING

REFER TO C0.1 FOR EXISTING FEATURES LEGEND

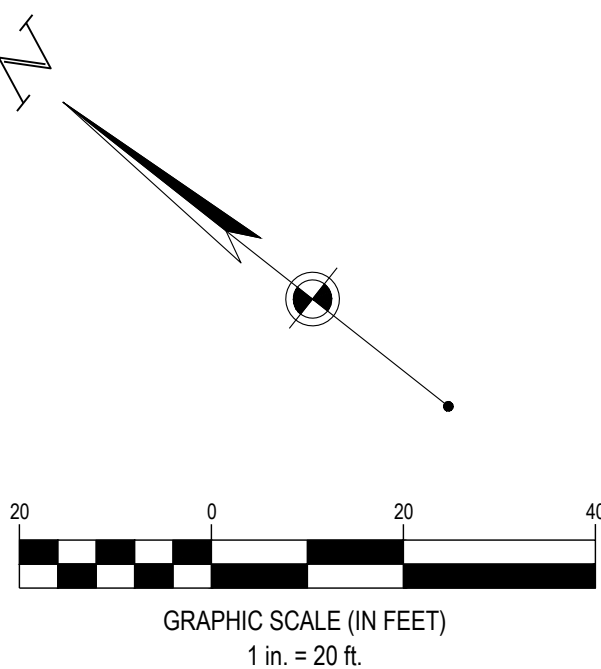
PROPOSED

- SITE CLEARING LIMITS
- REMOVE EXISTING BUILDING
- REMOVE EXISTING GRAVEL PAVEMENT
- REMOVE EXISTING ASPHALT PAVEMENT (OR AS NOTED ON THE PLANS)
- SAWCUT LINE
- UTILITY LINE TO BE REMOVED / RELOCATED
- REMOVE EXISTING CURB & GUTTER
- REMOVE EXISTING FENCE

- GENERAL NOTES:**
SEE SHEET C0.1
- CODED NOTES:**
- EXISTING GAS LINE TO BE REMOVED.
 - EXISTING GAS STRUCTURE TO BE REMOVED.
 - EXISTING ELECTRIC STRUCTURE TO BE REMOVED.
 - EXISTING OVERHEAD ELECTRIC LINE TO BE REMOVED.
 - EXISTING UTILITY POLE TO BE REMOVED.
 - EVALUTE EXISTING RETAINING WALL TO REMAIN FOR STRUCTURAL INTEGRITY. PROTECT DURING DEMOLITION AND CONSTRUCTION.
 - EXISTING RETAINING WALL TO BE REMOVED.
 - EXISTING GUY WIRE AND ANCHOR TO BE REMOVED.
 - EXISTING STORM LINE TO REMAIN AND TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
 - EXISTING STORM STRUCTURE TO REMAIN AND TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
 - EXISTING GUY WIRES TO REMAIN TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
 - EXISTING UTILITY POLE TO REMAIN AND TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
 - EXISTING CURB BOX TO REMAIN AND BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
 - EXISTING GAS LINE TO REMAIN AND TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
 - EXISTING CURB AND SIDEWALK TO REMAIN AND TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.



SEVENTY-TWO (72) HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTORS SHALL NOTIFY THE FOLLOWING AGENCIES: NEW HAMPSHIRE UTILITIES PROTECTION SERVICE AT 811 OR 888-344-7233 AND ALL OTHER AGENCIES WHICH MIGHT HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NONMEMBERS OF STATE UTILITIES PROTECTION SERVICE



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EXISTING COND. & DEMO PLAN

C1.0

SWPPP GENERAL NOTES

1.

ALL EROSION AND SEDIMENTATION CONTROL SHALL BE PERFORMED ACCORDING TO SWPPP AND DETAIL PLANS; ACCORDING TO THE LATEST EPA AUTHORIZATION FOR CONSTRUCTION ACTIVITY UNDER THE "NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM" (NPDES); ANY AND ALL REQUIRED PERMITS, REPORTS, AND RELATED DOCUMENTS. ALL CONTRACTORS AND SUBCONTRACTORS MUST BECOME FAMILIAR WITH ALL OF THE ABOVE.
2.

CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES (BMPs) AS REQUIRED BY THE SWPPP. ADDITIONAL BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED AS DICTATED BY CONDITIONS AND GRADE CHANGES TO THE SITE AT NO ADDITIONAL COST TO OWNER THROUGHOUT ALL PHASES OF CONSTRUCTION.
3.

CONTRACTOR SHALL MINIMIZE CLEARING AND DISTURBANCE TO THE ENVIRONMENT TO THE MAXIMUM EXTENT POSSIBLE OR AS REQUIRED BY THE GENERAL PERMIT.
4.

SEDIMENT STRUCTURES AND PERIMETER SEDIMENT BARRIERS SHALL BE IMPLEMENTED AS THE FIRST STEP OF GRADING WITHIN SEVEN (7) DAYS FROM THE START OF CLEARING AND GRUBBING, AND SHALL CONTINUE TO FUNCTION UNTIL THE DEVELOPMENT AREA IS STABILIZED.
5.

PERMANENT SOIL STABILIZATION OF DISTURBED AREAS BY MEANS OF VEGETATION, LANDSCAPE TYPE MULCHING, MATING, SOD, RIP RAP, AND OTHER APPROVED LANDSCAPING TECHNIQUES TO BE APPLIED AS FOLLOWS:
 - WITHIN SEVEN (7) DAYS OF ANY AREA THAT WILL BE DORMANT FOR ONE (1) YEAR OR MORE.
 - WITHIN TWO (2) DAYS OF ANY AREA WITHIN 50 FEET OF A STREAM AT FINAL GRADE.
 - WITHIN SEVEN (7) DAYS FOR ANY OTHER AREA AT FINAL GRADE.
6.

TEMPORARY SOIL STABILIZATION OF DISTURBED AREAS BY MEANS OF TEMPORARY VEGETATION, MULCHING, GEOTEXTILES, SOD, PRESERVATION OF EXISTING VEGETATION, AND OTHER APPROVED TECHNIQUES TO BE APPLIED AS FOLLOWS:
 - WITHIN TWO (2) DAYS OF ANY AREA WITHIN 50 FEET OF A STREAM NOT AT FINAL GRADE.
 - WITHIN SEVEN (7) DAYS OF ANY AREA THAT WILL BE DORMANT FOR MORE THAN TWENTY ONE (21) DAYS, BUT LESS THAN ONE (1) YEAR.
 - PRIOR TO THE ONSET OF WINTER WEATHER FOR AREAS THAT WILL BE IDLE OVER WINTER.
7.

TEMPORARY SEEDING, MULCHING, AND FERTILIZER SPECIFICATIONS:

SEEDING: ANNUAL RYEGRASS AT 2.02 POUNDS PER 1,000 S.F.

MULCHING: STRAW MATERIAL SHALL BE UNROTTED SMALL GRAIN STRAW APPLIED AT A RATE OF TWO (2) TON/ACRE, OR 80-100 POUNDS PER 1,000 S.F. MULCH MATERIALS SHALL BE RELATIVELY FREE OF ALL KINDS OF WEEDS AND SHALL BE FREE OF PROHIBITIVE NOXIOUS WEEDS. MULCH SHALL BE SPREAD UNIFORMLY BY HAND OR MECHANICAL MEANS. FROM NOVEMBER 01 THRU MARCH 15 INCREASE THE RATE OF STRAW MULCH TO THREE (3) TON/ACRE.

FERTILIZER: APPLY FERTILIZER AT HALF THE RATE OF PERMANENT APPLICATION AND AS PER SPECIFICATIONS. IF PROJECT CONDITIONS PREVENT FERTILIZING THE SOIL, THEN THIS ITEM MAY BE WAIVED.
8.

SLOPES SHALL BE LEFT IN A ROUGHENED CONDITION DURING THE GRADING PHASE TO REDUCE RUNOFF VELOCITIES AND EROSION. ALL SLOPES 3:1 OR GREATER THAN 3:1 SHALL BE FERTILIZED, SEEDED, AND CURLEX BLANKETS BY AMERICAN EXCELSIOR COMPANY, NORTH AMERICAN GREEN, INC. OR AN APPROVED EQUAL AS SPECIFIED IN THE PLANS SHALL BE INSTALLED ON THE SLOPES.
9.

NO SOLID (OTHER THAN SEDIMENT) OR LIQUID WASTE, INCLUDING BUILDING MATERIALS, SHALL BE DISCHARGED IN STORM WATER RUNOFF. ALL NON-SEDIMENT POLLUTANTS MUST BE DISPOSED OF IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL GUIDELINES. WASH OUT OF CEMENT TRUCKS SHOULD OCCUR IN DESIGNATED PIT OR DIKED AREAS, WHERE WASHINGS CAN BE REMOVED AND PROPERLY DISPOSED OFF-SITE WHEN THEY HARDEN. STORAGE TANKS SHOULD ALSO BE LOCATED IN PIT OR DIKED AREAS. IN ADDITION, SUFFICIENT OIL AND GREASE ABSORBING MATERIALS AND FLOTATION BOOMS TO CLEAN AND CONTAIN FUEL AND CHEMICAL SPILLS MUST BE KEPT ON SITE.

10.

IF THE ACTION OF VEHICLES TRAVELING OVER THE STABILIZED CONSTRUCTION EXIT DOES NOT SUFFICIENTLY REMOVE MOST OF THE DIRT AND MUD, THEN THE TIRES MUST BE WASHED BEFORE VEHICLES ENTER A PUBLIC ROAD. PROVISIONS MUST BE MADE TO INTERCEPT THE WATER AND TRAP THE SEDIMENT BEFORE IT IS CARRIED OFF THE SITE.
11.

RUBBISH, TRASH, GARBAGE, LITTER, OR OTHER SUCH MATERIALS SHALL BE DISPOSED INTO SEALED CONTAINERS. MATERIALS SHALL BE PREVENTED FROM LEAVING THE SITE THROUGH THE ACTION OF WIND OR STORM WATER DISCHARGE INTO DRAINAGE DITCHES OR WATERS OF THE STATE.
12.

DUST CONTROL USING APPROVED MATERIALS MUST BE PERFORMED AT ALL TIMES. THE USE OF MOTOR OILS AND OTHER PETROLEUM BASED OR TOXIC LIQUIDS FOR DUST SUPPRESSION IS PROHIBITED.
13.

ON-SITE AND OFF-SITE STOCKPILE AND BORROW AREAS SHALL BE PROTECTED FROM EROSION AND SEDIMENTATION BY THE USE OF BEST MANAGEMENT PRACTICES. THESE AREAS MUST BE SHOWN IN THE SITE MAP AND PERMITTED IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS. AT A MINIMUM SILT FENCE TO BE PLACED AT PERIMETER OF STOCKPILE AREA TO PREVENT SOIL FROM LEAVING THE STOCKPILE AREA.
14.

ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED ONTO THE ROADWAYS OR INTO THE STORM SEWERS MUST BE REMOVED IMMEDIATELY.
15.

ALL CONSTRUCTION SHALL BE STABILIZED AT THE END OF EACH DAY; THIS INCLUDES BACKFILLING OF TRENCHES FOR UTILITY CONSTRUCTION AND PLACEMENT OF GRAVEL OR ASPHALT FOR ROAD CONSTRUCTION.
16.

THE LAST LAYER OF SOIL, INCLUDING TOP SOIL, SHOULD BE COMPACTED TO 80% - 85% OF THE MAXIMUM STANDARD PROCTOR DENSITY, IN AREAS OUTSIDE THE PARKING LOT THAT WILL RECEIVE VEGETATION. THIS IS PARTICULARLY IMPORTANT IN CUT SLOPE AND EMBANKMENT AREAS. IN PAVEMENT AND ISLAND AREAS, IT IS RECOMMENDED THAT THE SOIL BE COMPACTED TO 98% AND 95% OF THE MAXIMUM STANDARD PROCTOR DENSITY RESPECTIVELY; THE LAST COMPACTED LAYER MAY BE SCARIFIED TO IMPROVE THE SOIL GROWTH CHARACTERISTICS.
17.

ALL DEWATERING ACTIVITIES SUCH AS PUMPING DOWN OF FLOODED FOUNDATION AND UTILITY TRENCHES MUST PASS THROUGH THE RETROFITTED DETENTION BASIN OR A SEDIMENT CONTROL PRACTICE PRIOR TO WATER LEAVING THE SITE.
18.

SILT FENCE AND OTHER PERIMETER EROSION CONTROL MEASURES SHOWN OFF LIMITS OF DISTURBANCE FOR CLARITY PURPOSES ONLY. CONTRACTOR TO ENSURE PERIMETER EROSION CONTROL MEASURES ARE PLACED AT THE LIMITS OF DISTURBANCE. ANY DISCREPANCIES SHOULD BE BROUGHT TO THE ENGINEER PRIOR TO PLACEMENT OF ANY EROSION CONTROL MEASURES.

SWPPP MAINTENANCE NOTES

1.

ALL CONTROL MEASURES STATED IN THE SWPPP SHALL BE MAINTAINED IN FULLY FUNCTIONAL CONDITION UNTIL TEMPORARY OR PERMANENT STABILIZATION OF THE SITE IS ACHIEVED. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED BY A QUALIFIED PERSON IN ACCORDANCE TO THE CONTRACT DOCUMENTS OR THE APPLICABLE PERMIT, WHICHEVER IS MORE STRINGENT, AND REPAIRED ACCORDING TO THE FOLLOWING.
2.

INLET PROTECTION DEVICES AND CONTROLS SHALL BE REPAIRED OR REPLACED WHEN THEY SHOW SIGNS OF UNDERMINING AND OR DETERIORATION. INLET PROTECTION DEVICES SHOULD BE ROUTINELY CLEANED AND MAINTAINED.
3.

ALL SEEDED AREAS SHALL BE CHECKED REGULARLY TO ENSURE THAT A GOOD STANDING OF GRASS IS MAINTAINED. AREAS SHOULD BE FERTILIZED, WATERED, AND RESEEDED AS NEEDED.
4.

MINIMIZE OFF-SITE SEDIMENT TRACKING OF VEHICLES BY THE USE OF STONE MATERIAL IN ALL CONSTRUCTION ENTRANCES, ALONG WITH REGULARLY SCHEDULED SWEEPING/GOOD HOUSEKEEPING. STABILIZED CONSTRUCTION ENTRANCES TO BE PROPERLY MAINTAINED BY GENERAL CONTRACTOR AND IN GOOD WORKING ORDER AT ALL TIMES; THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE STONE AS CONDITIONS DEMAND.

5.

THE TEMPORARY PARKING AND STORAGE AREA SHALL BE KEPT IN GOOD CONDITION (SUITABLE FOR PARKING AND STORAGE) BY GENERAL CONTRACTOR. THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE TEMPORARY PARKING AS CONDITIONS DEMAND.
6.

CONTRACTORS AND SUBCONTRACTORS WILL BE RESPONSIBLE FOR REMOVING ALL SEDIMENT FROM THE SITE, AND STORM SEWER SYSTEMS. SEDIMENT DEPOSITION DURING SITE STABILIZATION MUST ALSO BE REMOVED.
7.

STONE CONSTRUCTION EXIT TO BE MAINTAINED BY GENERAL CONTRACTOR UNTIL SITE HAS BEEN PAVED OR IS NO LONGER REQUIRED.
8.

ALL CATCH BASIN GRATES ARE TO BE PROTECTED WITH INLET BAGS AFTER THEY ARE INSTALLED. THEY SHOULD BE ROUTINELY CLEANED AND MAINTAINED.
9.

CONTAINERS SHALL BE AVAILABLE FOR DISPOSAL OF DEBRIS, TRASH, HAZARDOUS OR PETROLEUM WASTES. ALL CONTAINERS MUST BE COVERED AND LEAK-PROOF. ALL WASTE MATERIAL SHALL BE DISPOSED OF AT FACILITIES APPROVED FOR THE PERTINENT MATERIAL.
10.

BRICKS, HARDENING CONCRETE AND SOIL WASTE SHALL BE FREE FROM CONTAMINATION WHICH MAY LEACH CONSTITUENTS TO WATERS OF THE STATE.
11.

CLEAN CONSTRUCTION WASTES THAT WILL BE DISPOSED INTO THE PROPERTY SHALL BE SUBJECT TO ANY LOCAL PROHIBITIONS FROM THIS TYPE OF DISPOSAL.
12.

ALL CONSTRUCTION AND DEMOLITION DEBRIS (C&DD) WASTE SHALL BE DISPOSED OF IN A STATE APPROVED C&DD LANDFILL. CONSTRUCTION DEBRIS MAY BE DISPOSED OF ON-SITE, BUT DEMOLITION DEBRIS MUST BE DISPOSED IN A STATE APPROVED LANDFILL. ALSO, MATERIALS WHICH CONTAIN ASBESTOS MUST COMPLY WITH ALL LOCAL AND STATE REGULATIONS.
13.

AREA SHALL BE DESIGNATED BY CONTRACTOR AND SHOWN ON SWPPP MAP FOR MIXING OR STORAGE OF COMPOUNDS SUCH AS FERTILIZERS, LIME, ASPHALT, OR CONCRETE. THESE DESIGNATED AREAS SHALL BE LOCATED AWAY FROM WATERCOURSES, DRAINAGE DITCHES, FIELD DRAINS, OR OTHER STORMWATER DRAINAGE AREA.
14.

EQUIPMENT FUELING & MAINTENANCE SHALL BE IN DESIGNATED AREAS ONLY.
15.

A SPILL PREVENTION CONTROL AND COUNTERMEASURE (SPCC) PLAN MUST BE DEVELOPED FOR SITES WITH ONE ABOVE-GROUND STORAGE TANK OF 660 GALLONS OR MORE, TOTAL ABOVE-GROUND STORAGE OF 1,330 GALLONS OR BELOW-GROUND STORAGE OF 4,200 GALLONS OF FUEL.
16.

ALL DESIGNATED CONCRETE WASHOUT AREAS SHALL BE LOCATED AWAY FROM WATERCOURSES, DRAINAGE DITCHES, FIELD DRAINS OR OTHER STORMWATER DRAINAGE AREAS.
17.

ALL CONTAMINATED SOIL MUST BE TREATED AND/OR DISPOSED IN AN EPA APPROVED SOLID WASTE MANAGEMENT FACILITY OR HAZARDOUS WASTE TREATMENT, STORAGE OR DISPOSAL FACILITIES.
18.

THE CONTRACTOR SHALL CONTACT THE STATE EPA, THE LOCAL FIRE DEPARTMENT AND THE LOCAL EMERGENCY PLANNING COMMITTEE IN THE EVENT OF A PETROLEUM SPILL (>25 GALLONS) OR THE PRESENCE OF SHEEN.
19.

OPEN BURNING IS NOT PERMITTED ON THE SITE.
20.

CONTRACTOR TO ENSURE STREETS SHALL BE CLEARED OF DEBRIS FROM SITE AND SWEEPED CLEAN ON AN AS NEEDED BASIS.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PROJECT NARRATIVE:

PLAN ENGINEERS:	CESO, INC. 2800 CORPORATE EXCHANGE DRIVE COLUMBUS, OH 43231 PHONE: (614) 942-7631 CONTACT: ZACH FRESHNER	DEVELOPER:	HANG TEN CAR WASH 1380 SOLDIERS FIELD ROAD BOSTON, MA 02135 CONCTACT: STEVE LUKIN
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THE PROPOSED PROJECT IS THE CONSTRUCTION OF A CAR WASH AND PARKING. THE SUBJECT PARCEL IS 1.29 ACRES. THE TOTAL DISTURBED AREA IS 1.28 ACRES.

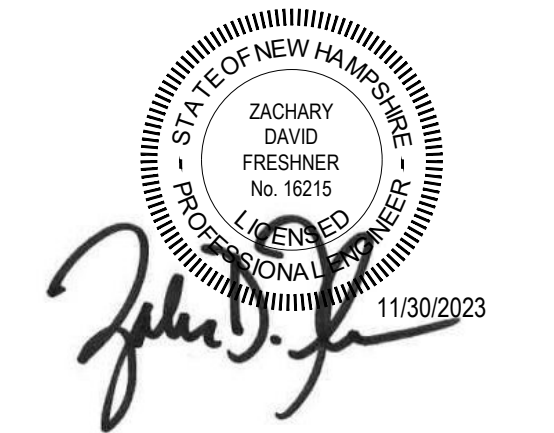
THE SITE DRAINS TO AN EXISTING YARD DRAIN IN THE NORTH WEST CORNER OF THE PROPERTY.

ON-SITE SOILS:	HAB	27.1%
	HAC	26.1%
	HBE	46.8%
HYDROLOGIC SOIL GROUP = A		

SEQUENCE OF CONSTRUCTION

1. NOTIFY CITY/COUNTY ENGINEER BEFORE WORK IS TO BEGIN.
2. INSTALL ALL TEMPORARY EROSION CONTROL MEASURES INCLUDING SILT FENCE, CONSTRUCTION EXIT, FILTER SACKS, CONCRETE WASHOUT.
3. SITE DEMOLITION AND CLEARING.
4. ROUGH GRADING, PROVIDE TEMPORARY SEEDING OF DISTURBED AREAS WHICH ARE INACTIVE.
5. STORM SEWER AND UNDERGROUND UTILITY CONSTRUCTION.
6. BUILDING PAD.
7. CURB CONSTRUCTION.
8. FINE GRADING AND PAVEMENT SUBGRADE PREPARATION
9. ASPHALT PAVING AND REMAINING CONCRETE FLATWORK.
10. FINAL SEEDING.

* CONTRACTOR SHALL MODIFY THE SEQUENCE OF CONSTRUCTION BASED ON SITE CONDITIONS. CONTRACTOR TO NOTIFY PROJECT MANAGER PRIOR TO CHANGING SEQUENCE OF CONSTRUCTION.



HANG TEN CAR WASH

DOVER, NH

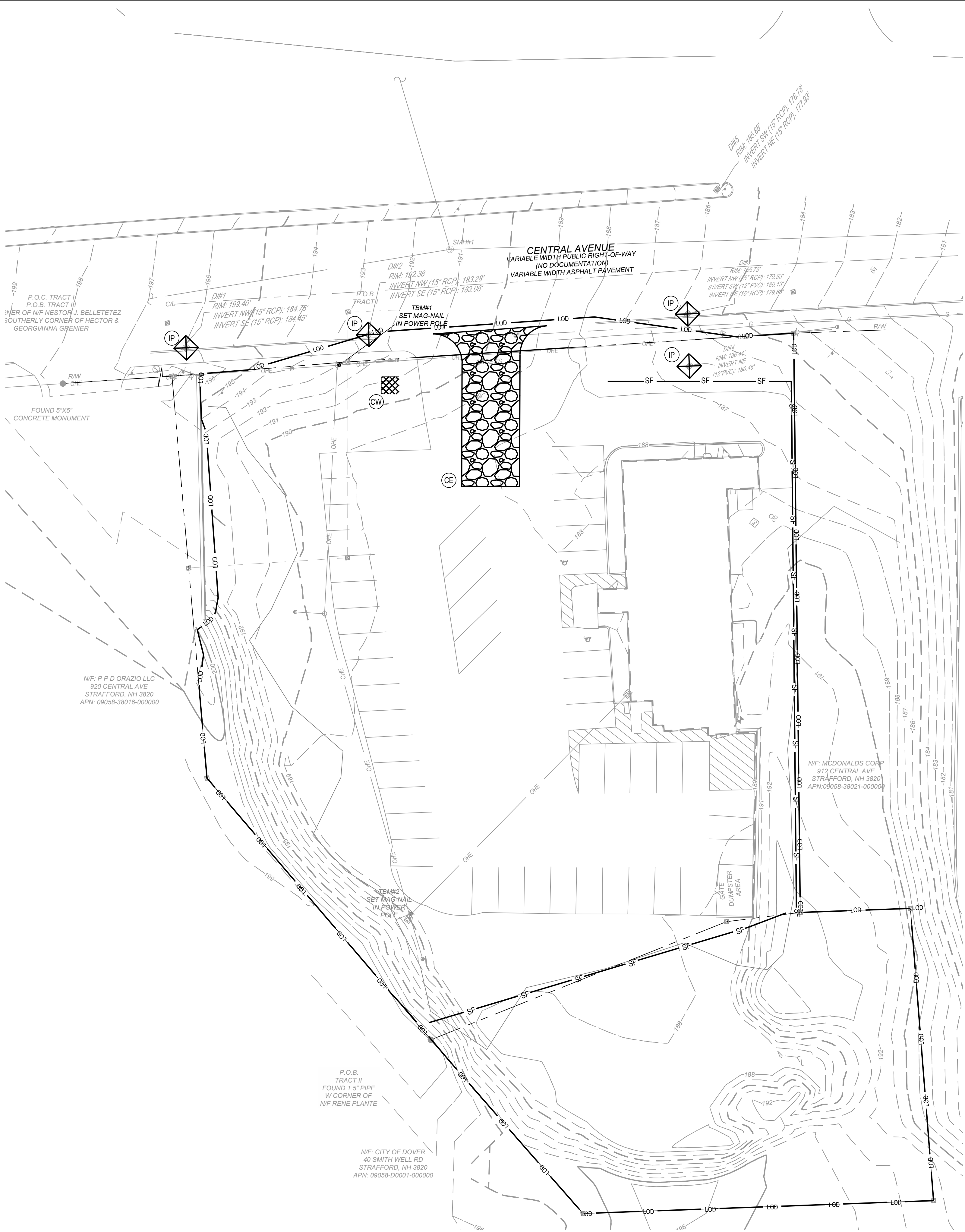
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Date:	06/28/2023
Issue:	PERMIT

Drawing Title:
SWPPP NOTES

C2.0



SWPPP LEGEND

EXISTING

REFER TO C1.1 FOR EXISTING FEATURES LEGEND

PROPOSED

950

MAJOR CONTOUR

952

MINOR CONTOUR

PAVEMENT/WALK

SF

SF

LOD

IP

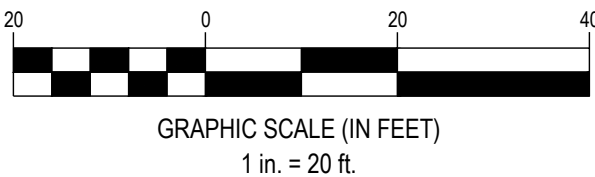
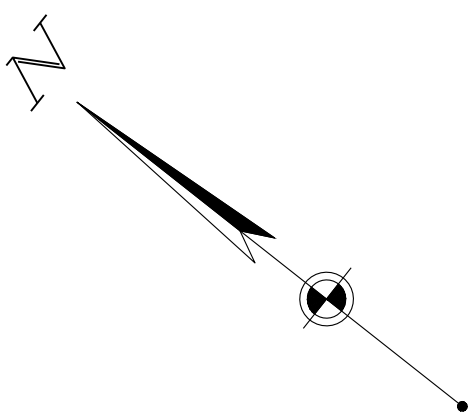
CE

CW

IP



SEVENTY-TWO (72) HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTORS SHALL NOTIFY THE FOLLOWING AGENCIES: NEW HAMPSHIRE UTILITIES PROTECTION SERVICE AT 811 OR 888-344-7233 AND ALL OTHER AGENCIES WHICH MIGHT HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NONMEMBERS OF STATE UTILITIES PROTECTION SERVICE



3601 Rigby Rd., Suite 300
Merrimack, NH 03042
Phone: 937.435.8584 Fax: 888.208.4826



HANG TEN CAR WASH

DOVER, NH

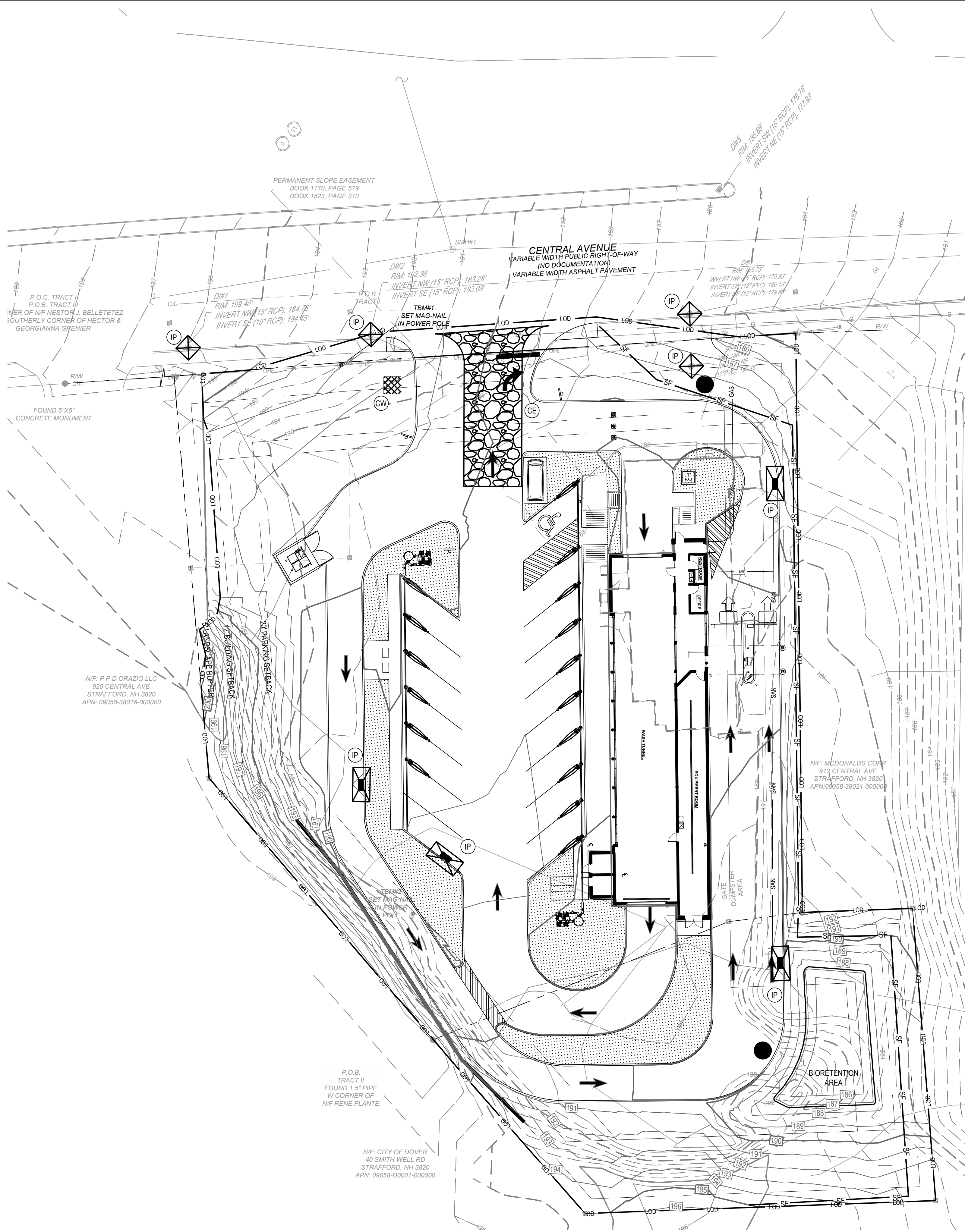
914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions		
ID	Description	Date
1	TRC RESUBMITTAL	2023/11/30

Project Number:	761766
Scale:	1"=20'
Drawn By:	NTV
Checked By:	HGC
Date:	06/28/2023
Issue:	PERMIT

Drawing Title:
SWPPP PHASE 1 PLAN

C2.1



SWPPP LEGEND

EXISTING

REFER TO C1.1 FOR EXISTING FEATURES LEGEND

PROPOSED

950

MAJOR CONTOUR

952

MINOR CONTOUR

PAVEMENT/WALK

STORM SEWER

SF — SF

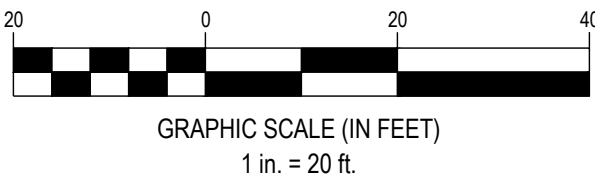
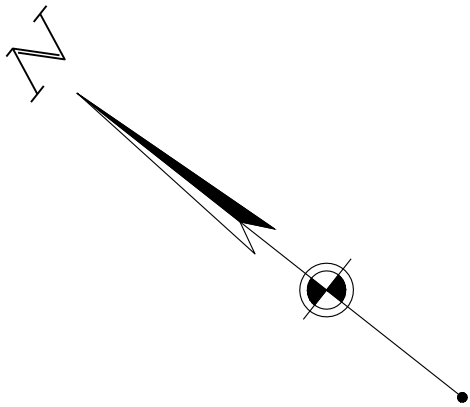
SILT FENCE

LOO

LIMIT OF DISTURBANCE

STABILIZED CONSTRUCTION ENTRANCECONCRETE WASHOUTBASIN SEDIMENT FILTERSTORM MANHOLECATCH BASINCURB INLETSTABILIZED CONSTRUCTION ENTRANCECONCRETE WASHOUT AREAINLET PROTECTION

SEVENTY-TWO (72) HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTORS SHALL NOTIFY THE FOLLOWING AGENCIES: NEW HAMPSHIRE UTILITIES PROTECTION SERVICE AT 811 OR 888-344-7233 AND ALL OTHER AGENCIES WHICH MIGHT HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NONMEMBERS OF STATE UTILITIES PROTECTION SERVICE



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HANG TEN CAR WASH

DOVER, NH

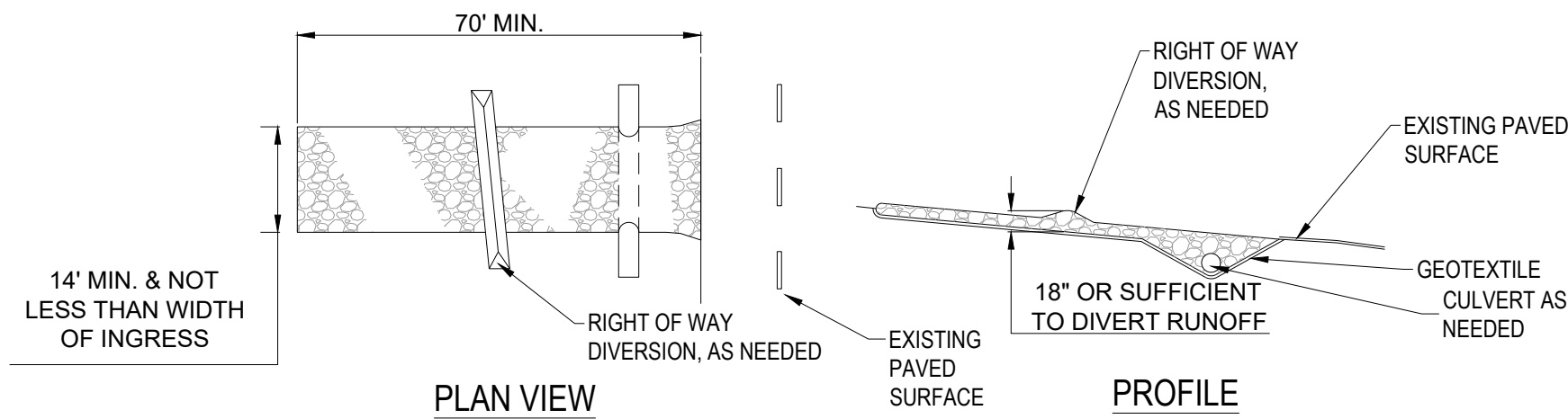
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DOVER, NH 03820

Revisions / Submissions		
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Project Number:	761766
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Drawn By:	NTV
Checked By:	HGC
Date:	06/28/2023
Issue:	PERMIT

Drawing Title:
SWPPP PHASE 2 PLAN

C2.2



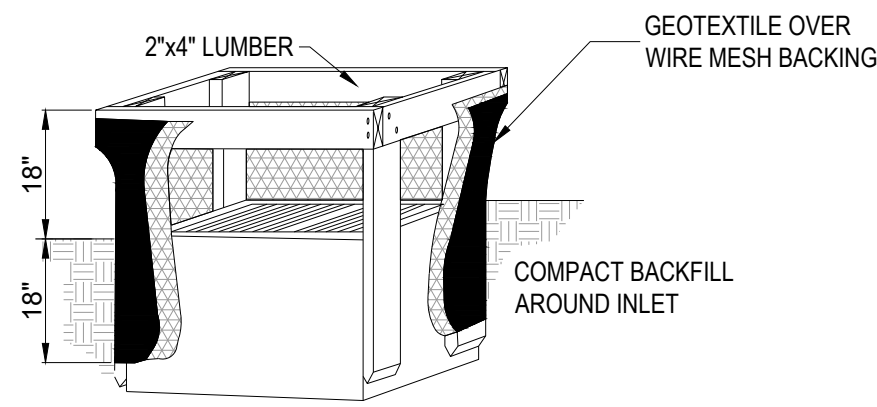
GEOTEXTILE SPECIFICATION FOR CONSTRUCTION ENTRANCE	
MINIMUM TENSILE STRENGTH	200 lbs.
MINIMUM PUNCTURE STRENGTH	80 psi.
MINIMUM TEAR STRENGTH	50 lbs.
MINIMUM BURST STRENGTH	320 psi.
MINIMUM ELONGATION	20%
EQUIVALENT OPENING SIZE	EOS < 0.6 mm.
PERMITTIVITY	1x10-3 cm/sec.

NOTES:

- STONE SIZE - (1.5-2.5 INCH) STONE SHALL BE USED, OR RECYCLED CONCRETE EQUIVALENT.
- LENGTH - THE CONSTRUCTION ENTRANCE SHALL BE AS LONG AS REQUIRED TO STABILIZE HIGH TRAFFIC AREAS BUT NOT LESS THAN 70 FT. (EXCEPTION: APPLY 30 FT. MINIMUM TO SINGLE RESIDENCE LOTS.
- THICKNESS - THE STONE LAYER SHALL BE AT LEAST 6 INCHES THICK FOR LIGHT DUTY ENTRANCES OR AT LEAST 10 INCHES FOR HEAVY DUTY USE.
- WIDTH - THE ENTRANCE SHALL E AT LEAST 14 FEET WIDE, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
- GEOTEXTILE - A GEOTEXTILE SHALL BE LAID OVER THE ENTIRE AREA PRIOR TO PLACING STONE. IT SHALL BE COMPOSED OF STRONG ROT-PROOF POLYMERIC FIBERS AND MEET THE FOLLOWINGS SPECIFICATIONS:
- TIMING - THE CONSTRUCTION ENTRANCE SHALL BE INSTALLED AS SOON AS IS PRACTICAL BEFORE MAJOR GRADING ACTIVITIES.
- CULVERT - A PIPE OR CULVERT SHALL BE CONSTRUCTED UNDER THE ENTRANCE IF NEEDED TO PREVENT SURFACE WATER FROM FLOWING ACROSS THE ENTRANCE OR TO PREVENT RUNOFF FROM BEING DIRECTED OUT ONTO PAVED SURFACES.
- WATER BAR - A WATER BAR SHALL BE CONSTRUCTED AS PART OF THE CONSTRUCTION ENTRANCE IF NEEDED TO PREVENT SURFACE RUNOFF FROM FLOWING THE LENGTH OF THE CONSTRUCTION ENTRANCE AND OUT ONTO PAVED SURFACES.
- MAINTENANCE - TOP DRESSING OF ADDITIONAL STONE SHALL BE APPLIED AS CONDITIONS DEMAND. MUD SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC ROADS, ORA ANY SURFACE WHERE RUNOFF IS NOT CHECKED BY SEDIMENT CONTROLS, SHALL BE REMOVED IMMEDIATELY. REMOVAL SHALL BE ACCOMPLISHED BY SCRAPING OR SWEEPING.
- CONSTRUCTION ENTRANCES SHALL NOT BE RELIED UPON TO REMOVE MUD FROM VEHICLES AND PREVENT OFF-SITE TRACKING. VEHICLES THAT ENTER AND LEAVE THE CONSTRUCTION-SITE SHALL BE RESTRICTED FROM MUDDY AREAS.
- REMOVAL - THE ENTRANCE SHALL REMAIN IN PLACE UNTIL THE DISTURBED AREA IS STABILIZED OR REPLACED WITH A PERMANENT ROADWAY OR ENTRANCE.

STABILIZED CONSTRUCTION ENTRANCE

NTS



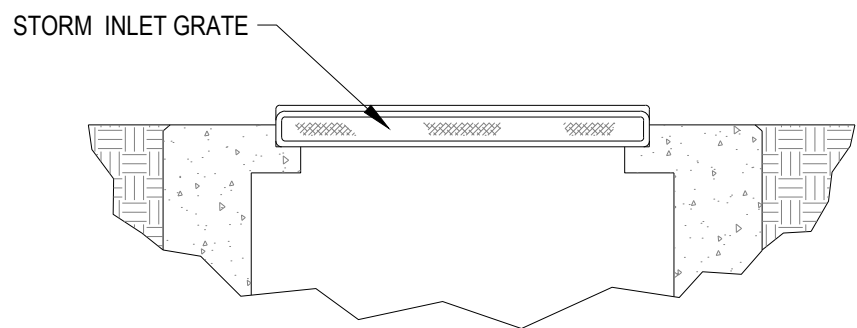
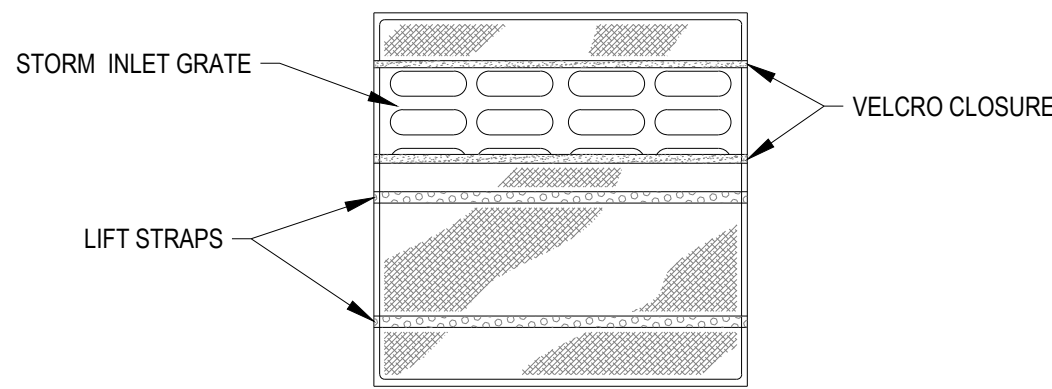
SECTION

NOTES:

- INLET PROTECTION SHALL BE CONSTRUCTED EITHER BEFORE UPSLOPE LAND DISTURBANCE BEGINS OR BEFORE THE INLET BECOMES FUNCTIONAL.
- THE EARTH AROUND THE INLET SHALL BE EXCAVATED COMPLETELY TO A DEPTH AT LEAST 18 INCHES.
- THE WOODEN FRAME SHALL BE CONSTRUCTED OF 2-INCH BY 4-INCH CONSTRUCTION GRADE LUMBER. THE 2-INCH BY 4-INCH POSTS SHALL BE DRIVEN 18\"/>

AREA INLET PROTECTION

NTS

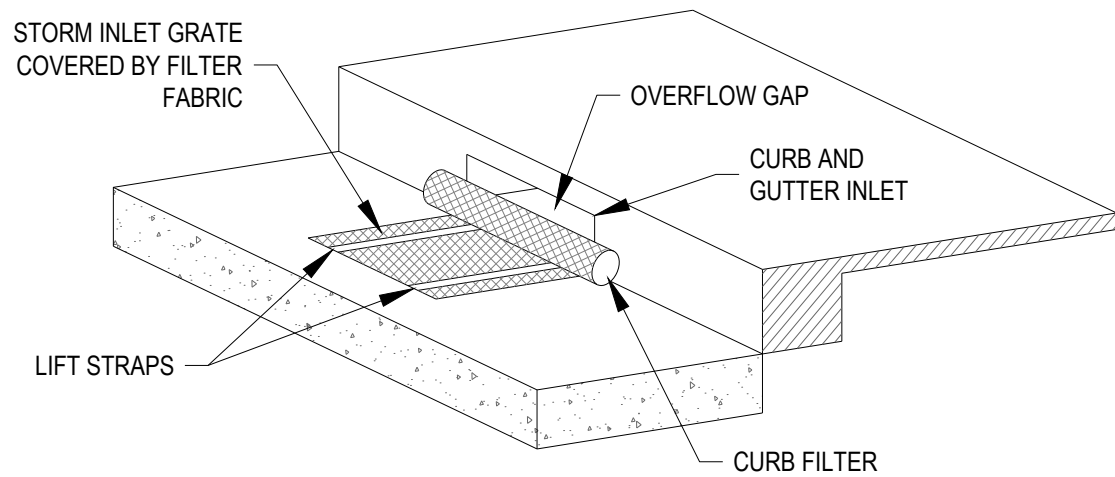


NOTE:

INLET PROTECTION SHALL BE DANDY BAG OR APPROVED OTHER.

INLET PROTECTION

NTS

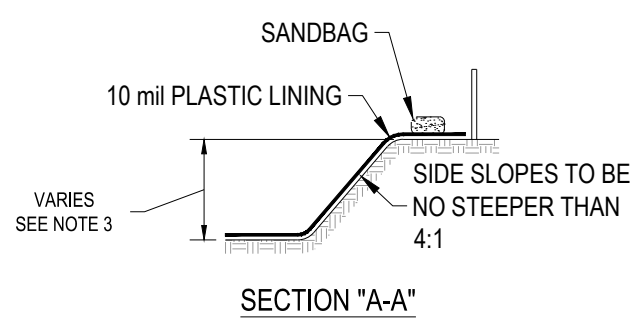


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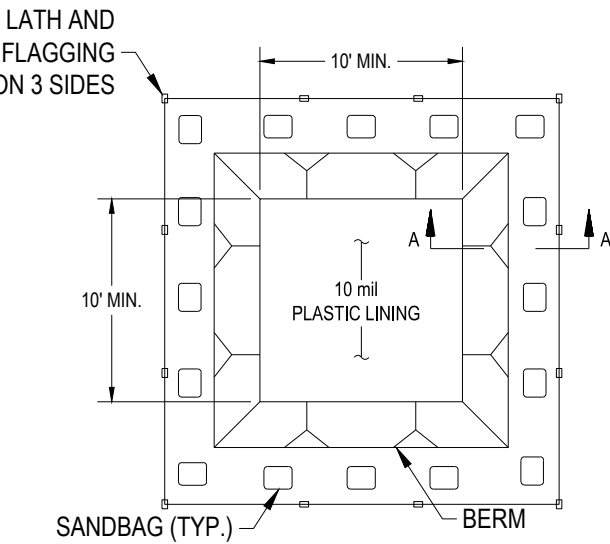
INLET PROTECTION SHALL BE DANDY CURB BAG OR APPROVED OTHER.

CURB INLET PROTECTION

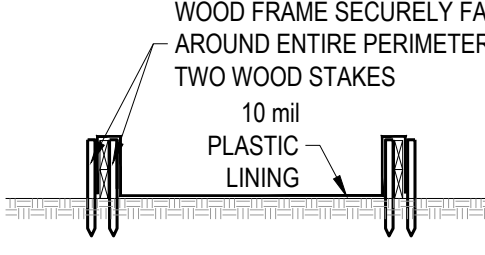
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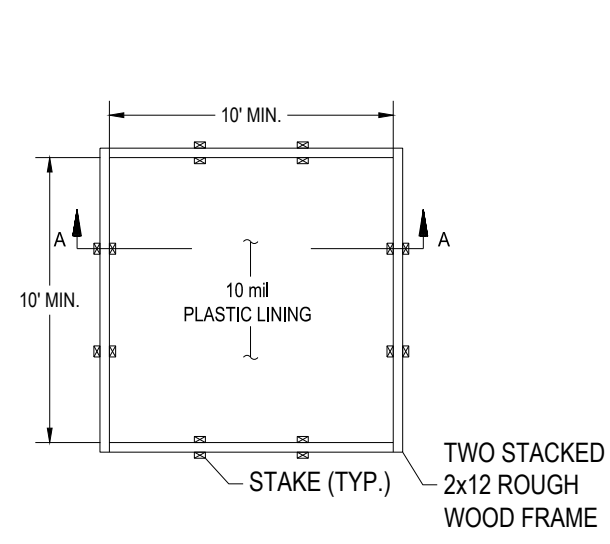
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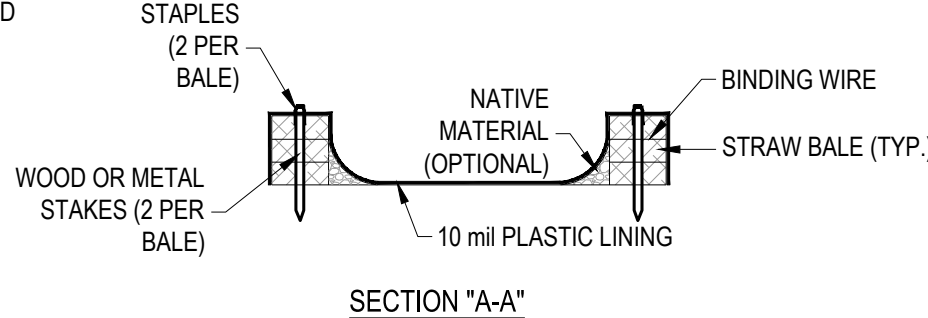
BELOW GRADE



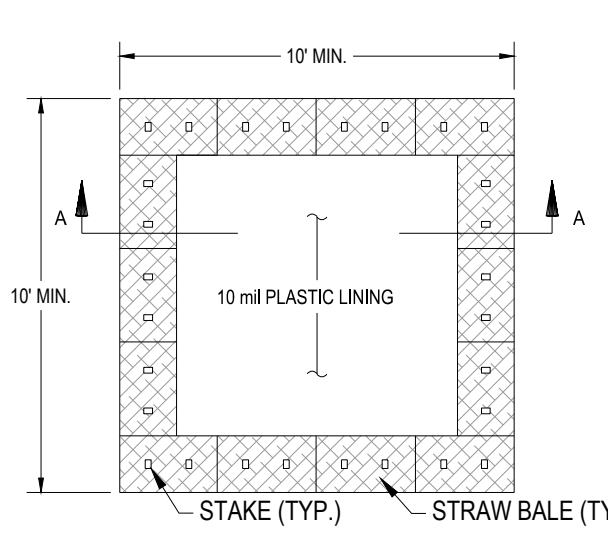
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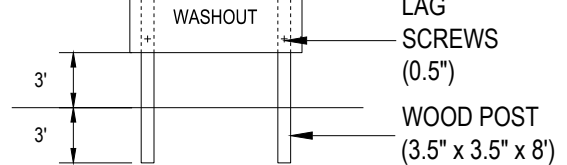
ABOVE GRADE WITH WOOD PLANKS



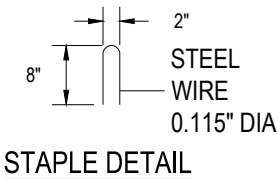
SECTION "A-A"



ABOVE GRADE W/ HAYBALES



CONCRETE WASHOUT SIGN DETAIL



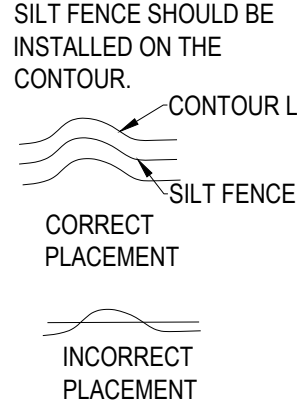
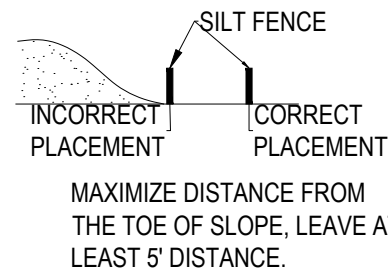
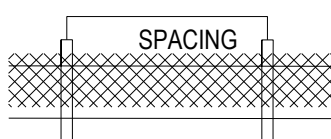
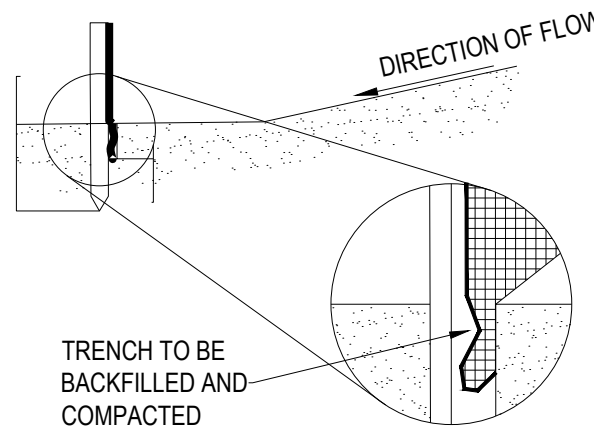
STAPLE DETAIL

NOTES:

- ACTUAL LAYOUT DETERMINED IN THE FIELD.
- THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30' OF THE TEMPORARY CONCRETE WASHOUT FACILITY.
- THE WASHOUT MUST HAVE SUFFICIENT VOLUME TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS INCLUDING BUT NOT LIMITED TO OPERATIONS ASSOCIATED WITH GROUT AND MORTAR.

CONCRETE WASHOUT

NTS



SPECIFICATIONS FOR SILT FENCE

FABRIC PROPERTIES	VALUES	TEST METHODS
GRAB TENSILE STRENGTH	90 LB. MINIMUM	ASTM D-1682
MULEN BURST STRENGTH	190 PSI MINIMUM	ASTM D-3786
SLURRY FLOW RATE	0.3 GAL/MIN/FT. MAX.	
EQUIVALENT OPENING SIZE	40-80	US STD. SIEVE CW 02215
ULTRAVIOLET RADIATION STABILITY	90% MINIMUM	ASTM - G 26

CRITERIA FOR SILT FENCE MATERIALS

- FENCE POSTS - THE LENGTH SHALL BE A MINIMUM OF 32 INCHES LONG. WOOD POSTS WILL BE 2 IN. X 2 IN. HARDWOOD OF SOUND QUALITY. THE MAXIMUM SPACING BETWEEN POSTS SHALL BE 10 FT.
- SILT FENCE FABRIC (SEE CHART BELOW)

- THE SILT FENCE SHALL BE PLACED IN A TRENCH CUT A MINIMUM F 6 IN. DEEP. THE TRENCH SHALL BE CUT WITH A TRENCHER, CABLE LAYING MACHINE, OR OTHER SUITABLE DEVICES WHICH WILL ENSURE ADEQUATE UNIFORM TRENCH DEPTH.
- THE SILT FENCE SHALL BE PLACED WITH THE STAKES ON THE DOWNSLOPE SIDE OF THE GEOTEXTILE AND SO THAT THE 8 INCHES OF CLOTH ARE BELOW THE GROUND SURFACE. EXCESS MATERIAL SHALL LAY ON THE BOTTOM OF THE 6 IN. DEEP TRENCH. THE TRENCH SHALL BE BACKFILLED AND COMPACTED.
- SEAMS BETWEEN SECTIONS OF SILT FENCE SHALL BE OVERLAPPED WITH THE END STAKES OF EACH SECTION WRAPPED TOGETHER BEFORE DRIVING INTO THE GROUND.
- MAINTENANCE - SILT FENCE SHALL ALLOW RUNOFF TO PASS ONLY AS DIFFUSE FLOW THROUGH THE GEOTEXTILE. IF RUNOFF OVERTOPS SILT FENCE, FLOWS UNDER OR AROUND THE ENDS, OR IN ANY OTHER WAY BECOMES A CONCENTRATED FLOW, ONLY OF THE FOLLOWING SHALL BE PERFORMED, AS APPROPRIATE:
 - THE LAYOUT OF THE SILT FENCE SHALL BE CHANGED.
 - ACCUMULATED SEDIMENT SHALL BE REMOVED, OR
 - OTHER PRACTICES SHALL BE INSTALLED.

SILT FENCE

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HANG TEN CAR WASH

DOVER, NH

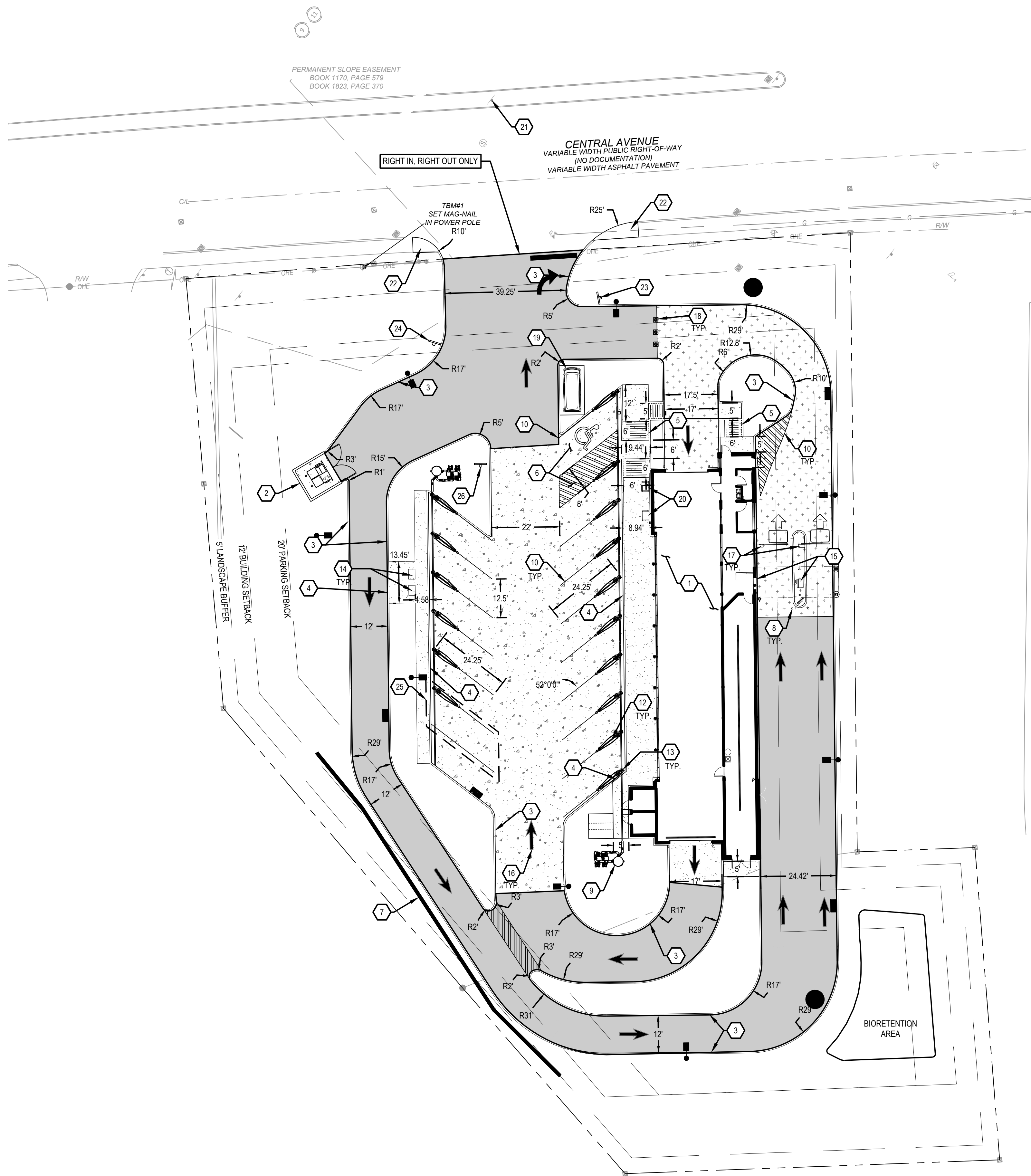
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DOVER, NH 03820

Revisions / Submissions		
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Issue:	PERMIT

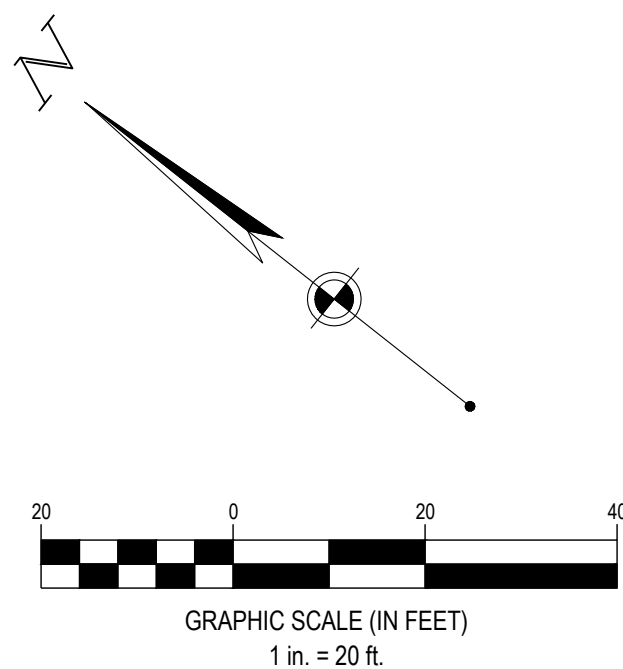
Drawing Title:
SWPPP DETAILS

C2.3



SEVENTY-TWO (72) HOURS
BEFORE DIGGING IS TO
COMMENCE, THE CONTRACTORS
SHALL NOTIFY THE FOLLOWING
AGENCIES: NEW HAMPSHIRE
UTILITIES PROTECTION SERVICE
AT 811 OR 888-344-7233 AND ALL
OTHER AGENCIES WHICH MIGHT
HAVE UNDERGROUND UTILITIES
INVOLVING THIS PROJECT AND
ARE NONMEMBERS OF STATE
UTILITIES PROTECTION SERVICE

SITE-2023-0008



SITE LEGEND

EXISTING

REFER TO C0.1 FOR EXISTING FEATURES LEGEND

PROPOSED

	PROPOSED STANDARD DUTY ASPHALT PAVEMENT
	PROPOSED PERVIOUS PAVERS (SEE DETAIL ON SHEET C600)
	PROPOSED CONCRETE PAVEMENT
	PROPOSED CONCRETE PAVEMENT WITH FIBER REINFORCEMENT
	RIGHT-OF-WAY
	PROPERTY LINE
	SETBACK
	EASEMENT
	CENTERLINE
	BUILDING
	CONCRETE CURB
	PAVEMENT/WALK
	RETAINING WALL
	PARKING SPACE COUNT
	SIGN
	DETECTABLE WARNING MAT.
	CATCH BASIN
	STORM MANHOLE
	SANITARY MANHOLE
	CURB INLET
	CLEANOUT
	YARD DRAIN
	DOWN SPOUT
	FIRE HYDRANT
	LIGHT POLE
	CONCRETE BUMPER BLOCK

GENERAL NOTES:

SEE SHEET C0.1

CODED NOTES:

- PROPOSED 4400 SF BUILDING. REFER TO ARCHITECTURAL PLANS FOR DETAILS.
- PROPOSED TRASH ENCLOSURE PER LOCAL REQUIREMENTS. SEE ARCHITECTURAL PLAN FOR DETAILS.
- PROPOSED 6" CONCRETE CURB. REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
- PROPOSED CONCRETE CURB WITH SIDEWALK. REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
- PROPOSED CURB RAMP, REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
- ADA ACCESSIBLE PARKING SPACE WITH SIGNAGE. REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
- PROPOSED RETAINING WALL SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW HAMPSHIRE.
- PROPOSED 6" CONCRETE BOLLARD. REFER TO CONSTRUCTION DETAILS, SHEET C6.0.
- PROPOSED PUMP. REFER TO MEP PLANS FOR DETAILS.
- PROPOSED PARKING LOT PAVEMENT MARKINGS.
- PROPOSED LIGHT POLE.
- PROPOSED VACUUMS. REFER TO MEP PLANS FOR DETAILS.
- PROPOSED VACUUM MOTOR/ EQUIPMENT ENCLOSURE. REFER TO MEP PLANS FOR DETAILS.
- PROPOSED TRASH RECEPTACLE.
- PROPOSED PAY STATION. REFER TO MEP PLANS FOR DETAILS.
- PROPOSED DIRECTIONAL ARROW TO BE IN COMPLIANCE WITH M.U.T.C.D. STANDARDS.
- PROPOSED BARRIER GATE. REFER TO MEP PLANS FOR DETAILS.
- PROPOSED TRAFFIC CONE.
- PROPOSED CAR SIGNAGE.
- PROPOSED FLOOR MAT CLEANER.
- CONFIRM CONDITION OF ONE-WAY SIGN ON CENTRAL AVE MEDIAN. REPLACE WITH NEW SIGN IF NEEDED.
- RECONSTRUCTED SIDEWALK TIPDOWNS. REPAIR ANY AND ALL DAMAGED PAVED SIDEWALKS.
- DO NOT ENTER SIGN.
- INTERNAL WAYFINDING SIGN.
- ELECTRIC VEHICLE SPACE
- SIGN IDENTIFYING THAT POROUS PAVEMENT IS PRESENT AND THERE ARE RESTRICTIONS ON DEICING MATERIALS ON POROUS SURFACES. NO WINTER SANDING OF PERMEABLE PAVEMENTS IS PERMITTED.



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HANG TEN CAR WASH

DOVER, NH

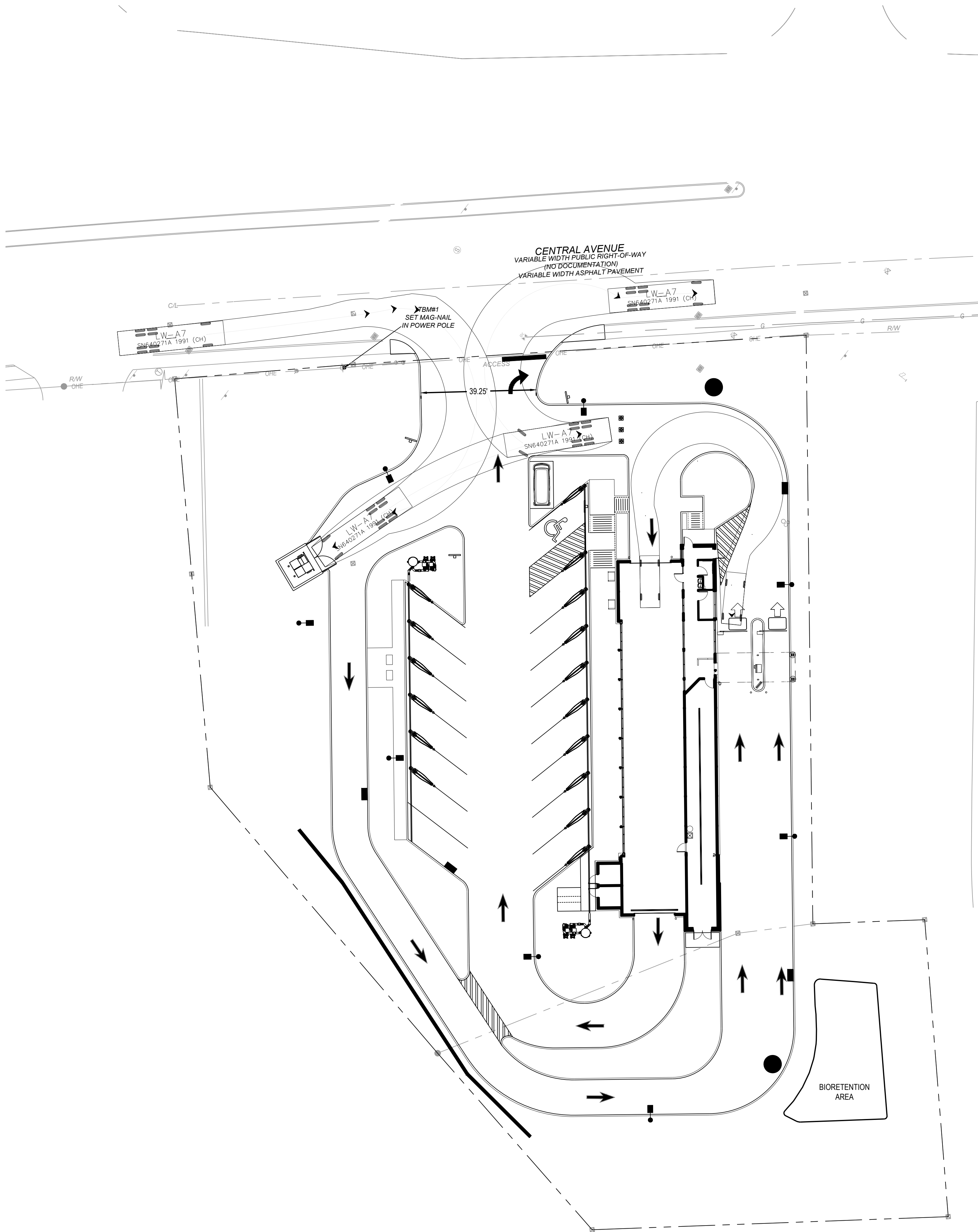
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1"=20'	
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06/28/2023	
PERMIT	

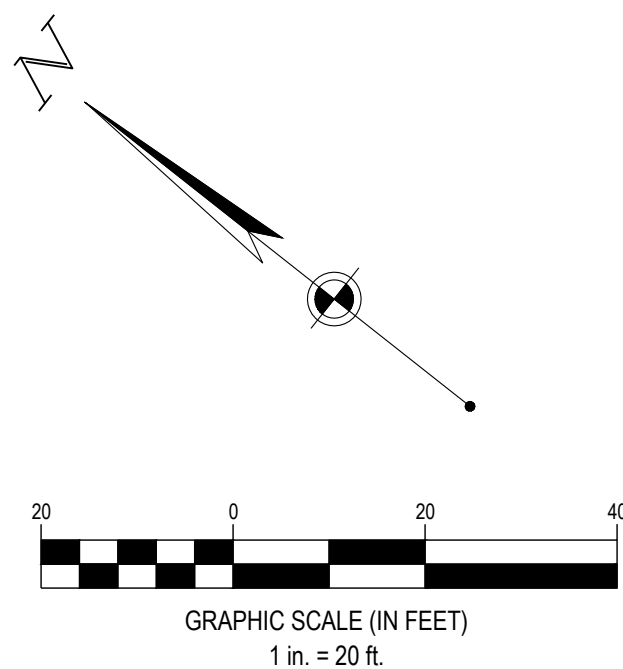
SITE PLAN

C3.0



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SITE-2023-0008



SITE LEGEND

EXISTING

REFER TO C0.1 FOR EXISTING FEATURES LEGEND

PROPOSED

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- PROPOSED PERVIOUS PAVERS (SEE DETAIL ON SHEET C600)
- PROPOSED CONCRETE PAVEMENT
- PROPOSED CONCRETE PAVEMENT WITH FIBER REINFORCEMENT
- RIGHT-OF-WAY
- PROPERTY LINE
- SETBACK
- EASEMENT
- CENTERLINE
- BUILDING
- CONCRETE CURB
- PAVEMENT/WALK
- RETAINING WALL
- PARKING SPACE COUNT
- SIGN
- DETECTABLE WARNING MAT.
- CATCH BASIN
- STORM MANHOLE
- SANITARY MANHOLE
- CURB INLET
- CLEANOUT
- YARD DRAIN
- DOWN SPOUT
- FIRE HYDRANT
- LIGHT POLE
- CONCRETE BUMPER BLOCK

GENERAL NOTES:
SEE SHEET C0.1



HANG TEN CAR WASH

DOVER, NH

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1"=20'	
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HGC	
06/28/2023	
PERMIT	

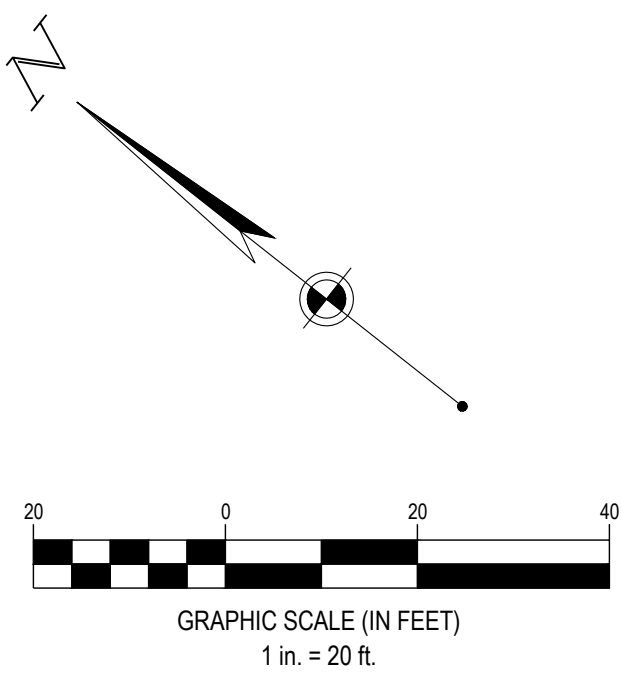
AUTOTURN PLAN

C3.1



SITE LEGEND	
EXISTING	
REFER TO C0.1 FOR EXISTING FEATURES LEGEND	
PROPOSED	
	PROPOSED STANDARD DUTY ASPHALT PAVEMENT
	PROPOSED PERVIOUS PAVERS (SEE DETAIL ON SHEET C600)
	PROPOSED CONCRETE PAVEMENT
	PROPOSED CONCRETE PAVEMENT WITH FIBER REINFORCEMENT
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GENERAL NOTES:
SEE SHEET C0.1



HANG TEN CAR WASH

DOVER, NH

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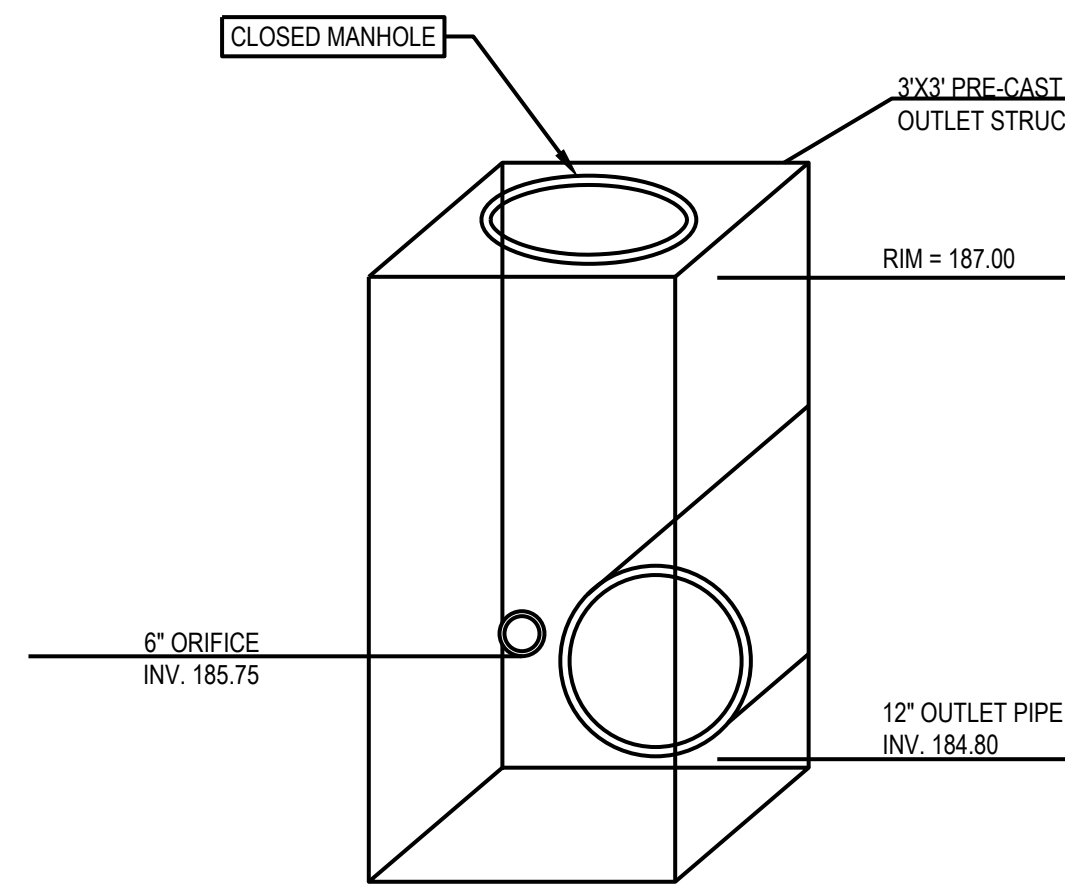
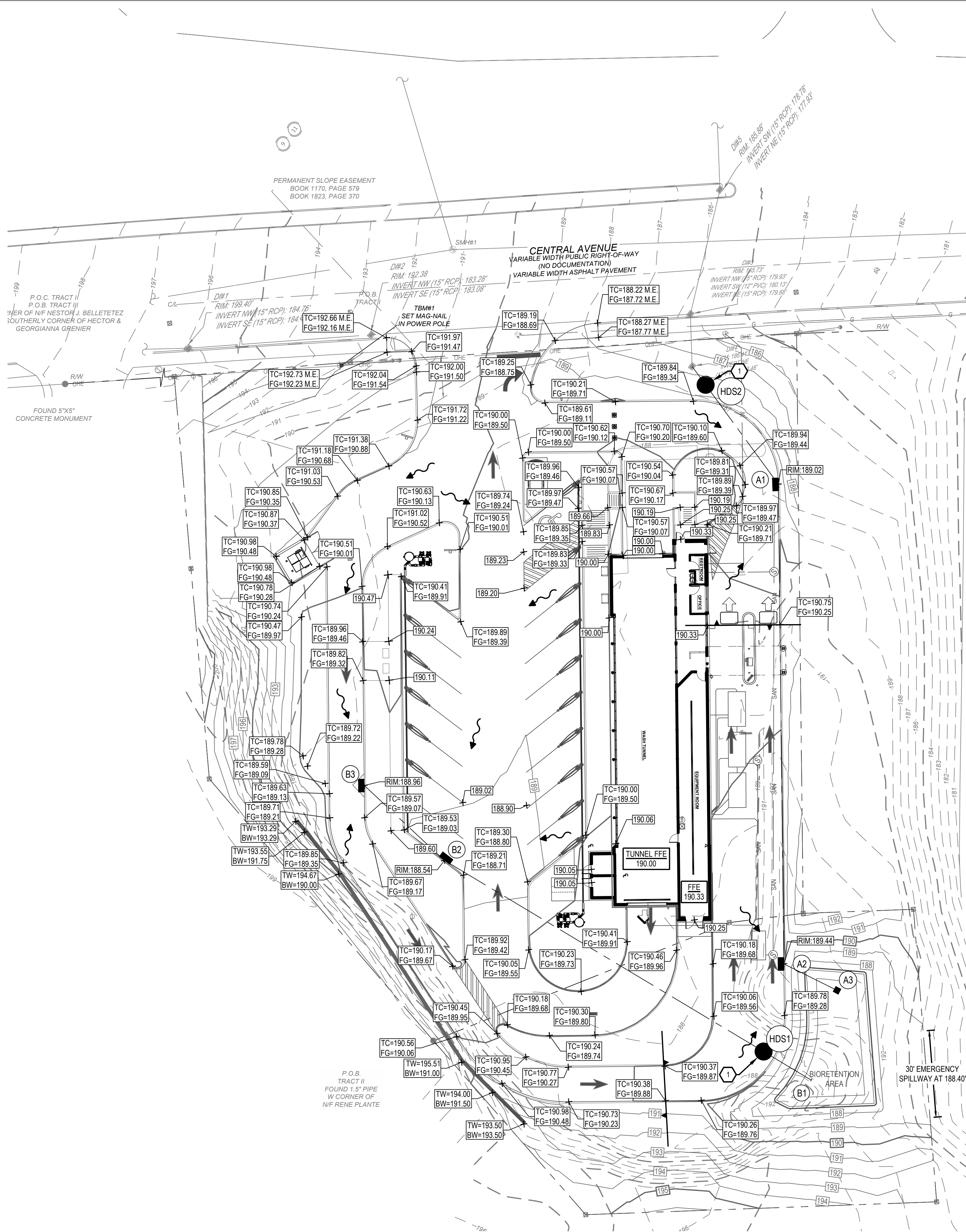
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	1"=30'
	NTV
	HGC
	06/28/2023
	PERMIT

EXTENDED SITE PLAN

C3.2

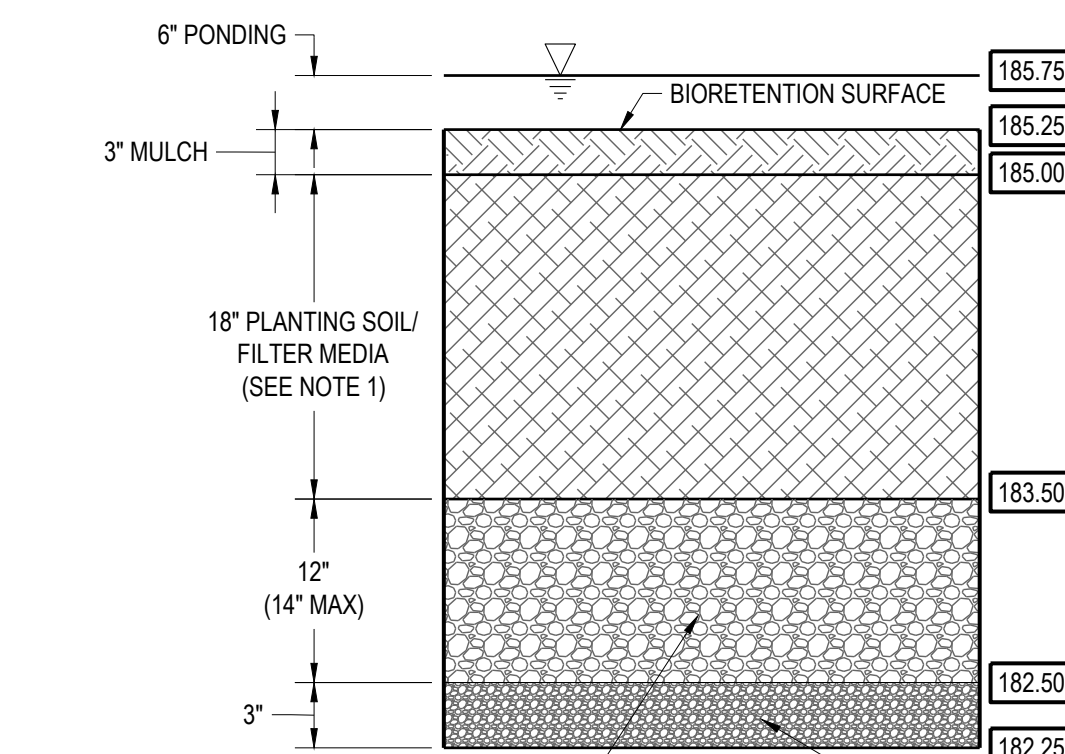


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OUTLET STRUCTURE (A3)

NTS



STORAGE LAYER WITH UNIFORM, DOUBLE
WASHED, CLEAN AND FREE OF ALL FINES
AND PACKED #57 STONE (1' - 2')

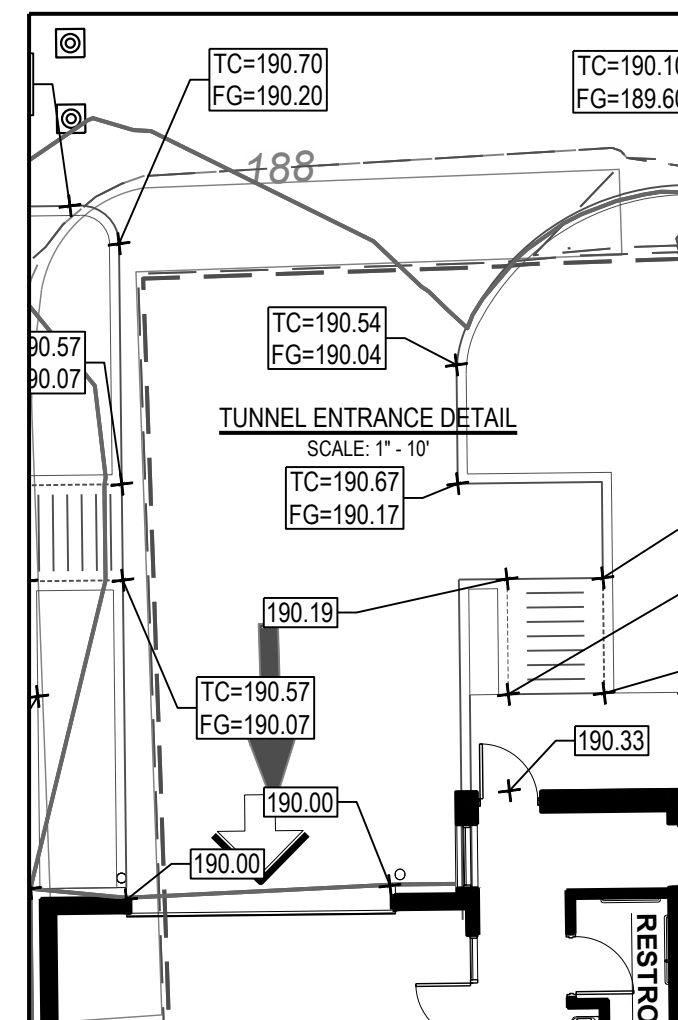
CHOKER LAYER WITH #8 OR #9 CLEAN
WASHED GRAVEL

BIORETENTION NOTES:

1. FILTER MEDIA SHALL BE EITHER (PER THE NEW HAMPSHIRE STORMWATER MANUAL VOLUME 2, BIORETENTION SYSTEM):
 - A. FILTER MEDIA OPTION A
 - 50 TO 55% - ASTM C-33 CONCRETE SAND
 - 20 TO 30% - LOAMY SAND TOPSOIL, WITH FINES AS INDICATED (15 TO 25% PERCENT BY WEIGHT PASSING STANDARD #200 SIEVE)
 - 20 TO 30% - MODERATELY FINE SHREDDED BARK OR WOOD FIBER MULCH, WITH FINES AS INDICATED (<5% PERCENT BY WEIGHT PASSING STANDARD #200 SIEVE)
 - B. FILTER MEDIA OPTION B
 - 20 TO 30% - MODERATELY FINE SHREDDED BARK OR WOOD FIBER MULCH, WITH FINES AS INDICATED (<5% PERCENT BY WEIGHT PASSING STANDARD #200 SIEVE)
 - 70 TO 80% - LOAMY COARSE SAND
 - 85 TO 100% PERCENT BY WEIGHT PASSING STANDARD #10 SIEVE
 - 70 TO 100% PERCENT BY WEIGHT PASSING STANDARD #20 SIEVE
 - 15 TO 40% PERCENT BY WEIGHT PASSING STANDARD #60 SIEVE
 - 8 TO 15% BY WEIGHT PASSING STANDARD #200 SIEVE

BIORETENTION SECTION

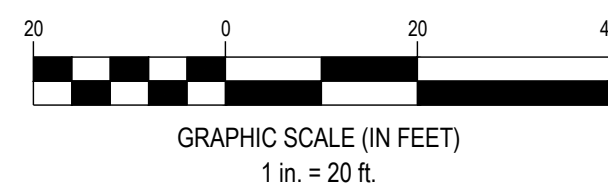
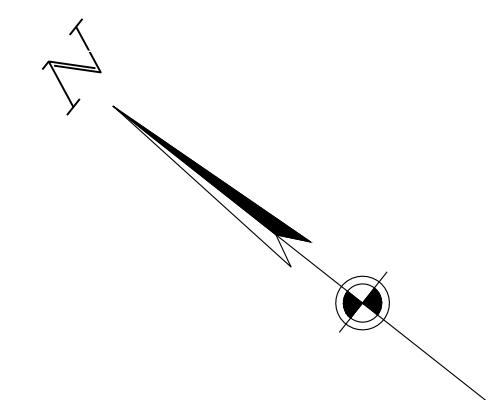
NTS



STORM SEWER STRUCTURE SCHEDULE			
NO.	STRUCTURE	GRATE	INVERT
A1	CURB INLET	189.02	181.22 (12") SW 181.22 (12") N
A2	CURB INLET	189.44	183.70 (12") NE 184.80 (12") S
A3	OUTLET CONTROL STRUCTURE	185.25	183.70 (12") N
B1	HEADWALL	-	185.25 (18") N
B2	CURB INLET	188.54	185.50 (12") N 185.50 (18") S
B3	CURB INLET	188.96	186.46 (12") S
EX1	EXISTING INLET	187.52	180.46 (12") S
HDS1	HYDRODYNAMIC SEPARATOR	189.47	185.28 (18") N 185.28 (18") S
HDS2	HYDRODYNAMIC SEPARATOR	188.41	180.58 (12") N 180.58 (12") N



SEVENTY-TWO (72) HOURS
BEFORE DIGGING IS TO
COMMENCE, THE CONTRACTORS
SHALL NOTIFY THE FOLLOWING
AGENCIES: NEW HAMPSHIRE
UTILITIES PROTECTION SERVICE
AT 811 OR 888-344-7233 AND ALL
OTHER AGENCIES WHICH MIGHT
HAVE UNDERGROUND UTILITIES
INVOLVING THIS PROJECT AND
ARE NONMEMBERS OF STATE
UTILITIES PROTECTION SERVICE

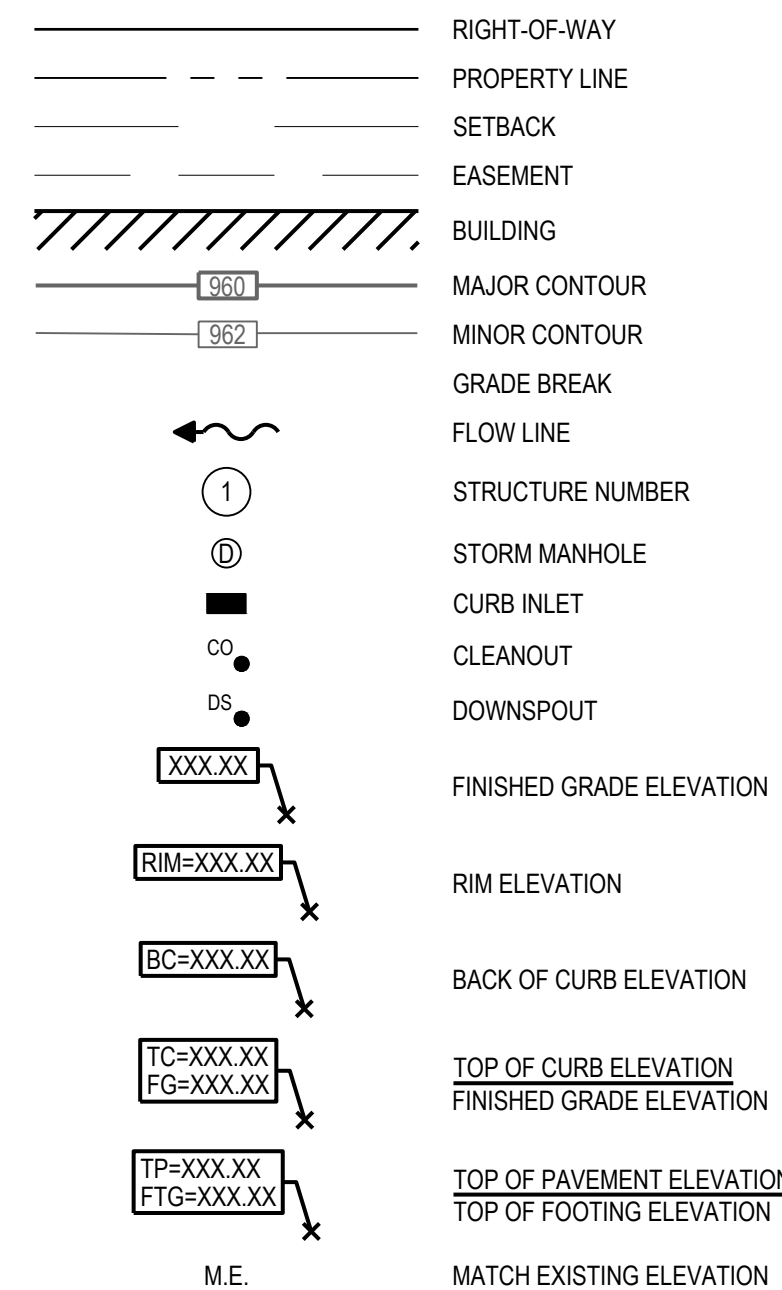


GRADING LEGEND

EXISTING

REFER TO C1.1 FOR EXISTING FEATURES LEGEND

PROPOSED



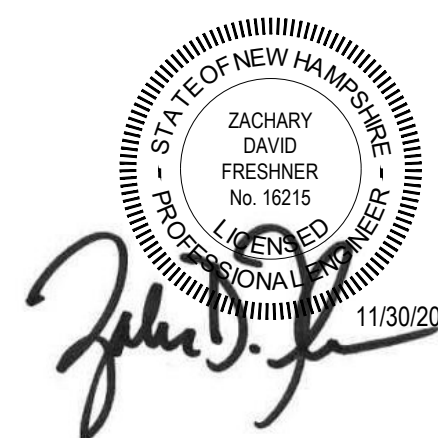
GENERAL NOTES:

SEE SHEET C0.1

CODED NOTES:

1. PROPOSED HYDRODYNAMIC SEPARATOR. CONTRACTOR SHALL USE STORMTRAP STORMSETTLER OR APPROVED EQUAL.
2. BIORETENTION POND SHALL HAVE AN IMPERMEABLE LINER INSTALLED ALONG THE SIDE WALLS SO AS TO SEPARATE THE SYSTEM FROM THE GROUP A SOILS.

DESIGN ENGINEER SHALL PROVIDE SIGNED LETTER TO
THE CITY ENGINEER CERTIFYING THAT THE
STORMWATER MANAGEMENT SYSTEM HAS BEEN
INSTALLED IN ACCORDANCE WITH APPROVED PLANS.



HANG TEN CAR WASH

DOVER, NH

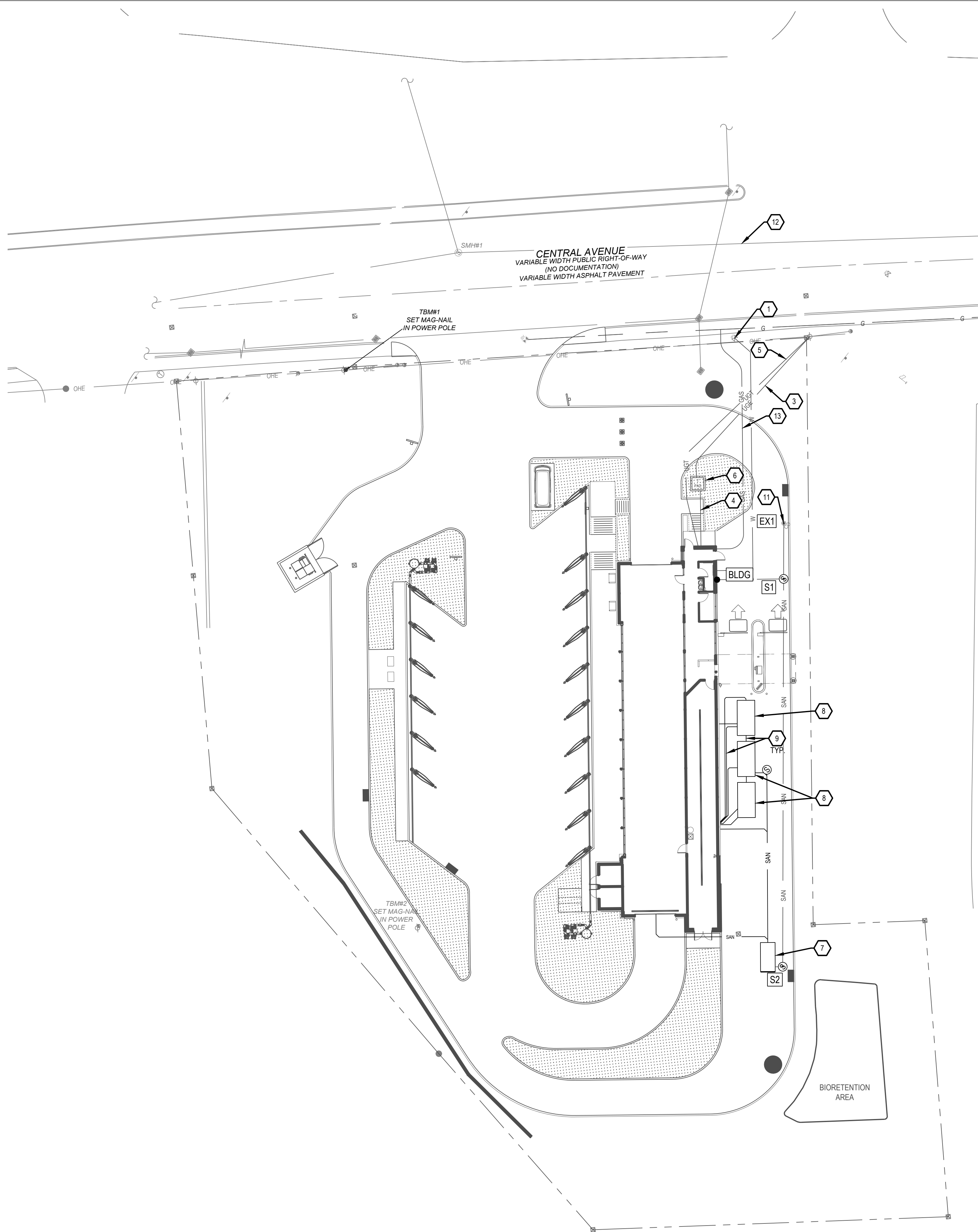
914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions		
ID	Description	Date
1	TRC RESUBMITTAL	2023/11/30

761766
1"=20'
NTV
HGC
06/28/2023
PERMIT

GRADING & DRAINAGE
PLAN

C4.0



SANITARY SEWER STRUCTURE SCHEDULE			
NO.	STRUCTURE	RIM	INVERT
BLDG	BLDG CONNECTION	190.08	187.10 (6") SE
EX1	CLEANOUT	188.82	186.91 (6") SW
S1	CLEANOUT	189.59	187.10 (6") SW 187.10 (6") NE 187.33 (6") NW
S2	CLEANOUT	189.50	188.42 (6") NE

SANITARY SEWER PIPE TABLE			
PIPE NAME	DIAMETER	LENGTH	SLOPE
S1-S2	6"	132'	1.00%
EX1-S1	6"	19'	1.00%
S1-BLDG	6"	23'	1.00%

UTILITY LEGEND	
EXISTING	
REFER TO &&X FOR EXISTING FEATURES LEGEND	
PROPOSED	
	BUILDING
	CONCRETE CURB
	PAVEMENT/WALK
	STORM SEWER LINE
	SANITARY SEWER LINE
	DOMESTIC WATER SERVICE LINE
	GAS SERVICE LINE
	OVERHEAD ELECTRIC LINE
	UNDERGROUND ELECTRIC LINE
	FORCEMAIN
	UNDERGROUND TELEPHONE LINE
	OVERHEAD TELEPHONE LINE
	CATCH BASIN
	STORM SEWER
	SANITARY SEWER
	CURB INLET
	CLEANOUT
	YARD DRAIN
	DOWNSPOUT
	ELECTRICAL TRANSFORMER PAD
	FIRE HYDRANT
	WATER VALVE
	HEADWALL WITH RIP-RAP

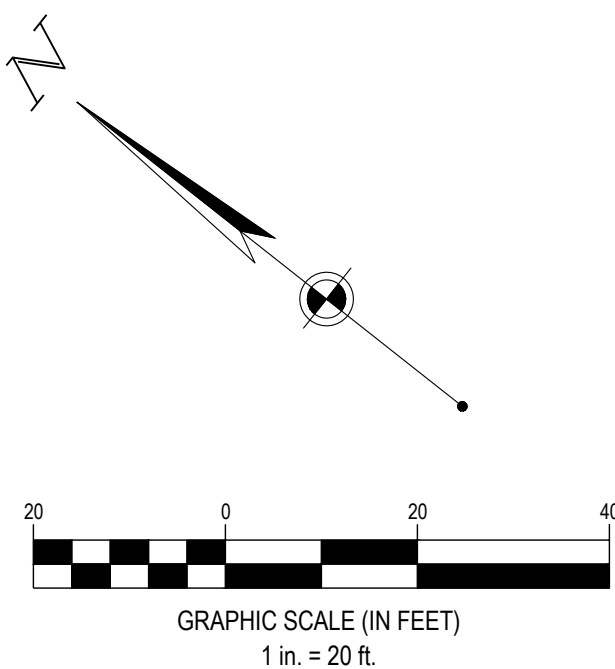
GENERAL NOTES:
SEE SHEET C1.1

CODED NOTES:

- PROPOSED 2" WATER SERVICE LINE CONNECTED TO EXISTING CURB BOX. CONTRACTOR SHALL VERIFY WITH UTILITY COMPANY CURRENT SIZE OF CURB BOX.
- PROPOSED GAS SERVICE LINE. CONTRACTOR TO COORDINATE SERVICE WITH PROVIDER FOR CONNECTION. SEE MECHANICAL SHEETS FOR SIZE, MATERIALS, AND BUILDING CONNECTION DETAILS.
- PROPOSED UNDERGROUND PRIMARY ELECTRIC SERVICE LINE. CONTRACTOR SHALL COORDINATE WITH SERVICE PROVIDER.
- PROPOSED UNDERGROUND SECONDARY ELECTRIC SERVICE LINE. CONTRACTOR SHALL COORDINATE WITH SERVICE PROVIDER AND MEP PLANS FOR CONNECTION.
- PROPOSED UNDERGROUND TELEPHONE SERVICE LINE. CONTRACTOR SHALL COORDINATE WITH SERVICE PROVIDER FOR CONNECTION.
- PROPOSED TRANSFORMER PAD. CONTRACTOR SHALL COORDINATE WITH SERVICE PROVIDER FOR CONNECTION.
- PROPOSED OIL/WATER SEPARATOR. SEE MECHANICAL SHEETS FOR ADDITIONAL INFORMATION.
- PROPOSED 2000 GAL. RECLAIM TANK. SEE MECHANICAL SHEETS FOR ADDITIONAL INFORMATION.
- PROPOSED RECLAIM TANK SERVICE LINE. SEE MECHANICAL SHEETS FOR ADDITIONAL INFORMATION.
- PROPOSED ELECTRIC AND COMMUNICATIONS LINES. REFER TO MEP PLANS FOR ADDITIONAL INFORMATION.
- SANITARY SEWER TO BE TIED INTO EXISTING CLEANOUT. CONTRACTOR SHALL TELEVIEW SANITARY SEWER BETWEEN CLEAN OUT AND SANITARY MAIN TO DETERMINE IF SANITARY SEWER NEEDS TO BE REPLACED. CONTRACTOR TO VERIFY 1% SLOPE. NOTIFY ENGINEER OF ANY DISCREPANCIES. CONTRACTOR SHALL VERIFY THAT THE EXISTING SANITARY SERVICE IS 6".
- EXISTING SANITARY MAIN IS 12" DIAMETER VCP.
- PROPOSED GAS LINE. CONTRACTOR SHALL COORDINATE WITH UTIL FOR CONNECTION.



SEVENTY-TWO (72) HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTORS SHALL NOTIFY THE FOLLOWING AGENCIES: NEW HAMPSHIRE UTILITIES PROTECTION SERVICE AT 811 OR 888-344-7233 AND ALL OTHER AGENCIES WHICH MIGHT HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NONMEMBERS OF STATE UTILITIES PROTECTION SERVICE



HANG TEN CAR WASH

DOVER, NH

914 CENTRAL AVE.
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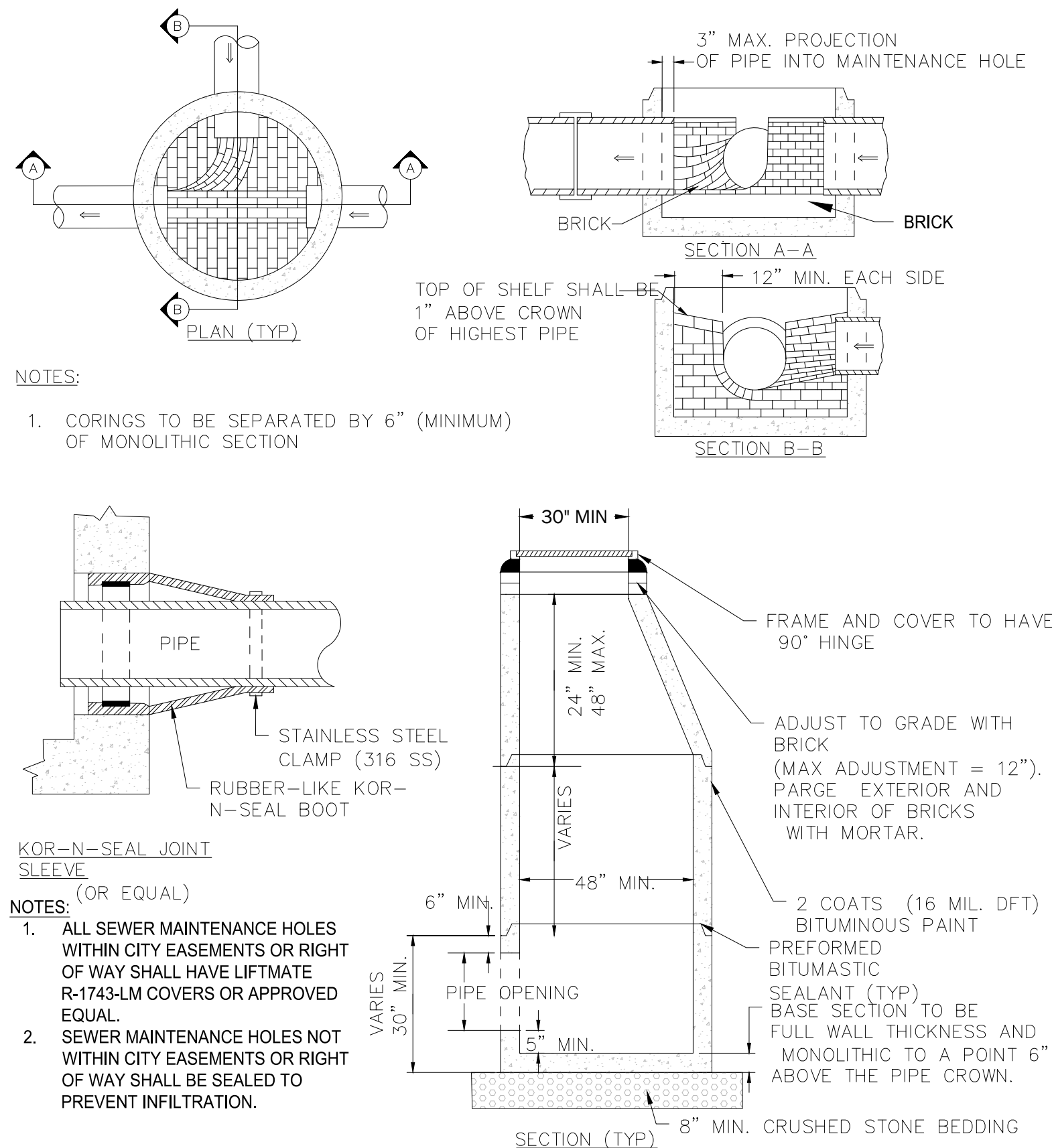
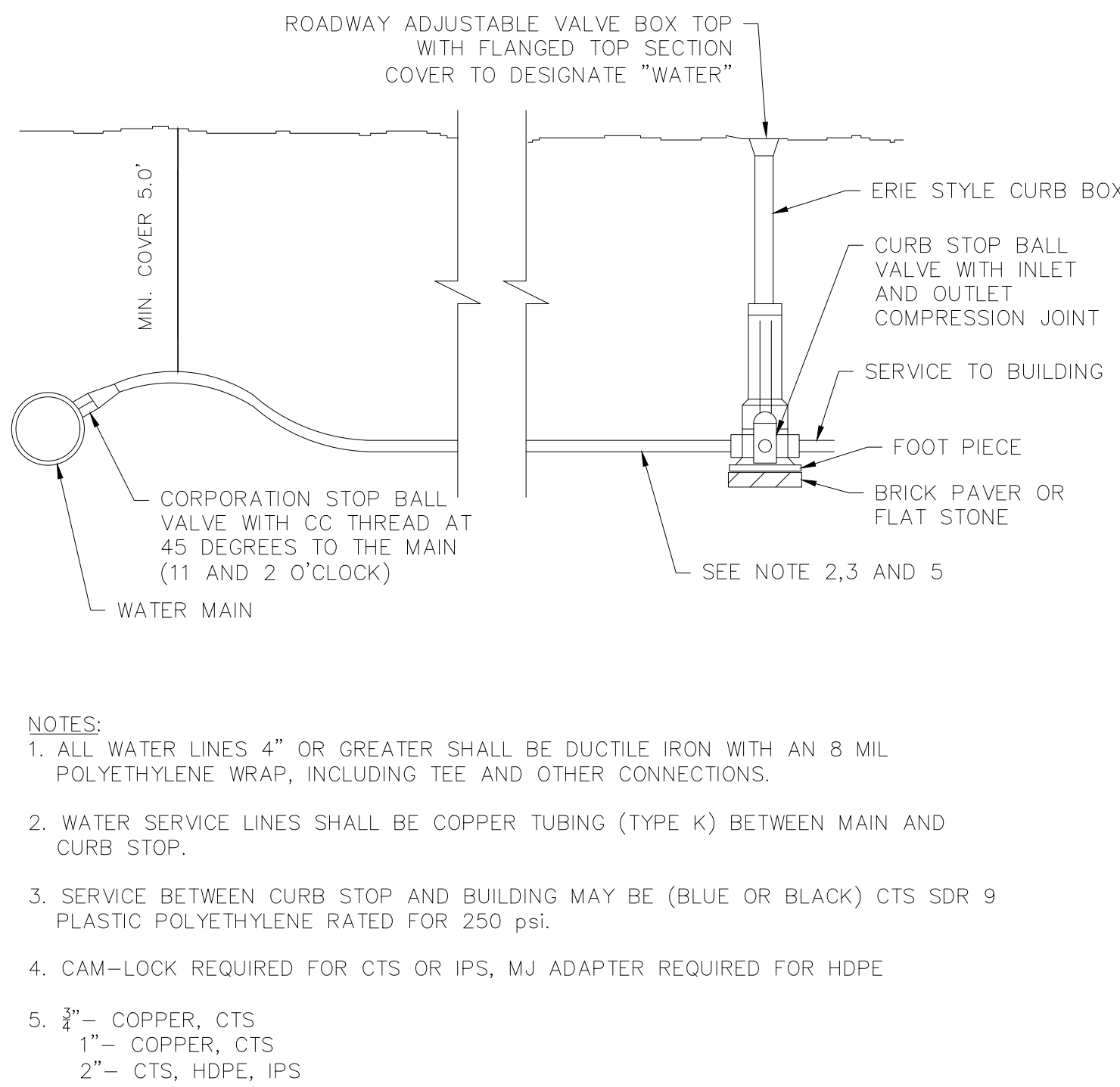
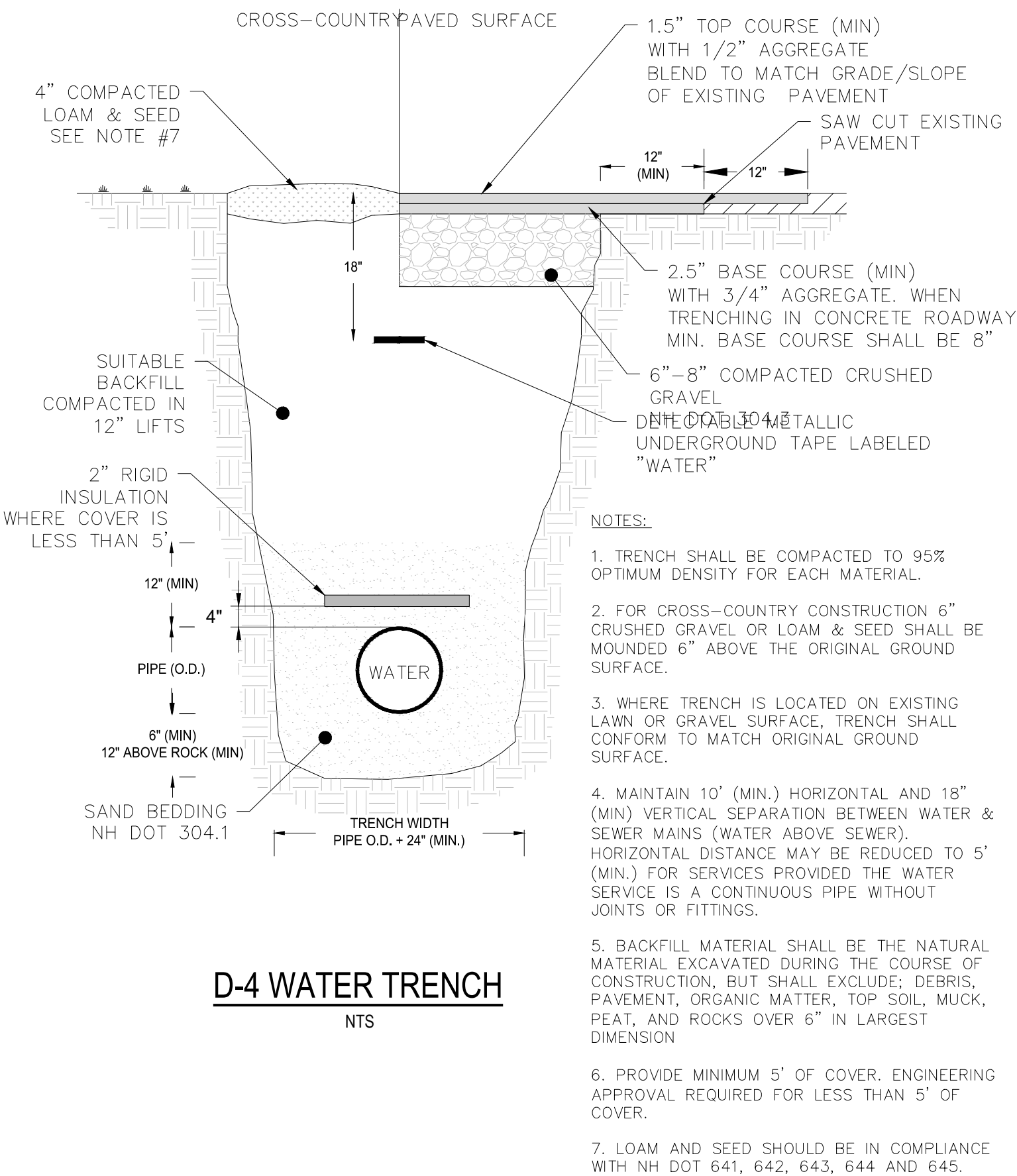
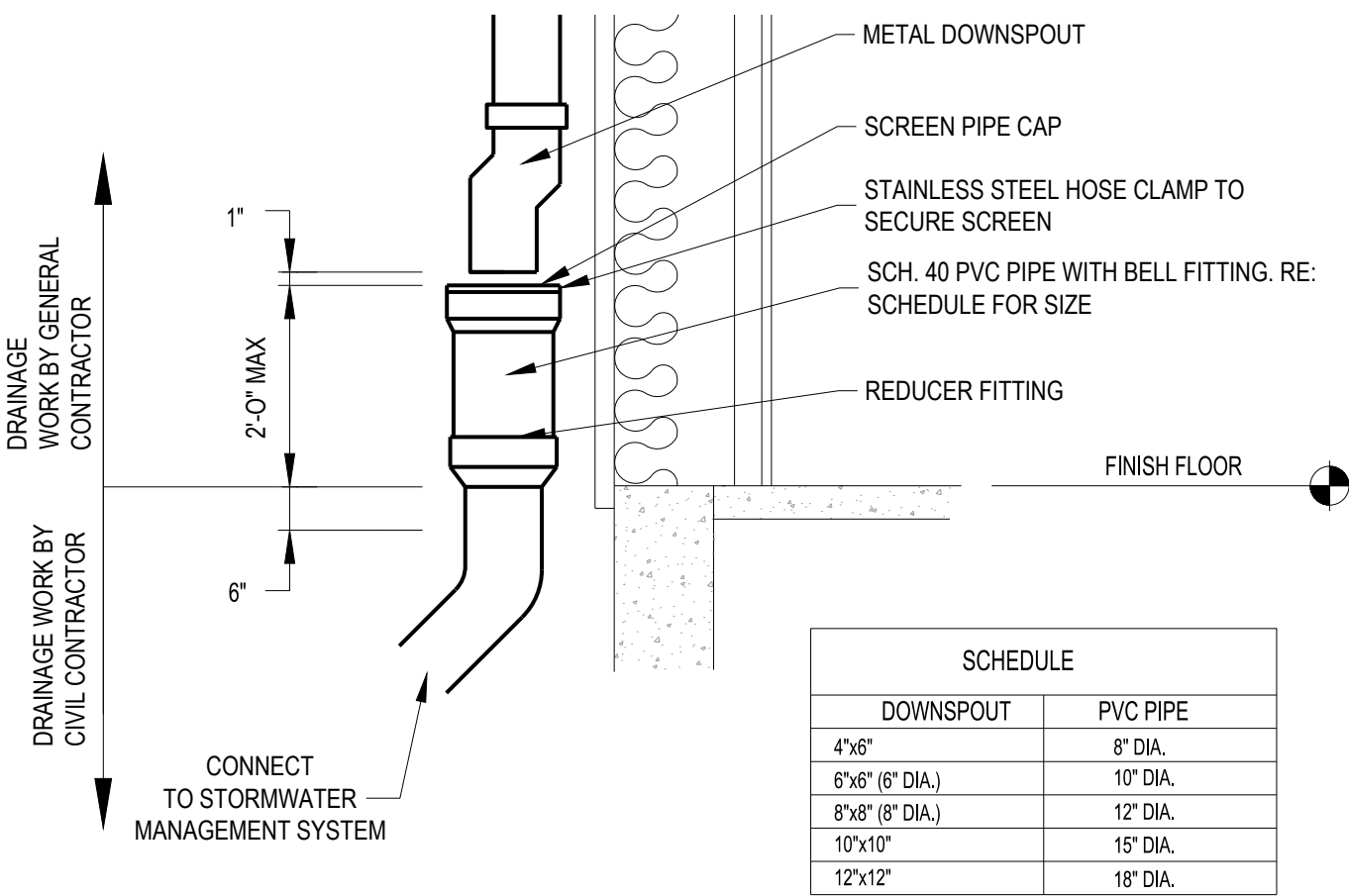
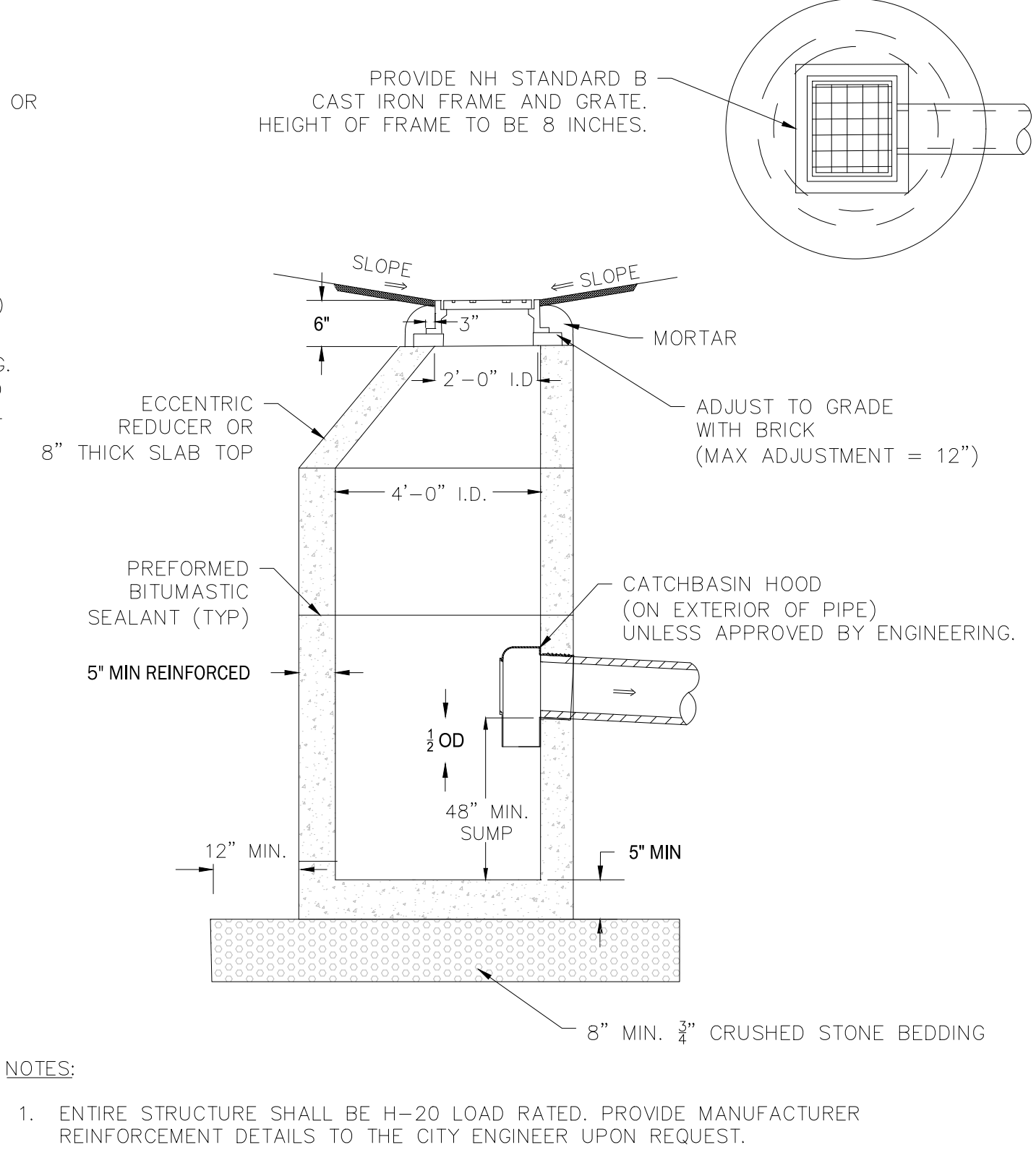
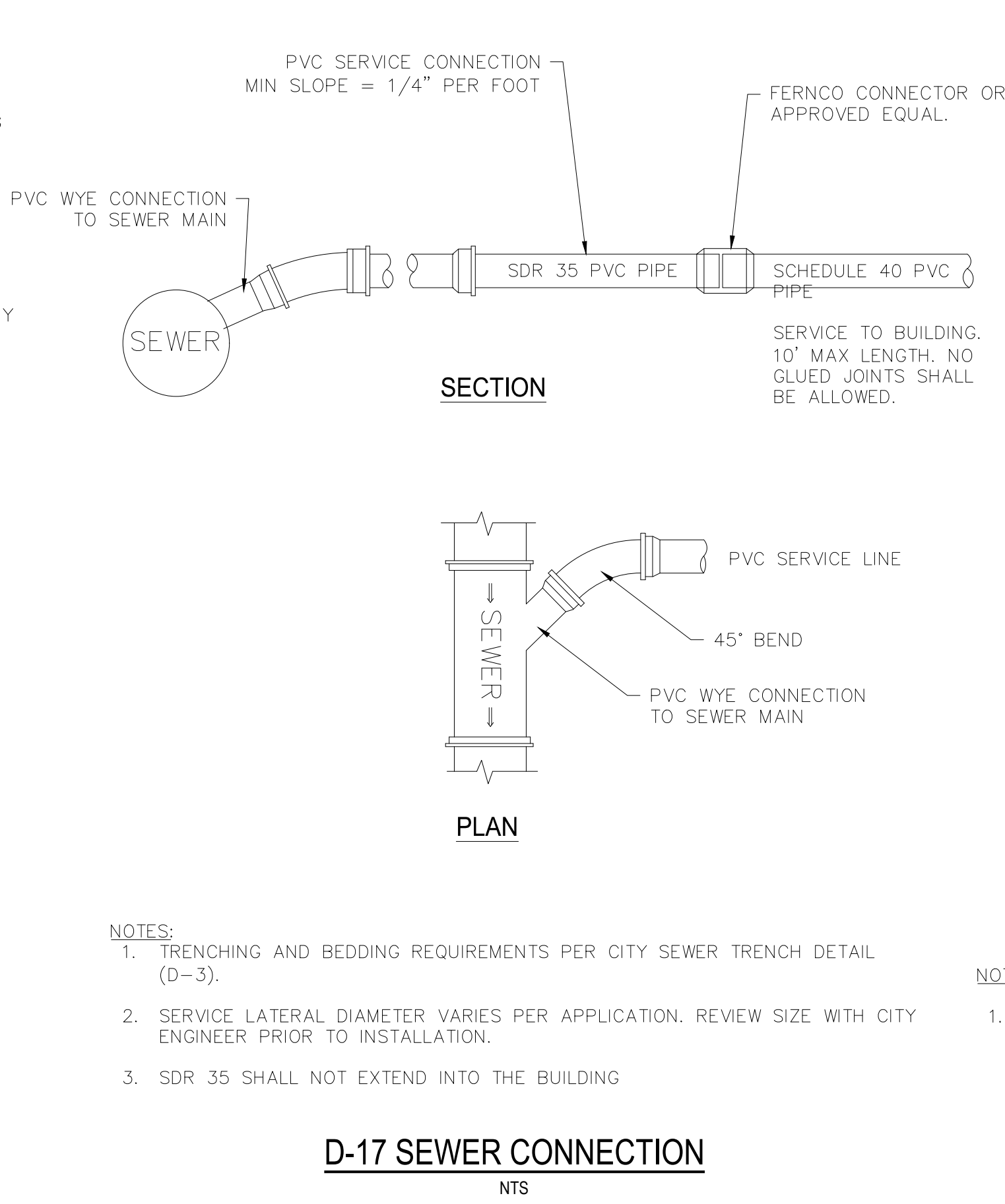
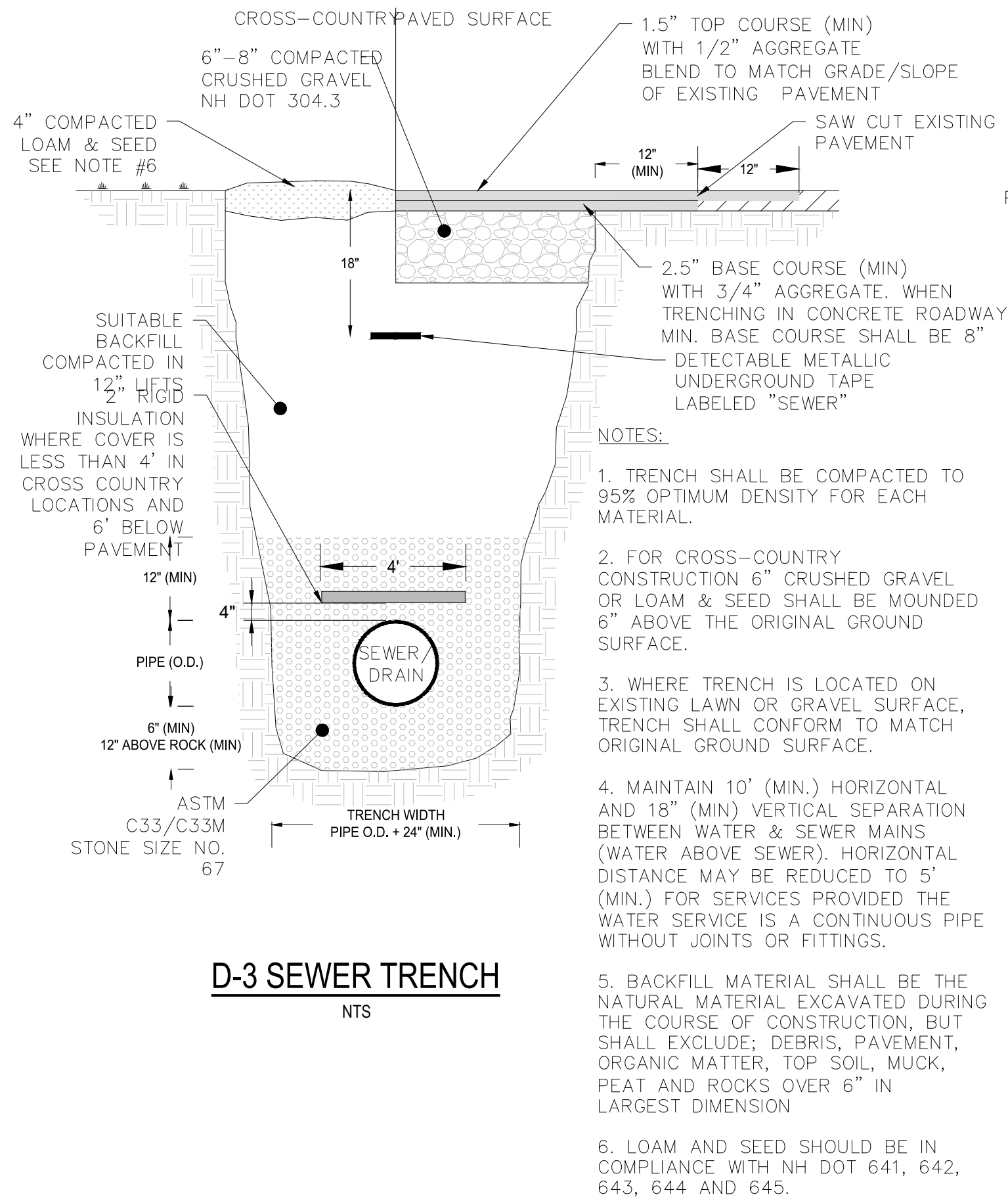
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ID	Description	Date
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761766
1"=20'
NTV
HGC
06/28/2023
PERMIT

UTILITY PLAN

C5.0

W:\PROJECTS\WEA761766-01_Hang 10_Dover_NH\09-CIVIL\PLAN\PLANS D- UTILITY PLAN.dwg - 11/30/2023 - Paige Weidner



HANG TEN CAR WASH

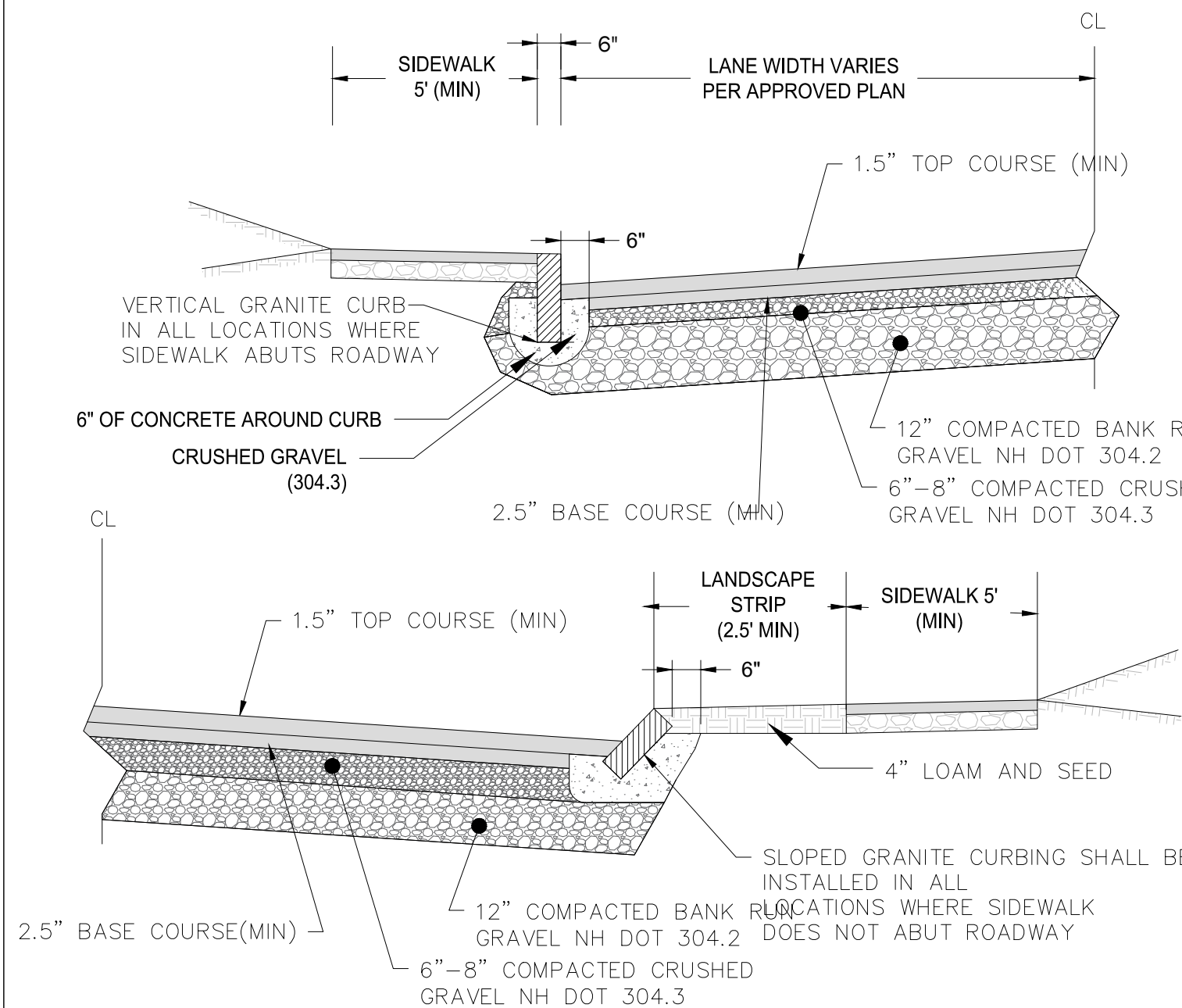
DOVER, NH

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DOVER, NH 03820

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1"=20'		
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HGC		
06/28/2023		
PERMIT		

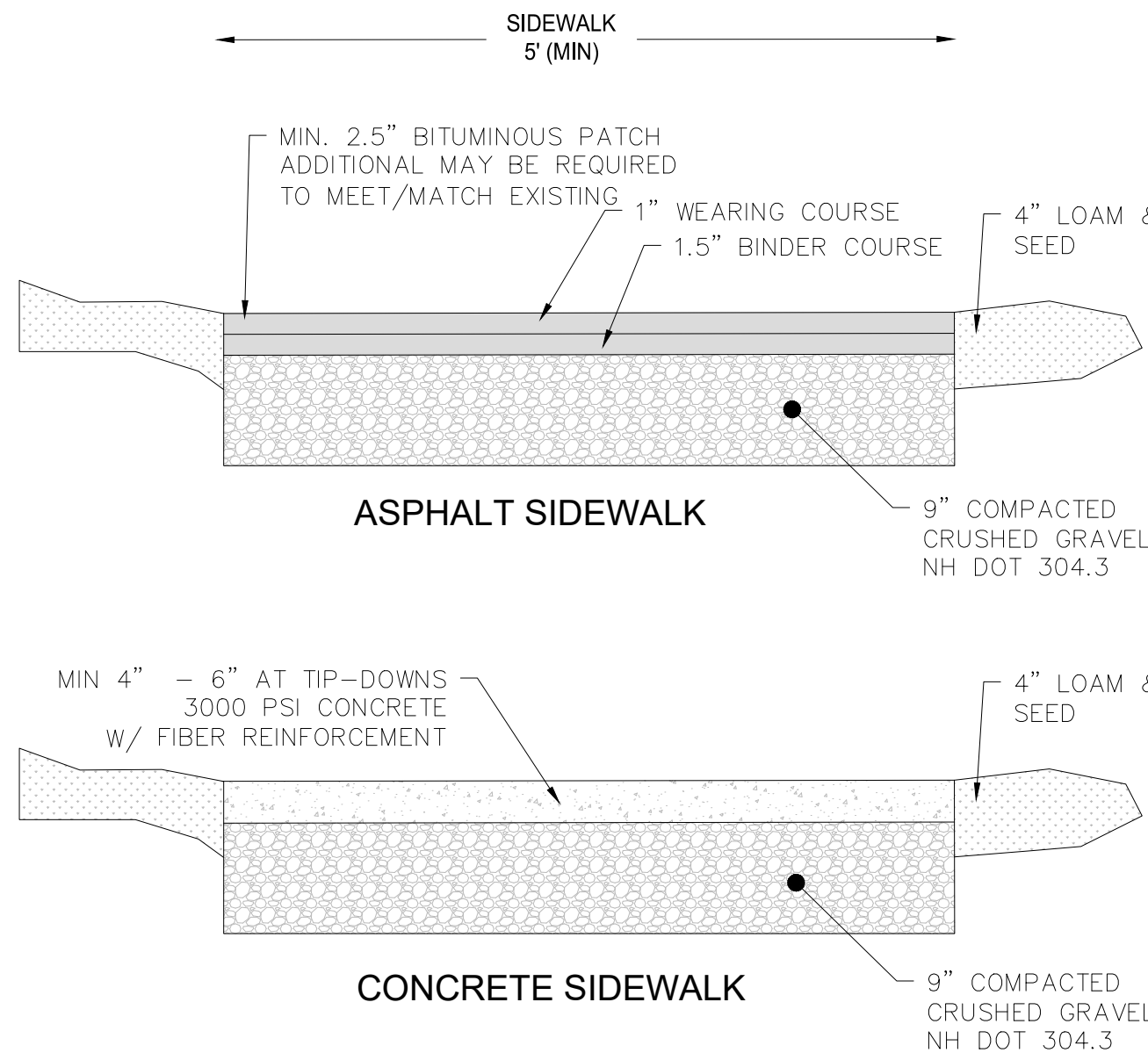
UTILITY DETAILS

C5.1



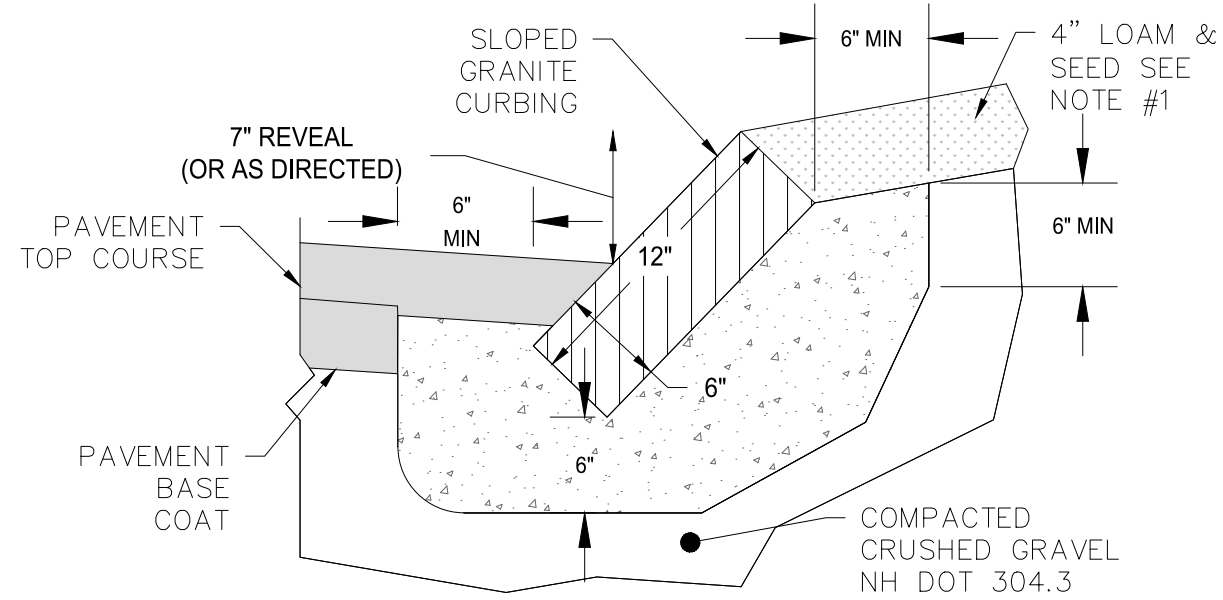
- NOTES:**
1. THIS DETAIL IS FOR GENERAL REVIEW PURPOSES ONLY, FINAL DESIGN SHALL BE BASED ON SPECIFIC SITE CONDITIONS AND APPROVED PLANS.
 2. SIDEWALK LOCATION AND MATERIAL SHALL BE AS APPROVED BY THE CITY OF DOVER.

D-5 ROADWAY CROSS SECTION
NTS



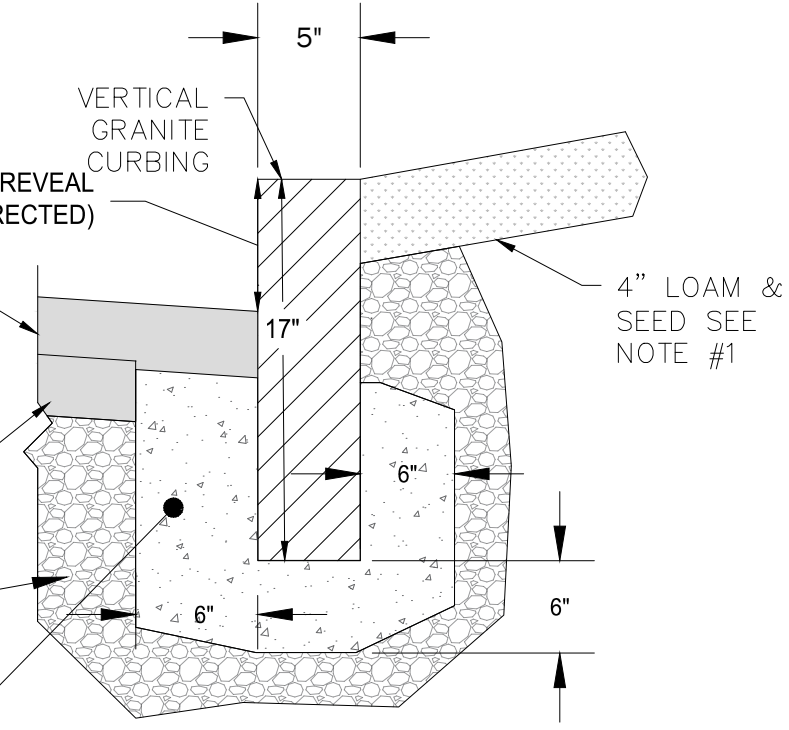
- NOTES:**
1. MATERIALS SHALL BE IN ACCORDANCE WITH THE CITY OF DOVER STANDARDS SPECIFICATIONS.
 2. SIDEWALK AND DRIVEWAY WIDTHS SHALL BE EQUAL TO EXISTING WIDTHS OR AS APPROVED AND SHALL SLOPE TO MATCH EXISTING ELEVATIONS.
 3. BASE FOR THE SIDEWALKS AND DRIVEWAYS SHALL BE 9-INCHES OF CRUSHED GRAVEL.

D-6 SIDEWALK
NTS



RADIUS	MAX LENGTH
< 21'	USE CURVED CURB
12'	3'
22' - 28'	4'
29' - 35'	5'
36' - 42'	6'
43' - 49'	7'
50' - 56'	8'
57' - 60'	9'
OVER 60'	10'

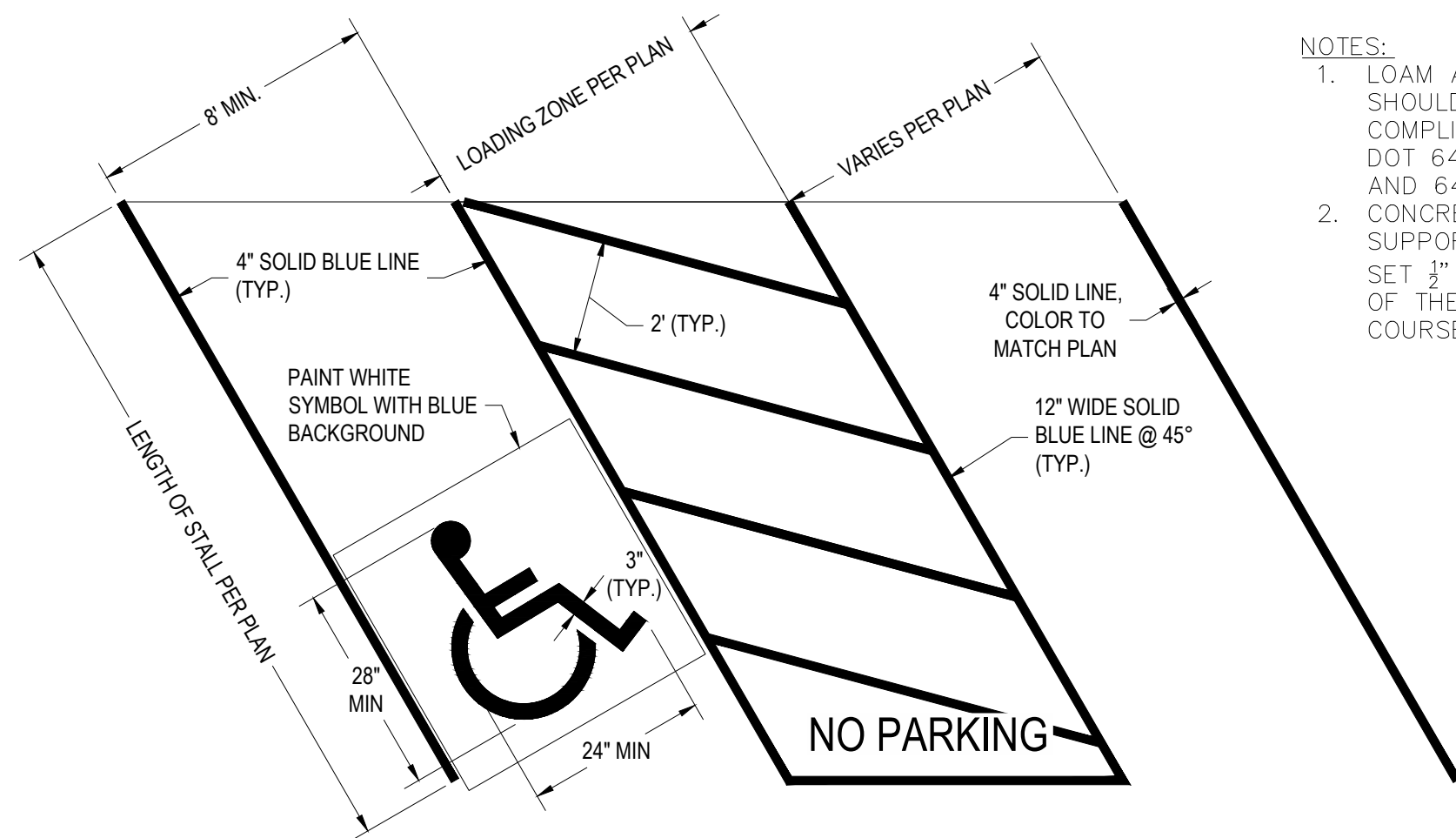
SLOPED GRANITE CURB



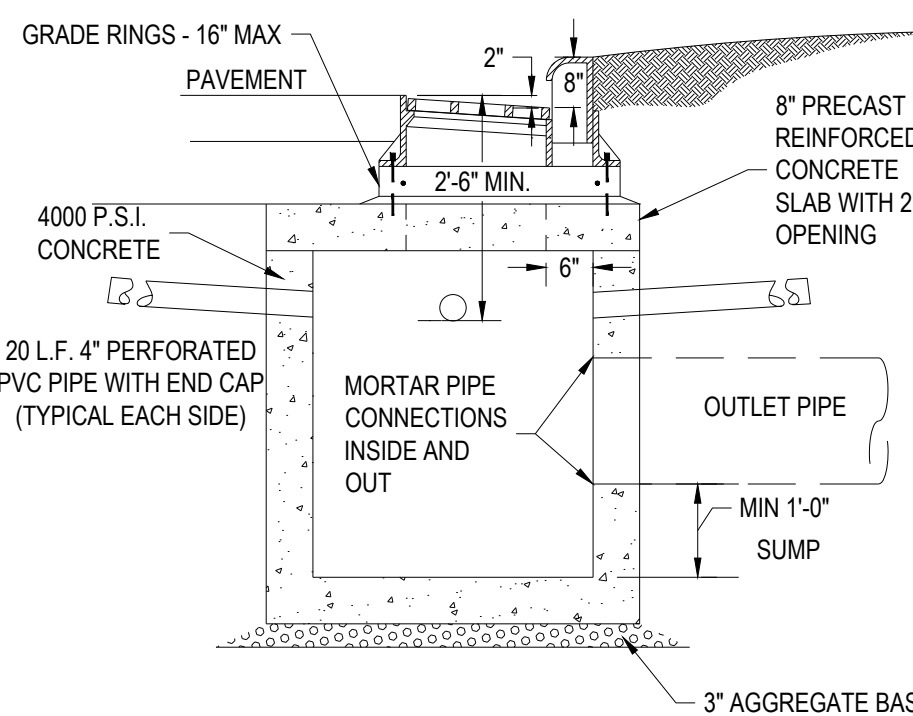
VERTICAL GRANITE CURB

D-8 GRANITE CURB
NTS

- NOTES:**
1. LOAM AND SEED SHOULD BE IN COMPLIANCE WITH NH DOT 641, 642, 643, 644 AND 645.
 2. CONCRETE CURB SUPPORT SHOULD BE SET 3" BELOW THE TOP OF THE PAVEMENT BASE COURSE.



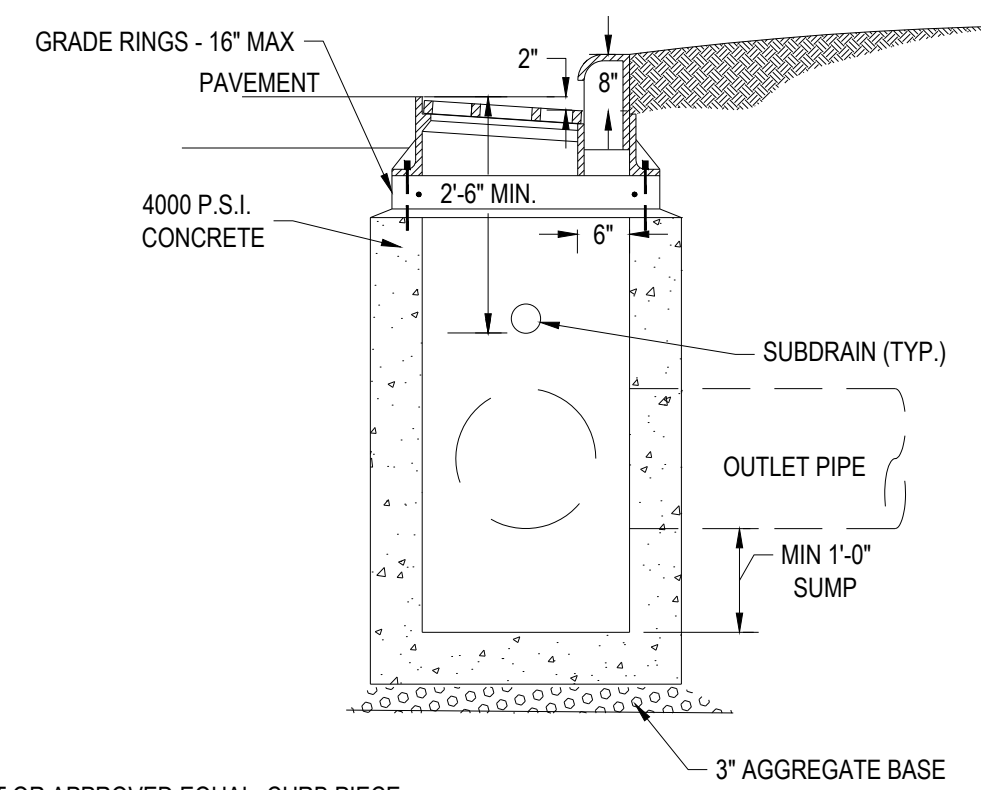
ACCESSIBLE PARKING SPACE STRIPING
NTS



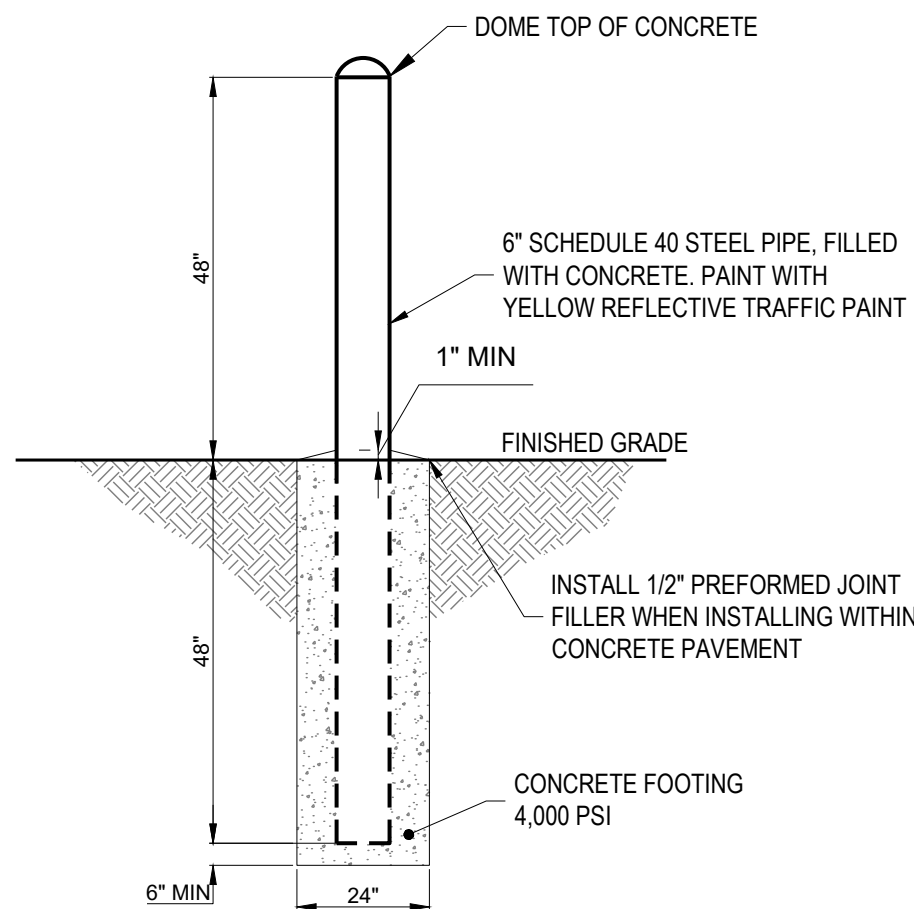
3x3 AND 4x4 - SECTION A-A
TOP VIEW - CASTING REMOVED

- NOTES:**
1. FRAME AND GRATE ASSEMBLY SHALL BE EAST JORDAN 5352M, 7080Z, 7080T OR APPROVED EQUAL. CURB PIECE SHALL BE CAST WITH "DUMP NO WASTE" AND "DRAINS TO WATERWAY".
 2. JOINT SEALS BETWEEN PRECAST SECTIONS SHALL BE RESILIENT AND FLEXIBLE GASKET JOINTS PER ASTM C-990.
 3. PRECAST SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478. CONCRETE SHALL BE 4000 PSI.
 4. ADJUSTMENTS TO GRADES TO BE PRECAST GRADE RINGS. CASTINGS TO BE MORTARED WITH TYPE "M" MASONRY MORTAR.

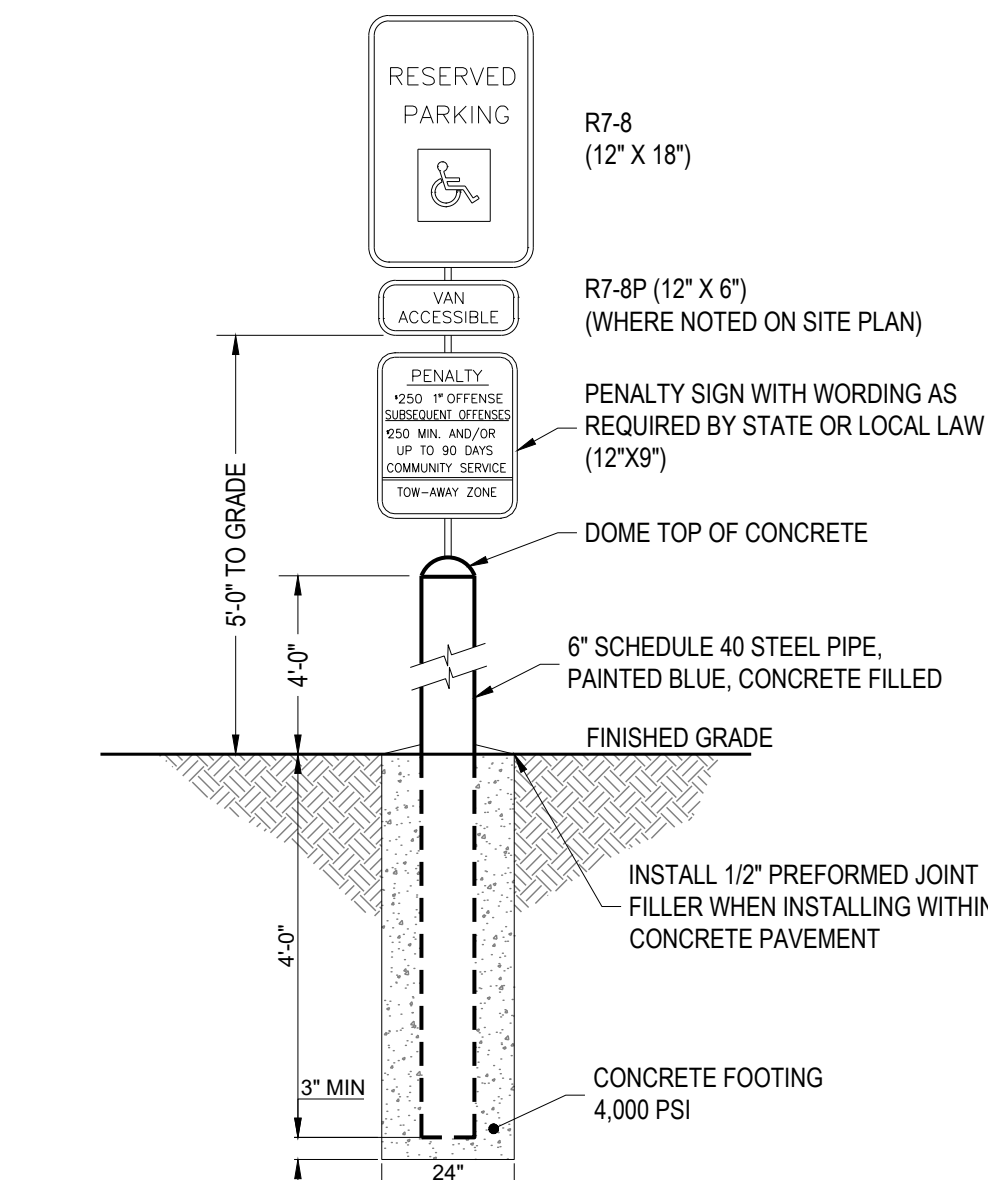
PRECAST CURB INLET
NTS



2x3 - SECTION A-A
TOP VIEW - CASTING REMOVED

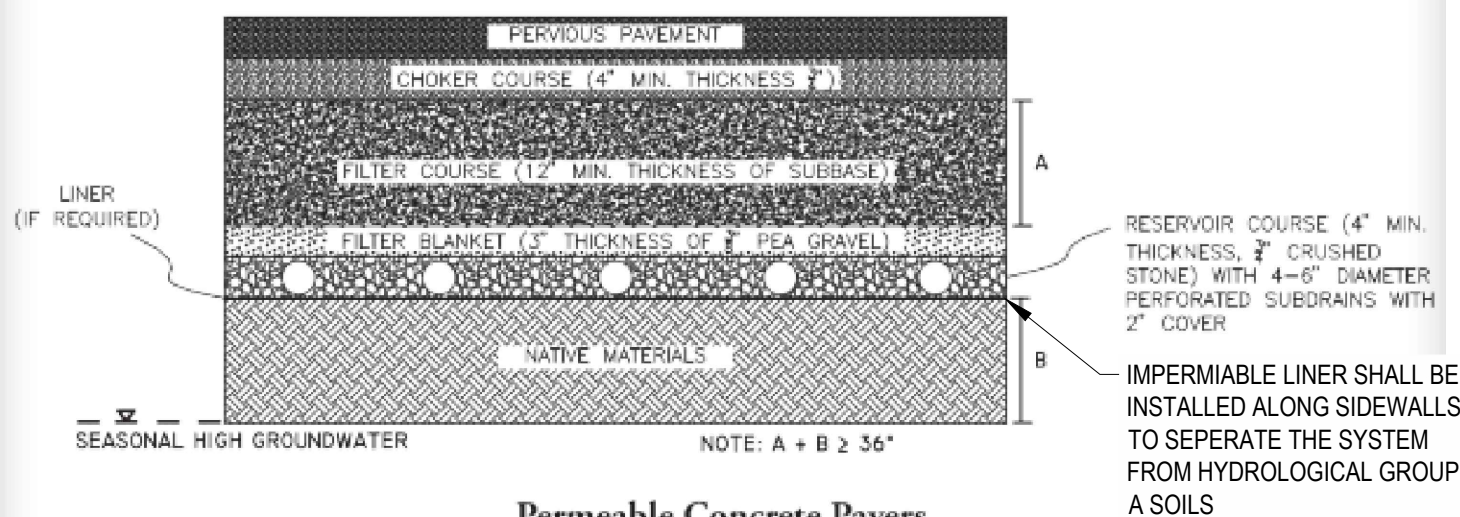


BOLLARD
NTS

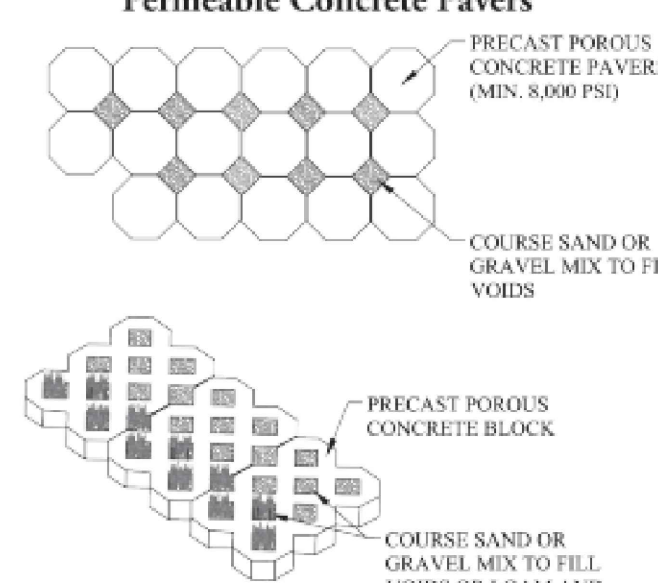


ACCESSIBLE PARKING SIGN IN BOLLARD
NTS

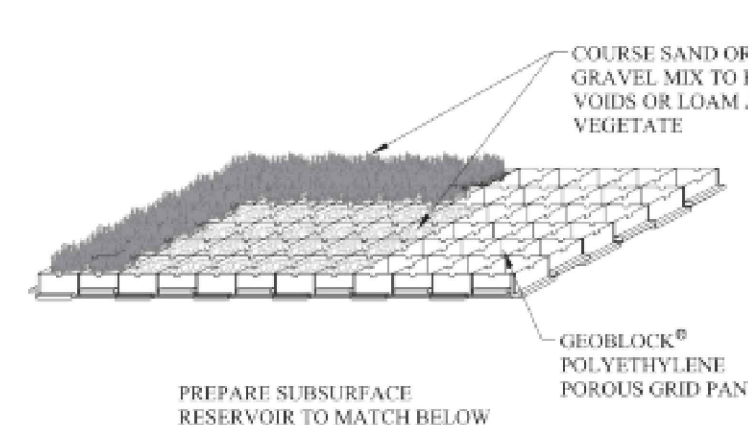
Permeable Pavement Profile



Permeable Concrete Pavers



Geoblock Porous Pavement



HANG TEN CAR WASH

DOVER, NH

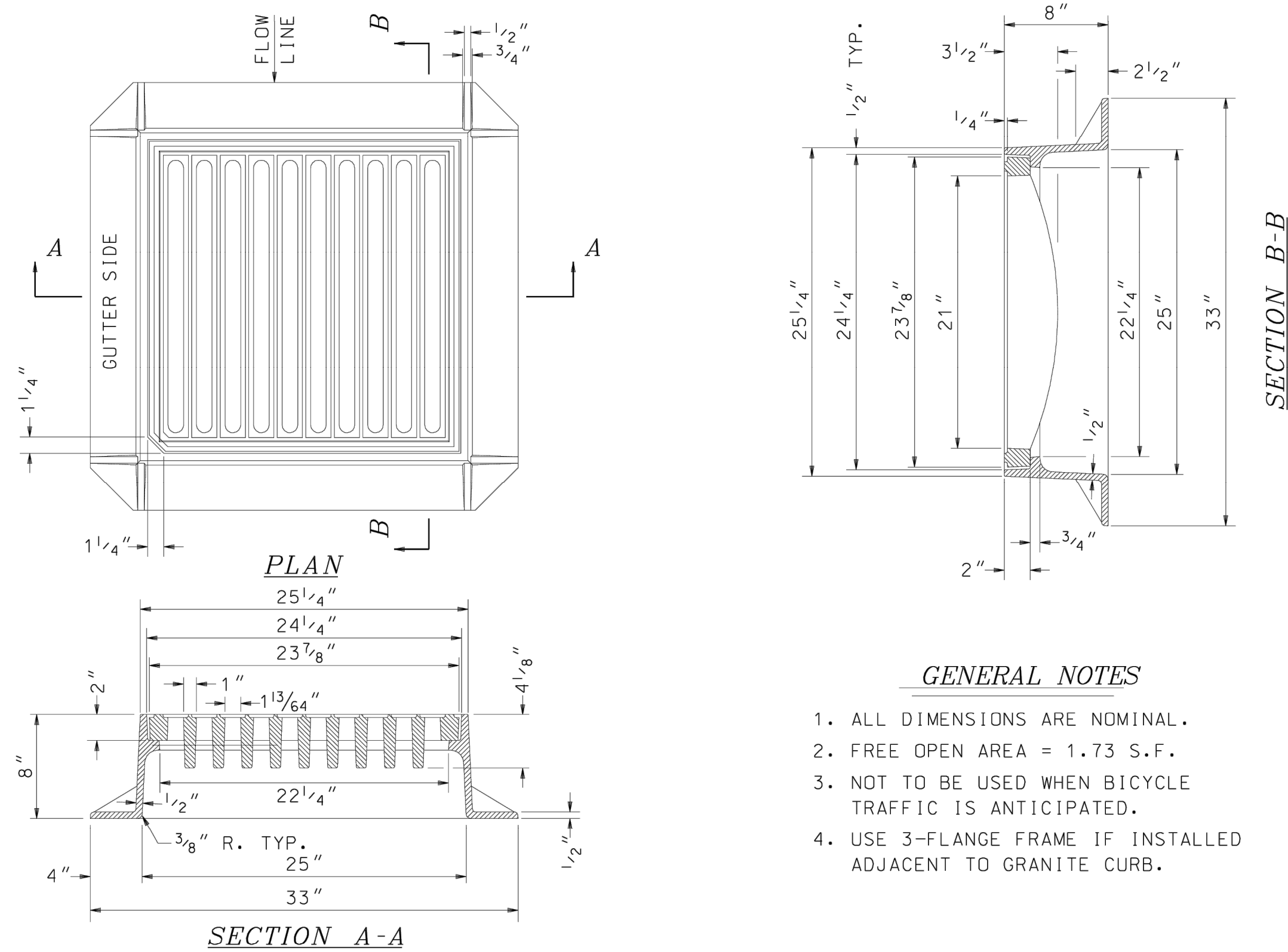
914 CENTRAL AVE.
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Revisions / Submissions		
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CONSTRUCTION
DETAILS

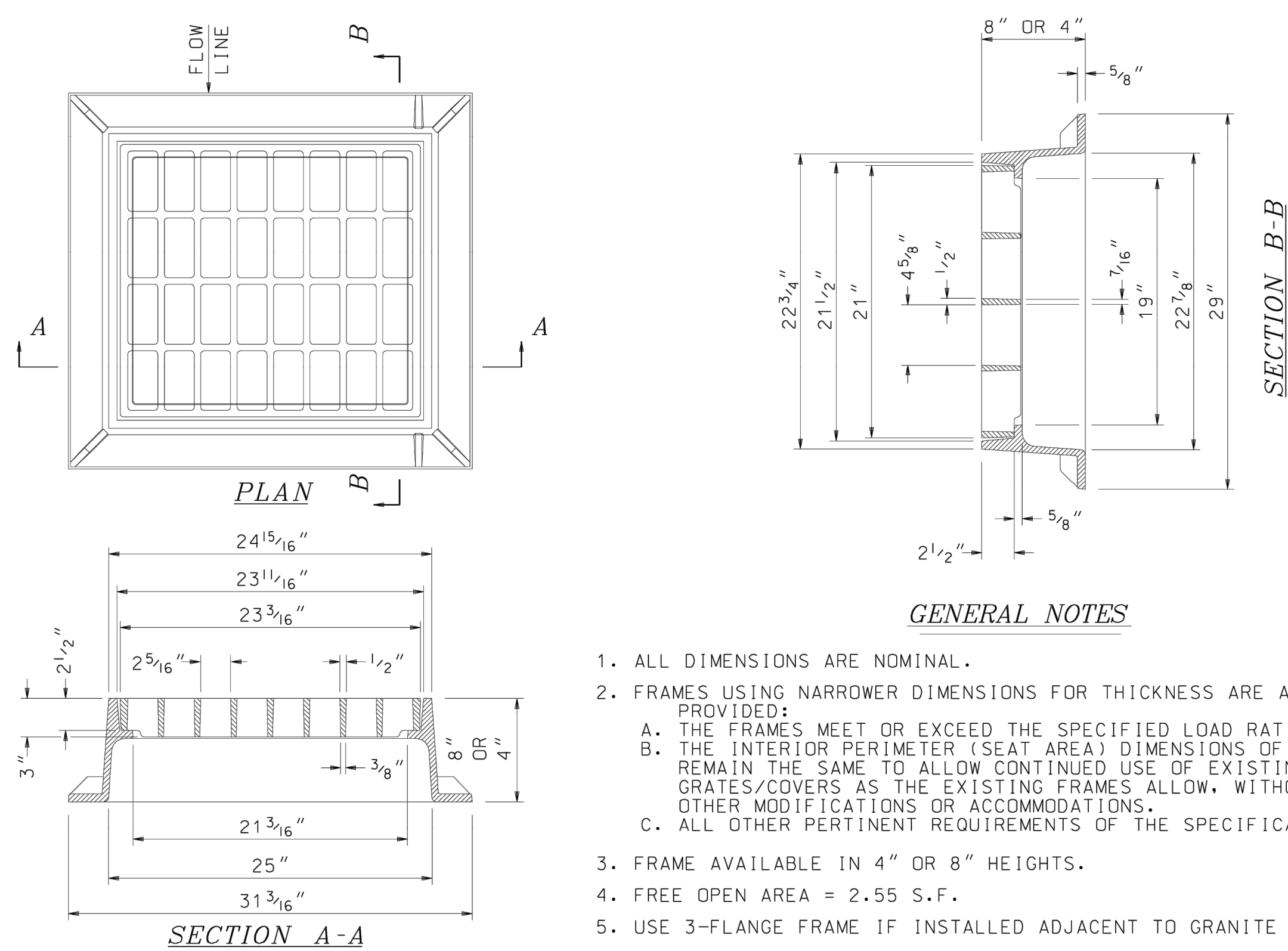
C6.0



NHDOT STANDARD PLANS

TYPE "A" GRATE & FRAME

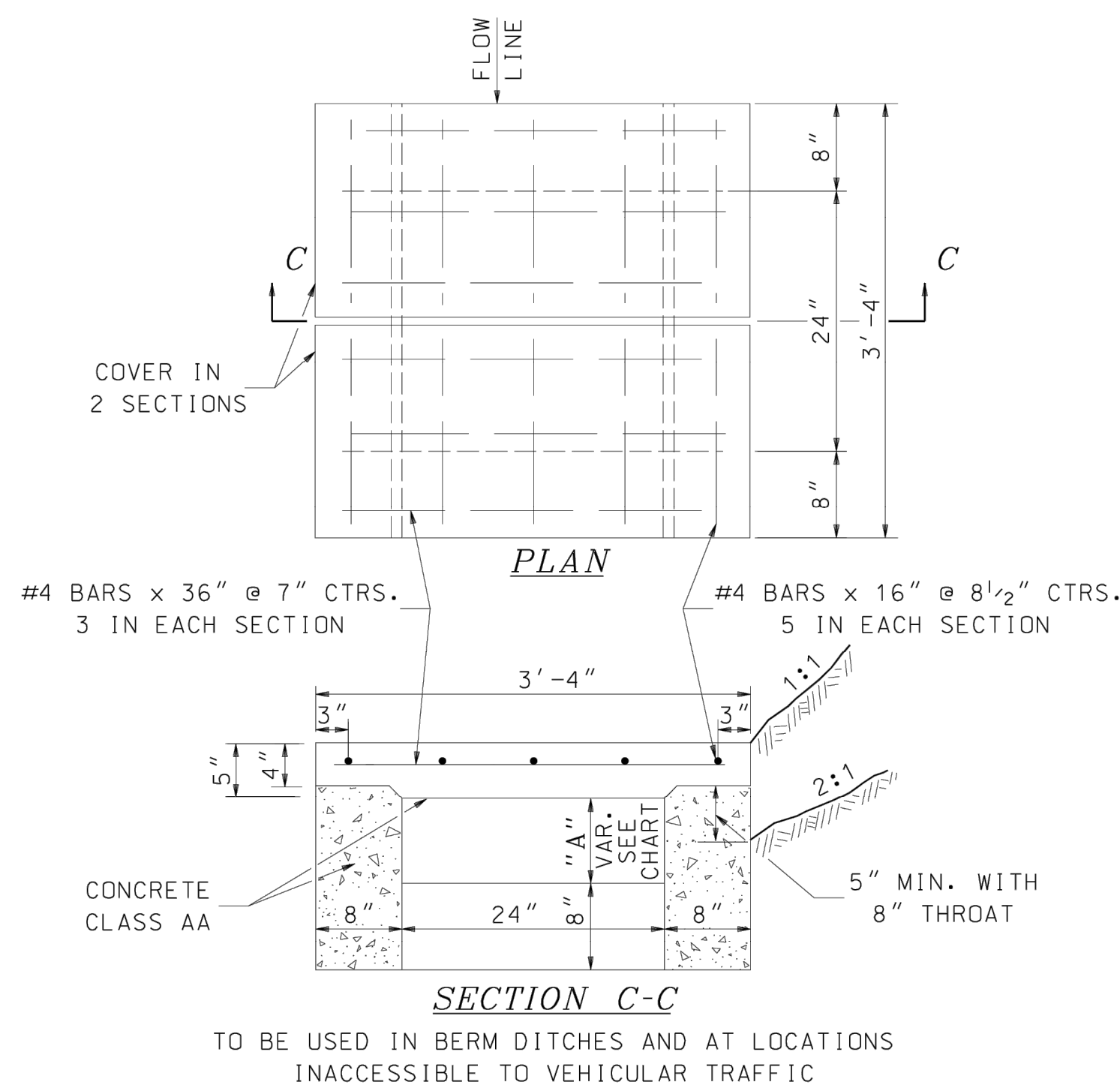
REV. DATE		PLATE 1
06-16-2010		
		STANDARD
		DR-1



NHDOT STANDARD PLANS

TYPE "B" GRATE & FRAME

REV. DATE		PLATE 2
06-16-2010		
08-14-2015		STANDARD DR-1

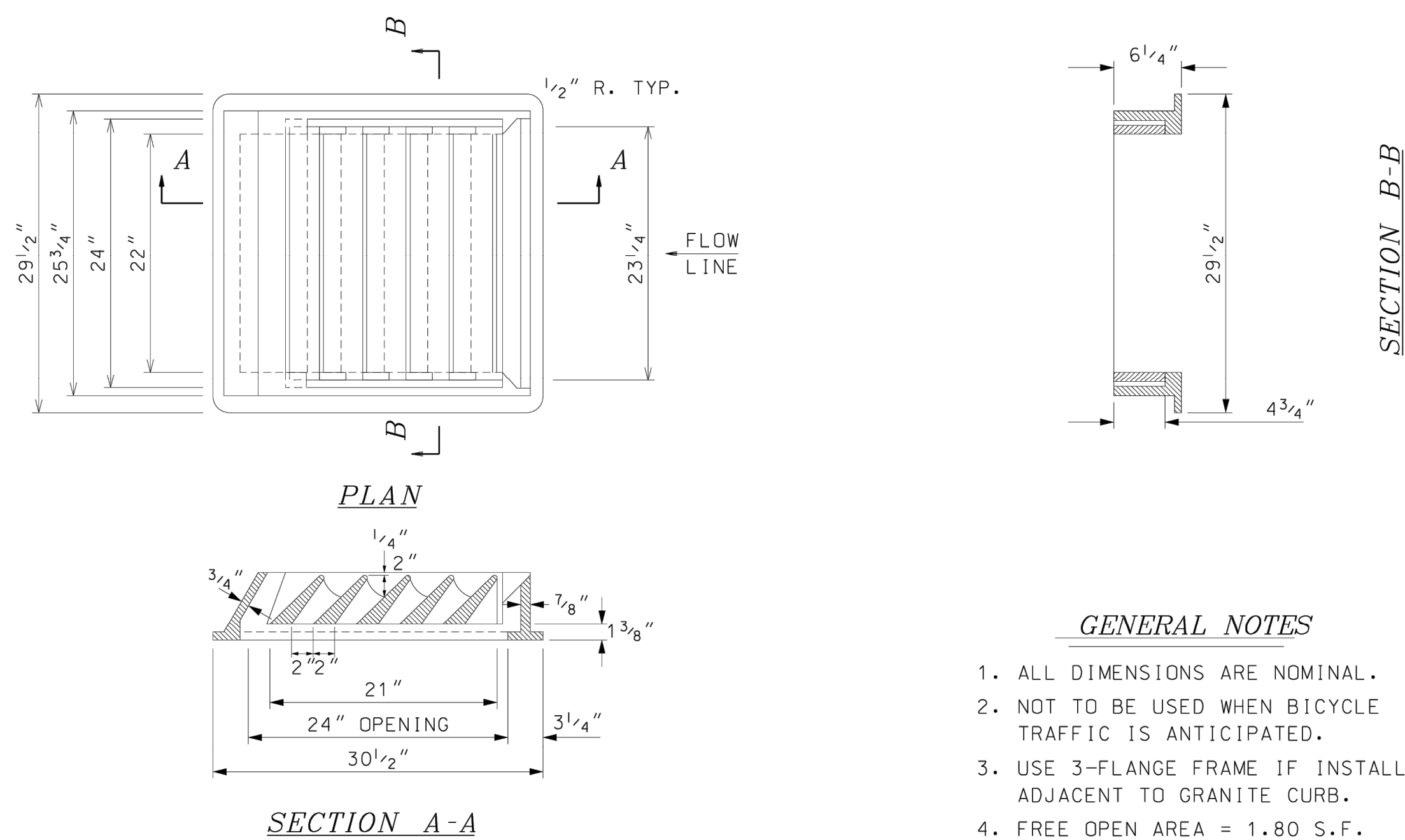


NHDOT STANDARD PLANS

TYPE "C" GRATE & FRAME

PIPE DIAMETER INCHES	THROAT DEPTH "A" INCHES	
	ONE THROAT	TWO THROAT
12"	8"	8"
15"	8"	8"
18"	16"	8"
24"	18"	16"

IN A SERIES OF CONNECTING
C.B.'S OR D.I.'S, THE OUTLET
PIPES MAY INCREASE IN
DIAMETER, BUT THE SURFACE
THROAT OPENINGS ARE NOT AFFECTED.



NHDOT STANDARD PLANS

TYPE "E" GRATE

REV. DATE		PLATE 4
06-16-2010		
		STANDARD DR-1

STANDARD NO.	
DR-1	
REVISION DATE	
07-13-2001	
06-16-2010	
08-14-2015	
*.DGN FILE NAME	
DR-1	

STANDARD PLANS



STANDARD
NO. DR-1



HANG TEN CAR WASH

DOVER, NH

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DOVER, NH 03820

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NHDOT DETAILS

C6.1

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GENERAL NOTES:

- THESE SHEETS ARE IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA), AND THE REQUIREMENTS OF THE 2011 PROPOSED ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES IN THE PUBLIC RIGHT OF WAY (PROWAG).
- NOT ALL FACILITIES CAN BE CONSTRUCTED TO MEET THE DESIGN STANDARDS. FACILITIES THAT CANNOT BE CONSTRUCTED TO MEET THE DESIGN STANDARDS SHALL BE CONSTRUCTED TO MEET THE STANDARDS TO THE GREATEST EXTENT PRACTICABLE. NONSTANDARD FEATURES SHALL BE DOCUMENTED ON TECHNICAL INFEASIBILITY FORM AND SUBMITTED TO NHDOT ADA COORDINATOR FOR APPROVAL.
- TO CHECK FIELD LAYOUT ALL SLOPES AND GRADES SHALL BE MEASURED WITH A DIGITAL LEVEL USING AT LEAST TWO READINGS. WHERE THE READINGS VARY, THE MEASUREMENTS SHALL BE AVERAGED. GRADE (RUNNING SLOPE) SHALL BE MEASURED ALONG THE CENTERLINE AND OFFSET 1.00' TO 1.50' FROM THE CENTERLINE. CROSS SLOPES SHALL BE MEASURED PERPENDICULAR TO CENTERLINE AT 5.00' TO 10.00' INTERVALS.
- GRADES (RUNNING SLOPES) ARE MEASURED IN THE DIRECTION OF PEDESTRIAN TRAVEL. CROSS SLOPES ARE MEASURED PERPENDICULAR TO THE DIRECTION OF PEDESTRIAN TRAVEL.
- JOINTS BETWEEN SIDEWALKS, CURB RAMPS, TURNING SPACES AND ROADWAYS SHALL BE FLUSH AND FREE FROM ABRUPT VERTICAL CHANGES GREATER THAN 1/4". VERTICAL SURFACE DISCONTINUITIES BETWEEN 1/4" AND 1/2" SHALL BE BEVELED WITH A SLOPE NOT STEEPER THAN 2:1. THE BEVEL SHALL BE APPLIED ACROSS THE ENTIRE JOINT. SEE DETAIL ON SHEET 9 OF 9.
- SIDEWALKS ARE CONNECTED TO ROADWAYS BY EITHER BLENDED TRANSITIONS OR CURB RAMPS. BLENDED TRANSITIONS ARE CONNECTIONS BETWEEN THE SIDEWALK LEVEL AND THE ROADWAY LEVEL THAT HAVE A MAXIMUM GRADE (RUNNING SLOPE) OF 5%, AND TRANSITIONS GREATER THAN 5% ARE CONSIDERED CURB RAMPS.
- CURB RAMPS AND BLENDED TRANSITIONS MAY REQUIRE THE INSTALLATION OF DETECTABLE WARNINGS. SEE ADDITIONAL "DETECTABLE WARNING DEVICE NOTES" ON THIS SHEET, AND DETAILS ON SHEET 6 OF 10 FOR DIMENSIONS, ORIENTATION AND INSTALLATION.
- VERTICAL ALIGNMENT SHALL BE GENERALLY PLANAR. GRADE BREAKS WITHIN THE PEDESTRIAN ACCESS ROUTE SHALL BE PERPENDICULAR TO THE DIRECTION OF TRAVEL AND SHALL NOT BE ROUNDED.
- THE CROSS SLOPE OF PEDESTRIAN ACCESS ROUTES (PAR) SHALL BE 2% MAXIMUM. THE FOLLOWING EXCEPTIONS ARE ALLOWED:
 - WHERE PEDESTRIAN CROSSINGS ARE PROVIDED AT INTERSECTIONS WITHOUT YIELD OR STOP CONTROL OR WHERE THERE IS ANY TRAFFIC SIGNAL, THE CROSS SLOPE OF A PEDESTRIAN ACCESS ROUTE CONTAINED WITHIN A CROSSING SHALL BE 5% MAXIMUM.
 - WHERE MIDBLOCK PEDESTRIAN CROSSINGS ARE PROVIDED, THE CROSS SLOPE OF A PEDESTRIAN ACCESS ROUTE CONTAINED WITHIN A MIDBLOCK CROSSING SHALL BE PERMITTED TO EQUAL THE STREET OR HIGHWAY GRADE.
- THE MINIMUM CLEAR WIDTH FOR PEDESTRIAN ACCESS ROUTES IS 4.00', EXCLUSIVE OF THE CURB. WHEN WALKWAY WIDTHS ARE LESS THAN 5.00' x 5.00' PASSING SPACES, OR A FEATURE OF EQUAL OR GREATER DIMENSIONS (E.G., DRIVEWAYS) THAT MEET THE SLOPE CRITERIA, SHALL BE PROVIDED AT A MAXIMUM INTERVAL OF 200'. EXISTING DRIVEWAYS AND STREET CROSSING MAY ALSO SERVE AS PASSING SPACES.
- THE BUFFER ZONE IS A PHYSICAL DISTANCE SEPARATING THE PEDESTRIAN ACCESS ROUTE FROM THE VEHICLE TRAVELED WAY. THE BUFFER ZONE MAY BE PLANTED OR PAVED.
- WHEN CROSSING DRIVEWAYS, THE WORK SHALL BE IN CONFORMANCE WITH NHDOT DRIVEWAY DETAILS SHEET. THE CROSS SLOPE ACROSS DRIVEWAYS SHALL BE 2% MAXIMUM.
- FOR ACCESSIBLE PEDESTRIAN SIGNAL PUSH BUTTONS, SEE DETAILS ON SHEET 8 OF 9.
- FOR RAMP COUNTER SLOPE REQUIREMENTS, SEE DETAILS ON SHEET 9 OF 9.

CURB RAMP NOTES:

- THE MINIMUM WIDTH OF A CURB RAMP SHALL BE 4.00'.
- THE FULL WIDTH OF THE RAMP OR LANDING SHALL BE CONTAINED WITHIN THE PAVEMENT MARKINGS AT MARKED CROSSWALKS.
- CURB RAMPS ARE NOT REQUIRED IN LOCATIONS WHERE THERE IS NO ACCESSIBLE PEDESTRIAN ACCESS ROUTE. UNLESS IT IS SERVING AS A LANDING FOR A PEDESTRIAN SIGNAL.
- THE GRADE (RUNNING SLOPE) OF A CURB RAMP SHALL BE A MAXIMUM OF 8.3%.
- WHERE EXISTING CONDITIONS DO NOT ALLOW THE CONSTRUCTION OF A CURB RAMP WITH A GRADE (RUNNING SLOPE) OF 8.3% OR LESS, THE RAMP LENGTH SHALL NOT BE REQUIRED TO EXCEED 15.00'.
- THE CROSS SLOPE OF THE CURB RAMP SHALL BE AS FLAT AS POSSIBLE AND STILL PROVIDE POSITIVE DRAINAGE. THE CROSS SLOPE OF A CURB RAMP 2% MAXIMUM. SEE NOTE 9 FOR EXCEPTIONS. WHERE THE EXISTING ROADWAY GRADE EXCEEDS 2%, THE CURB RAMP MAY BE WARPED ACCORDING TO THE DETAIL ON SHEET 9 OF 9 TO TIE INTO THE ROADWAY GRADE.
- RAMP SIDE TREATMENT OPTIONS ARE DETAILED ON SHEET 7 OF 9 FOR USE WITHIN THE BUFFER ZONE. WHERE A PEDESTRIAN CIRCULATION PATH CROSSES THE CURB RAMP, FLARED SIDES SHALL BE INSTALLED WITH A SLOPE OF 10% MAXIMUM. THE SLOPE OF FLARED SIDES IS MEASURED PARALLEL TO THE CURB LINE. (ALSO SEE CURB RAMP CONFIGURATION TYPE 7 ON SHEET 3 OF 9.)
- THE BACKSIDE OF A PARALLEL RAMP SHOULD BE GRADED TO MATCH EXISTING TERRAIN. UNLESS OTHERWISE SHOWN IN THE CONTRACT DOCUMENTS. WHERE GRADING IS NOT FEASIBLE DUE TO LIMITED ROW OR PHYSICAL CONSTRAINTS, A BACK CURB MAY BE INSTALLED. SEE DETAILS ON SHEET 7 OF 9.

TURNING SPACE AND CLEAR SPACE NOTES:

- WHERE A CHANGE IN DIRECTION IS REQUIRED TO UTILIZE A CURB RAMP, A TURNING SPACE SHALL BE PROVIDED AT THE BASE AND/OR THE TOP OF CURB RAMP AS APPLICABLE. TURNING SPACES SHALL BE PERMITTED TO OVERLAP CLEAR SPACES.
- WHERE THERE ARE NO VERTICAL CONSTRAINTS AT THE BACK OF SIDEWALK, (E.G., VERTICAL CURB, BUILDINGS, FENCES) THE TURNING SPACE DIMENSIONS SHALL BE 4.00' x 4.00' MINIMUM. WHERE THE TURNING SPACE IS CONSTRAINED AT THE BACK OF SIDEWALK, THE TURNING SPACE SHALL BE 4.00' x 5.00' MINIMUM. THE 5.00' DIMENSION SHALL BE PROVIDED PERPENDICULAR TO THE CONSTRAINT.
- TURNING SPACE MAXIMUM CROSS SLOPE IS 2% IN ANY DIRECTION.
- BEYOND THE BOTTOM GRADE BREAK, A CLEAR SPACE OF 4.00' x 4.00' MINIMUM SHALL BE PROVIDED WITHIN THE WIDTH OF THE PEDESTRIAN CROSSWALK, AND OUTSIDE THE PARALLEL VEHICLE TRAVEL LANE. THE CLEAR SPACE MAY OVERLAP TURNING SPACES, DETECTABLE WARNING SURFACES, AND DROP CURBS.

DETECTABLE WARNING DEVICE NOTES:

- DETECTABLE WARNING DEVICES (DWD) SHALL BE PROVIDED AT THE FOLLOWING LOCATIONS ON PEDESTRIAN ACCESS ROUTES:
 - CURB RAMPS AT PEDESTRIAN CROSSINGS.
 - PEDESTRIAN REFUGE ISLANDS (WHERE THE LENGTH OF THE PEDESTRIAN ACCESS ROUTE ACROSS THE REFUGE ISLAND IS GREATER THAN OR EQUAL TO 6.00'). SEE SHEET 8 OF 9.
 - PEDESTRIAN AT-GRADE RAIL CROSSINGS NOT LOCATED WITHIN A STREET OR HIGHWAY.
 - DRIVEWAY CROSSINGS WITH NHDOT APPROVED AND MAINTAINED SIGNALS, YIELD OR STOP CONTROL. DETECTABLE WARNING DEVICES SHALL NOT BE PROVIDED AT CROSSINGS OF UNCONTROLLED DRIVEWAY APRONS.
- SOME DETECTABLE WARNING PRODUCTS REQUIRE A CONCRETE BORDER FOR PROPER INSTALLATION. IF REQUIRED, THE BORDER SHALL NOT EXCEED 2" IN WIDTH OR 6" ALONG ROADWAY EDGE/CURB. THE BORDER DIMENSION SHALL BE MEASURED FROM THE INSIDE EDGE OF THE RADIUS.
- THE DETAILS PROVIDED ARE NOT DRAWN TO SCALE. THE QUANTITY OF DOMES DEPICTED ON THE DETECTABLE WARNING DEVICE DETAIL IS FOR ILLUSTRATION ONLY. THE SIZE OF THE DETECTABLE WARNING FIELD SHALL BE 2.00' MINIMUM IN THE DIRECTION OF TRAVEL AND SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP OR FLUSH SURFACE, EXCLUDING ANY FLARED SIDES. THE WIDTH OF THE DETECTABLE WARNING FIELD INCLUDES A CONCRETE BORDER, IF PROVIDED. PLACEMENT AND ORIENTATION SHALL BE IN COMPLIANCE WITH THE DETAILS.
- ON SLOPES OF 5% OR GREATER, THE ROWS OF DOMES SHALL BE ALIGNED TO BE PERPENDICULAR OR RADIAL TO THE LOWER GRADE BREAK ON THE RAMP RUN. WHERE DOMES ARE ARRAYED RADially THEY MAY DIFFER IN DOME DIAMETER AND CENTER-TO-CENTER SPACING WITHIN THE RANGES SPECIFIED ON SHEET 9. ON SLOPES LESS THAN 5%, DOME ORIENTATION IS LESS CRITICAL AND MAY DIFFER FROM PERPENDICULAR OR RADIAL ALIGNMENT TO THE GRADE BREAK.
- THE DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT GUTTER, STREET OR HIGHWAY, OR PEDESTRIAN ACCESS ROUTE SURFACE.
- DETECTABLE WARNING PANELS SHALL BE CAST IRON WITH NO SURFACE COATING AND SHALL BE ALLOWED TO TRANSITION TO THEIR NATURAL PATINA.

DEFINITION OF TERMS:

LANDING: A 4.00' x 4.00' CLEAR SPACE WITH A 2% SLOPE OR LESS IN ALL DIRECTIONS.

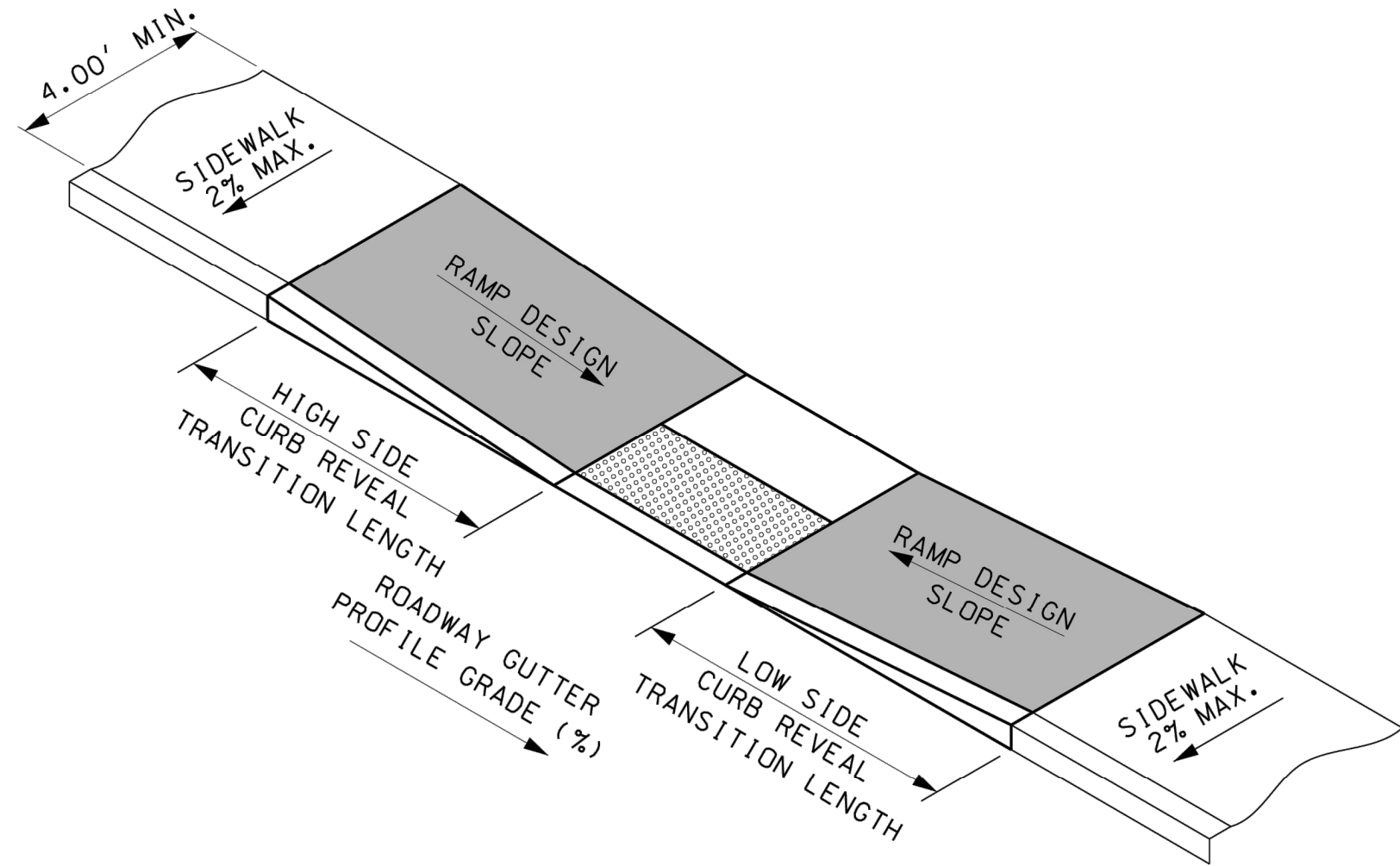
MAXIMUM EXTENT FEASIBLE: ALL CHANGES THAT ARE POSSIBLE ARE MADE TO COMPLY WITH ACCESSIBILITY STANDARDS.

PEDESTRIAN ACCESS ROUTE (PAR): A CONTINUOUS AND UNOBSTRUCTED PATH OF TRAVEL PROVIDED FOR PEDESTRIANS WITH DISABILITIES WITHIN OR CONCINCIDING WITH A PEDESTRIAN CIRCULATION PATH. PAR SHALL BE 4'W MIN.(EXCLUDING CURBING), 2% MAX. CROSS SLOPE AND 1/4" OR LESS VERTICAL DISCONTINUITY.

TECHNICAL INFEASIBILITY: EXISTING PHYSICAL OR SITE CONSTRAINTS THAT PROHIBIT MODIFICATIONS OR ADDITIONS OF ELEMENTS, SPACES OR FEATURES TO COMPLY WITH MINIMUM ACCESSIBILITY REQUIREMENTS.

INDEX OF SHEETS

1 OF 9	INDEX OF SHEETS AND GENERAL NOTES
2 OF 9	CURB RAMP CONFIGURATIONS TYPE 1 - 5
3 OF 9	CURB RAMP CONFIGURATIONS TYPE 6 - 7
4 OF 9	CURB RAMP CONFIGURATIONS TYPE 8 - 11
5 OF 9	SLIP RAMP, SIDEWALK TO SHOULDER TRANSITION, ACCESS ISLAND
6 OF 9	DETECTABLE WARNING DEVICE PLACEMENT OPTIONS
7 OF 9	RAMP SIDE CONFIGURATIONS AND BACK TREATMENTS
8 OF 9	RR X-INGS, ROUNDABOUTS, PEDESTRIAN BUTTONS
9 OF 9	DETECTABLE WARNING DEVICE, TRUNCATED DOMES, MISCELLANEOUS DETAILS



TYPICAL CURB TRANSITION LENGTH TABLE								
CURB REVEAL (INCHES)		7	6	5	4	3	2	1
Low Side Transition Length	ROADWAY PROFILE GRADE (%)	Minimum Transition Length Required (FT)						
	-10%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	-9%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	-8%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	-7%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	-6%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	-5%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	-4%	5.1	5.0	5.0	5.0	5.0	5.0	5.0
	-3%	5.6	5.0	5.0	5.0	5.0	5.0	5.0
	-2%	6.1	5.3	5.0	5.0	5.0	5.0	5.0
	-1%	6.9	5.9	5.0	5.0	5.0	5.0	5.0
	0%	7.8	6.7	5.6	5.0	5.0	5.0	5.0
	1%	9.0	7.7	6.4	5.1	5.0	5.0	5.0
	2%	10.6	9.1	7.6	6.1	5.0	5.0	5.0
High Side Transition Length	3%	13.0	11.1	9.3	7.4	5.6	5.0	5.0
	4%	15.0	14.3	11.9	9.5	7.1	5.0	5.0
	5%	15.0	15.0	15.0	13.3	10.0	6.8	5.0
	6%	15.0	15.0	15.0	15.0	15.0	11.3	5.3
	7%	15.0	15.0	15.0	15.0	15.0	15.0	15.0
	8%	15.0	15.0	15.0	15.0	15.0	15.0	15.0
	9%	15.0	15.0	15.0	15.0	15.0	15.0	15.0
	10%	15.0	15.0	15.0	15.0	15.0	15.0	15.0

THIS TABLE REPRESENTS THE MINIMUM LENGTH OF CURB RAMP TRANSITION BASED ON THE EXISTING ROADWAY PROFILE GRADE AND THE CURB REVEAL AT FULL HEIGHT ALONG THE SIDEWALK. THE MINIMUM TRANSITION LENGTH REQUIRED IS BASED ON 7.5% SLOPE AND INDICATED CURB REVEAL.

TREATMENT KEY LEGEND

(RESURFACING STYLE PROJECTS)

##--\$--\$	RAMP BACK TREATMENT OPTION - SEE SHEET 7
##--\$--\$	RAMP SIDE CONFIGURATION - SEE SHEET 7
##--\$--\$	DETECTABLE WARNING DEVICE PLACEMENT - SEE SHEET 6
##--\$--\$	RAMP CONFIGURATION TYPE - SEE SHEETS 2-5 (X = OMIT THIS OPTION)

STATE OF NEW HAMPSHIRE SPECIAL DETAILS DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN					
SIDEWALK CURB RAMP DETAILS (SHEET 1 OF 9)					
REVISION DATE	MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
6-18-18	Curb-Ramp-1	crb_ramp_1-9	-	1	9



HANG TEN CAR WASH

DOVER, NH

914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions		
ID	Description	Date
1	TRC RESUBMITTAL	2023/11/30

761766
1'=20'
NTV
HGC
06/28/2023
PERMIT

NHDOT DETAILS

C6.2

W:\PROJECTS\WEA761269-01_Hang 10_Warwick_R103-CIVIL\PLAN\761269_CONSTRUCTION DETAILS.dwg - 11/30/2023 - Paige Weidner



CESO
WWW.CESOINC.COM



HANG TEN CAR WASH

DOVER, NH

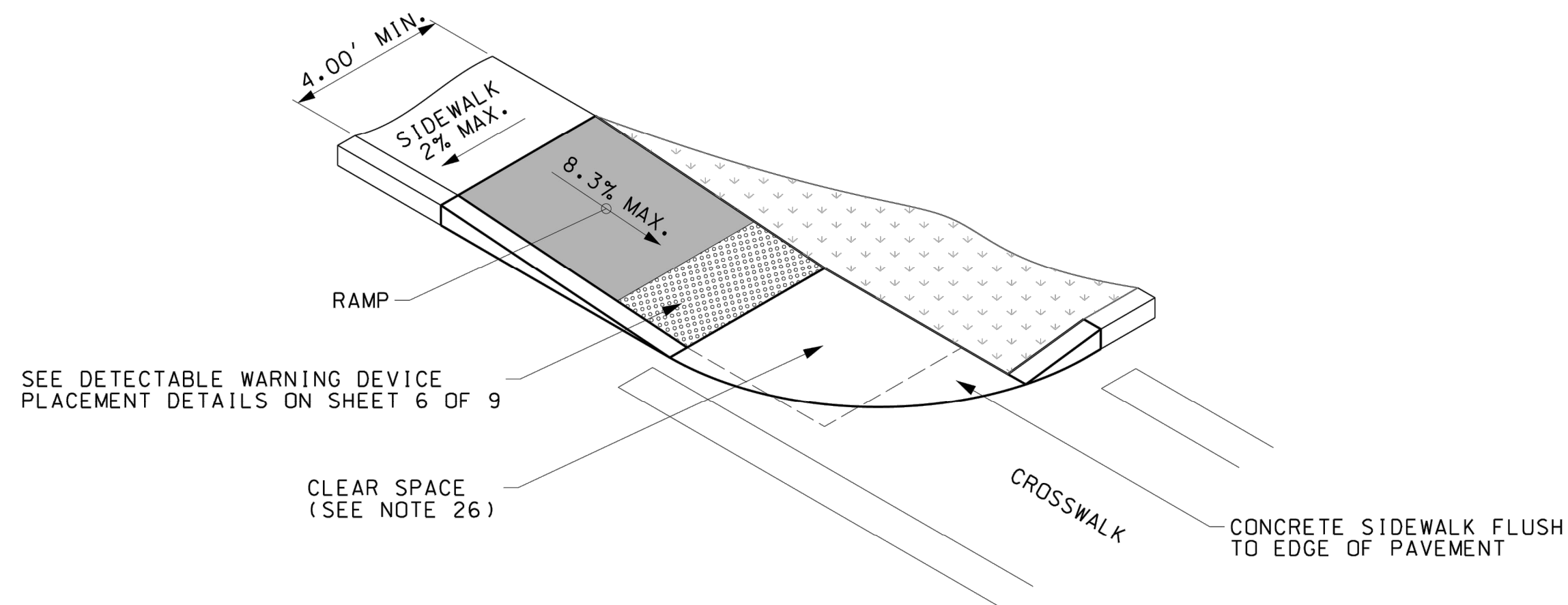
914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions		
ID	Description	Date
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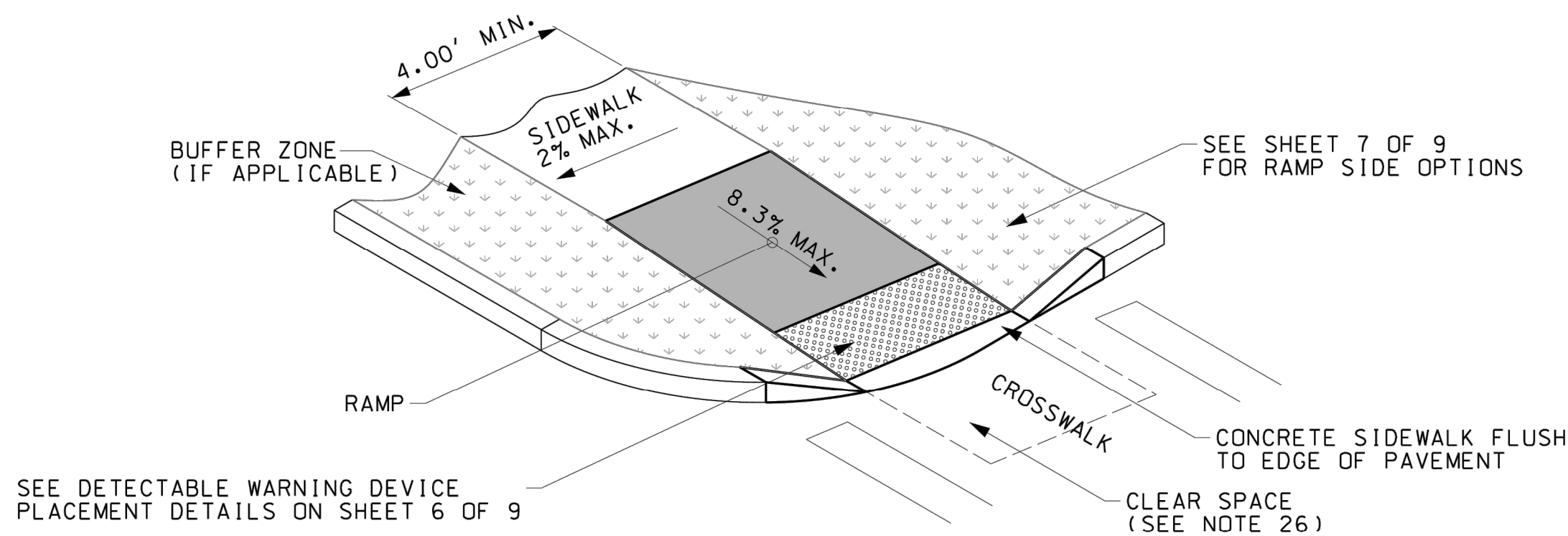
761766
1"=20'
NTV
HGC
06/28/2023
PERMIT

NHDOT DETAILS

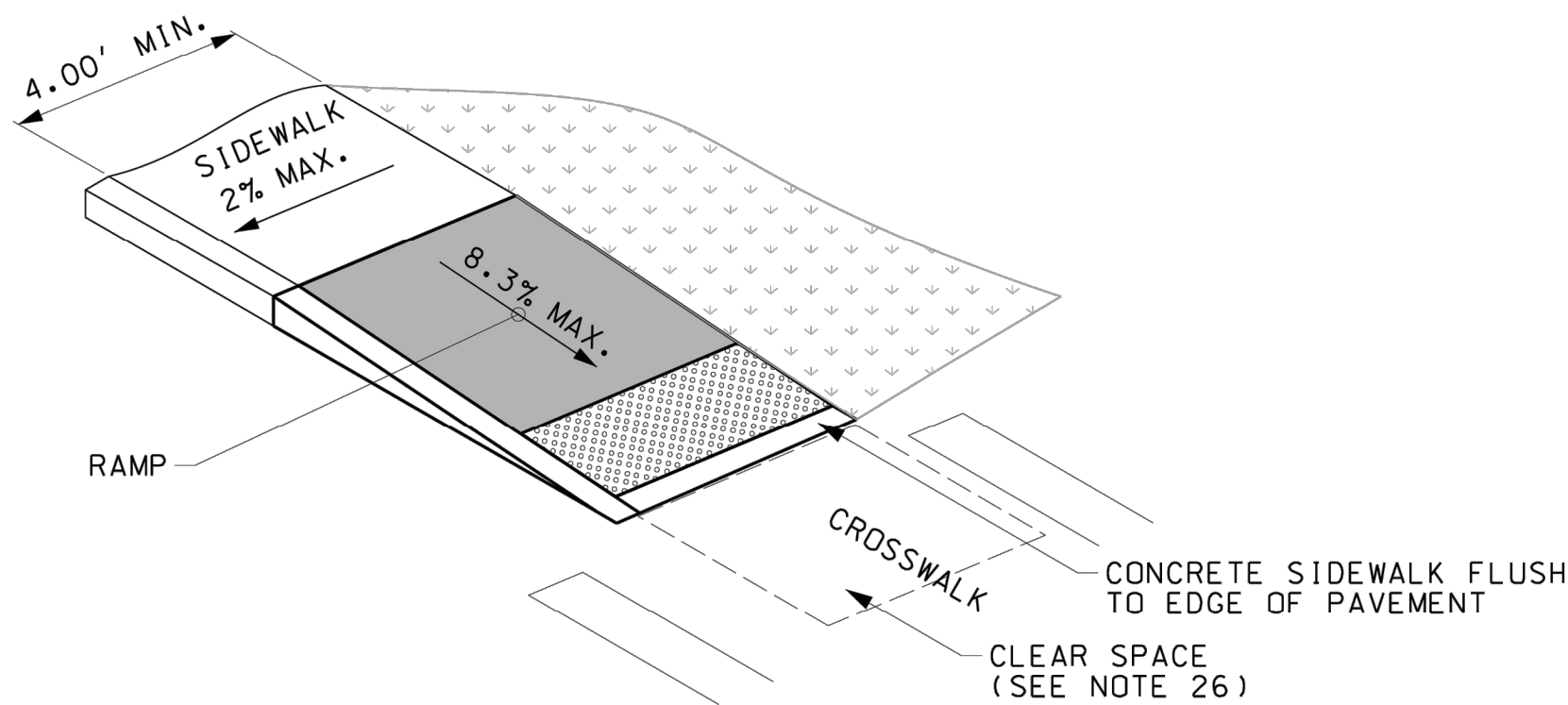
C6.3



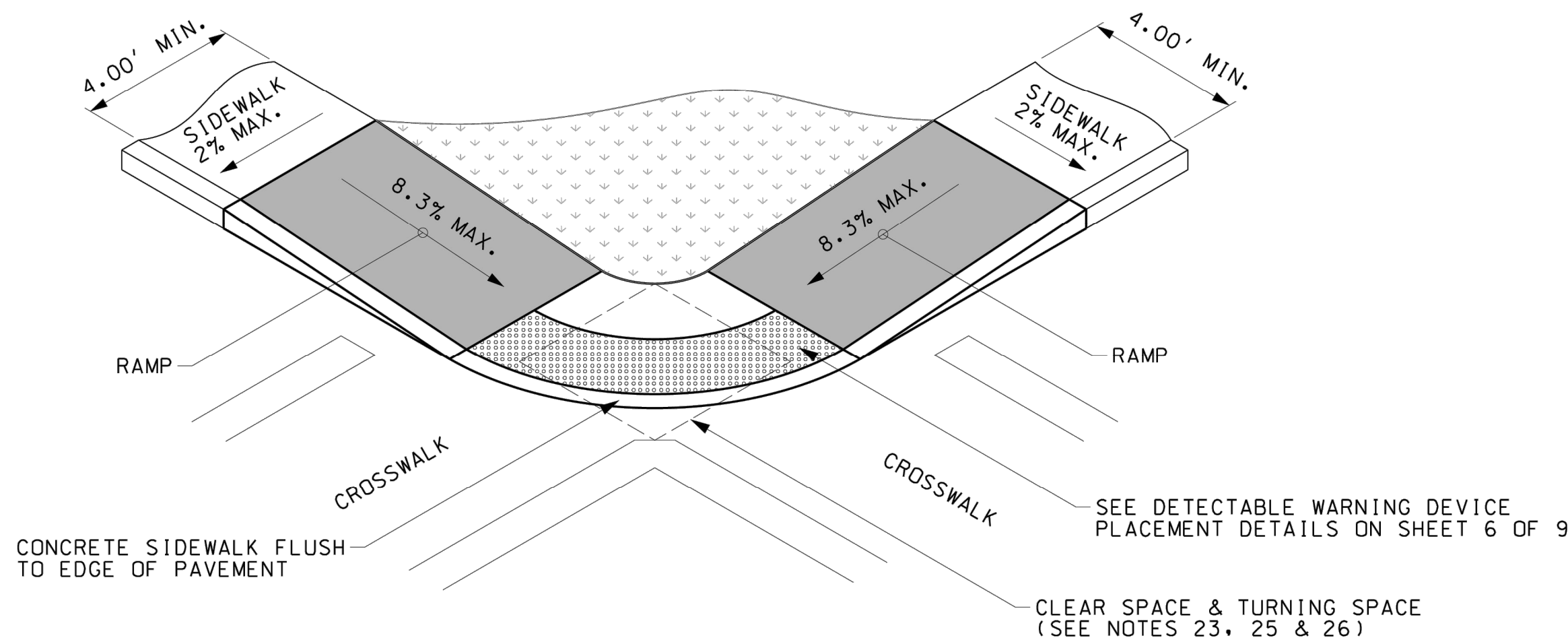
TYPE 1



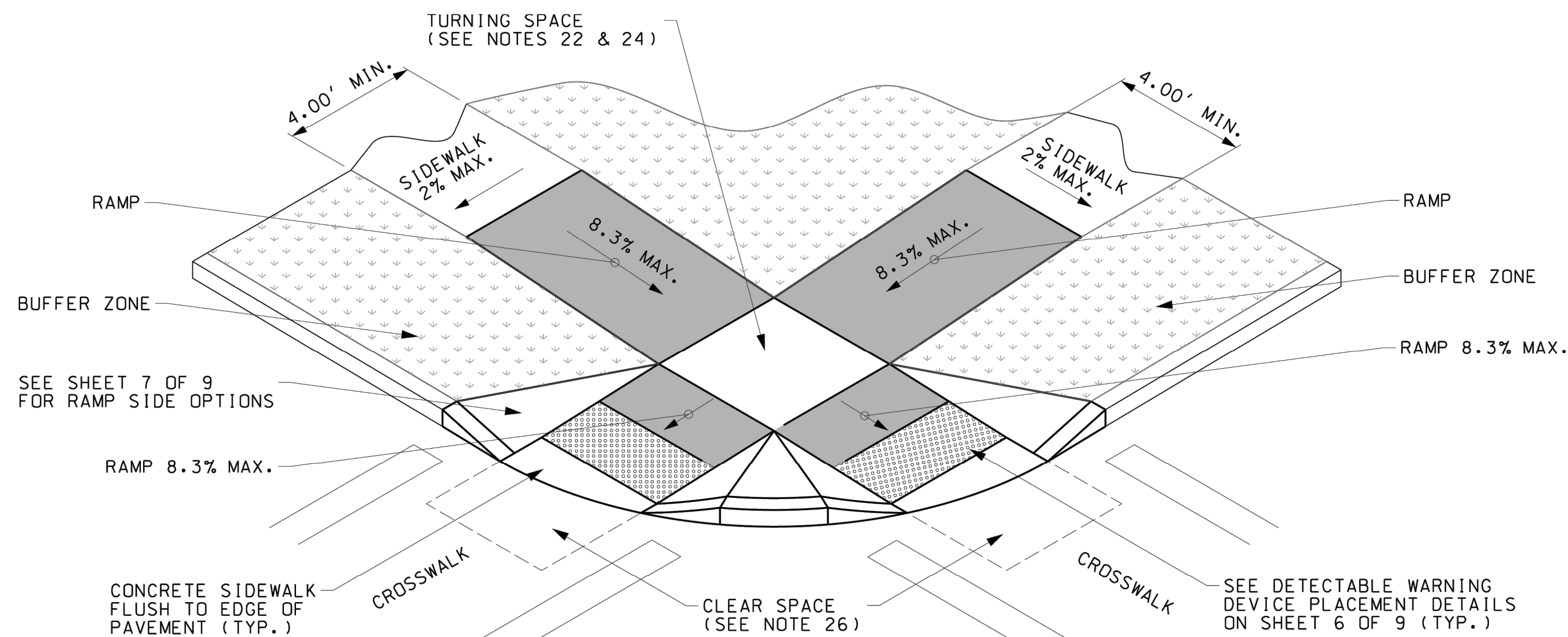
TYPE 2



TYPE 3



TYPE 4
NOT FOR NEW DESIGNS - RETROFITS ONLY



TYPE 5

CURB RAMP CONFIGURATIONS

NOTE:

ALL NOTES REFERENCED ON THIS SHEET CAN BE FOUND ON SIDEWALK CURB RAMP DETAILS, SHEET 1 OF 9.

STATE OF NEW HAMPSHIRE SPECIAL DETAILS					
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN					
SIDEWALK CURB RAMP DETAILS (SHEET 2 OF 9)					

REVISION DATE	MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
7-2-18	Curb-Ramp-2	crb_ramp_1-9	-	2	9

Plant List - Trees and Shrubs				
ID	Qty	Botanical Name	Common Name	Scheduled Size
ASF	3	Amelanchier laevis 'Spring Flurry'	Spring Flurry Serviceberry	3" Cal.
ASV	6	Acer rubrum 'Sun Valley'	Sun Valley Maple	3" Cal.
CBF	4	Carpinus betulus 'Fastigiata'	Fastigiata Hornbeam	3" Cal.
CCF	3	Cercis canadensis 'Forest Pansy'	Forest Pansy Redbud	3" Cal.
COP	71	Comptonia peregrina	Sweetfern	24" HT.
CSA	43	Cornus sericea 'Arctic Fire'	Arctic Fire Dogwood	3" Cal.
FG	26	Fothergilla gardenii	Dwarf Fothergilla	24" HT
GBP	5	Ginkgo biloba 'Princeton Sentry'	Maidenhair Tree	3" Cal.
HHid	34	Hypericum x 'Hidcote'	Hidcote St. John's Wort	24" HT.
ICH	4	Ilex crenata 'Hetzii'	Japanese Holly	24" HT.
ICM	3	Ilex crenata 'Hoogendorn'	Hoogendorn Japanese Holly (Male)	24" HT.
JBD	3	Juniperus communis depressa 'AmiDak'	Blueberry Delight Juniper	5 Gal.
JES	17	Juniperus virginiana 'Emerald Sentinel'	Emerald Sentinel Red Cedar	3" Cal.
MG	38	Myrica gale	Sweetgale	24" HT.
NS	2	Nyssa sylvetica	Black Tupelo	3" Cal.
PG	7	Picea glauca 'Densata'	White Spruce	3" Cal.
RGL	149	Rhus aromatica 'Grow Low'	Grow Low Sumac	2 GAL.
SAW	8	Spiraea x bumalda 'Anthony Waterer'	Anthony Waterer Spirea	24" HT

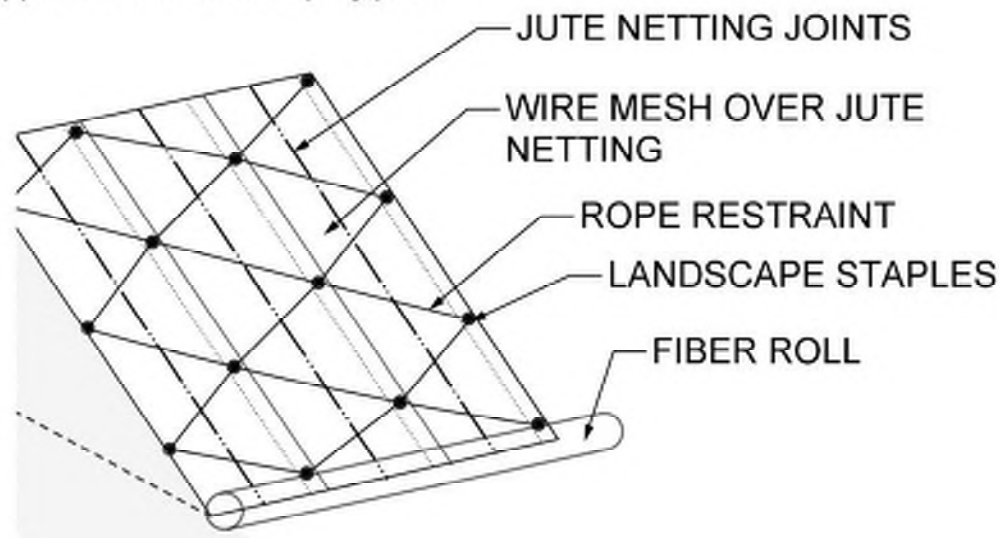
Plant List - Perennials				
ID	Qty	Botanical Name	Common Name	Scheduled Size
AOS	6	Aster oblongifolius 'October Skies'	Aromatic Aster	2 QT
DES	26	Deschampsia cespitosa	Tussock Grass	2 QT
PVS	37	Panicum virgatum 'Shenandoah'	Shenandoah Switch Grass	2 Gal.
RBK	5	Rudbeckia fulgida 'Goldsturm'	Black-Eyed Susan	2 QT
SH	24	Sporobolus heterolepis	Prairie Dropseed	1 Gal.
SS	71	Schizachyrium scoparium	Little Buestem	2 QT

LANDSCAPE NOTES:

1. THE CONTRACTOR SHALL LOCATE AND VERIFY THE EXISTENCE OF ALL UTILITIES PRIOR TO STARTING WORK.
2. THE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIALS IN QUANTITIES SUFFICIENT TO COMPLETE THE PLANTINGS SHOWN ON THE DRAWINGS.
3. ALL MATERIAL SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE CURRENT AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
4. ALL PLANT SUBSTITUTIONS MUST BE APPROVED BY THE LANDSCAPE ARCHITECT.
5. ALL PLANT MATERIALS SHALL BE EXACTLY AS SPECIFIED BY THE LANDSCAPE ARCHITECT. IF PLANT SPECIES CULTIVARS ARE FOUND TO VARY FROM THAT SPECIFIED AT ANY TIME DURING THE GUARANTEE PERIOD, THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO HAVE THE CONTRACTOR REPLACE THAT PLANT MATERIAL. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO REJECT ANY PLANT DELIVERED TO THE SITE FOR AESTHETIC REASONS BEFORE PLANTING. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR THE QUALITY FOR ALL THE PLANTS.
6. PLANTS SHALL BE SUBJECT TO INSPECTION AND APPROVAL AT THE PLACE OF GROWTH, UPON DELIVERY OR AT THE JOB SITE WHILE WORK IS ON-GOING TO CONFORMITY TO SPECIFIED QUALITY, SIZE AND VARIETY.
7. PLANTS FURNISHED IN CONTAINERS SHALL HAVE THE ROOTS WELL ESTABLISHED IN THE SOIL MASS AND SHALL HAVE AT LEAST ONE (1) GROWING SEASON. ROOT-BOUND PLANTS OR INADEQUATELY SIZED CONTAINERS TO SUPPORT THE PLANT MAY BE DEEMED UNACCEPTABLE.
8. NO PLANT SHALL BE PUT IN THE GROUND BEFORE GRADING HAS BEEN FINISHED AND APPROVED BY THE LANDSCAPE ARCHITECT.
9. ALL PLANTS SHALL BE INSTALLED AND DETAILED PER PROJECT SPECIFICATIONS.
10. ALL PLANTS SHALL BE WATERED THOROUGHLY TWICE DURING THE FIRST 24-HOUR PERIOD AFTER PLANTING. ALL PLANTS SHALL BE WATERED WEEKLY, OR MORE OFTEN IF NECESSARY, DURING THE FIRST GROWING SEASON. WITH TREES BEING WATERED FOR 1 YEAR PER INCH OF CALIPER AT TIME OF PLANTING. IF TEMPORARY IRRIGATION SYSTEMS ARE TO BE USED, THEY SHALL BE DESIGNED AND INSTALLED FOR EFFICIENT AND EFFECTIVE WATER USE TO LANDSCAPED AREAS FOR A LIMITED PERIOD OF TIME DETERMINED BY THE PLANT MATERIAL AND SITE CONDITIONS.
11. ALL PLANTS SHALL BE GUARANTEED BY THE CONTRACTOR FOR NOT LESS THAN ONE FULL YEAR FROM THE TIME OF PROVISIONAL ACCEPTANCE. DURING THIS TIME, THE OWNER SHALL MAINTAIN ALL PLANT MATERIALS IN THE ABOVE MANNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSPECT THE PLANTS TO ENSURE PROPER CARE. IF THE CONTRACTOR IS DISSATISFIED WITH THE CARE GIVEN, HE SHALL IMMEDIATELY, AND IN SUFFICIENT TIME TO PERMIT THE CONDITION TO BE RECTIFIED, NOTIFY THE LANDSCAPE ARCHITECT IN WRITING OR OTHERWISE FORFEIT HIS CLAIM. LANDSCAPE CONTRACTOR SHALL PRUNE PLANTINGS OF DEAD LIMBS OR TWIGS DURING THE FIRST YEAR OF GROWTH.
12. FINAL ACCEPTANCE BY THE LANDSCAPE ARCHITECT WILL BE MADE UPON THE CONTRACTOR'S REQUEST AFTER ALL CORRECTIVE WORK HAS BEEN COMPLETED.
13. LANDSCAPE CONTRACTOR SHOULD REPLACE DEAD PLANTINGS IMMEDIATELY UPON OWNER DIRECTION WITHIN THE WARRANTY PERIOD AND AGAIN AT THE END OF THE GUARANTEE PERIOD. THE CONTRACTOR SHALL HAVE REPLACED ANY PLANT MATERIAL THAT IS MISSING, NOT TRUE TO SIZE AS SPECIFIED, THAT HAVE DIED, THAT HAVE LOST THEIR NATURAL SHAPE DUE TO DEAD BRANCHES, EXCESSIVE PRUNING OR INADEQUATE OR IMPROPER CARE, OR THAT ARE, IN THE OPINION OF THE LANDSCAPE ARCHITECT, IN UNHEALTHY OR UNSIGHTLY CONDITION.
14. ALL LANDSCAPE AREAS TO BE GRASS COMMON TO REGION EXCEPT FOR INTERIOR LANDSCAPED ISLANDS OR WHERE OTHER PLANT MATERIAL IS CALLED FOR.
15. ALL TREES AND SHRUBS TO BE PLANTED IN MULCH BEDS WITH DEFINED AND CUT EDGES TO SEPARATE TURF GRASS AREAS.
16. FOR ANY LANDSCAPE AREA SO DESIGNATED TO REMAIN, WHETHER ON OR OFF-SITE, REMOVE WEEDS, ROCKS, CONSTRUCTION ITEMS, ETC., THEN APPLY GRASS SEED OR PINE BARK MULCH AS DEPICTED ON PLANS.
17. LANDSCAPE CONTRACTOR SHALL FEED AND PRUNE EX. TREES, ON OR JUST OFF SITE, THAT HAVE EXPERIENCED ROOT BASE INTRUSION OR DAMAGE DURING CONSTRUCTION IMMEDIATELY AND FOR THE DURATION OF THE WARRANTY PERIOD AT THE DIRECTION OF THE LANDSCAPE ARCHITECT.
18. EXISTING TREES TO REMAIN SHALL BE PROTECTED WITH TEMPORARY SNOW FENCING AT THE EDGE OF THE EX. TREE CANOPY THE CONTRACTOR SHALL NOT STORE VEHICLES OR MATERIALS WITHIN THE LANDSCAPED AREAS. ANY DAMAGE TO EXISTING TREES, SHRUBS OR LAWN SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
19. ALL MULCH AREAS SHALL RECEIVE A 3" LAYER OF SHREDDED PINE BARK MULCH, AND MULCH SHALL NOT BE IN CONTACT WITH STEMS OR TRUNKS OF SHRUBS AND TREES.
20. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH PROJECT SPECIFICATIONS.

Maintenance Plan

Installation of all new plants or replacement plants shall be planted during the growing season from April to October. Plants shall be planted in accordance with the Landscape Notes on the planting plan. All plants shall be watered 2x per week during the first growing season. Watering shall saturate the soil around the root ball. The proper use and regular refilling of 'Gator' bags is acceptable. Trees shall be watered for a period of one year per inch of caliper at planting, if temporary irrigation systems are to be used, they shall be designed and installed for efficient and effective water use to landscaped area for a limited period of time determined by the plant material and site conditions. Aged and organic compost mulch shall be used to a 3" depth shall be maintained around root ball, but kept away from stems and trunks. Do not stack mulch in mounds deeper than 3". Planting beds shall be kept free of weeds on a biweekly schedule. Bed edges shall be maintained to keep lawn mowers from damaging trees and shrubs. Lawn areas shall be mowed on a weekly schedule. Broken or dead limbs of all plant materials shall be removed close to trunk, but not damaging trunk of plant with clean sharp shears. Severely injured, diseased, or dead plant material shall be replaced in kind in perpetuity. Aged organic compost mulch is preferred, but an owner may use a low phosphorous and slow release nitrogen organic fertilizer as needed. The owner shall be responsible for continued inspection and maintenance requirements as cited by the City of Dover requirements of § 153-14G. Snow Storage to occur on grassed and/or non-living landscape. If ownership of a site is conveyed to a new property owner, the new owner shall be responsible for maintaining all landscaping in accordance with the approved final landscaping plan.



TONGUE + GROOVE FENCE DETAIL
SCALE: NTS

Chillmark Fence by Walpole Woodworkers or Approved Equal
"V" groove board with ship-lap joinery is 5 5/8". Rails are square edge. Mortise and Tenon installation.

767 East Street, Rt 27
Walpole, MA 02081
508 668-2800



0 20 40 60 80 FT

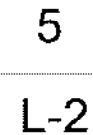
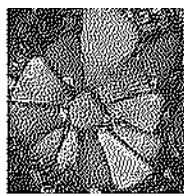
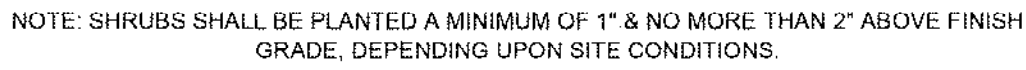
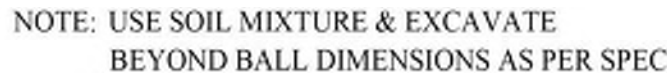


TERRENCE P. PARKER
041

No.	Date	By	Revision Notes

No.	Date	Issue Notes

Design Firm		terra firma landscape architecture 163.a Court Street Portsmouth, NH	
Consultant			
Project Title		Hang Ten Car Wash	
Sheet Title		Landscape Plan	
Project Manager		Project ID Hang Ten	
Drawn By TC		Scale 1:240	
Reviewed By TP		Sheet No.	
Date 6/28/2023		L-1	
CAD File Name hangten51623.vwx		of 2	

[illegible]

No.	Date	Issue Notes

TITLE COMMITMENT INFORMATION

THE PROPERTY HEREON DESCRIBED IS THE SAME AS THE PERTINENT PROPERTY AS DESCRIBED IN CONNECTICUT ATTORNEYS TITLE INSURANCE COMPANY (C.A.T.I.C.), AGENT NO.: 004402, WITH A COMMITMENT DATE OF 9/19/2022.

SCHEDULE A DESCRIPTION

RE: 914 CENTRAL AVENUE, DOVER, NH 03820

THREE CERTAIN PARCELS OF LAND WITH ANY BUILDINGS THEREON, LOCATED ON THE WESTERLY SIDE OF CENTRAL AVENUE, DOVER, COUNTY OF STRAFFORD AND STATE OF NEW HAMPSHIRE, BEING MORE PARTICULARLY DESCRIBED ON PLAN ENTITLED, "PLAN OF LAND NESTOR J. BELLETTE - DOVER, NEW HAMPSHIRE, DATED NOVEMBER 1955 AND DRAWN BY G.L. DAVIS & ASSOCIATES, ENGINEERS - 44 ELM STREET, DOVER, NH", RECORDED AT THE STRAFFORD COUNTY REGISTRY OF DEEDS AS PLAN #82A, POCKET #2, FOLDER #21, BOUNDED AND DESCRIBED AS FOLLOWS:

TRACT I:

BEGINNING AT AN IRON STAKE DRIVEN IN THE GROUND SITUATE ON THE WESTERLY SIDE OF SAID HIGHWAY SIXTY-TWO, AND FIFTY HUNDREDTHS (62.50) FEET SOUTHERLY FROM THE NORTHEASTERLY CORNER OF LAND NOW OR FORMERLY OF NESTOR J. BELLETTE; THENCE RUNNING SOUTH 25° 00' EAST TO AN IRON STAKE AND OTHER LAND NOW OR FORMERLY OF SAID BELLETTE ONE HUNDRED FIFTY-FOUR (154) FEET; THENCE TURNING AND RUNNING SOUTH 68° 58' WEST TO AN IRON PIN AND LAND NOW OR FORMERLY OF ONE HYMAN L. PINDRUS, TWO HUNDRED FOURTEEN AND FIVE TENTHS (214.5) FEET; THENCE TURNING AND RUNNING NORTH 29° 30' WEST BY AND ALONG SAID PINDRUS LAND TO A PINE STUMP TWENTY-FIVE AND SEVEN TENTHS (25.7) FEET; THENCE RUNNING NORTH 44° 10' WEST BY AND ALONG SAID PINDRUS LAND ONE HUNDRED TEN (110) FEET TO AN IRON PIN; THENCE TURNING AND RUNNING NORTH 27° 05' EAST BY AND ALONG LAND OF ONE VICTOR GRENIER ONE HUNDRED NINETEEN (119) FEET TO AN IRON STAKE; THENCE TURNING AND RUNNING N 62° 39' EAST BY AND ALONG SAID GRENIER LAND SEVENTY-TWO AND NINE TENTHS (72.9) FEET TO A STAKE IN THE GROUND AND OTHER LAND NOW OR FORMERLY OF SAID BELLETTE; THENCE TURNING AND RUNNING SOUTH 26° 04' EAST BY AND ALONG LAND OWNED BY SAID BELLETTE FIFTY-FIVE (55) FEET TO AN IRON STAKE; THENCE TURNING AND RUNNING NORTH 87° 42' EAST EIGHTY-FIVE (85) FEET TO THE POINT OF BEGINNING.

EXCEPTING A CERTAIN PARCEL OF LAND LOCATED ON CENTRAL AVENUE IN THE CITY OF DOVER, NEW HAMPSHIRE, SAID PARCEL BEING LOCATED WESTERLY OF CENTRAL AVENUE, AS NOW TRAVELED, AND DESIGNATED AS PARCEL #28 AND 28-A AS SHOWN AND DESCRIBED ON A RIGHT-OF-WAY MAP PREPARED BY KIMBALL CHASE COMPANY, INC., ENTITLED "CENTRAL AVENUE RECONSTRUCTION PROJECT #83-398" SHEET 6 AND 7 OF 7, REGISTERED AT THE STRAFFORD COUNTY REGISTRY OF DEEDS, MARCH 30, 1984, AS 24A-12 AND 13 AND CONSISTING OF .02 ACRES AND 88 SQUARE FEET, MORE OR LESS, AND MORE PARTICULARLY BOUNDED AND DESCRIBED BY REFERENCE TO ABOVE-MENTIONED MAP IN DEED OF TCD REALTY, INC. TO CITY OF DOVER DATED APRIL 18, 1984 AND RECORDED AT STRAFFORD COUNTY REGISTRY OF DEEDS AT BOOK 1130, PAGE 721.

TRACT II:

RE: 914 CENTRAL AVENUE, DOVER, NH 03820

BEGINNING AT AN IRON PIPE AT THE NORTHERLY CORNER OF THE HEREIN DESCRIBED PARCEL OF LAND WHICH POINT IS ALSO THE WESTERLY CORNER OF LAND NOW OR FORMERLY OF RENE PLANTE AND RUNNING THENCE SOUTH 44° 10' EAST BY OTHER LAND NOW OR FORMERLY OF RENE PLANTE A DISTANCE OF ONE HUNDRED TEN (110) FEET TO A POINT; THENCE CONTINUING SOUTH 29° 30' EAST BY SAID OTHER LAND OF PLANTE A DISTANCE OF TWENTY-FIVE AND SEVEN TENTHS (25.7) FEET TO AN IRON PIPE AT LAND NOW OR FORMERLY OF DOVER MCCOY CO., INC.; THENCE CONTINUING BY SAID LAND NOW OR FORMERLY OF DOVER MCCOY CO., INC., SOUTH 24° 29' EAST A DISTANCE OF THIRTY-EIGHT (38) FEET TO A POINT; THENCE TURNING AND RUNNING BY OTHER LAND NOW OR FORMERLY OF DOVER MCCOY CO., INC., SOUTH 63° 05' 30' WEST A DISTANCE OF ONE HUNDRED ONE AND FOUR TENTHS (101.4) FEET TO LAND NOW OR FORMERLY OF RUTH PINDRUS; THENCE TURNING AND RUNNING BY SAID LAND NOW OR FORMERLY OF RUTH PINDRUS NORTH 34° 29' WEST A DISTANCE OF ONE HUNDRED TWENTY-ONE AND TWO TENTHS (121.2) FEET TO LAND OF THE CITY OF DOVER; THENCE TURNING AND RUNNING BY SAID LAND OF THE CITY OF DOVER NORTH 26° 25' EAST A DISTANCE OF SEVENTY-NINE AND EIGHT TENTHS (79.8) FEET TO THE POINT OF BEGINNING.

TRACT III:

BEGINNING AT AN IRON STAKE SITUATE AT THE NORTHEASTERLY CORNER OF THE PREMISES HEREIN CONVEYED AND AT THE SOUTHERLY CORNER OF PROPERTY NOW OR FORMERLY OF HECTOR AND GEORGIANNA GRENIER; THENCE RUNNING SOUTH 25° 54' EAST SIXTY-TWO AND FIFTY HUNDREDTHS (62.50) FEET TO AN IRON STAKE AND LAND FORMERLY OF OLIVIA PLANTE, ET AL; THENCE TURNING AND RUNNING SOUTH 67° 42' WEST BY AND ALONG SAID PLANTE'S LAND EIGHTY-FIVE (85) FEET TO AN IRON STAKE AND OTHER LAND OF SAID PLANTE; THENCE TURNING AND RUNNING NORTH 26° 04' WEST FIFTY-FIVE AND NO HUNDREDTHS (55.00) FEET BY AND ALONG SAID PLANTE'S LAND TO AN IRON STAKE AND LAND OF SAID GRENIER; THENCE TURNING AND RUNNING NORTH 62° 39' EAST BY AND ALONG SAID GRENIER'S LAND EIGHTY-FIVE AND NO HUNDREDTHS (85.00) FEET TO THE POINT OF BEGINNING.

SAID TRACT III ALSO BEING CONVEYED TOGETHER WITH THE RIGHT AND EASEMENT RELATING TO LAND NOW OR FORMERLY OF ANITA DOHERTY RECORDED IN THE STRAFFORD COUNTY REGISTRY OF DEEDS.

EXCEPTING FROM SAID TRACT III, THE PARCEL CONVEYED BY RENE PLANTE TO ANITA M. DOHERTY RECORDED IN THE STRAFFORD COUNTY REGISTRY OF DEEDS.

RE: 914 CENTRAL AVENUE, DOVER, NH 03820

BEING THE SAME PROPERTY CONVEYED TO KITTY HO LAM, TRUSTEE OF THE HO FAMILY REVOCABLE TRUST OF 2003, BY DEED RECORDED JANUARY 8, 2021 IN BOOK 4855 PAGE 727.

PROPERTY ADDRESS:

(FOR REFERENCE ONLY)

914 CENTRAL AVENUE

DOVER, NH

THE PROPERTY SHOWN AND DEPICTED HEREON IS THE SAME AS THE PERTINENT PROPERTY AS DESCRIBED IN CONNECTICUT ATTORNEYS TITLE INSURANCE COMPANY (C.A.T.I.C.), AGENT NO.: 004402, WITH A COMMITMENT DATE OF 9/19/2022.

NOTES CORRESPONDING TO SCHEDULE B

6. TERMS AND CONDITIONS AS SHOWN ON PLAN REFERENCED IN THE PROPERTY DESCRIPTION HEREIN. (AFFECTS, CONTAINS NO PLOTTABLE EASEMENT ITEMS)
7. RIGHT OF WAY AS SHOWN ON PLAN IN BOOK 24A-12 & 24A-13. (AFFECTS, CONTAINS NO PLOTTABLE EASEMENT ITEMS)
8. EASEMENT RECORDED IN BOOK 1512 PAGE 471. (AFFECTS, CONTAINS NO PLOTTABLE EASEMENT ITEMS)
9. NOTICE OF CONDEMNATION RECORDED IN BOOK 1770 PAGE 579. (AFFECTS, PLOTTED AS SHOWN)
10. ORDER RECORDED IN BOOK 1823 PAGE 369. (AFFECTS, CONTAINS NO PLOTTABLE EASEMENT ITEMS)
11. AMENDED DECLARATION OF TAKING RECORDED IN BOOK 1823 PAGE 370. (AFFECTS, PLOTTED AS SHOWN)
12. RIGHT OF WAY SHOWN IN PLAN BOOK 56-69 & 56-82. (UNABLE TO PLOT, BOOK 56-69 AND 56-82 NOT PROVIDED)

ZONING INFORMATION

PROPERTY IS CURRENTLY ZONED: AWAITING ZONING REPORT		
ITEM	REQUIRED	OBSERVED
PERMITTED USE		RESTAURANT
MIN. LOT AREA		56,078 SQ. FEET
MIN. LOT FRONTAGE		215.31'
MAX. BLDG COVERAGE		06%
MIN. SETBACKS FRONT		40.1'
MIN. SETBACKS SIDE		12.4'
MIN. SETBACKS REAR		163.4'
MAX. BUILDING HEIGHT		23.5%
PARKING REGULAR		44
PARKING HANDICAP		2
PARKING TOTAL		46

G#1
RIM ELEVATION: 198.40'
RIM ELEVATION: 198.40'
INVERT SW (15" RCP): 184.75'
INVERT SE (15" RCP): 184.45'

G#2
RIM ELEVATION: 192.38'
INVERT NW (15" RCP): 183.28'
INVERT SE (15" RCP): 183.08'

G#3
RIM ELEVATION: 185.73'
INVERT NW (15" RCP): 179.93'
INVERT SW (12" PVC): 180.13'
INVERT NE (15" RCP): 179.68'

G#4
RIM ELEVATION: 186.41'
INVERT NE (12" PVC): 180.46'

G#5
RIM ELEVATION: 185.88'
INVERT SW (15" RCP): 178.78'
INVERT NE (15" RCP): 177.93'

G#6
RIM ELEVATION: 198.16'

G#7
RIM ELEVATION: 197.99'

G#8
RIM ELEVATION: 182.41'

G#9
RIM ELEVATION: 180.45'

G#10
RIM ELEVATION: 179.57'

G#11
RIM ELEVATION: 178.60'

SM#1
RIM ELEVATION: 191.24'
INVERT NW (12" CLAY): 183.44'
INVERT NE (12" CLAY): 183.29'

SM#2
RIM ELEVATION: 180.10'

SM#3
RIM ELEVATION: 180.05'

SM#4
RIM ELEVATION: 176.83'

DM#1
RIM ELEVATION: 197.95'

DM#2
RIM ELEVATION: 198.46'

DM#3
RIM ELEVATION: 178.78'

INVERT INFORMATION

PARKING INFORMATION

REGULAR: 44

HANDICAP: 2

TOTAL = 46

FLOOD ZONE INFORMATION

BY GRAPHIC PLOTTING ONLY, THIS PROPERTY IS IN ZONE "X" OF THE FLOOD INSURANCE RATE MAP, COMMUNITY PANEL NO. 33017C0310E, WHICH BEARS AN EFFECTIVE DATE OF 09/30/2015 AND IS NOT IN A SPECIAL FLOOD HAZARD AREA.

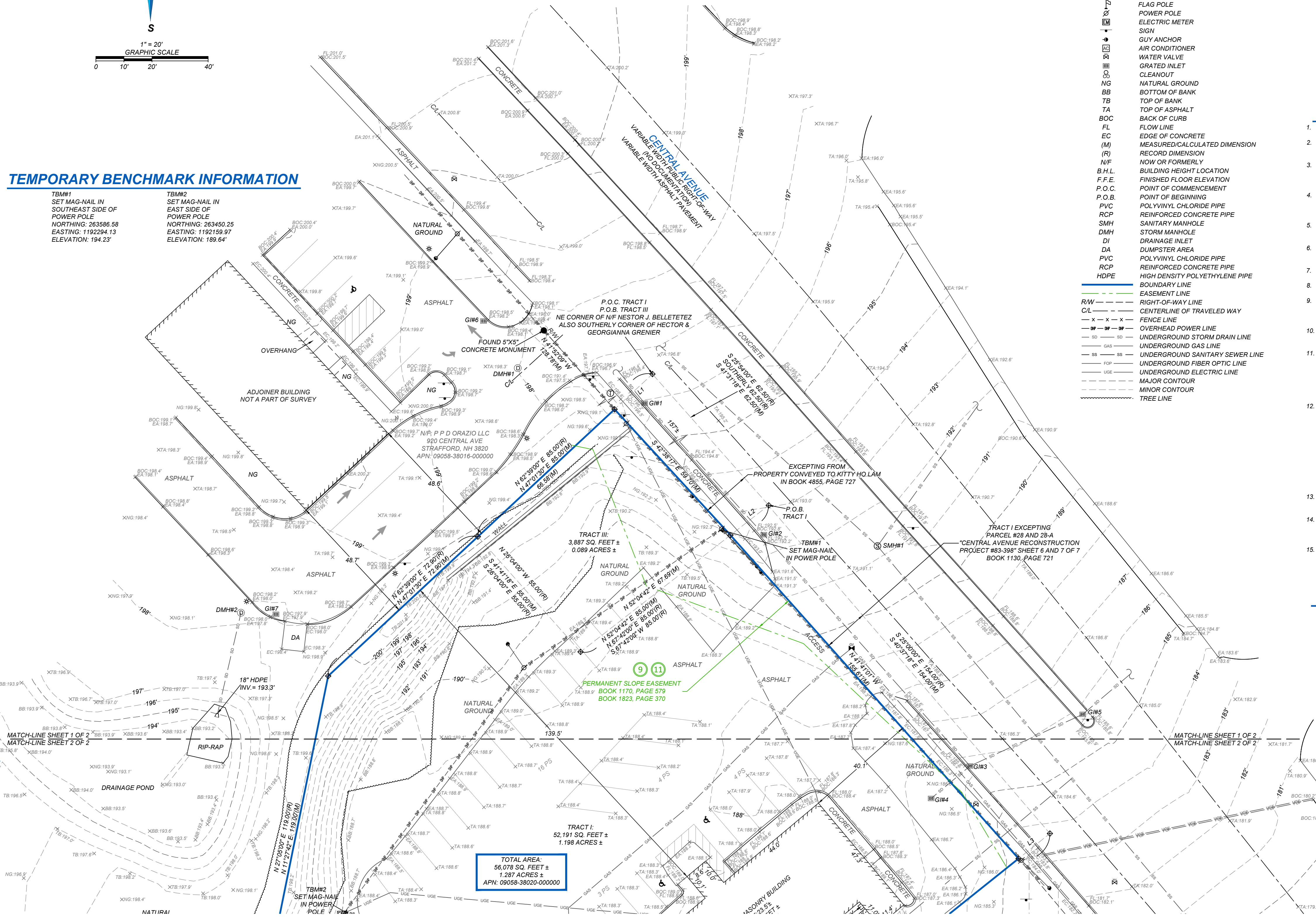
ZONE "X" - AREA OF MINIMAL FLOOD HAZARD, USUALLY DEPICTED ON FIRMS AS ABOVE THE 500-YEAR FLOOD LEVEL. ZONE "X" IS THE AREA DETERMINED TO BE OUTSIDE THE 500-YEAR FLOOD AND PROTECTED BY LEVEE FROM 100-YEAR FLOOD.

BASIS OF BEARINGS

THE BASIS OF BEARINGS OF THIS SURVEY IS GRID NORTH BASED ON THE WEST LINE OF THE SUBJECT PROPERTY. THE BEARING IS DENOTED AS S81°20'52"W PER GPS COORDINATE OBSERVATIONS NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM, NAD83.
LATITUDE = 43°13'13.84536"
LONGITUDE = -70°53'10.14027"
CONVERGENCE ANGLE = -00°32'04.27"

ALTA/NSPS LAND TITLE SURVEY

914 CENTRAL AVE
DOVER, STRAFFORD COUNTY, NEW HAMPSHIRE 03820

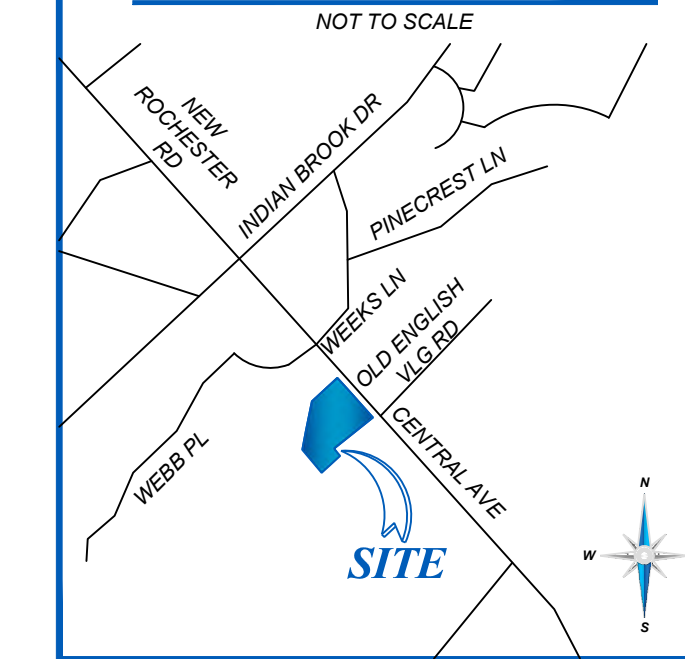


LEGEND & SYMBOLS

- FOUND MONUMENT AS-NOTED
- SET MONUMENT AS-NOTED
- COMPUTED POINT
- TELEPHONE MANHOLE
- HANDICAP PARKING
- FIRE HYDRANT
- GAS VALVE
- SANITARY MANHOLE
- FLAG POLE
- POWER POLE
- ELECTRIC METER
- SIGN
- GUY ANCHOR
- AIR CONDITIONER
- WATER VALVE
- GRATED INLET
- CLEANOUT
- NG NATURAL GROUND
- BB BOTTOM OF BANK
- TB TOP OF BANK
- TA TOP OF ASPHALT
- BOC BACK OF CURB
- FL FLOW LINE
- EC EDGE OF CONCRETE
- (M) MEASURED/CALCULATED DIMENSION
- (R) RECORD DIMENSION
- NF NOW OR FORMERLY
- B.H.L. BUILDING HEIGHT LOCATION
- F.F.E. FINISHED FLOOR ELEVATION
- P.O.C. POINT OF COMMENCEMENT
- P.O.B. POINT OF BEGINNING
- PVC POLYVINYL CHLORIDE PIPE
- RCP REINFORCED CONCRETE PIPE
- SMH SANITARY MANHOLE
- DMH DRAINAGE INLET
- DI DRAINAGE INLET
- DA DUMPSTER AREA
- PVC POLYVINYL CHLORIDE PIPE
- RCP REINFORCED CONCRETE PIPE
- HDPE HIGH DENSITY POLYETHYLENE PIPE

- EASEMENT LINE
- RIGHT-OF-WAY LINE
- CENTERLINE OF TRAVELED WAY
- FENCE LINE
- OVERHEAD POWER LINE
- UNDERGROUND STORM DRAIN LINE
- UNDERGROUND GAS LINE
- UNDERGROUND SANITARY SEWER LINE
- UNDERGROUND FIBER OPTIC LINE
- UNDERGROUND ELECTRIC LINE
- MAJOR CONTOUR
- MINOR CONTOUR
- TREE LINE

VICINITY MAP



GENERAL NOTES

- SOME FEATURES SHOWN ON THIS PLAT MAY BE SHOWN OUT OF SCALE FOR CLARITY.
- DIMENSIONS ON THIS PLAT ARE EXPRESSED IN FEET AND DECIMAL PARTS THEREOF UNLESS OTHERWISE NOTED. MONUMENTS WERE FOUND AT POINTS WHERE INDICATED.
- IN REGARD TO TABLE A ITEM 16, THERE WAS NO OBSERVABLE EVIDENCE OF RECENT EARTH MOVING WORK, BUILDING CONSTRUCTION OR ADDITIONS EXCEPT AS SHOWN HEREON.
- IN REGARD TO TABLE A ITEM 17, THERE WERE NO KNOWN PROPOSED CHANGES IN RIGHT OF WAY LINES, RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS EXCEPT AS SHOWN HEREON.
- AT THE TIME OF THE ALTA SURVEY, THERE WAS NO OBSERVABLE EVIDENCE OF SITE USE AS A SOLID WASTE DUMP, SUMP, OR SANITARY LANDFILL.
- AT THE TIME OF THE ALTA SURVEY, THERE WAS NO OBSERVABLE EVIDENCE OF SITE USE AS A CEMETERY, ISOLATED GRAVE SITE OR BURIAL GROUNDS.
- COMPLETED FIELD WORK WAS SEPTEMBER 27, 2023.
- THE DISTANCES SHOWN HEREON ARE UNITS OF GROUND MEASUREMENTS.
- THE NEAREST INTERSECTING STREET IS THE INTERSECTION OF WEBB PLACE AND CENTRAL AVENUE, WHICH IS APPROXIMATELY 200' FROM THE NORTHWEST CORNER OF THE SUBJECT PROPERTY.
- THE SUBJECT PROPERTY HAS DIRECT PHYSICAL ACCESS TO CENTRAL AVENUE, BEING A PUBLICLY DEDICATED RIGHT-OF-WAY.
- EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAT, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT PROPERTY: EASEMENTS, OTHER THAN POSSIBLE EASEMENTS WHICH WERE VISIBLE AT THE TIME OF SURVEY; RESTRICTIVE COVENANTS; SUBDIVISION RESTRICTIONS OR OTHER LAND USE REGULATIONS; AND ANY OTHER FACTS WHICH AN ACCURATE TITLE SEARCH MAY DISCLOSE.
- NO SURVEYOR OR ANY OTHER PERSON OTHER THAN A LICENSED NEW HAMPSHIRE ATTORNEY MAY PROVIDE LEGAL ADVICE CONCERNING THE STATUS OF TITLE TO THE PROPERTY DESCRIBED IN THIS SURVEY (THE "SUBJECT PROPERTY"). THE PURPOSE OF THIS SURVEY, AND THE COMMENTS RELATED TO THE SCHEDULE B-II EXCEPTIONS, IS ONLY TO SHOW THE LOCATION OF BOUNDARIES AND PHYSICAL OBJECTIONS IN RELATION THERETO, TO THE EXTENT THAT THE SURVEY INDICATES THAT THE LEGAL INSTRUMENT "AFFECTS" THE SUBJECT PROPERTY. SUCH STATEMENT IS ONLY INTENDED TO INDICATE THAT PROPERTY BOUNDARIES INCLUDED IN SUCH INSTRUMENT INCLUDE SOME OR ALL OF THE SUBJECT PROPERTY. THE SURVEYOR DOES NOT PURPORT TO DESCRIBE HOW SUCH INSTRUMENT AFFECTS THE SUBJECT PROPERTY OR THE ENFORCEABILITY OR LEGAL CONSEQUENCES OF SUCH INSTRUMENT.
- NAMES AND ADDRESSES OF ADJOINING PROPERTY OWNERS WERE TAKEN FROM STRAFFORD COUNTY GIS.
- IN REGARD TO TABLE A ITEM 10, NO VISIBLE DIVISION OR PARTY WALLS WITH RESPECT TO ADJOINING PROPERTIES WERE OBSERVED AT THE TIME THE FIELD SURVEY WAS PERFORMED, NOR WERE ANY DESIGNATED BY THE CLIENT.
- ELEVATIONS ESTABLISHED WITH GPS STATIC OBSERVATIONS UTILIZING ONLINE POSITIONING USER SERVICE (OPUS) FOR POST PROCESSING. VERTICAL DATUM BASED UPON NORTH AMERICAN VERTICAL DATUM (NAVD83) IN US SURVEY FEET. CONTOURS SHOWN ARE AT ONE FOOT INTERVALS.

LAND AREA

TRACT I:	52,191 ± SQUARE FEET
	1.198 ± ACRES
TRACT II:	13,408 ± SQUARE FEET
	0.308 ± ACRES
TRACT III:	3,887 ± SQUARE FEET
	0.089 ± ACRES
TOTAL AREA:	56,078 ± SQUARE FEET
	1.287 ± ACRES

SURVEYOR'S CERTIFICATE

TO: CONNECTICUT ATTORNEYS TITLE INSURANCE COMPANY (C.A.T.I.C.):

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 2, 3, 4, 5, 6A, 6B, 7E1, 7C, 8, 9, 10, 13, 14, 16, 17, AND 19 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON 09/27/2023.

DATE OF PLAT OR MAP: 10/06/2023

HOLLAND E. SHAW
PROFESSIONAL LAND SURVEYOR NO. 632
STATE OF NEW HAMPSHIRE
NEW HAMPSHIRE C.O.A. 00545

BLEW
& ASSOCIATES, P.A.

3825 N. SHILOH DRIVE - FAYETTEVILLE, AR 72703
EMAIL: SURVEY@BLEWINC.COM
OFFICE: 479.443.4506 FAX: 479.582.1883
WWW.BLEWINC.COM

Surveying
Engineering
Mapping

SURVEYOR JOB NUMBER: 22-10520.03	SURVEY DRAWN BY: DMS - 10/06/2023
SURVEY REVIEWED BY: S.T.M.	SHEET: 1 OF 2

ALTA/NSPS LAND TITLE SURVEY

914 CENTRAL AVE
DOVER, STRAFFORD COUNTY, NEW HAMPSHIRE 03820



LEGEND & SYMBOLS

- FOUND MONUMENT AS-NOTED
- SET MONUMENT AS-NOTED
- COMPUTED POINT
- TELEPHONE MANHOLE
- HANDICAP PARKING
- FIRE HYDRANT
- GAS VALVE
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- ELECTRIC METER
- SIGN
- GUY ANCHOR
- AIR CONDITIONER
- WATER VALVE
- DRAIN GRATE
- CLEANOUT
- NATURAL GROUND
- BB BOTTOM OF BANK
- TB TOP OF BANK
- TA TOP OF ASPHALT
- BOC BACK OF CURB
- FL FLOW LINE
- EC EDGE OF CONCRETE
- (M) MEASURED/CALCULATED DIMENSION
- (R) RECORD DIMENSION
- NF NOW OR FORMERLY
- B.H.L. BUILDING HEIGHT LOCATION
- F.F.E. FINISHED FLOOR ELEVATION
- P.O.B. POINT OF BEGINNING
- PVC POLYVINYL CHLORIDE PIPE
- RCP REINFORCED CONCRETE PIPE
- SMH SANITARY MANHOLE
- DMH STORM MANHOLE
- DI DRAINAGE INLET
- DA DUMPSTER AREA
- PVC POLYVINYL CHLORIDE PIPE
- RCP REINFORCED CONCRETE PIPE
- RCP HIGH DENSITY POLYETHYLENE PIPE
- HDPE HIGH DENSITY POLYETHYLENE PIPE
- BOUNDARY LINE
- SS UNDERGROUND SANITARY SEWER LINE
- RW RIGHT-OF-WAY LINE
- CL CENTERLINE
- X-X-X-X FENCE LINE
- SS UNDERGROUND SANITARY SEWER LINE
- SD UNDERGROUND STORM DRAIN LINE
- SD UNDERGROUND GAS LINE
- GAS
- TREE LINE
- RCP UNDERGROUND FIBER OPTIC LINE
- UGS UNDERGROUND ELECTRIC LINE
- MAJOR CONTOUR
- MINOR CONTOUR

LINE TABLE

LINE	BEARING	DISTANCE	LINE	BEARING	DISTANCE
L1(M)	N 47°01'30" E	18.43'	L1(M)	N/A	N/A
L2(M)	N 52°04'42" E	17.31'	L2(M)	N/A	N/A
L3(M)	S 51°20'52" W	14.29'	L3(M)	N/A	N/A
L4(M)	N 45°07'18" W	25.70'	L4(R)	N 29°30'00" W	25.70'
			L4(R)	S 29°30'00" E	25.70'

TEMPORARY BENCHMARK INFORMATION

TBM#1 SET MAG-NAIL IN SOUTHEAST SIDE OF POWER POLE NORTHING: 263588.88 EASTING: 1192294.13 ELEVATION: 194.23'	TBM#2 SET MAG-NAIL IN EAST SIDE OF POWER POLE NORTHING: 263450.25 EASTING: 1192159.97 ELEVATION: 189.64'
---	--

INVERT INFORMATION

GI#1 RIM ELEVATION: 199.40' INVERT NW (15" RCP): 184.75' INVERT SE (15" RCP): 184.45'	GI#5 RIM ELEVATION: 185.88' INVERT SW (15" RCP): 178.78' INVERT NE (15" RCP): 177.93'	SMH#1 RIM ELEVATION: 191.24' INVERT NW (12" CLAY): 183.44' INVERT NE (12" CLAY): 183.64' INVERT SE (12" CLAY): 183.29'	DMH#1 RIM ELEVATION: 197.95'
GI#2 RIM ELEVATION: 192.38' INVERT NW (15" RCP): 183.28' INVERT SE (15" RCP): 183.08'	GI#6 RIM ELEVATION: 198.16' RIM ELEVATION: 197.99'	SMH#2 RIM ELEVATION: 180.10'	DMH#2 RIM ELEVATION: 198.46'
GI#3 RIM ELEVATION: 185.73' INVERT NW (15" RCP): 179.93' INVERT SW (12" PVC): 180.13' INVERT NE (15" RCP): 179.68'	GI#8 RIM ELEVATION: 182.41'	SMH#3 RIM ELEVATION: 180.05'	DMH#3 RIM ELEVATION: 178.78'
GI#4 RIM ELEVATION: 186.41' INVERT NE (12" PVC): 180.46'	GI#9 RIM ELEVATION: 180.45'	SMH#4 RIM ELEVATION: 176.83'	
	GI#10 RIM ELEVATION: 179.57'		
	GI#11 RIM ELEVATION: 178.60'		

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SURVEYOR JOB NUMBER:
22-10520.03

SURVEY REVIEWED BY:
S.T.M.

SURVEY DRAWN BY:
DMS - 10/06/2023

SHEET:
2 OF 2



STORMWATER OPERATION AND MAINTENANCE MANUAL

Hang 10 – Dover, NH
November 29, 2023

Table of Contents

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APPENDICES

- A. BMP LOCATION MAPS
- B. CONSTRUCTION DETAILS
- C. STORM STRUCTURE INLET INSPECTION AND MAINTENANCE CHECKLIST
- D. STORM PIPE INSPECTION AND MAINTENANCE CHECKLIST
- E. STORMSETTLER INSPECTION AND MAINTENANCE MANUAL AND INSPECTION CHECKLIST
- F. BIORETENTION AREA INSPECTION AND MAINTENANCE CHECKLIST
- G. PERMEABLE PAVEMENT INSPECTION AND MAINTENANCE CHECKLIST

SITE INFORMATION

Business: Hang 10
Site Address: 914 Central Ave.
County: Strafford County
City, State: Dover, NH

BMP OWNER INFORMATION

Owner Name: Hang Ten Car Wash
Owner Address: 1380 Soldiers Field Road Boston, MA 02135
Contact Name: Steve Lukin
Contact Email: steve.lukin@hang10carwash.com

The BMP owner is responsible for all maintenance, including cost, associated with inspections.

O&M MANUAL PREPARED BY

Name: Paige Weidner PE; CESO Inc
Address: 3601 Rigby Rd, Suite 300
City, State: Miamisburg, OH 45342
Phone: (937) 648-3213

INTRODUCTION

This reference document is to be used to find maintenance and inspection information for the Dover, NH Hang 10's storm system and BMPs.

The project located at 914 Central Ave. Dover, NH consists of a proposed car wash, parking lot and associated site improvements.

The site's stormwater runoff is collected by permeable pavement and a series of inlets, flows through the storm pipe system then the runoff will be directed to the site's BMPs (Hydrodynamic Separators and Bioretention Area). See Appendix A for the Storm System Map.

SUMMARY TABLE FOR INSPECTION TIMELINE

	Minimum Inspection Timeline
Storm Structure Inlets	Monthly and After Each Rainfall Event
Storm Pipe System	If Problem Occurs
Hydrodynamic Separator	Twice Per Year and If Problem Occurs
Bioretention Area	- Twice Per Year and After Each Rainfall Event of 2.5 Inches or More and If Problem Occurs - Once Per Year for Drawdown Time - Once Per Year for Vegetation
Permeable Pavement	Quarterly and If Problem Occurs

See the attached Appendix for the Inspection Checklists.

STORM STRUCTURE INLET MAINTENANCE

The site contains four storm structure inlets. The details for these structures can be found in the Appendix B of this O&M Manual.

All inlet castings should be inspected a minimum of monthly and after each rainfall event. More frequent inspections should be performed in areas where there is higher potential for trash and/or litter (e.g., retail establishments) and during fall season when leaves and debris are present on the ground. Inlets should be inspected for sediment depths and the maximum allowable sediment depth should be no greater than 3-inches.

Waste, leaves, or any other miscellaneous debris collected during maintenance and inspections should be properly disposed of in accordance with local regulations. Removed

sediment should be disposed of in the garbage and should NOT be dumped in the storm or sanitary sewer.

Remove and replace or repair all necessary inlet features that are damaged.

A record log of all storm structure inspections and cleaning activities should be maintained, see Appendix E of this O&M Manual.

CONVEYANCE MAINTENANCE (STORM PIPES)

The site contains five storm sewer pipes that discharge into the existing storm system and bioretention area. All storm sewer pipes should be inspected if a problem occurs. Prior to cleaning, storm sewers should be inspected for sediment depths and the maximum allowable sediment depth should be no greater than 3-inches. During cleaning, debris traps should be used where applicable to prevent sedimentation from entering the main storm sewer system. Larger obstructions (i.e. branches, trash, etc.) should be removed by hand or by mechanical methods.

Waste, leaves, or any other miscellaneous debris collected during maintenance and inspections should be properly disposed of in accordance with local regulations. Removed sediment should be disposed of in the garbage and should NOT be dumped in the storm or sanitary sewer.

Remove and replace or repair all necessary pipes that are damaged or if the pipe diameter has been compromised. Remove and replace deteriorated pipes.

A record log of all storm pipe inspections and cleaning activities should be maintained see Appendix E of this O&M Manual.

HYDRODYNAMIC SEPARATOR MAINTENANCE

This site will contain two hydrodynamic separators, Stormtrap Stormsettler or approved equal. The detail for this stormwater quality unit can be found in Appendix B of this O&M Manual.

The hydrodynamic separator should be inspected and maintained at least twice a year or more often if any problems occur. The inspection should include a visual evaluation that there are no blockages or barriers within the system as well as a measurement of the buildup of any hydrocarbons, trash, and sediment. The measurement and other inspection notes will need to be recorded for every inspection; a log can be found in Appendix C of this O&M manual.

The hydrodynamic separator will need to be cleaned when there is no stormwater flowing through the system during dry weather conditions. Refer to the manufacturer's manual, provided in Appendix C for the proper methods to clean the unit.

Waste, leaves, or any other miscellaneous debris collected during maintenance and inspections should be properly disposed of in accordance with local regulations. Removed sediment should be disposed of in the garbage and should NOT be dumped in the storm or sanitary sewer.

Remove and replace or repair anything damaged or compromised.

A record log of all hydrodynamic separators inspections and cleaning activities should be maintained see Appendix E of this O&M Manual.

BIORETENTION AREA MAINTENANCE

This site will contain a Bioretention Area, the detail for which can be found in Appendix B of this O&M Manual.

The bioretention area should be inspected and maintained at least twice a year and after each rainfall event of 2.5 inches or more within a 24-hour period, or more often if any problems occur. The inspection should include all of the elements in the Bioretention Area Inspection and Maintenance Checklist, see Appendix D of this O&M manual.

The drawdown time for the bioretention area should be inspected at least once a year or more often if any problems occur. If the system does not drain in under 72 hours, a qualified professional must review the situation and determine a solution which may include the removal of blockages or the restoration of the filter media.

The vegetation in the bioretention area should be inspected at least once a year, to ensure it is in healthy condition with no invasive species.

If during the inspection trash, sediment or other blockages are observed, the system shall be cleaned.

Waste, leaves, or any other miscellaneous debris collected during maintenance and inspections should be properly disposed of in accordance with local regulations. Removed sediment should be disposed of in the garbage and should NOT be dumped in the storm or sanitary sewer.

Remove and replace or repair anything damaged or compromised.

A record log of all inspections and cleaning activities should be maintained see Appendix D of this O&M Manual.

PERMEABLE PAVEMENT MAINTENANCE

This site will contain permeable pavement, the location can be found in Appendix A and the detail can be found in Appendix B of this O&M Manual.

The permeable pavement should be inspected and maintained at least twice a year or more often if any problems occur. The inspection should include a visual evaluation that there are no blockages or barriers and cleaned using a vacuum sweeper to remove any buildup of hydrocarbons, trash, and sediment.

The permeable pavement shall have no winter sanding and minimal salt application shall be applied.

If the system is observed to be not draining, a qualified professional must review the situation and determine a solution which may include the replacement of the filter course and sub-base course.

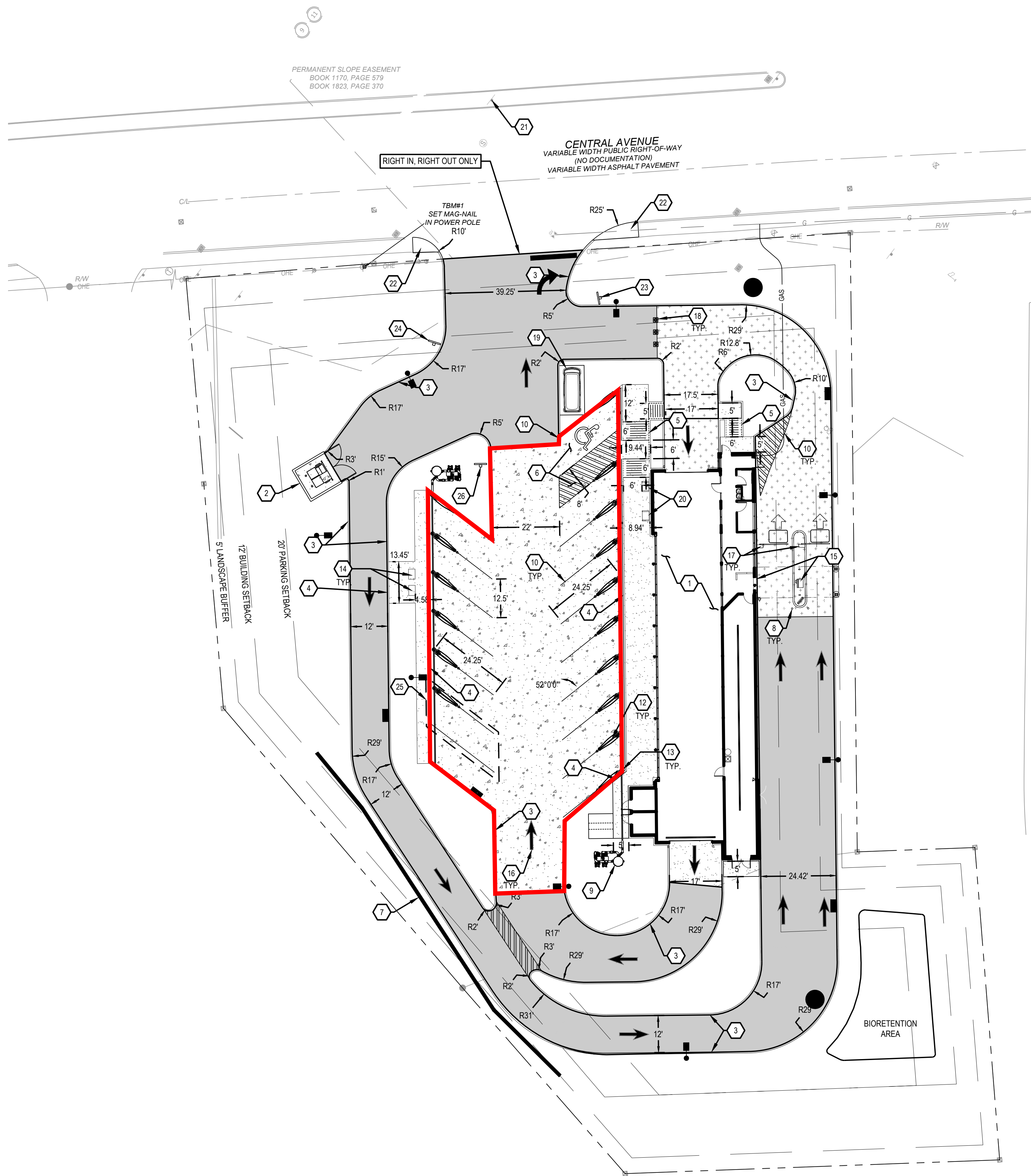
Waste, leaves, or any other miscellaneous debris collected during maintenance and inspections should be properly disposed of in accordance with local regulations. Removed sediment should be disposed of in the garbage and should NOT be dumped in the storm or sanitary sewer.

Remove and replace or repair anything damaged or compromised.

A record log of all inspections and cleaning activities should be maintained see Appendix F of this O&M Manual.

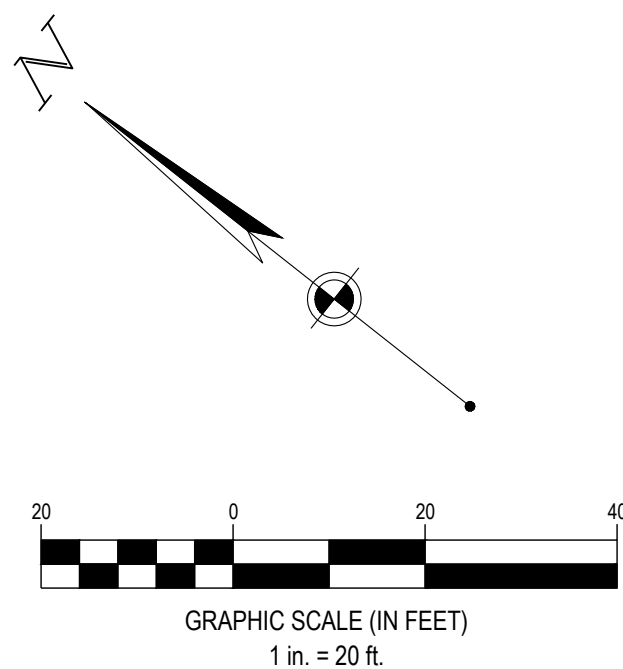
APPENDIX A

BMP LOCATION MAPS



SEVENTY-TWO (72) HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTORS SHALL NOTIFY THE FOLLOWING AGENCIES: NEW HAMPSHIRE UTILITIES PROTECTION SERVICE AT 811 OR 888-344-7233 AND ALL OTHER AGENCIES WHICH MIGHT HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NONMEMBERS OF STATE UTILITIES PROTECTION SERVICE

SITE-2023-0008



SITE LEGEND

EXISTING

REFER TO C0.1 FOR EXISTING FEATURES LEGEND

PROPOSED

- PROPOSED STANDARD DUTY ASPHALT PAVEMENT
- PROPOSED PERVIOUS PAVERS (SEE DETAIL ON SHEET C600)
- PROPOSED CONCRETE PAVEMENT
- PROPOSED CONCRETE PAVEMENT WITH FIBER REINFORCEMENT
- RIGHT-OF-WAY
- PROPERTY LINE
- SETBACK
- EASEMENT
- CENTERLINE
- BUILDING
- CONCRETE CURB
- PAVEMENT/WALK
- RETAINING WALL
- PARKING SPACE COUNT
- SIGN
- DETECTABLE WARNING MAT.
- CATCH BASIN
- STORM MANHOLE
- SANITARY MANHOLE
- CURB INLET
- CLEANOUT
- YARD DRAIN
- DOWN SPOUT
- FIRE HYDRANT
- LIGHT POLE
- CONCRETE BUMPER BLOCK

GENERAL NOTES:
SEE SHEET C0.1

CODED NOTES:

- PROPOSED 4400 SF BUILDING. REFER TO ARCHITECTURAL PLANS FOR DETAILS.
- PROPOSED TRASH ENCLOSURE PER LOCAL REQUIREMENTS. SEE ARCHITECTURAL PLAN FOR DETAILS.
- PROPOSED 6" CONCRETE CURB. REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
- PROPOSED CONCRETE CURB WITH SIDEWALK. REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
- PROPOSED CURB RAMP, REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
- ADA ACCESSIBLE PARKING SPACE WITH SIGNAGE. REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
- PROPOSED RETAINING WALL SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW HAMPSHIRE.
- PROPOSED 6" CONCRETE BOLLARD. REFER TO CONSTRUCTION DETAILS, SHEET C6.0.
- PROPOSED PUMP. REFER TO MEP PLANS FOR DETAILS.
- PROPOSED PARKING LOT PAVEMENT MARKINGS.
- PROPOSED LIGHT POLE.
- PROPOSED VACUUMS. REFER TO MEP PLANS FOR DETAILS.
- PROPOSED VACUUM MOTOR/ EQUIPMENT ENCLOSURE. REFER TO MEP PLANS FOR DETAILS.
- PROPOSED TRASH RECEPTACLE.
- PROPOSED PAY STATION. REFER TO MEP PLANS FOR DETAILS.
- PROPOSED DIRECTIONAL ARROW TO BE IN COMPLIANCE WITH M.U.T.C.D. STANDARDS.
- PROPOSED BARRIER GATE. REFER TO MEP PLANS FOR DETAILS.
- PROPOSED TRAFFIC CONE.
- PROPOSED CAR SIGNAGE.
- PROPOSED FLOOR MAT CLEANER.
- CONFIRM CONDITION OF ONE-WAY SIGN ON CENTRAL AVE MEDIAN. REPLACE WITH NEW SIGN IF NEEDED.
- RECONSTRUCTED SIDEWALK TIPDOWNS. REPAIR ANY AND ALL DAMAGED PAVED SIDEWALKS.
- DO NOT ENTER SIGN.
- INTERNAL WAYFINDING SIGN.
- ELECTRIC VEHICLE SPACE
- SIGN IDENTIFYING THAT POROUS PAVEMENT IS PRESENT AND THERE ARE RESTRICTIONS ON DEICING MATERIALS ON POROUS SURFACES. NO WINTER SANDING OF PERMEABLE PAVEMENTS IS PERMITTED.



HANG TEN CAR WASH

DOVER, NH

914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions		
ID	Description	Date
1	TRC RESUBMITTAL	2023/11/30

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761766

1"=20'

NTV

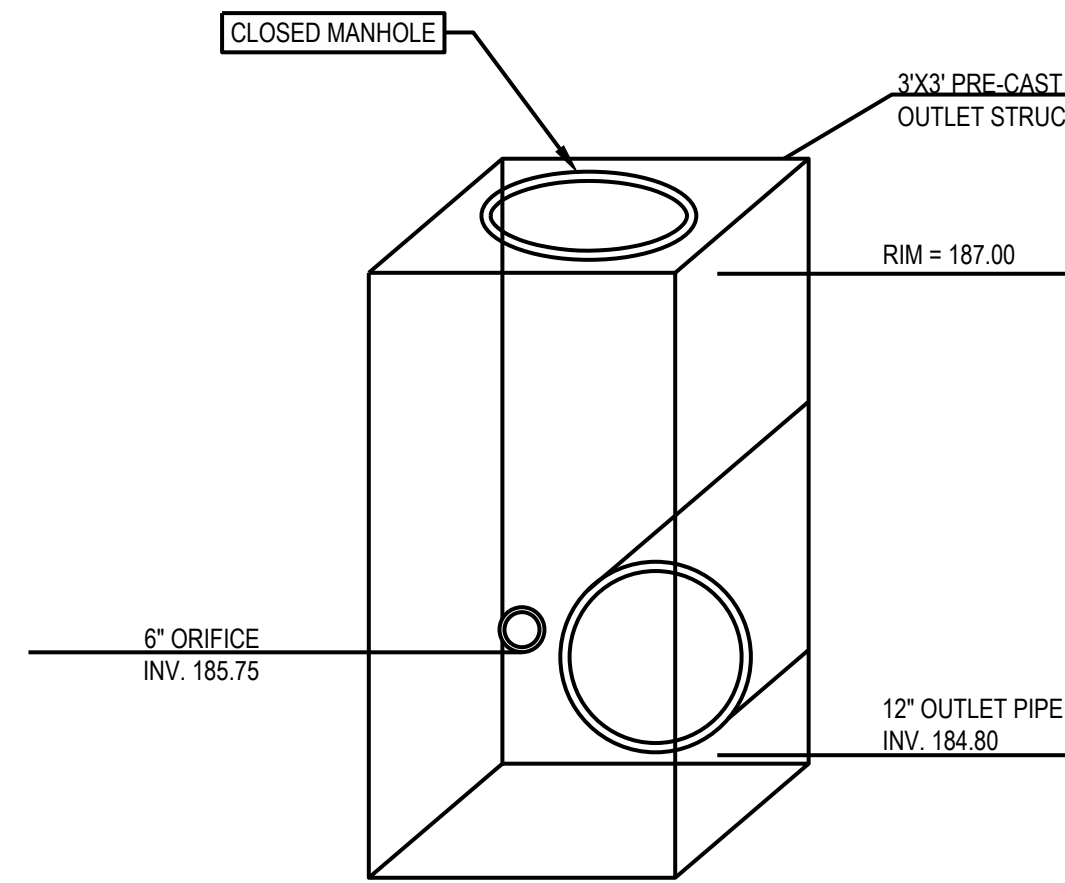
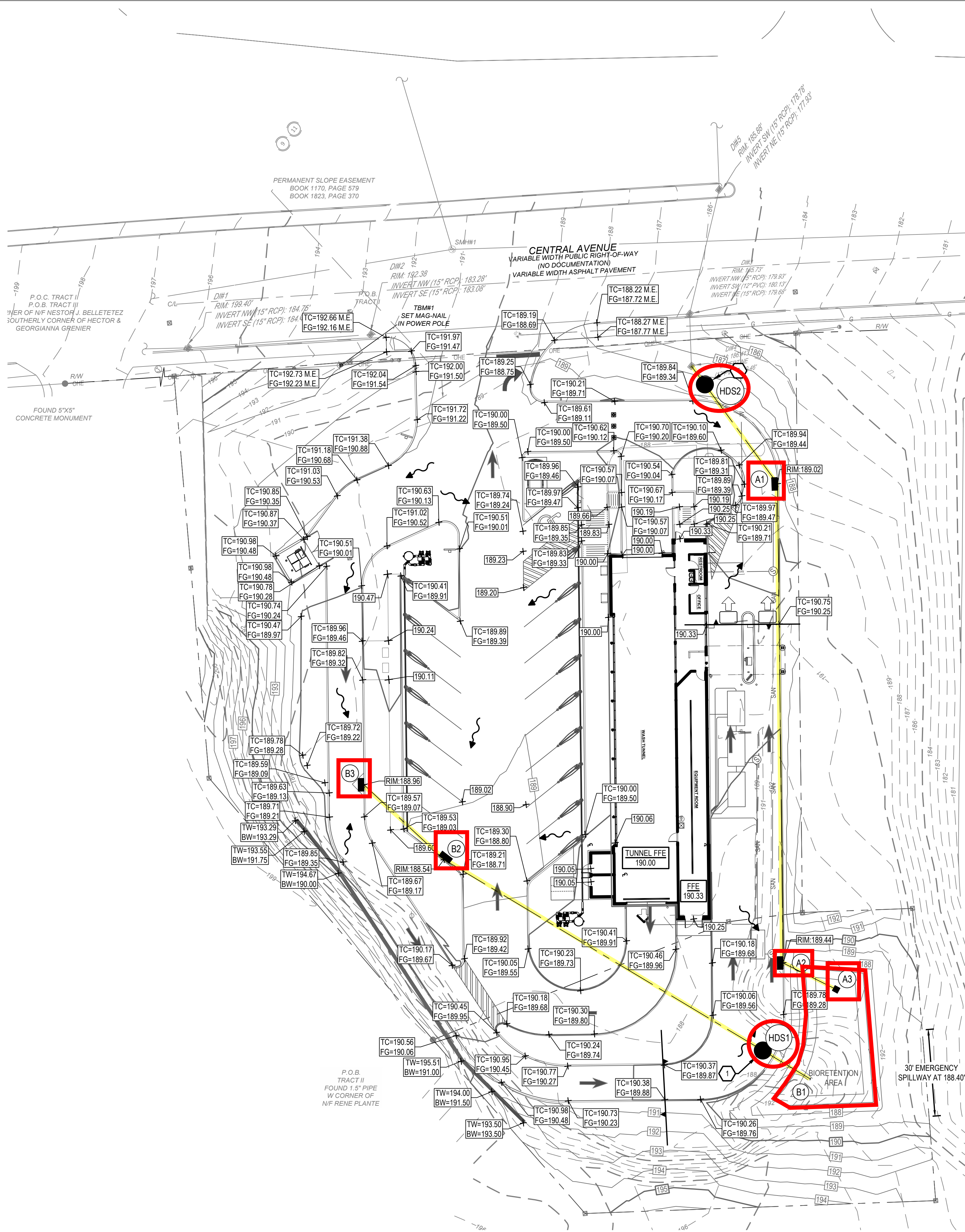
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06/28/2023

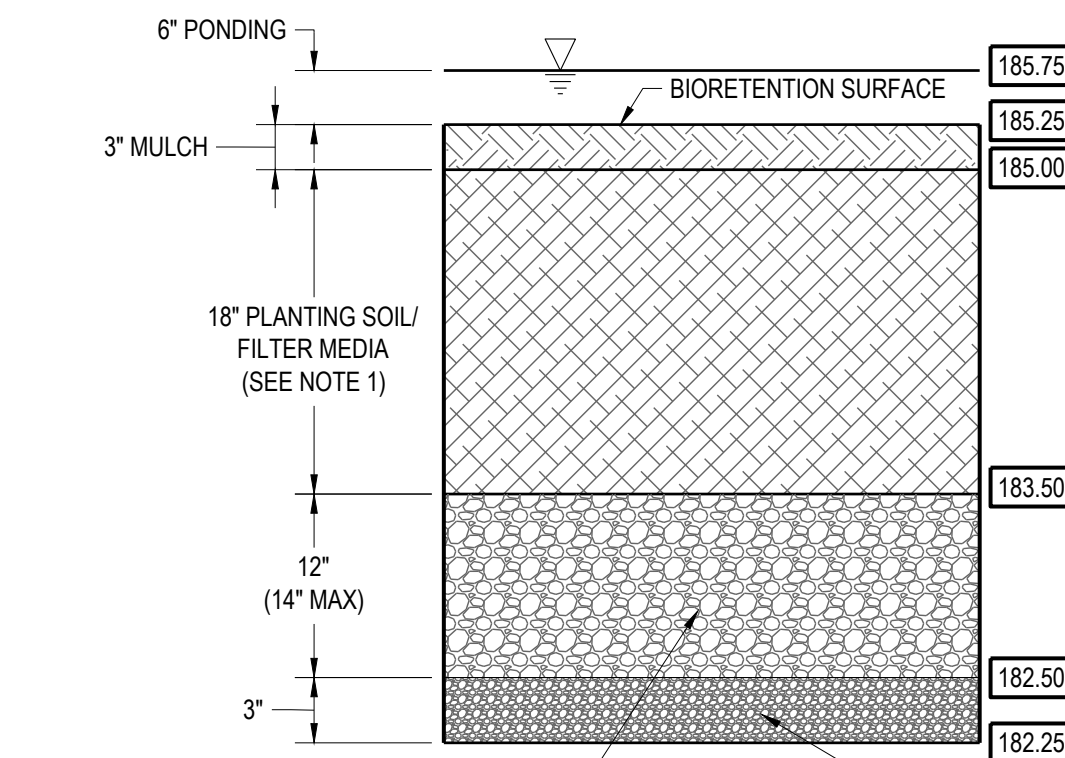
PERMIT

SITE PLAN

C3.0



OUTLET STRUCTURE (A3)
NTS

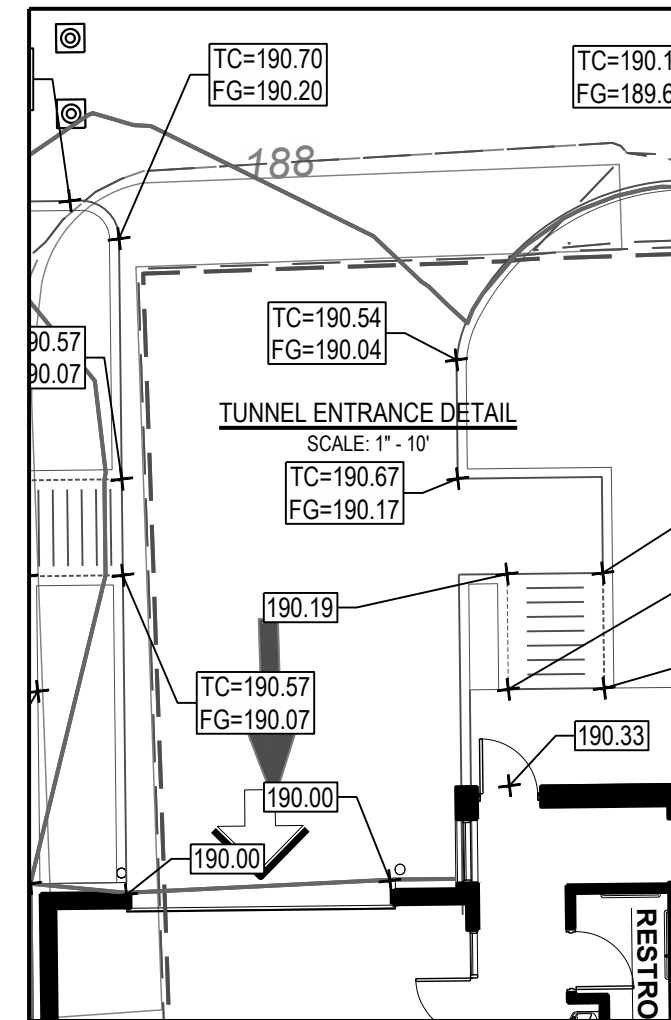


STORAGE LAYER WITH UNIFORM, DOUBLE WASHED, CLEAN AND FREE OF ALL FINES AND PACKED #57 STONE (1' - 2')

CHOKER LAYER WITH #8 OR #9 CLEAN WASHED GRAVEL

- BIORETENTION NOTES:
1. FILTER MEDIA SHALL BE EITHER (PER THE NEW HAMPSHIRE STORMWATER MANUAL VOLUME 2, BIORETENTION SYSTEM):
 - A. FILTER MEDIA OPTION A
 - 50 TO 55% - ASTM C-33 CONCRETE SAND
 - 20 TO 30% - LOAMY SAND TOPSOIL, WITH FINES AS INDICATED (15 TO 25% PERCENT BY WEIGHT PASSING STANDARD #200 SIEVE)
 - 20 TO 30% - MODERATELY FINE SHREDDED BARK OR WOOD FIBER MULCH, WITH FINES AS INDICATED (<5% PERCENT BY WEIGHT PASSING STANDARD #200 SIEVE)
 - B. FILTER MEDIA OPTION B
 - 20 TO 30% - MODERATELY FINE SHREDDED BARK OR WOOD FIBER MULCH, WITH FINES AS INDICATED (<5% PERCENT BY WEIGHT PASSING STANDARD #200 SIEVE)
 - 70 TO 80% - LOAMY COARSE SAND
 - 85 TO 100% PERCENT BY WEIGHT PASSING STANDARD #10 SIEVE
 - 70 TO 100% PERCENT BY WEIGHT PASSING STANDARD #20 SIEVE
 - 15 TO 40% PERCENT BY WEIGHT PASSING STANDARD #60 SIEVE
 - 8 TO 15% BY WEIGHT PASSING STANDARD #200 SIEVE

BIORETENTION SECTION
NTS

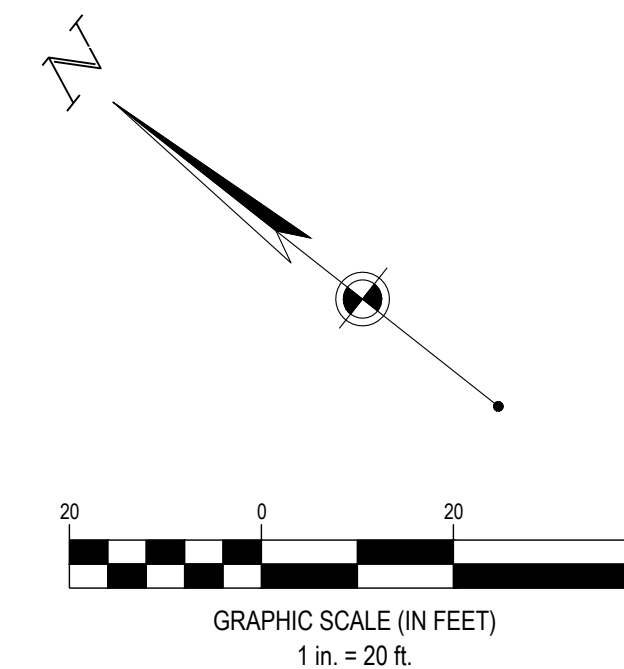


STORM SEWER STRUCTURE SCHEDULE			
NO.	STRUCTURE	GRATE	INVERT
A1	CURB INLET	189.02	181.22 (12") SW 181.22 (12") N
A2	CURB INLET	189.44	183.70 (12") NE 184.80 (12") S
A3	OUTLET CONTROL STRUCTURE	185.25	183.70 (12") N
B1	HEADWALL	-	185.25 (18") N
B2	CURB INLET	188.54	185.50 (12") N 185.50 (18") S
B3	CURB INLET	188.96	186.46 (12") S
EX1	EXISTING INLET	187.52	180.46 (12") S
HDS1	HYDRODYNAMIC SEPARATOR	189.47	185.28 (18") N 185.28 (18") S
HDS2	HYDRODYNAMIC SEPARATOR	188.41	180.58 (12") S 180.58 (12") N

STORM SEWER PIPE TABLE			
PIPE NAME	DIAMETER	LENGTH	SLOPE
A1-HDS2	12"	43'	1.50%
A2-A1	12"	166'	1.50%
A3-A2	12"	21'	5.36%
B2-HDS1	18"	128'	0.17%
B3-B2	12"	38'	2.54%
HDS1-B1	18"	19'	0.16%
HDS2-EX1	12"	8'	1.52%



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GRADING LEGEND

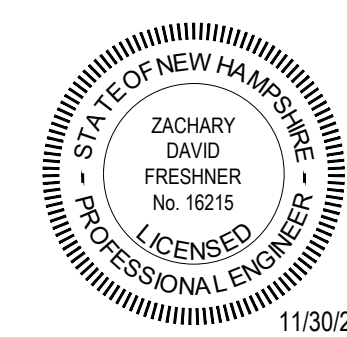
- EXISTING
REFER TO C1.1 FOR EXISTING FEATURES LEGEND
- PROPOSED
- RIGHT-OF-WAY
 - PROPERTY LINE
 - SETBACK
 - EASEMENT
 - BUILDING
 - MAJOR CONTOUR
 - MINOR CONTOUR
 - GRADE BREAK
 - FLOW LINE
 - STRUCTURE NUMBER
 - STORM MANHOLE
 - CURB INLET
 - CLEANOUT
 - DOWNSPOUT
 - FINISHED GRADE ELEVATION
 - RIM ELEVATION
 - BACK OF CURB ELEVATION
 - TOP OF CURB ELEVATION
 - FINISHED GRADE ELEVATION
 - TOP OF PAVEMENT ELEVATION
 - TOP OF FOOTING ELEVATION
 - MATCH EXISTING ELEVATION

GENERAL NOTES:
SEE SHEET C0.1

CODED NOTES:

1. PROPOSED HYDRODYNAMIC SEPARATOR, CONTRACTOR SHALL USE STORMTRAP STORMSETTLER OR APPROVED EQUAL.
2. BIORETENTION POND SHALL HAVE AN IMPERMEABLE LINER INSTALLED ALONG THE SIDE WALLS SO AS TO SEPARATE THE SYSTEM FROM THE GROUP A SOILS.

DESIGN ENGINEER SHALL PROVIDE SIGNED LETTER TO THE CITY ENGINEER CERTIFYING THAT THE STORMWATER MANAGEMENT SYSTEM HAS BEEN INSTALLED IN ACCORDANCE WITH APPROVED PLANS.



HANG TEN CAR WASH

DOVER, NH

914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions		
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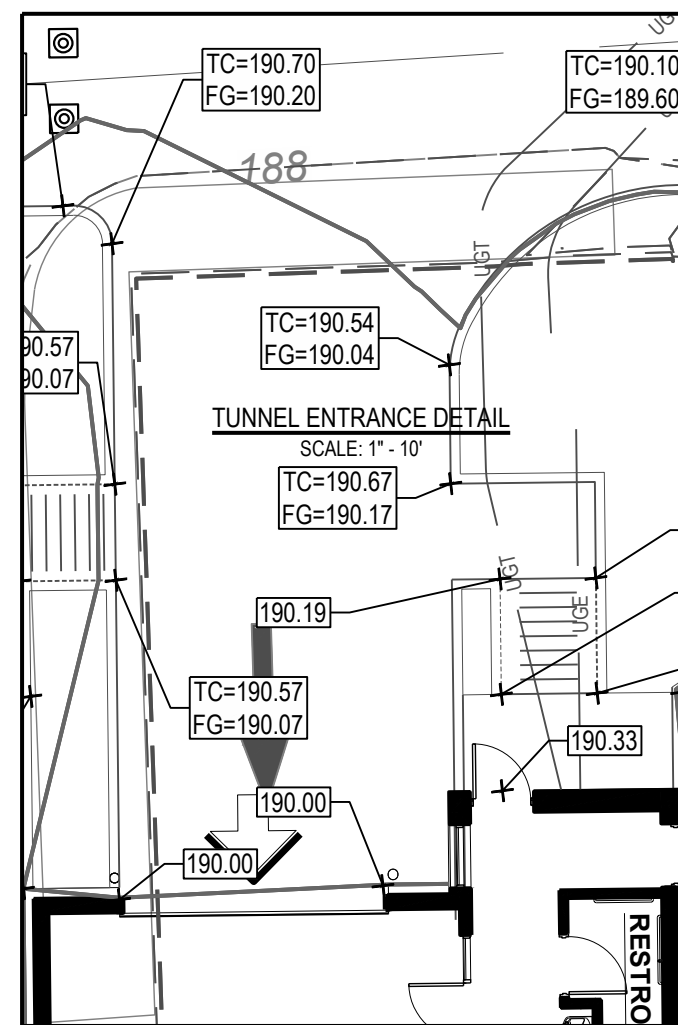
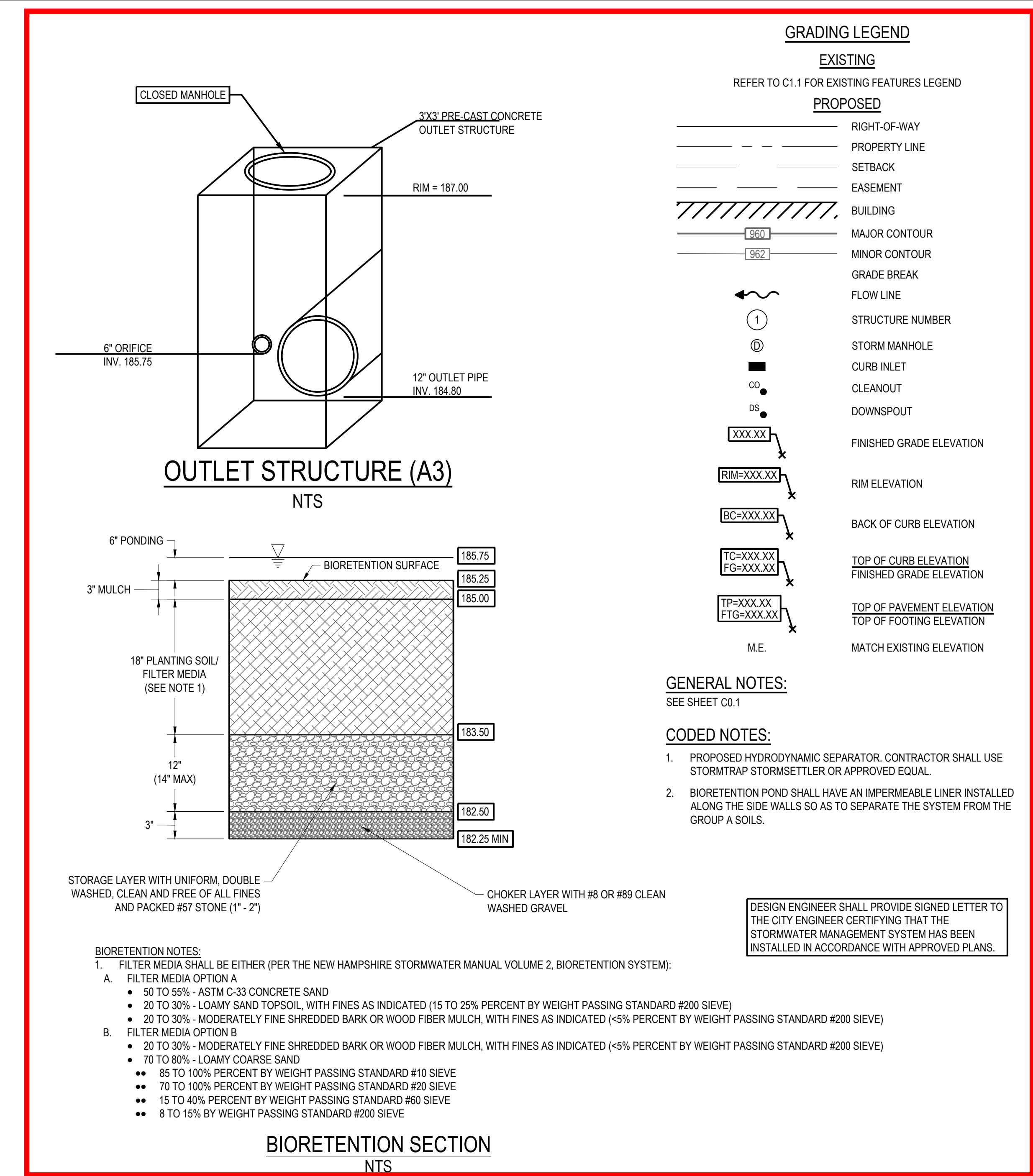
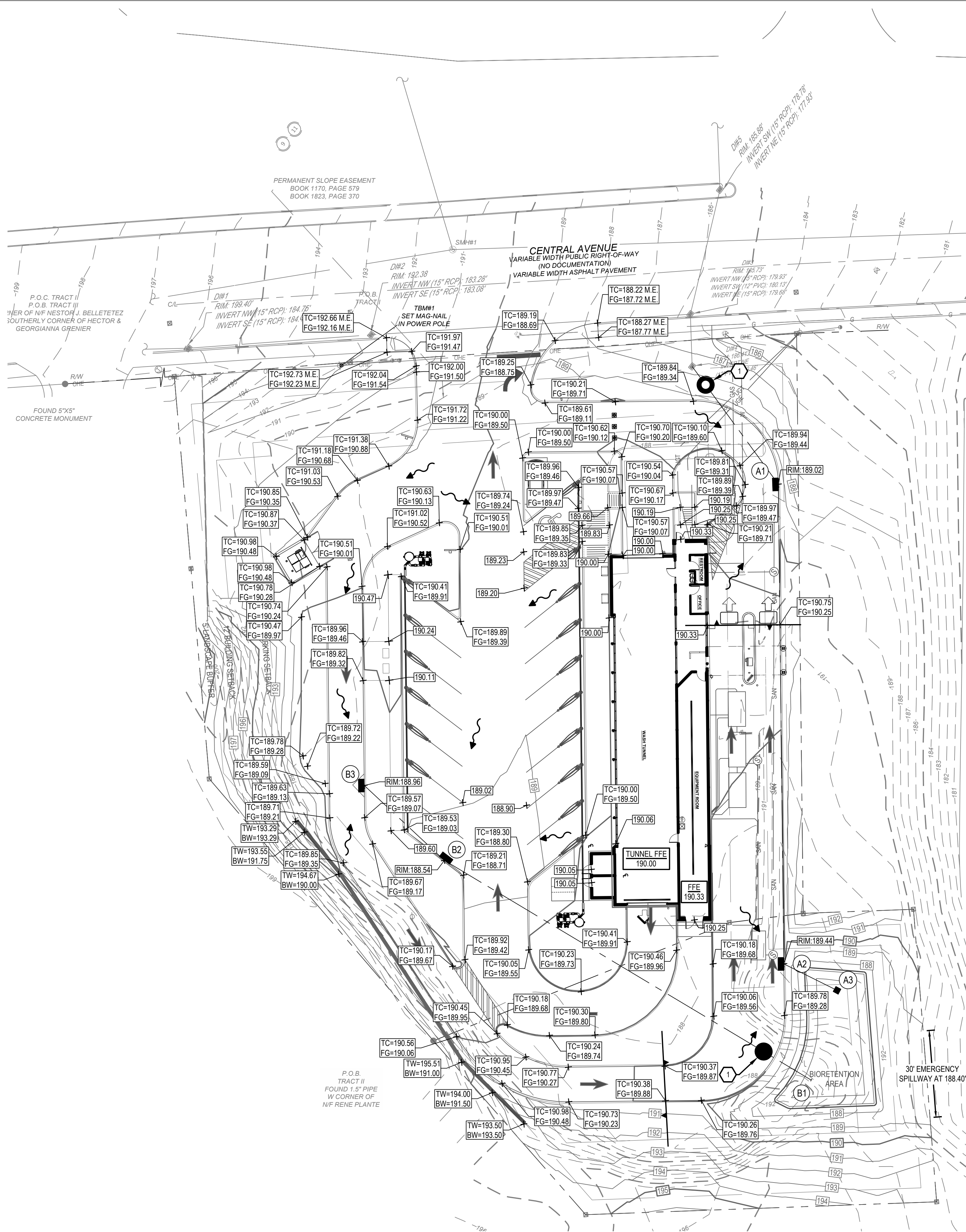
761766
1"=20'
NTV
HGC
06/28/2023
PERMIT

GRADING & DRAINAGE
PLAN

C4.0

APPENDIX B

CONSTRUCTION DETAILS

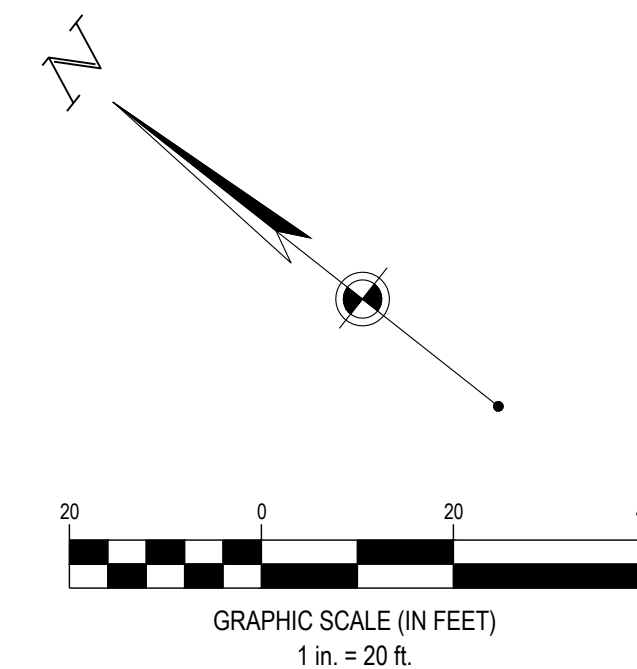


STORM SEWER STRUCTURE SCHEDULE			
NO.	STRUCTURE	GRATE	INVERT
A1	CURB INLET	189.02	181.22 (12") SW 181.22 (12") N
A2	CURB INLET	189.44	183.70 (12") NE 184.80 (12") S
A3	OUTLET CONTROL STRUCTURE	185.25	183.70 (12") N
B1	HEADWALL	-	185.25 (18") N
B2	CURB INLET	188.54	185.50 (12") N 185.50 (18") S
B3	CURB INLET	188.96	186.46 (12") S
EX1	EXISTING INLET	187.52	180.46 (12") S 180.58 (12") S

STORM SEWER PIPE TABLE			
PIPE NAME	DIAMETER	LENGTH	SLOPE
A1-EX	12"	43'	1.50%
A1-EX (1)	12"	8'	1.52%
A2-A1	12"	166'	1.50%
A3-A2	12"	21'	5.36%
B2-B1	18"	148'	0.17%
B3-B2	12"	38'	2.54%



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HANG TEN CAR WASH

DOVER, NH

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761766
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GRADING & DRAINAGE
PLAN

C4.0

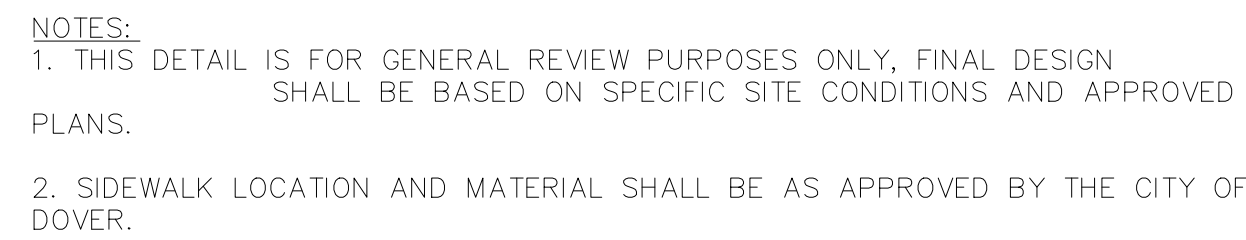


Diagram illustrating the specifications for a diagonal "NO PARKING" sign, including ADA-compliant features:

- 8" MIN.**: Minimum width of the sign.
- LOADING ZONE PER PLAN**: Label for the loading zone area.
- VARIES PER PLAN**: Label for the variable width of the sign.
- 4" SOLID BLUE LINE (TYP.)**: Typical width of the solid blue line.
- 2' (TYP.)**: Typical distance between the blue lines.
- 4" SOLID LINE, COLOR TO MATCH PLAN**: Label for the solid line matching the plan.
- 12" WIDE SOLID BLUE LINE @ 45° (TYP.)**: Typical width and angle of the solid blue line.
- PAINT WHITE SYMBOL WITH BLUE BACKGROUND**: Label for the white symbol on a blue background.
- 3" (TYP.)**: Typical width of the white symbol.
- 28" MIN.**: Minimum height of the sign.
- 24" MIN.**: Minimum width of the sign.
- LENGTH OF STALL PER PLAN**: Label for the length of the stall.
- NO PARKING**: Text on the sign.

NOTES:

1. LOAM / SHOULD COMPLY DOT 64 AND 64
2. CONCRETE SUPPORT SET 3" OF THE COURSE

ASPHALT SIDEWALK

- SIDEWALK 5' (MIN)
- MIN. 2.5" BITUMINOUS PATCH ADDITIONAL MAY BE REQUIRED TO MEET/MATCH EXISTING
- 1" WEARING COURSE
- 1.5" BINDER COURSE
- 4" LOAM & SEED
- 9" COMPACTED CRUSHED GRAVEL NH DOT 304.3

CONCRETE SIDEWALK

- MIN 4" - 6" AT TIP-DOWNS 3000 PSI CONCRETE W/ FIBER REINFORCEMENT
- 4" LOAM & SEED
- 9" COMPACTED CRUSHED GRAVEL NH DOT 304.3

NOTES:

1. MATERIALS SHALL BE IN ACCORDANCE WITH THE CITY OF DOVER STANDARDS SPECIFICATIONS.
2. SIDEWALK AND DRIVEWAY WIDTHS SHALL BE EQUAL TO EXISTING WIDTHS OR AS APPROVED AND SHALL SLOPE TO MATCH EXISTING ELEVATIONS.
3. BASE FOR THE SIDEWALKS AND DRIVEWAYS SHALL BE 9-INCHES OF CRUSHED GRAVEL.

A cross-sectional diagram of a sloped granite curb and seed bed. The diagram shows a sloped granite curb with a 12" height and a 6" base. The curb is set back 6" MIN from the pavement top course. The pavement top course is 7" REVEAL (OR AS DIRECTED) from the curb. The pavement base coat is 6" MIN thick. The seed bed is 4" LOAM & SEED SEE NOTE #1, 6" MIN thick, and is set back 6" MIN from the curb. The seed bed is filled with COMPACTED CRUSHED GRAVEL NH DOT 304.3. The curb is 6" MIN thick. The diagram also shows a 6" MIN gap between the curb and the seed bed.

SLOPED GRANITE CURB

NOTES:

1. LOAM AND SEED SHOULD BE IN COMPLIANCE WITH NH DOT 641, 642, 643, 644 AND 645.
2. CONCRETE CURB SUPPORT SHOULD BE SET 1" BELOW THE TOP OF THE PAVEMENT BASE COURSE.

COMPACTED CRUSHED GRAVEL NHDOT 304.3

3000 PSI CONCRETE CURB SUPPORT

PAVEMENT TOP COURSE

PAVEMENT BASE COURSE

4" LOAM & SEED SEE NOTE #1

17"

6"

6"

6"

BOLLARD
NTS

3x3 and 4x4 - SECTION A-A
TOP VIEW - CASTING REMOVED

2x3 - SECTION A-A
TOP VIEW - CASTING REMOVED

NOTES:

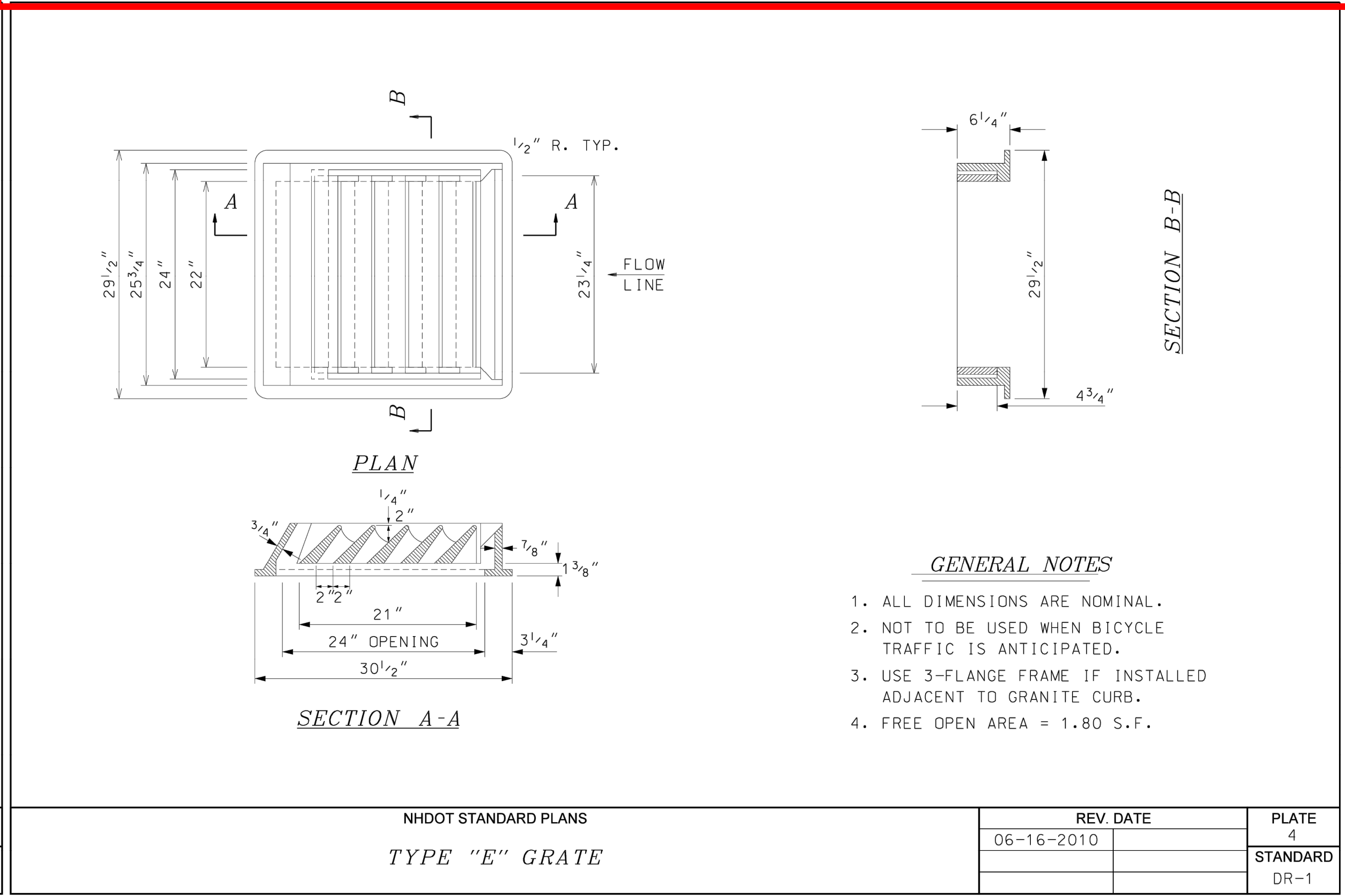
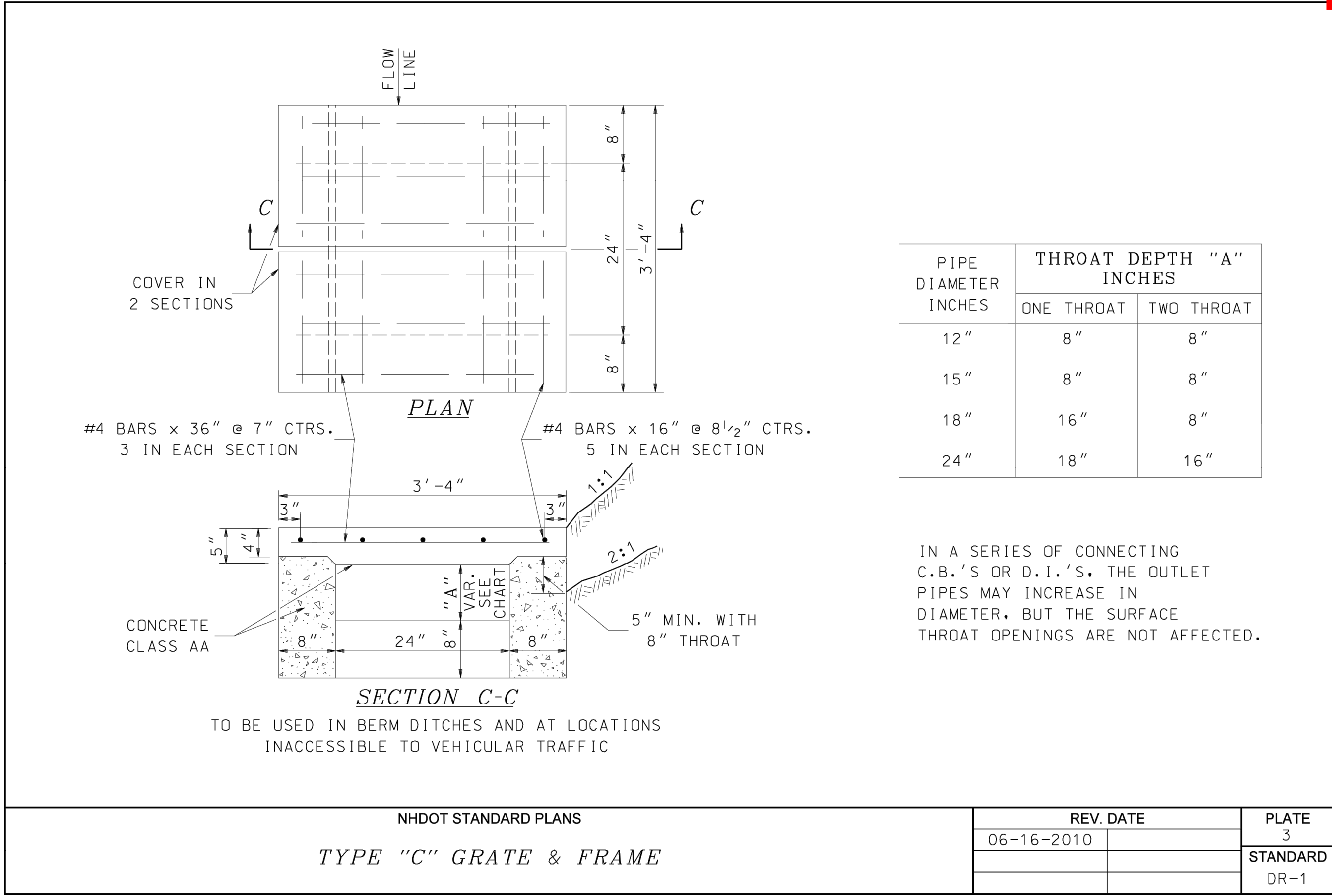
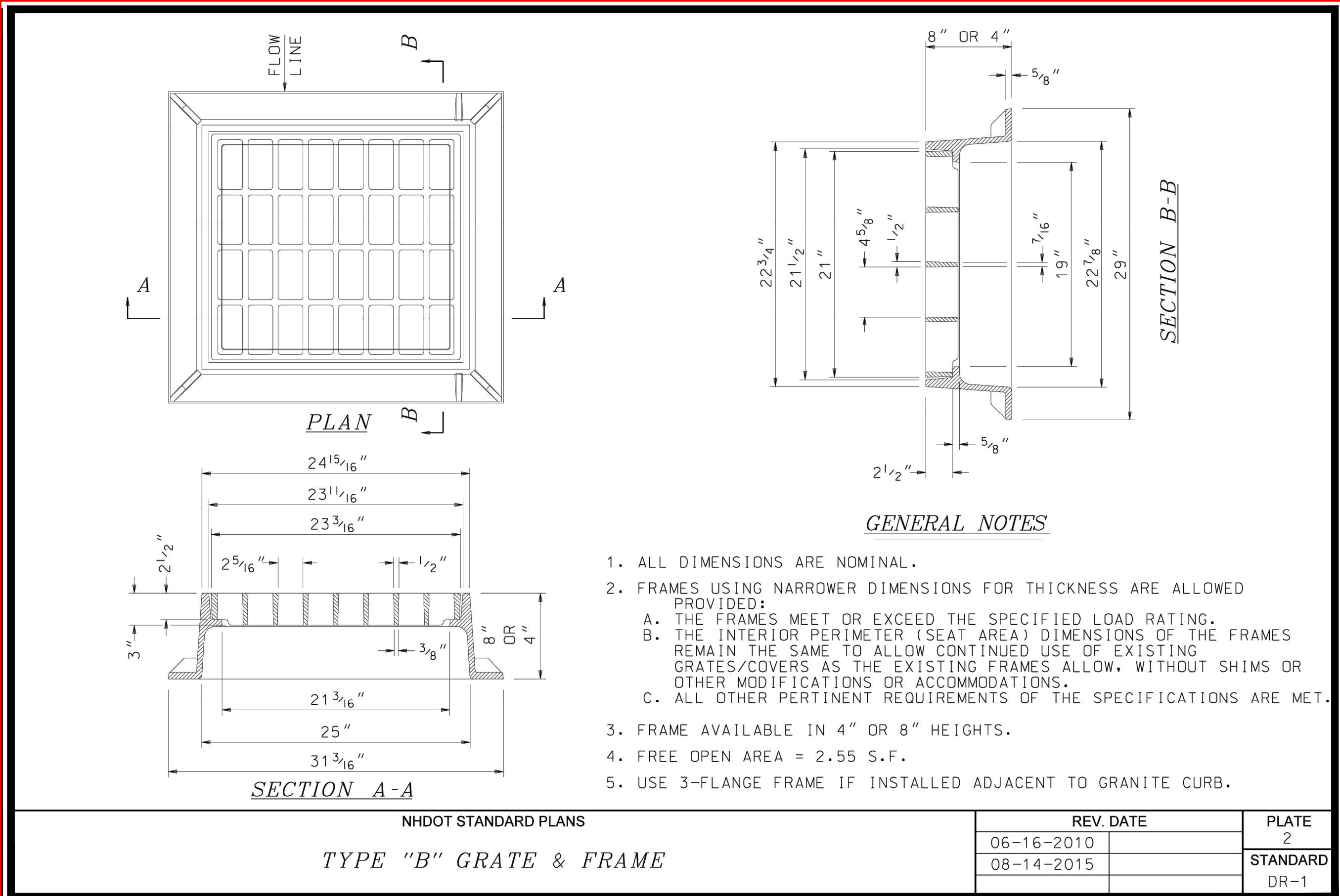
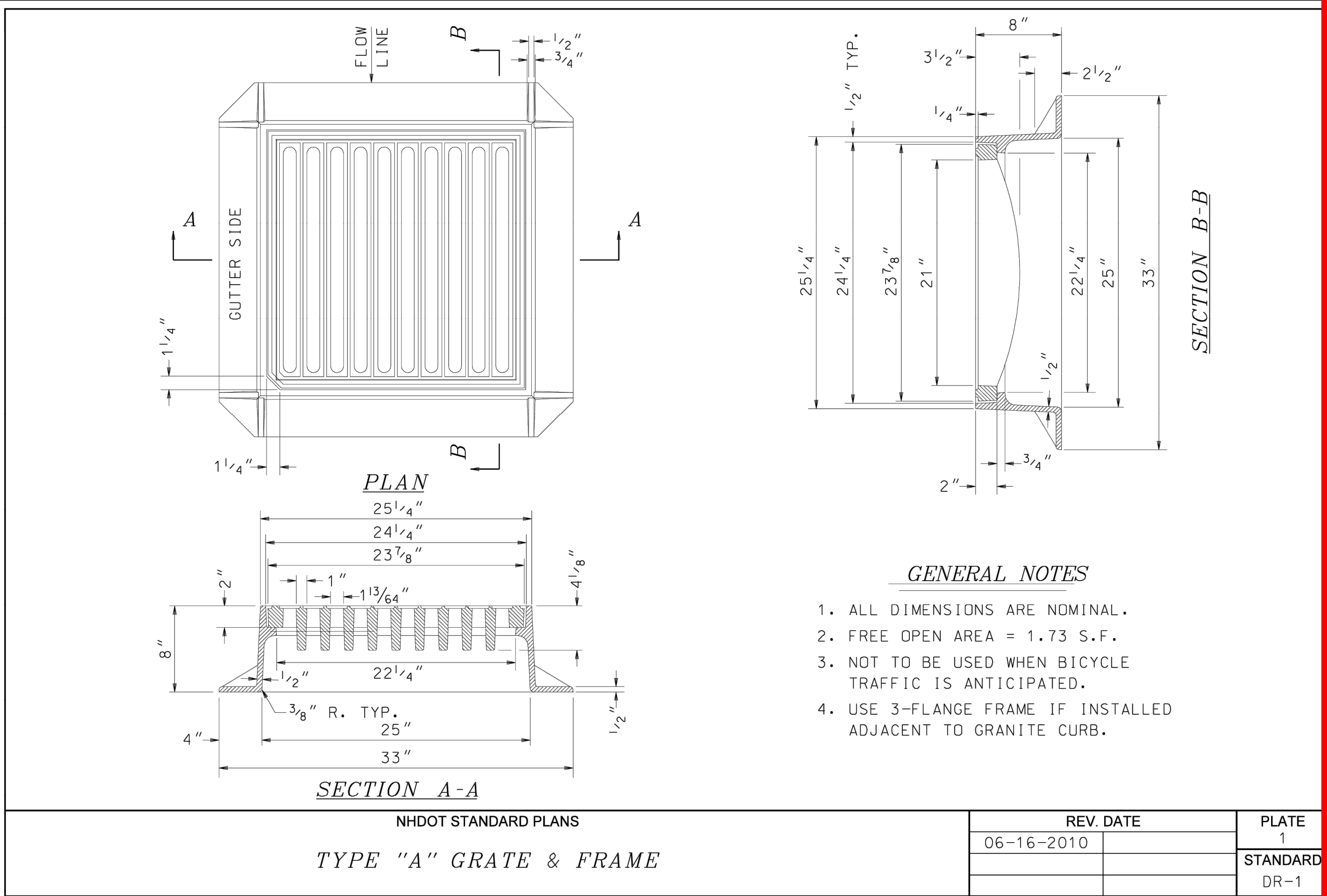
1. FRAME AND GRATE ASSEMBLY SHALL BE EAST JORDAN 5352M, 7080Z, 7080T OR APPROVED EQUAL. CURB PIECE SHALL BE CAST WITH "DUMP NO WASTE" AND "DRAINS TO WATERWAY".
2. JOINT SEALS BETWEEN PRECAST SECTIONS SHALL BE RESILIENT AND FLEXIBLE GASKET JOINTS PER ASTM C-890.
3. PRECAST SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478. CONCRETE SHALL BE 4000 PSI.
4. ADJUSTMENTS TO GRADES TO BE PRECAST GRADE RINGS, CASTINGS TO BE MORTARED WITH TYPE "M" MASONRY MORTAR.



914 CENTRAL AVE.
DOVER, NH 03820

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1'=20'
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C6.0



STANDARD NO. DR-1
REVISION DATE
07-13-2001
06-16-2010
08-14-2015
*DGN FILE NAME
DR-1

STANDARD PLANS



STANDARD NO. DR-1



HANG TEN CAR WASH

DOVER, NH

914 CENTRAL AVE.
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Revisions / Submissions		
ID	Description	Date
1	TRC RESUBMITTAL	2023/11/30

761766
1'=20'
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NHDOT DETAILS

C6.1

APPENDIX C

STORM STRUCTURE INLET INSPECTION AND MAINTENANCE CHECKLIST

Storm Sewer Structure Operation, Maintenance, and Management Inspection Checklist for BMP Owners

Project: _____ Owner Change since last inspection? Y N
 Owner Name, Address, Phone: _____
 Number: _____
 Location: _____
 Site Status _____
 Date: _____
 Time: _____
 Inspector: _____

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
Storm Casting and Grate (Inspect monthly and after major storms)		
1. Trash/Debris obstructing inflow		
Affected Structures:		
2. Silt/Sediment accumulation		
Affected Pipes:		
3. Other (describe)		
Structure Sump (Inspect annually and after major storms)		
1. Sediment/Debris in sump		
Affected Structures:		
2. Other (describe)		
Headwall Structures (Inspect annually and after major storms)		
1. Vegetation around headwall		
2. Erosion around headwall		
3. Animal burrows		
4. Headwall clear of obstructions		
5. Sediment Accumulation		
Affected Structures:		
6. Other (describe)		

Additional Comments:

Actions to be taken:	Timeframe:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

APPENDIX D

STORM PIPE INSPECTION AND MAINTENANCE CHECKLIST

Storm Sewer Pipes Operation, Maintenance, and Management Inspection Checklist for BMP Owners

Project: _____ Owner Change since last inspection? Y N
 Owner Name, Address, Phone: _____
 Number: _____
 Location: _____
 Site Status _____
 Date: _____
 Time: _____
 Inspector: _____

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
Storm sewer pipes (Inspect annually and after major storms)		
1. Trash/Debris obstructing inflow		
Affected Pipes:		
2. Silt/Sediment accumulation		
Affected Pipes:		
3. Other (describe)		

Additional Comments:

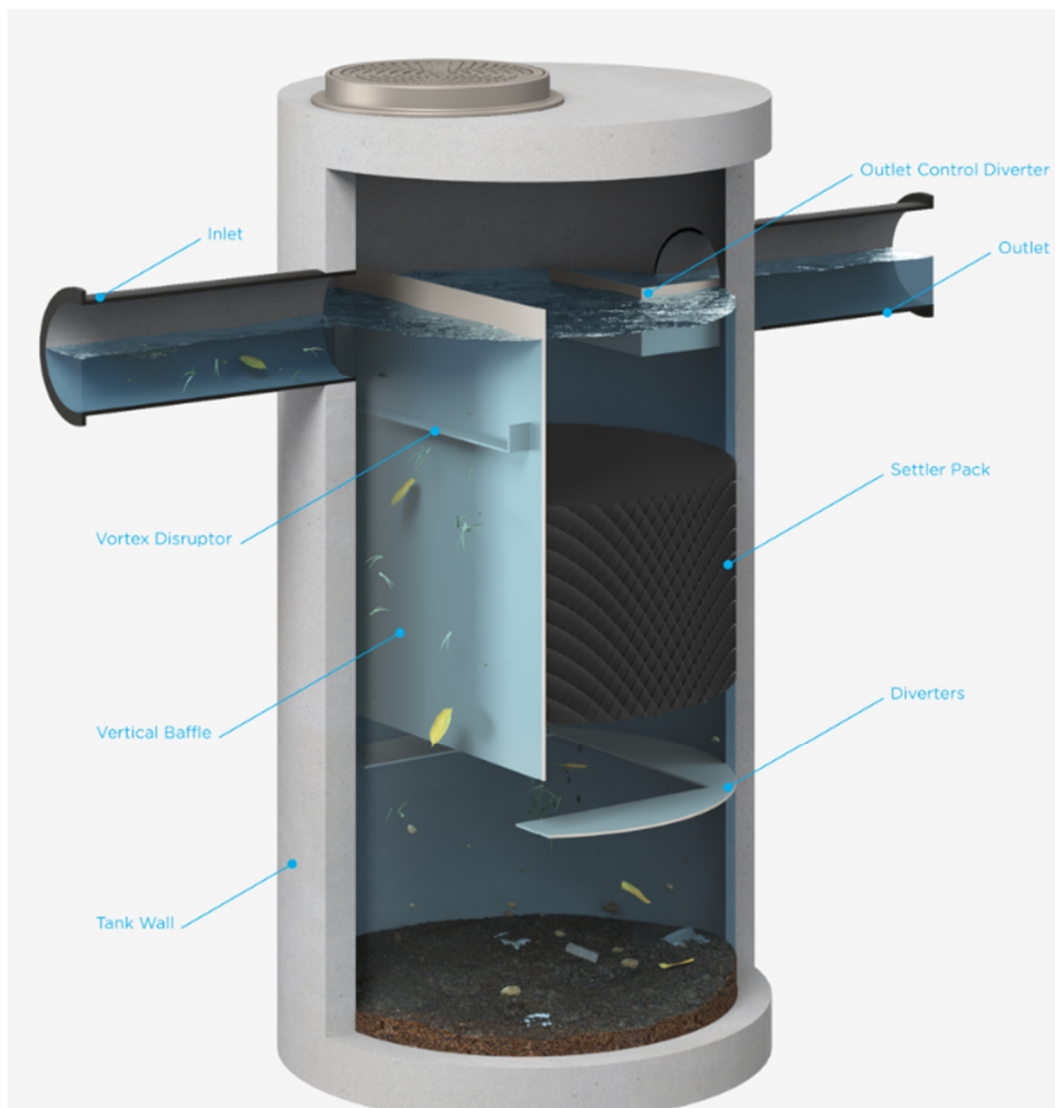
Actions to be taken:

Timeframe:

APPENDIX E
STORMSETTLER INSPECTION AND MAINTENANCE MANUAL
AND INSPECTION CHECKLIST

StormSettler®

StormSettler® Inspection and Maintenance Manual



PHONE 815 941 4549
FAX 331 318 5347

WEB www.stormtrap.com
EMAIL info@stormtrap.com

1287 Windham Parkway
Romeoville, Illinois 60446

StormSettler® Manufacturer's Inspection and Maintenance Manual

The StormSettler treatment device, manufactured by StormTrap, is a hydrodynamic separating device designed to capture and store pollutants from stormwater. StormSettler's maintenance frequency is site dependent and routine inspections are recommended to ensure that the system is functioning as designed. Please contact your authorized StormTrap representative if you have questions regarding the inspection and maintenance of the StormSettler system.

Inspection Scheduling

StormSettler inspections are important to assess the condition of the system internals to ensure peak performance. The frequency of inspections and maintenance is dependent on site specific loading conditions and rainfall frequency. Within the first year of operation, it is recommended that the unit be inspected quarterly to determine the rate of pollutant accumulation in order to develop a more accurate maintenance schedule. Inspections should be performed during dry weather conditions when no flow is entering the system. StormSettler systems are recommended to be inspected whenever the upstream and downstream catch basins and stormwater pipes of the stormwater collection system are inspected or maintained. If checked on an annual basis, the inspection should be conducted before the stormwater season begins to ensure that the system is functioning properly for the upcoming storm season.

Inspection and Maintenance Equipment

The following equipment is recommended to have during inspections:

- StormSettler Inspection and Maintenance Manual and Inspection Checklist
- Flashlight

- Manhole hook/lifter or pry bar to lift the manhole cover
- Measuring device(s) of sufficient length to reach the bottom of the device's sump
- Proper personal protective equipment
- Adequate traffic control signage
- Pole with skimmer or net (optional for maintenance procedure)
- Vacuum truck or similar trailer mounted equipment (for maintenance procedure)

Inspection Procedure

Inspections should be done such that a sufficient time has lapsed since the most recent rain event to allow for a static water condition and rainfall is not anticipated to occur during the duration of the inspection procedure. StormSettler does not require entry into the system for inspection or maintenance; however, if entering the system is deemed necessary, it is prudent to note that prior to entry into any underground storm sewer or underground structure, appropriate OSHA and local safety regulations and guidelines should be followed.

To begin the inspection process, set up the necessary traffic control signage per local ordinances. Open all manhole covers using appropriate equipment and ensure the manhole covers are in a location that would not prohibit the inspection process. Visually inspect the system at all manhole access opening locations. During the visual inspection, ensure that all components are in working order. An inspection checklist is provided within this guide for ease and reference.

If any components are not in working order, contact your authorized StormTrap representative.

After the components are inspected, visually quantify the accumulation of trash, debris, and hydrocarbons within the system by using a measuring device such as a tape measure, grade stick, dipstick, etc. Measure and record the depth of trash, debris, and hydrocarbon

accumulation from the static water elevation (pipe elevation) to the average elevation of the trash and debris.

If sorbent materials are used for retention of hydrocarbons, the level of discoloration of the sorbent material should also be noted during the inspection process.

For sediment accumulation, utilize either a sludge sampler or a sediment pole to measure and document the amount of sediment accumulation. To determine the amount of sediment in the system with a sludge sampler, follow the manufacturer's instructions. If utilizing a sediment pole or similar device, first insert the pole to the top of the sediment layer and record the depth. Then, insert the pole to the bottom of the system and record the depth. The difference in the two measurements corresponds to the amount of sediment in the system. Alternatively, sediment depth can also be determined by taking a measurement from a known and consistent elevation (manhole frame, pipe invert, vertical baffle top, etc.) to the top of the sediment layer. That distance can then be compared to the measurement between the known elevation to the sump floor. The difference between these two measurements will correspond to the sediment layer depth.

After completion of the inspection process, ensure that manhole covers are replaced and securely seated in the manhole frame and remove traffic control signage.

StormSettler units can also be installed with remote monitoring technology that measures the current capacities within the system and reports the data to any internet capable device. If a remote monitoring device is used, proper maintenance of the device, such as replacement of batteries, cleaning sensor, etc. needs to be completed to ensure functionality of the remote monitoring technology.

If it is determined during the inspection process that the accumulation of trash and debris or sediment is at or near the capacities of the StormSettler device, maintenance should be performed to ensure performance is not impacted for subsequent storm events.

Maintenance Procedure

Maintenance should be done such that a sufficient time has lapsed since the most recent rain event to allow for a static water condition and rainfall is not anticipated to occur during the duration of the maintenance procedure.

To begin the maintenance process, set up the necessary traffic control signage per local ordinances. Open all manhole covers using appropriate equipment and ensure the manhole covers are in a location that would not prohibit the maintenance process.

Visually inspect the system at all manhole access opening locations. During the visual inspection, ensure that all components are undamaged. If any components are not in working order, contact your authorized StormTrap representative.

After the components are inspected, remove all accumulated trash, debris, and hydrocarbons stored on the surface of the water using the vacuum hose or pole with attached skimmer or net.

If sorbent materials are used, the materials may have to be moved to not impact pollutant removal. If significant discoloration of the sorbent material has occurred, simply remove the sorbent materials and replace upon completion of maintenance activities.

To remove sediment, insert the vacuum truck's hose on the inlet side of the vertical baffle into the sump. The system should be completely drained, and all sediment should be removed from the sump. For smaller diameter devices (3' or 4' units), a 6" or smaller vacuum hose diameter may be required for effective cleaning due to maneuverability constraints. If the vacuum truck that is being utilized has a hose diameter greater than 6", a smaller tube can be affixed to the boom hose with duct tape to improve maneuverability within the device.

If excessive sediment or debris buildup occurs within the device, components can be washed with sewer jetting equipment or a spray lance to remove stubborn materials. Particular

attention must be taken when spraying the settler pack. A wide spray nozzle is recommended around the settler pack to ensure there is no damage to the material.

After completion of the maintenance procedure, complete a post maintenance inspection to ensure that all components are in good condition. Ensure that manhole covers are replaced and securely seated in the manhole frame and remove traffic control signage. Dispose of all pollutants removed during maintenance per local, state, and federal guidelines and regulations.

Inspection and Maintenance Documentation

Proof of inspections and maintenance activities is the responsibility of the owner. All inspection and maintenance reports and any relevant data should be kept on site or at a location where they will be accessible in accordance with local requirements. It is a good practice to take time stamped photographs after every inspection and maintenance event to include within logs. It is also good practice to keep records of rainfall events between maintenance events and the weight of material removed, even if no report is required. Some municipalities may require inspection and maintenance reports be forwarded to the proper governmental permitting agency on an annual basis. Refer to your local regulations and ordinances for any additional maintenance requirements and schedules not contained herein. Inspections and maintenance activities should be performed to ensure performance is not impacted and the device performs as designed.

Inspection Items

- StormSettler Maintenance Manual and Inspection Checklist
- Flashlight
- Manhole hook/lifter or pry bar to lift the manhole cover
- Measuring device(s) of sufficient length to reach the bottom of the device's sump
- Proper personal protective equipment
- Adequate traffic control signage

Maintenance Items

- StormSettler Maintenance Manual and Inspection Checklist
- Flashlight
- Manhole hook/lifter or pry bar to lift the manhole cover
- Measuring device(s) of sufficient length to reach the bottom of the device's sump
- Proper personal protective equipment
- Adequate traffic control signage
- Pole with skimmer or net (optional for maintenance procedure)
- Vacuum truck or similar trailer mounted equipment (for maintenance procedure)

StormSettler™	StormSettler Inspection Checklist			
Structure ID:				
Location/Address:				
Inspector Name:	Inspector Contact Information:			
Date:	Time:			
Weather Conditions:				
Rain in the Last 48hrs:	If yes, list amount and timing:			
*Do not enter underground chambers to inspect system unless Occupational Safety & Health Administration (OSHA) regulations for confined space entry are followed. *Follow inspection and maintenance instructions provided by system manufacturer. *Please circle the condition of each inspection item below. 1 being the worst and 5 being the best condition.				
Inspection Item	Condition	Comment	Yes	No
1.) Frames and Covers				
Accumulation of debris and/or sediment	1 2 3 4 5		Yes	No
Component(s) structural condition	1 2 3 4 5		Yes	No
2.) Inlet Pipe(s)				
Accumulation of debris and/or sediment	1 2 3 4 5		Yes	No
Component(s) structural condition	1 2 3 4 5		Yes	No
3.) Vortex Disruptor				
Accumulation of debris and/or sediment	1 2 3 4 5		Yes	No
Component(s) structural condition	1 2 3 4 5		Yes	No
4.) Verticle Baffle				
Accumulation of debris and/or sediment	1 2 3 4 5		Yes	No
Component(s) structural condition	1 2 3 4 5		Yes	No
5.) Enhanced Settling Pack				
Accumulation of debris and/or sediment	1 2 3 4 5		Yes	No
Component(s) structural condition	1 2 3 4 5		Yes	No
6.) Flow Modifiers				
Accumulation of debris and/or sediment	1 2 3 4 5		Yes	No
Component(s) structural condition	1 2 3 4 5		Yes	No

7.) Outlet Control Diverter									
Excessive accumulation of debris and/or sediment present	1	2	3	4	5		Yes	No	
Component(s) structurally sound	1	2	3	4	5		Yes	No	
8.) Outlet Pipe									
Accumulation of debris and/or sediment	1	2	3	4	5		Yes	No	
Component(s) structurally sound	1	2	3	4	5		Yes	No	
9.) Concrete Chamber									
Component(s) structural condition	1	2	3	4	5		Yes	No	
10.) Sediment Storage Capacity									
Sediment storage capacity	1	2	3	4	5		Yes	No	
Additional Notes:									
Wet Weather Inspection Needed: Yes No									
Maintenance Activities Needed: Yes No									

APPENDIX F

BIORETENTION AREA INSPECTION AND MAINTENANCE CHECKLIST

Bioretention Area Inspection and Maintenance Checklist

Facility:			
Location/Address:			
Date:	Time:	Weather Conditions:	Date of Last Inspection:
Inspector:		Title:	
Rain in Last 48 Hours ☐ Yes ☐ No If yes, list amount and timing:			
Pretreatment: ☐ vegetated filter strip ☐ swale ☐ turf grass ☐ forebay ☐ other, specify: _____ ☐ none			
Site Plan or As-Built Plan Available: ☐ Yes ☐ No			

Inspection Item	Comment	Action Needed
1. PRETREATMENT		
Sediment has accumulated.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Trash and debris have accumulated.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
2. DEWATERING		
Standing water is present after 48 hours. If yes, describe sheen, color, or smell.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
3. INLETS		
Inlets are in poor structural condition.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Sediment has accumulated and/or is blocking the inlets.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Erosion is occurring around the inlets.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
3. VEGETATION		
Vegetation is wilting, discolored, or dying due to disease or stress.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Vegetation needs to be controlled through mowing or manual removal.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
4. BIORETENTION MAIN INFILTRATION AREA		
Trash and debris have accumulated.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Sediment has accumulated at the surface.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Topmost layer is caked or crusted over with sediment.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Erosion is evident.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Mulch is compacted.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Sinkholes or animal borrows are present.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
5. SIDE SLOPES AND EMBANKMENT		
Erosion is evident.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Sinkholes or instability is evident.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
6. OUTLETS AND OVERFLOW STRUCTURE (i.e., catch basin)		
Outlets or overflow structures in poor structural condition.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Sediment, trash or debris is blocking the outlets or overflow structure.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Erosion is occurring around the outlets or overflow structure.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No
Height from surface of practice to top of overflow structure is insufficient to allow for ponding during rain events.	☐ Yes ☐ No ☐ N/A	☐ Yes ☐ No

APPENDIX G

PERMEABLE PAVEMENT INSPECTION AND MAINTENANCE CHECKLIST

Permeable Pavement Inspection and Maintenance Checklist

Facility:			
Location/Address:			
Date:	Time:	Weather Conditions:	Date of Last Inspection:
Inspector:		Title:	
Rain in Last 48 Hours ☐ Yes ☐ No If yes, list amount and timing:			
Pavement Type: ☐ permeable interlocking concrete pavement (PICP) ☐ asphalt ☐ concrete ☐ other, specify:			
Pretreatment: ☐ vegetated filter strip ☐ swale ☐ turf grass ☐ forebay ☐ other, specify:			
Site Plan or As-Built Plan Available: ☐ Yes ☐ No			

*Permeable interlocking concrete pavement (PICP)

Inspection Item		Comment	Action Needed
1. PRETREATMENT			
Sediment has accumulated.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Trash and debris have accumulated.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
2. PAVEMENT TRANSITION AREA			
Non-permeable transition area at pavement edges is unstable/deteriorating.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
3. DEWATERING			
Standing water is visible on the surface after a rain event.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
4. PAVEMENT SURFACE AND JOINTS			
Sediment has accumulated on pavement surface.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Trash and debris have accumulated on pavement surface or around curbing.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Pavement has deteriorated, cracked, settled, or raveled.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Sediment has accumulated in the joints of PICP.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Vegetation is growing in the joints of PICP.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Gravel is insufficient in the joints of PICP.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Additional Notes			

Additional Notes

[illegible]Wet weather inspection needed ☐ Yes ☐ No

Site Sketch:

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PROJECT NUMBER	
3202.012	
HANG 10 CAR WASH- DOVER	
914 CENTRAL AVE DOVER, NH 03820	
REV/DATE/COMMENTS	
ARCHITECT OF RECORD	
DATE:	07/21/2023
SCALE:	
DRAWN BY:	AS
CHECKED BY:	PEW
	
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SHEET	
8	
RENDERINGS	

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PROJECT NUMBER

3202.012

HANG 10 CAR WASH- DOVER

914 CENTRAL AVE
DOVER, NH 03820

REV/DATE/COMMENTS

ARCHITECT OF RECORD

DATE:

07/21/2023

SCALE:

DRAWN BY:

AS

CHECKED BY:

PEW

HOVER

ARCHITECTURE

383 INVERNESS PKWY., STE 175
ENGLEWOOD, CO 80112
(720) 775-2800

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SHEET

9

RENDERINGS

Safety & Hazard Overview

Sonny's CarWash Chemistry

GHS Pictograms & Hazards – Overview

Skin or Eye Irritant



Flammable



Corrosive



Long-Term Health Effects



Acute Toxicity



Explosive



Oxidizer



Compressed Gas



Environmental Hazard



GHS Pictograms & Hazards – Proposed Products

Skin or Eye Irritant



Flammable



Corrosive



Long-Term Health Effects



Acute Toxicity



Explosive



Oxidizer



Compressed Gas



Environmental Hazard



GHS Hazards of Proposed Products in *Concentrated* State

Proposed Line Up

Blast	Ceramic X3 Step 1	Ceramic X3 Step 2	Ceramic X3 Step 3	Cleantech HD	Flash Wax	Sensations Tri-Color	Fusion Seal	HI Suds	Infusions Bubblegum	Cherry Foam	Presoak HWS 2x	Weather-Guard	X55
 	 	 	 		N/A	N/A						N/A	
Causes skin irritation. Causes serious eye damage	Causes serious eye damage. Causes damage to organs.	Causes serious eye damage. Causes damage to organs.	Causes serious eye damage. Causes damage to organs.	Harmful if inhaled. Causes skin irritation. Causes serious eye damage.	N/A	N/A	Harmful if inhaled	May cause an allergic skin reaction	May cause an allergic skin reaction		Causes severe skin burns and eye damage	N/A	Harmful if inhaled



The currently proposed line up of chemicals does not contain any known acute risks to the workers, community, or environment.



Long-term effects are present with prolonged exposure to undiluted, concentrated products. With proper PPE and safety guidelines, this risk is mitigated.



Once diluted and applied in the wash, the products are no longer deemed a hazard and are routinely accepted by local municipalities for processing.



December 15th, 2022

Taylor Viera
CESO Inc

Natural Gas to 914 Central Ave Dover, NH

Hi Taylor,

Unitil/Northern Utilities Natural Gas Division has reviewed the requested site for natural gas service:

Unitil hereby confirms that natural gas is available for the proposed building at 914 Central Ave in Dover, NH.

If you have any questions, please contact me at 603-534-2379.

Sincerely,

A handwritten signature in blue ink, appearing to read "Dave MacLean", is written over a light blue circular background.

Dave MacLean
Senior Business Development Rep



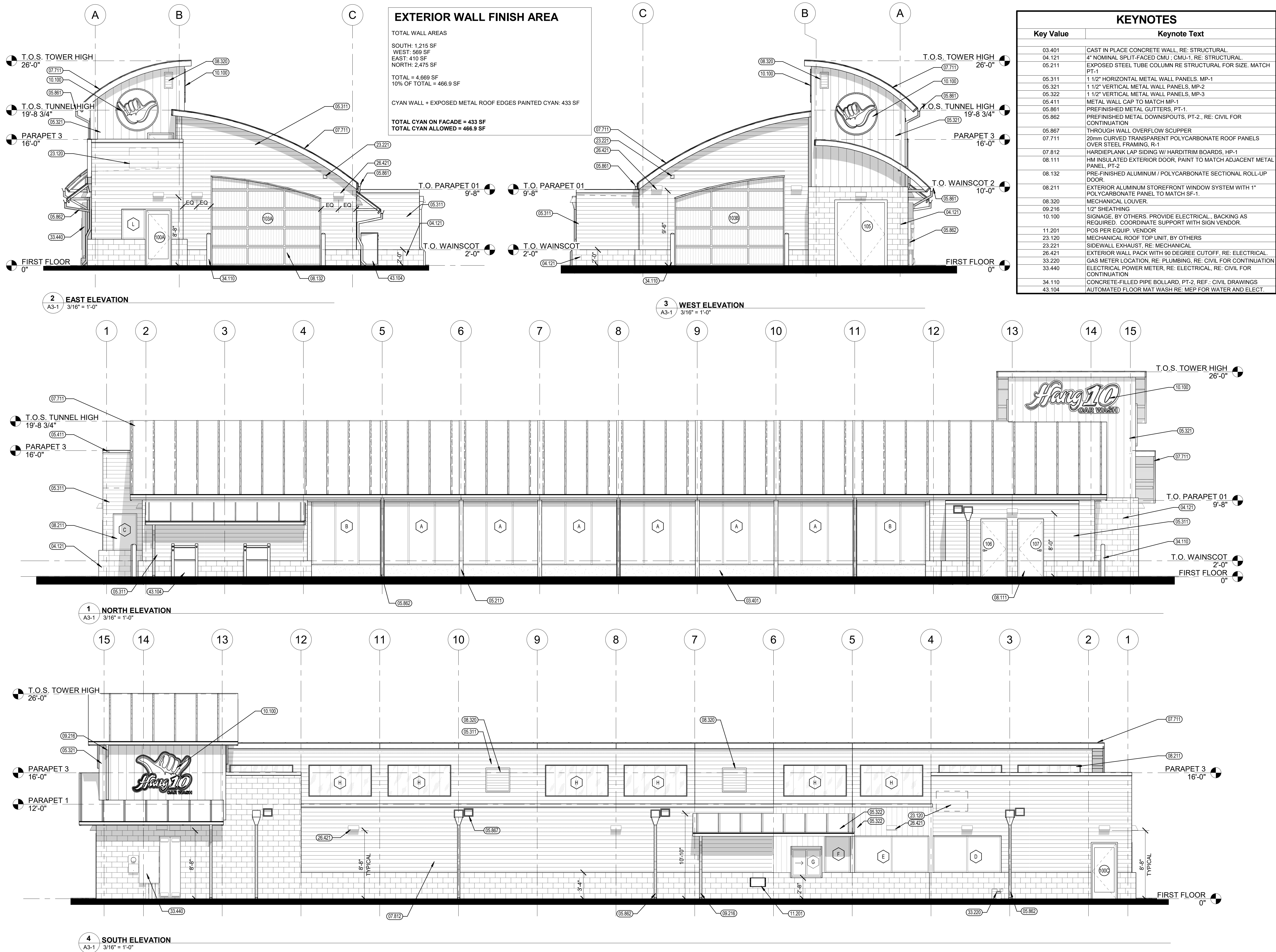
T 603.294.5261

M 603.534.2379

F 603.294.5264

Email macleand@unitil.com

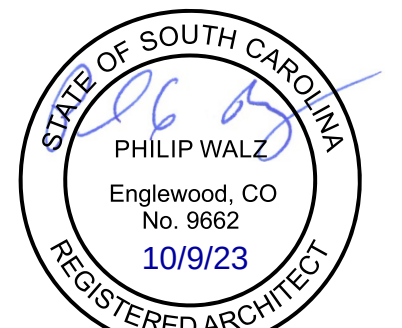
10/9/2023 2:44:27 PM C:\Users\jdee\Documents\3202_16 Hang 10 Summerville03_index.rvt



PROJECT NUMBER
3202.016

HANG 10 - SUMMERVILLE
1905 OLD TOLLEY RD
SUMMERVILLE, SC 29485

REV/DATE/COMMENTS



ARCHITECT OF RECORD

DATE: 10/09/2023
SCALE: As indicated
DRAWN BY: YG
CHECKED BY: RLH



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SHEET

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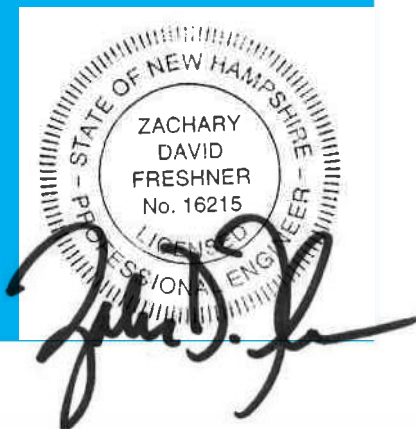
**BUILDING
ELEVATIONS**



05.02.2023

Traffic Impact Analysis

Proposed Car Wash Development



On behalf of:



Contact:

Mandy Gauss, PE
CESO Senior Project Manager
Office: 517.212.4185
Email: gauss@cesoinc.com

Preparation Date:

05/02/2023

1. Executive Summary

1.1. Introduction

This report is submitted on behalf of Wash Equity Advisors in connection with its application to the City of Dover, New Hampshire (NH) for site plan approval. The trip generation analysis conducted by CESO Inc. addresses the traffic impact associated with the Proposed Automated Car Wash Development; referred to herein as “Car Wash Development”.

CESO, Inc. was retained by the Developer to provide a traffic impact assessment and analysis for the Proposed Car Wash Development that will be located at 914 Central Avenue, Dover, NH 03820. The following analysis has been performed in general accordance with locally accepted standards and industry practices. Based on these guidelines, the purpose of this analysis is to quantify the amount of traffic generated by the construction of the Proposed Car Wash Development and identify measures to mitigate any adverse impacts on the existing transportation system.

1.2. Site Description

The Proposed Car Wash Development is to be located on the southwest side of Central Avenue, approximately 260' southeast of the Central Avenue and Webb Place. intersection, within the City of Dover, NH. The Site is primarily surrounded by commercial development in all directions. **Attachment A** contains a site location map, **Attachment B** contains a site aerial, and **Attachment C** contains a site conceptual plan.

The subject parcel is currently occupied by one approximately 4,000 sq. ft, vacant restaurant building. The existing building will be demolished to be replaced by the Car Wash Development. The Proposed Car Wash Development will be approximately 4,500 feet in gross floor area, will include one car wash tunnel and 17 vacuum-use parking spaces.

Wash Equity Advisor's Site Plan application requests approval of the following access point:

- Right-in-right-out (RIRO) access driveway to utilize the existing curb-cut approximately 300' southeast of the Central Avenue and Webb Place/Weeks Lane intersection.

1.3. Area Roadway Characteristics

Central Avenue – Central Avenue is a four-lane, two-way roadway with a two-way left-turn lane median that runs in the northwest/southeast direction in the Site vicinity. Central Avenue is classified as a minor arterial according to the *NHDOT Roads System*. Central Avenue has a posted speed limit of 30 mph and is under the jurisdiction of the City of Dover.

1.4. Area Pedestrian/Public Transit Characteristics

Pedestrian Access – Pedestrian amenities in the Site vicinity include 5' sidewalks running parallel to the roadway alignment on both the north and south side of Central Avenue. The nearest pedestrian crosswalk is located at the intersection of Central Avenue and Weeks Lane.

Public Transit – Local public transit includes bus access approximately ¼ mile northwest of the Site. However, due to the proposed use of the Site as a car wash, it is not anticipated that public transit will be utilized.

1.5. Site Traffic Generation

In order to calculate the Proposed Car Wash Development Generated Traffic Volumes, CESO reviewed Site Plan data provided by the client to determine the quantity of potential traffic volumes generated. The full buildout of the Development includes the proposed use of the Site as a Car Wash Development that consists of the following:

- One (1) approximate 4,500 sq. ft. Automated Car Wash Development with one (1) wash tunnel.

Studies of similar developments throughout North America have shown that the amount of traffic generated will be functionally related to some unit of activity (i.e., number of fueling stations, gross floor area, service bays, etc.). In practice, site traffic fluctuates substantially on different days and hours throughout the year. Therefore, it is imperative to select an appropriate hourly volume on which to base the design of the external roadway and site access facilities. The Weekday PM and Saturday Peak Hours were selected based on the hours of operation of the proposed Development and available data from the Institute of Transportation Engineers (ITE).

For analysis purposes, the base unit utilized for trip-generation was the number of car wash tunnels. The Proposed Car Wash Development Generated Traffic Volumes were calculated by utilizing data contained in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition*, in combination with methods outlined in the (ITE) Trip Generation Handbook. Trip Generation resources and calculations can be found in **Attachment D**. The Car Wash Development Generated Traffic Volumes are presented below in Table 1. The trip generation shown below includes PM peak hour trips generated, and Saturday peak hour trips generated.

Table 1
Site Generated Traffic Volumes

ITE Land Use Description	ITE Cat.	Size	Unit	Total Generated Trips								
				Weekday			Weekday PM Peak Hour			Saturday Peak Hour		
				Total	Total	Total	Total	In	Out	Total	In	Out
Automated Car Wash	948	1	Wash Tunnel	N/D	N/D	N/D	78	39	39	41	19	22
ITE Cat. 948 Entering (%) / Exiting (%)				N/D	N/D	N/D	100%	50%	50%	100%	46%	54%
TOTAL				--	--	--	78	39	39	41	19	22

N/D – No ITE trip generation data available

Note: ITE trip generation data was not available for the AM Peak Hour of the adjacent roadway. However, it would generally be accepted that a Car Wash Development would generate more traffic during a typical PM Peak Hour than a typical AM Peak Hour. As such, the typical PM Peak Hour trip generation would likely be a representative estimate of the worst-case scenario when forecasting future traffic demands.

The full buildout of the Car Wash Development is estimated to generate 78 new trips during a typical Weekday PM Peak Hour (39 inbound and 39 outbound) and 41 new trips during a typical Saturday Peak Hour (19 inbound and 22 outbound).

1.6. Site Traffic Distribution

The directional distribution of development-generated traffic is a function of several variables. The assumptions and methods used in estimating the direction in which traffic will approach and depart the Site varies with several location-specific conditions such as:

- Size and type of the proposed development.

- Population distribution within the defined area of influence.
- Prevailing operating conditions on the existing transportation system.

The analysis of directional distribution is based upon the observation that drivers normally choose the most convenient (not necessarily the most direct) routes to and from a given traffic generator. The anticipated directional distribution of trips generated by the proposed Car Wash Development is summarized in Table 2.

Table 2
Directional Distribution of Site Generated Traffic Volumes

Route	Distribution Approach/Departure	
	Passenger Cars	
	AM Peak Hour	PM Peak Hour
Trip Distribution – Cars		
From/To the North via Central Avenue	40%/40%	40%/40%
From/To the East via Central Avenue	40%/40%	40%/40%
From/To the West via Central Avenue	20%/20%	20%/20%
TOTAL	100%/100%	100%/100%

Based on an aerial review of the Site location, review of local population distributions, and an inventory of existing car wash developments in relation to the Site, it is likely that generated traffic will be distributed evenly between the northbound and southbound Central Avenue.

1.7. Intersection Sight Distance Analysis

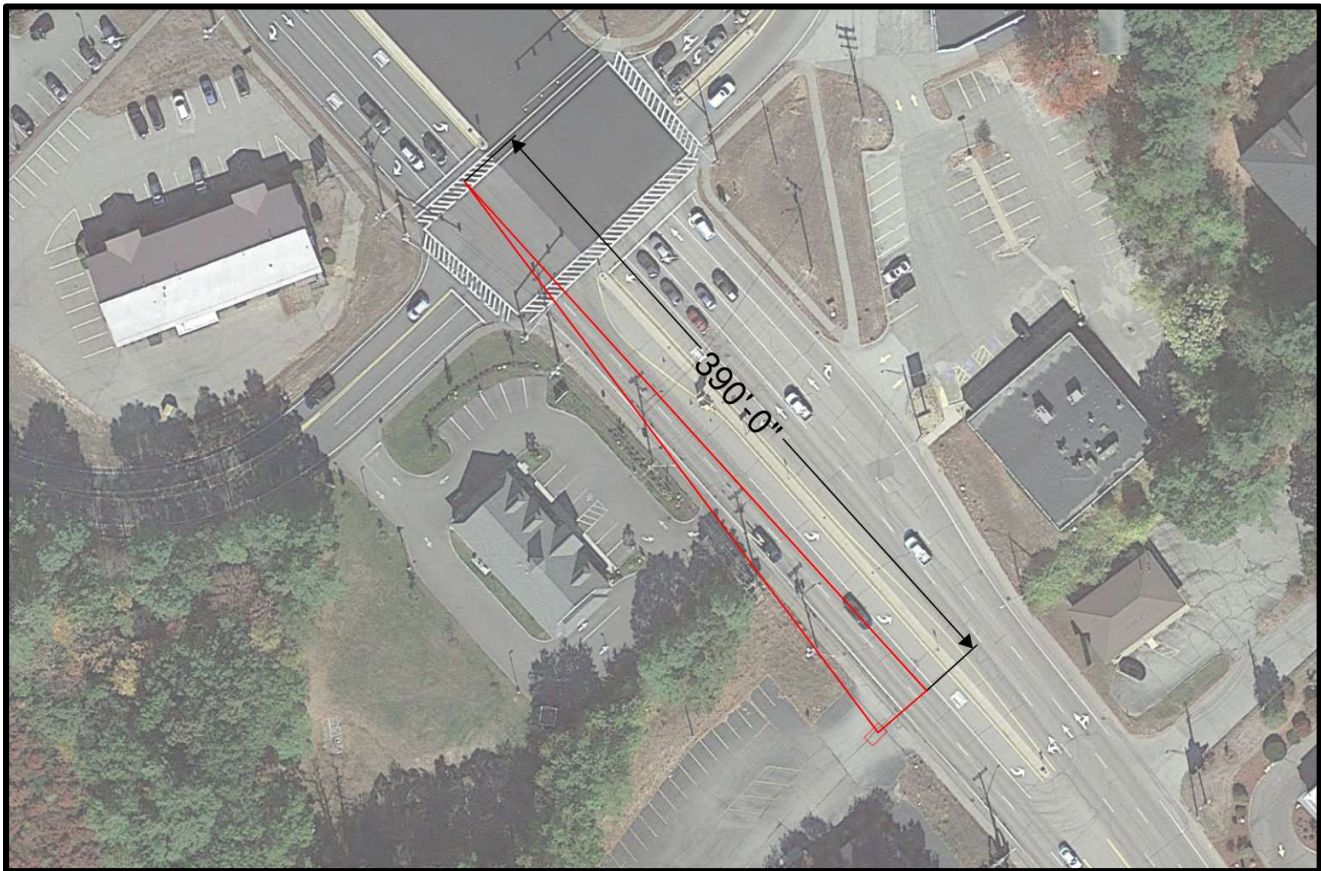
The site access driveway was reviewed for intersection sight distances were reviewed to determine if proper sight distance would be provided to vehicles exiting the Site Access Driveway per the procedures within AASHTO's *A Policy on Geometric Design of Highways and Streets 2018, 7th Edition*.

The following assumptions were made when measuring available intersection sight distance (ISD):

- 18-foot vehicle setback from the edge of travel.
- 3.5-foot visibility height for passenger cars exiting the Site Access Driveway.
- 3.5-foot object visibility height.

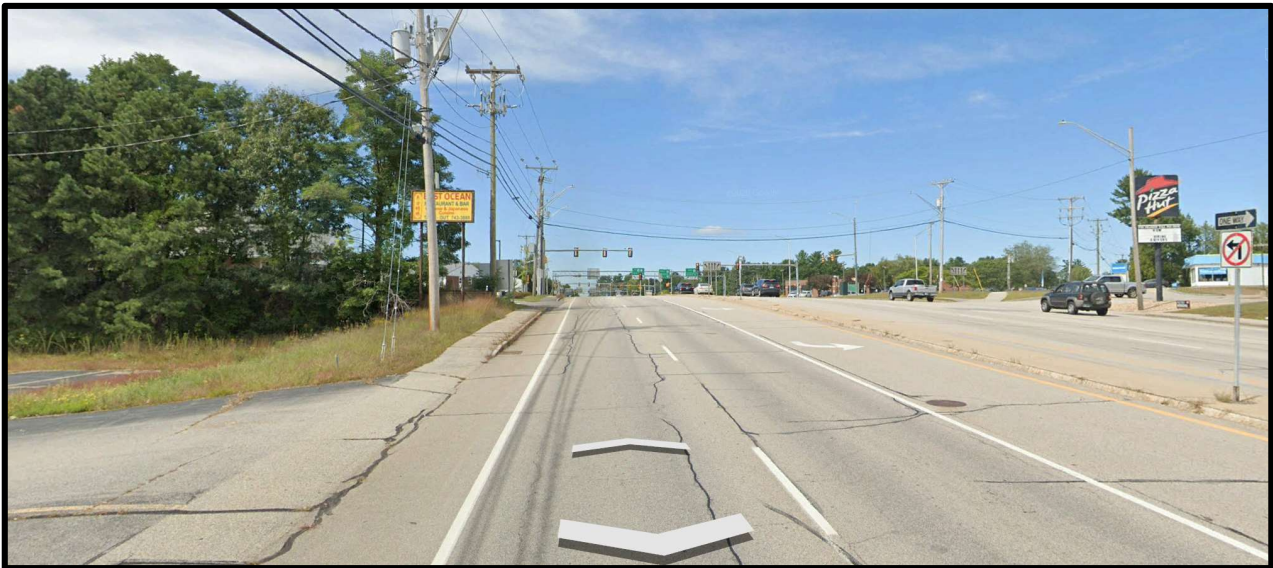
For a design speed of 35 MPH, the required intersection sight distance for an outbound right-turning vehicle is to be 390'. Intersection sight triangles for the site access driveway are shown on the following page.

Intersection Sight Distance



Based on the figure above, proper intersection sight distance will be provided to outbound vehicles making a right turn to exit the Car Wash Development. The following pictures show the existing sight distance at the existing driveway, provided by Google Earth imagery.

Central Avenue – Looking Northwest from Existing Site Driveway



Central Avenue – Looking Southeast from Existing Site Driveway



1.8. Summary of Recommendations

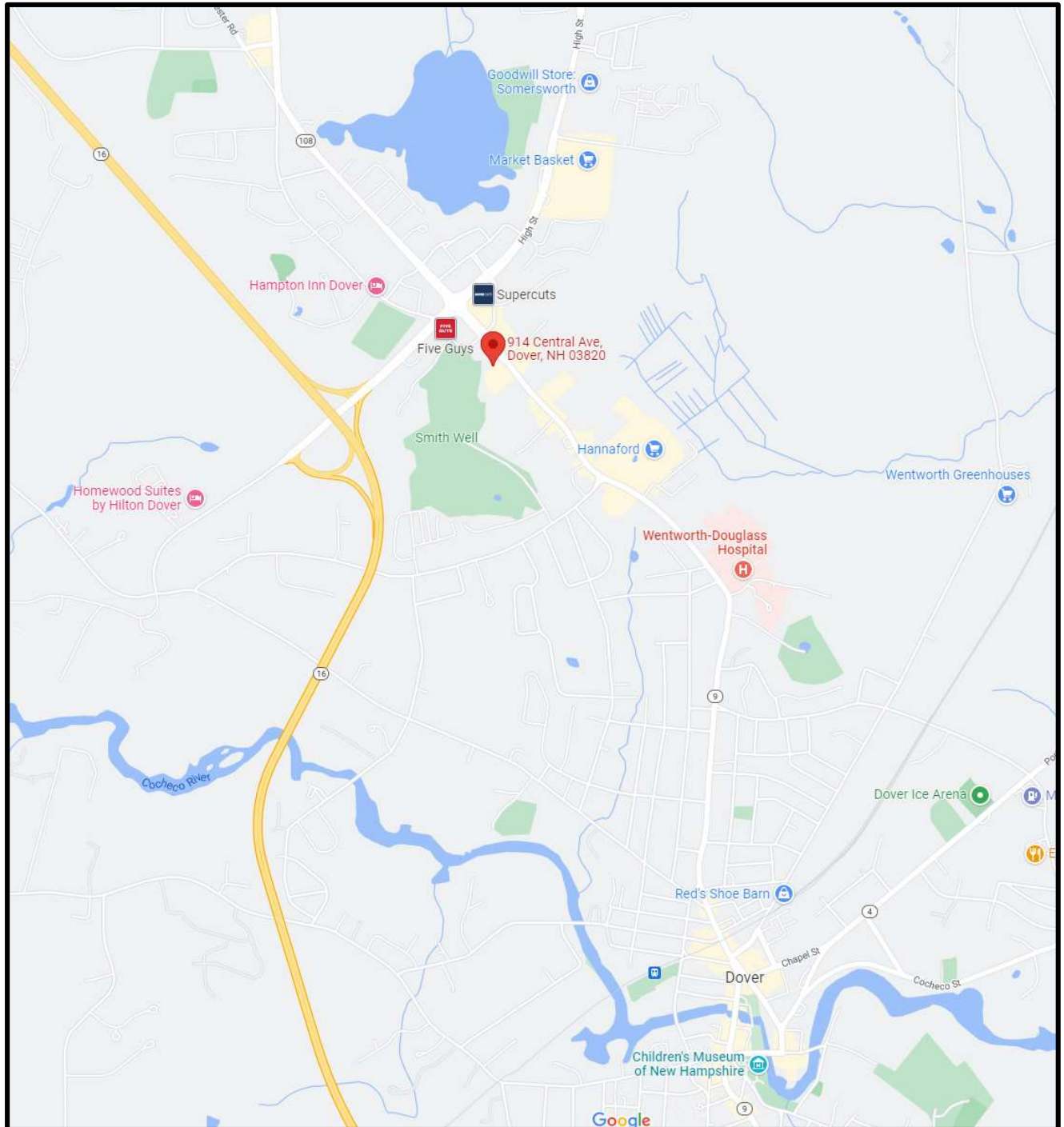
The following summary of recommendations was generated based upon the findings in the Traffic Impact Analysis.

2023 Build Traffic Scenario (Responsibility – Developer):

Central Avenue & Site Access Driveway:

- Improve Existing Site Access Driveway to permit right-in and right-out (RIRO) vehicle movements. Provide one (1) inbound lane and one (1) outbound right-turn lane.

Attachment A: Site Location Map

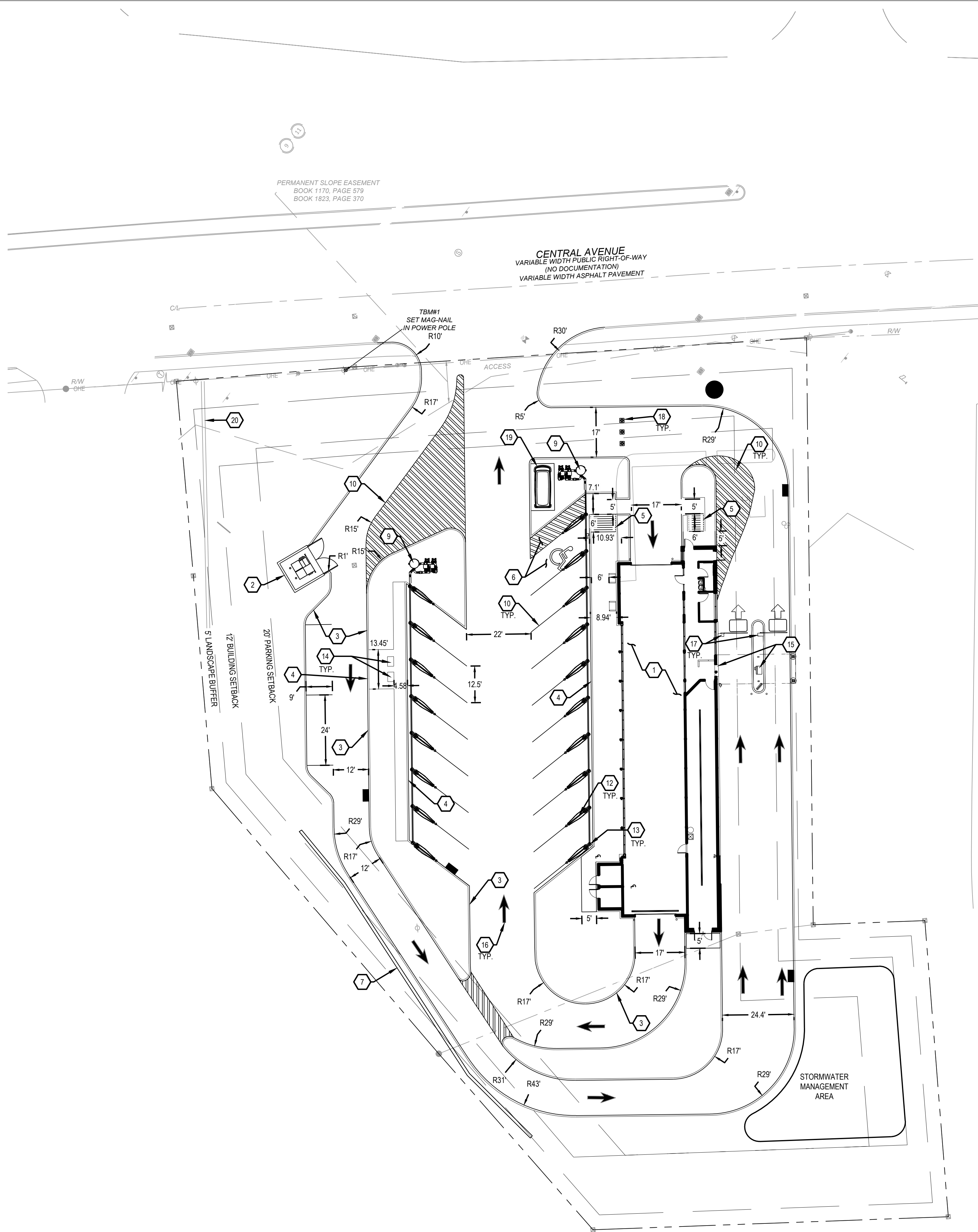


Attachment B: Site Aerial



Attachment C: Site Plan

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SITE LEGEND

EXISTING

REFER TO C1.1 FOR EXISTING FEATURES LEGEND

PROPOSED

	PROPOSED HEAVY DUTY ASPHALT PAVEMENT
	PROPOSED STANDARD DUTY ASPHALT PAVEMENT
	PROPOSED MILL & OVERLAY
	PROPOSED HEAVY DUTY CONCRETE PAVEMENT
	PROPOSED CONCRETE PAVEMENT
	PROPOSED CONCRETE SIDEWALK
	RIGHT-OF-WAY
	PROPERTY LINE
	SETBACK
	EASEMENT
	CENTERLINE
	BUILDING
	CONCRETE CURB
	PAVEMENT/WALK
	RETAINING WALL
	PARKING SPACE COUNT
	SIGN
	DETECTABLE WARNING MAT.
	CATCH BASIN
	STORM MANHOLE
	SANITARY MANHOLE
	CURB INLET
	CLEANOUT
	YARD DRAIN
	DOWN SPOUT
	FIRE HYDRANT
	LIGHT POLE
	CONCRETE BUMPER BLOCK

GENERAL NOTES:

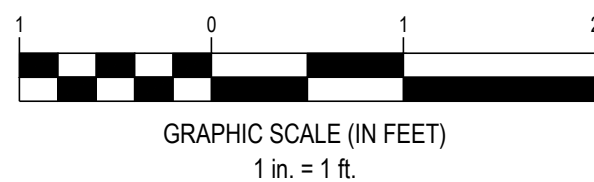
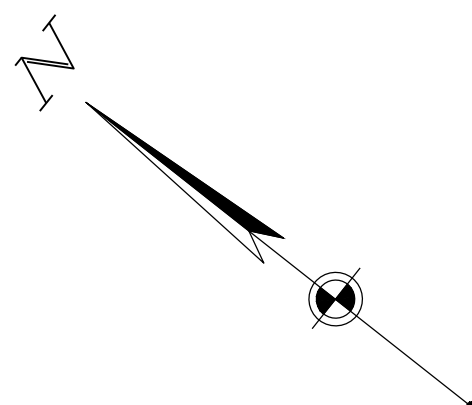
SEE SHEET

CODED NOTES:

1. PROPOSED 4400 SF BUILDING. REFER TO ARCHITECTURAL PLANS FOR DETAILS.
2. PROPOSED TRASH ENCLOSURE PER LOCAL REQUIREMENTS. SEE ARCHITECTURAL PLAN FOR DETAILS.
3. PROPOSED 6" STRAIGHT CURB. REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
4. PROPOSED INTEGRAL CONCRETE CURB AND SIDEWALK. REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
5. PROPOSED CURB RAMP, REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
6. ADA ACCESSIBLE PARKING SPACE WITH SIGNAGE. REFER TO CONSTRUCTION DETAILS, SHEET 6.0.
7. PROPOSED RETAINING WALL.
8. PROPOSED 6" CONCRETE BOLLARD. REFER TO CONSTRUCTION DETAILS, SHEET C6.0.
9. PROPOSED PUMP. REFER TO MEP PLANS FOR DETAILS.
10. PROPOSED PARKING LOT PAVEMENT MARKINGS.
11. PROPOSED LIGHT POLE.
12. PROPOSED VACUUMS. REFER TO MEP PLANS FOR DETAILS.
13. PROPOSED VACUUM MOTOR/ EQUIPMENT ENCLOSURE. REFER TO MEP PLANS FOR DETAILS.
14. PROPOSED TRASH RECEPTACLE.
15. PROPOSED PAY STATION. REFER TO MEP PLANS FOR DETAILS.
16. PROPOSED DIRECTIONAL ARROW TO BE IN COMPLIANCE WITH M.U.T.C.D. STANDARDS.
17. PROPOSED BARRIER GATE. REFER TO MEP PLANS FOR DETAILS.
18. PROPOSED TRAFFIC CONE
19. PROPOSED CAR SIGNAGE
20. EXISTING RETAINING WALL



SEVENTY-TWO (72) HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTORS SHALL NOTIFY THE FOLLOWING AGENCIES: NEW HAMPSHIRE UTILITIES PROTECTION SERVICE AT 811 OR 888-344-7233 AND ALL OTHER AGENCIES WHICH MIGHT HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NONMEMBERS OF STATE UTILITIES PROTECTION SERVICE



HANG TEN CAR WASH

DOVER, NH

914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions		
ID	Description	Date
761766		
1"=20'		
NTV		
HGC		
03/10/2023		
NOT FOR CONSTRUCTION		

SITE PLAN

C3.0

Attachment D: Trip Generation Resources

Automated Car Wash

(948)

Vehicle Trip Ends vs: Car Wash Tunnels
On a: Saturday, Peak Hour of Generator

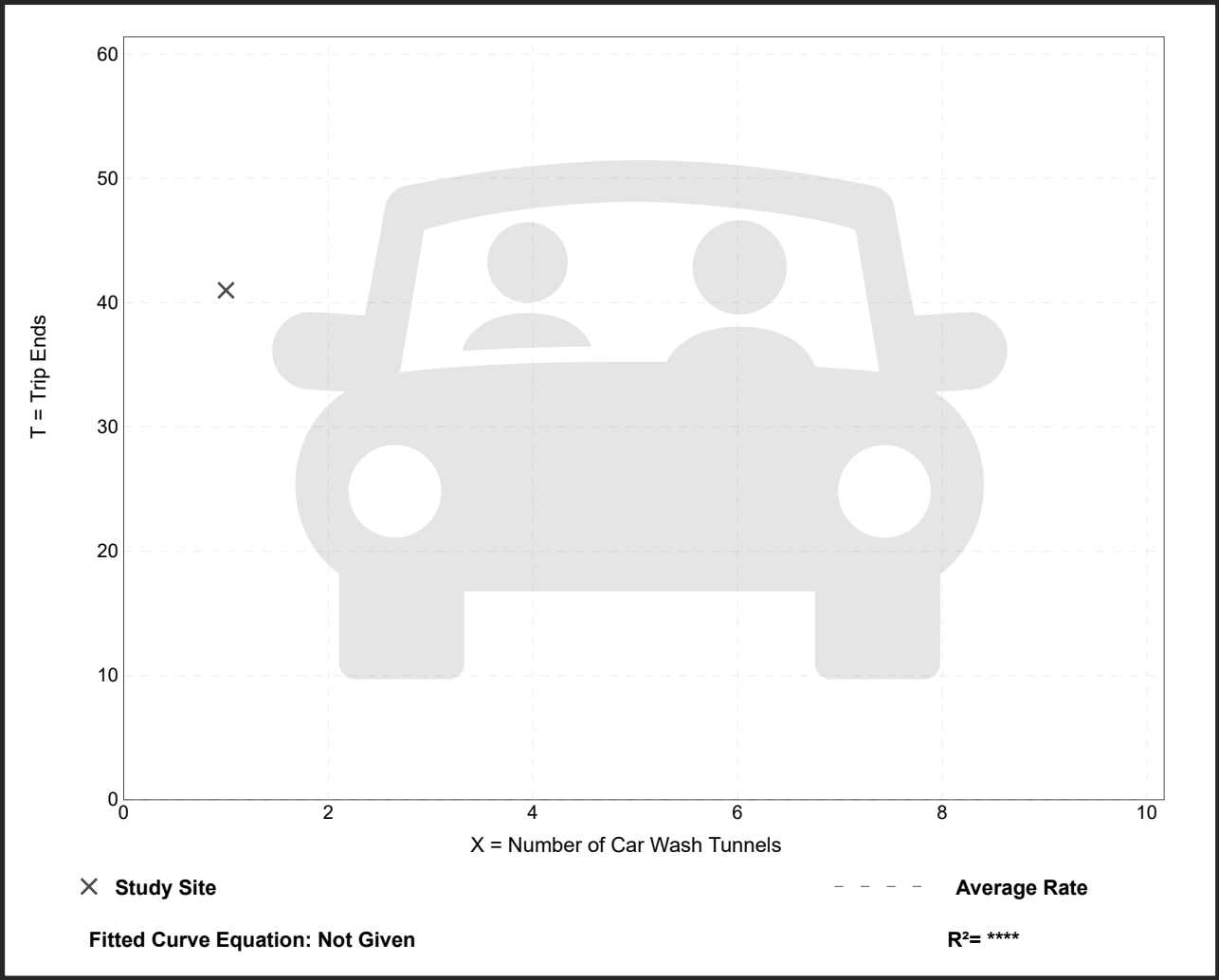
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Car Wash Tunnels: 1
Directional Distribution: 46% entering, 54% exiting

Vehicle Trip Generation per Car Wash Tunnel

Average Rate	Range of Rates	Standard Deviation
41.00	41.00 - 41.00	*

Data Plot and Equation

Caution – Small Sample Size



Automated Car Wash

(948)

Vehicle Trip Ends vs: Car Wash Tunnels

On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 3

Avg. Num. of Car Wash Tunnels: 1

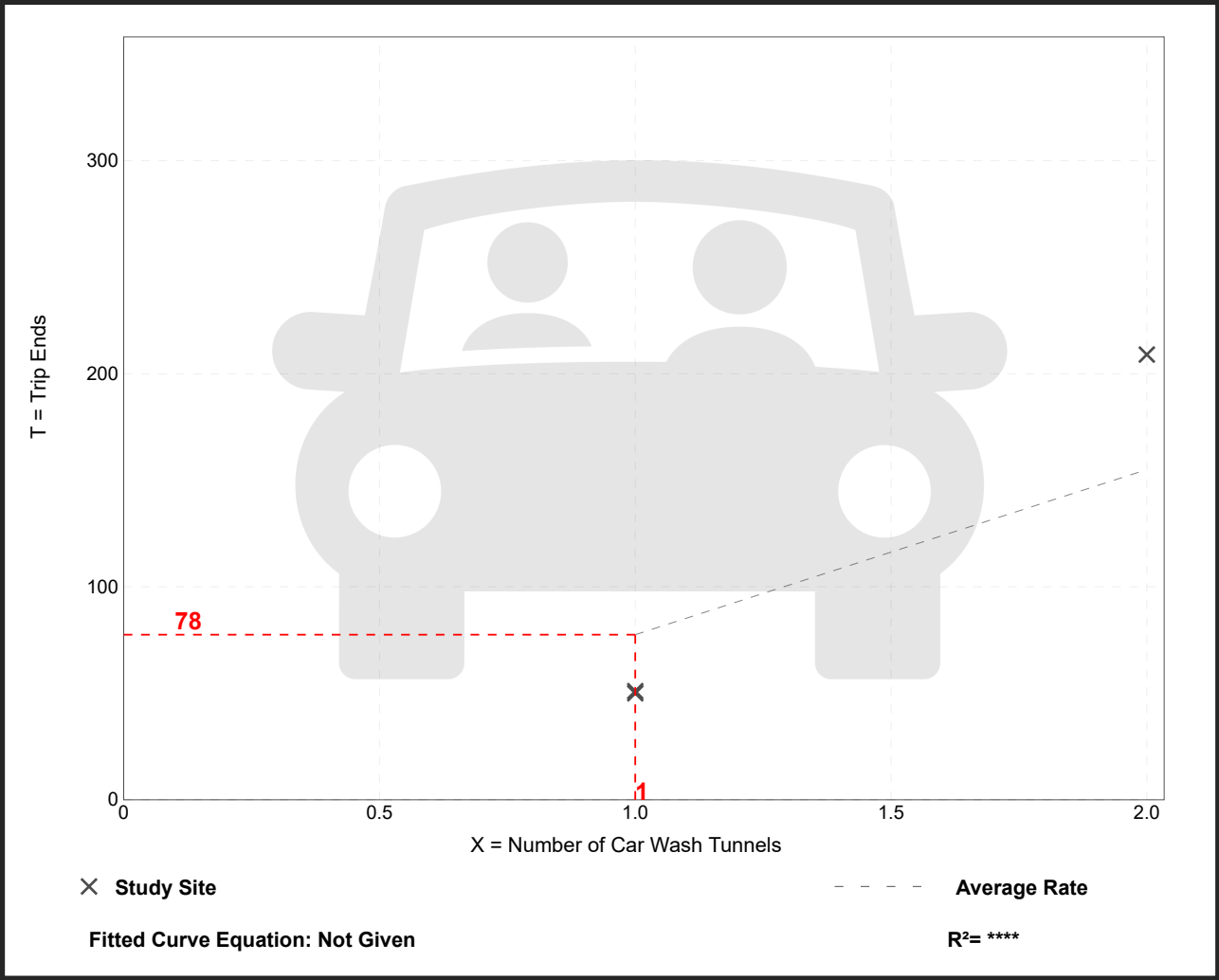
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Car Wash Tunnel

Average Rate	Range of Rates	Standard Deviation
77.50	50.00 - 104.50	33.07

Data Plot and Equation

Caution – Small Sample Size



November 11th, 2022

Traffic Impact Study – Proposed Automobile Wash Facility

City of Dover, NH

CESO Trip Generation Calculations – 2023 Build Traffic Scenario:

ITE 948 – Automated Car Wash

For Weekday → N/D

For AM Peak Hour → N/D

For PM Peak Hour → 50% Enter/50% Exit

1 Wash Tunnel x 77.50 = 77.50 ≈ **78 Trips** for Even Number

Primary Trips = 78 x 0.50 (50%) = **39 Trips Enter/39 Trips Exit**

For Saturday Peak Hour → 46% Enter/54% Exit

1 Wash Tunnel x 41.00 = 41.00 ≈ **41 Trips** for Even Number

Primary Trips = 41 x 0.46 (46%) and 41 x 0.54 (54%) = **19 Trips Enter/22 Trips Exit**



Stormwater Management Report

Hang Ten Car Wash
914 Central Ave
Dover, NH 03820

Date Prepared: 05/24/2023

Revised: 07/21/2023

On behalf of:



Contact:

Hosea Cunningham
cunningham@cesoinc.com
615-932-5187

CESO
216 Centerview Dr, Ste 150
Nashville, TN 37207

Engineer of Record:

Zach Freshner



Table of Contents

Introduction.....	1
Existing Conditions	1
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Stormwater Quality	2
Stormwater Quantity	3
Summary.....	3

APPENDICES

- A. Proposed Conditions Calculations**
- B. Stormwater Pipe Calculations**
- C. USDA NRCS Web Soil Survey**
- D. Drainage Area Maps**
 - D1. Existing Conditions Drainage Area Map**
 - D2. Proposed Conditions Drainage Area Map**
 - D3. Tributary Drainage Area Map**

Introduction

This report covers the methodology and calculations used in the design of the stormwater management system for the proposed development anticipated for 914 Central Ave, Dover, NH 03820.

The stormwater management system is designed in accordance with Dover, NH Site Plan Regulations (SPR) Section 153-14 C.2 and New Hampshire Stormwater Manual Volume 2. The stormwater criteria for Dover, NH have requirements for stormwater mitigation and treatment found in the SPR 153-14 A.3.c.2.a. The site qualifies for redevelopment under the SPR with the existing impervious coverage of the site being calculated as greater than 40% (44%, see pre-developed conditions exhibit, Appendix D1). Based on direction from the City, the impervious area shall not be increased.

- For sites qualifying for redevelopment, stormwater shall be managed in accordance with one or more of the following techniques:
 - Implement measures on site that result in mitigation and treatment of at least 30% of the existing impervious cover as well as 50% of the additional proposed impervious surfaces and pavement areas through the application of LID; or
 - Implement other LID techniques on site to the Maximum Extent Practicable (MEP) to provide mitigation and treatment for at least 50% of the entire site area

The proposed design incorporates the former bullet point – mitigation and treatment of at least 30% of the existing impervious cover (0.17 acres) as well as 50% of the additional proposed impervious area (0 acres) for a total of 0.17 acres. A total of 0.18 acres of pervious pavers were included to mitigate the post-developed impervious area below the pre-developed impervious area.

The stormwater quality requirements are found in SPR Section 153-14 B: runoff of impervious surfaces shall be treated to provide 80% of removal of total suspended solids (TSS) and 50% removal of both total nitrogen and phosphorus.

Storm routings for this project were performed using HydroCAD. Time of Concentration was determined by using the TR-55 method, within HydroCAD.

The onsite soils were obtained from USDA NRCS Web Soil Survey and can be found in **Appendix C**.

The storm pipe network was designed using Hydraflow Stormsewers Extension for Autodesk Civil 3D. City of Dover site development design criteria requires that the pipes be sized appropriately to convey the 10-year, 24-hour storm. Refer to **Appendix B** for the Storm Pipe Calculations and **Appendix D3** for the associated Tributary Drainage area Map.

Existing Conditions

The existing site is a 1.29 acre developed site with an existing restaurant and parking lot on site. The 1.29 acre ± developed parcel with an existing restaurant and parking lot that has frontage along Central Ave (NH #9). Central Ave borders the site to the northeast. McDonalds borders the site to the southeast. A financial institution borders the site to the northwest. A commercial use borders the site to the west. An undeveloped wooden tract borders the site to the southwest.

The Soil Survey indicates this site to have Hinckley Loamy Sand (Hydrologic Soil Group A). For hydrologic soil group A soils, we assumed CN values of 98 for impervious areas, and 39 for grassed areas in good condition.

The Existing Conditions Drainage Area Map can be found in **Appendix D1**.

Proposed Conditions

The proposed development of the site will consist of the construction of a 4,400 SF building, a paved parking area, paved drive aisles, associated site improvements and a stormwater management system. The stormwater management system consists of a bioretention area, a hydrodynamic separator, an outlet control structure, and an emergency spillway. There is a natural emergency spillway on the south edge of the bioretention basin. The bioretention area in conjunction with the outlet control structure have been designed to address the water quality and water quantity requirements. A hydrodynamic separator shall be utilized as a pretreatment device for the bioretention area. There shall be another hydrodynamic separator installed at the outlet of the site for the stormwater that was not routed through the bioretention area. The stormwater shall then be routed into the existing stormwater system along Central Ave.

The proposed improvements will create a bioretention area, with the amount of stormwater managed as defined by the redevelopment criteria.

- B-1 – Proposed stormwater management basin, which discharges into the existing storm sewer system with Main St.

For hydrologic soil group A soils, we assumed CN values of 98 for impervious areas, and 39 for grassed areas in good condition.

Stormwater Quality

To satisfy the water quality requirements, a bioretention system was chosen for stormwater mitigation and treatment. The bioretention system is designed to mitigate and treat the area defined by the redevelopment criteria in the Dover, NH Code which results in 0.17 acres of impervious area. The area draining to the pond is 0.86 acres, greater than the 0.17 areas required by the redevelopment criteria. A hydrodynamic separator shall be used as pretreatment for the bioretention area. According to the New Hampshire Stormwater Manual, Volumes 1 & 2, bioretention systems provide 90% TSS removal, 60% nitrogen removal and 65% phosphorus removal.

The impervious areas to the southeast of the site do not drain to the bioretention system, the areas drain to the second hydrodynamic separator. This second hydrodynamic separator is installed to manage the water quality to the MEP, as the required area to treat and mitigate is being handled by the bioretention system.

Stormwater Quantity

The stormwater quantity that is being managed is 0.17 acres, the amount totaled from the redevelopment section 153-14 C.2, mentioned above.

The discharge characteristics for the proposed stormwater management basin are listed in the following table:

Basin B-1		
Storm	Peak Discharge	Water surface Elevation
2-year	0.41 CFS	186.10 FT
10-year	0.62 CFS	186.22 FT
25-year	0.78 CFS	186.32 FT
50-year	0.93 CFS	186.42 FT

Refer to **Appendix A** for the Stormwater Quantity Calculations. The Proposed Conditions Drainage Area Map can be found in **Appendix D2**.

Summary

The proposed stormwater management system has been successfully designed to manage the increased runoff from associated improvements of the project. The stormwater management system has been designed in accordance with the appropriate regulations, as demonstrated in the previous tables and accompanying calculations.

APPENDIX A: PROPOSED CONDITIONS CALCULATIONS

Dover - Redev0524

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NRCC 24-hr	D	Default	24.00	1	3.15	2
2	10-Year	NRCC 24-hr	D	Default	24.00	1	4.74	2
3	25-Year	NRCC 24-hr	D	Default	24.00	1	5.98	2
4	50-Year	NRCC 24-hr	D	Default	24.00	1	7.14	2

Dover - Redev0524

NRCC 24-hr D 2-Year Rainfall=3.15"

Prepared by CESO, Inc

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

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

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

Subcatchment1S: Post-Developed

Runoff Area=0.170 ac 100.00% Impervious Runoff Depth>2.60"

Tc=10.0 min CN=98 Runoff=0.41 cfs 0.037 af

Pond 2P: Pond

Peak Elev=186.10' Storage=601 cf Inflow=0.41 cfs 0.037 af

Outflow=0.30 cfs 0.028 af

Total Runoff Area = 0.170 ac Runoff Volume = 0.037 af Average Runoff Depth = 2.60"
0.00% Pervious = 0.000 ac 100.00% Impervious = 0.170 ac

Summary for Subcatchment 1S: Post-Developed Conditions

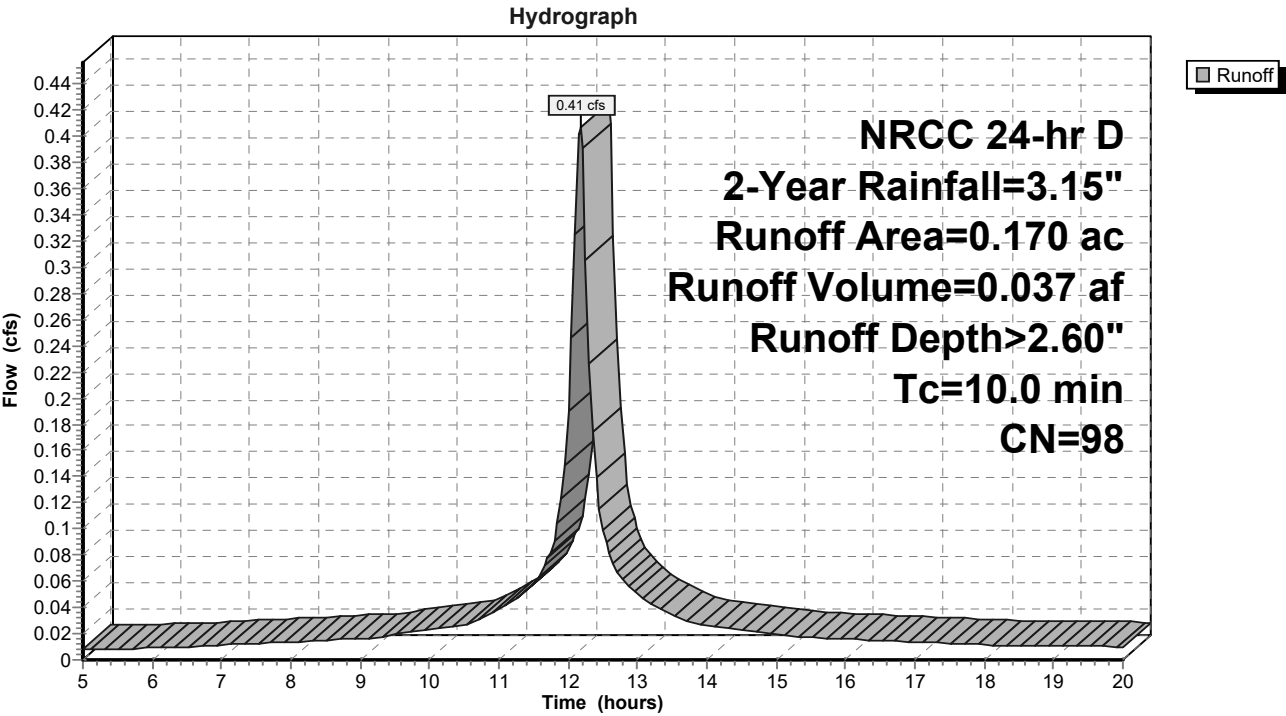
Runoff = 0.41 cfs @ 12.17 hrs, Volume= 0.037 af, Depth> 2.60"
Routed to Pond 2P : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (ac)	CN	Description
* 0.170	98	
0.170		100.00% Impervious Area

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

Subcatchment 1S: Post-Developed Conditions



Summary for Pond 2P: Pond

Inflow Area = 0.170 ac, 100.00% Impervious, Inflow Depth > 2.60" for 2-Year event
 Inflow = 0.41 cfs @ 12.17 hrs, Volume= 0.037 af
 Outflow = 0.30 cfs @ 12.26 hrs, Volume= 0.028 af, Atten= 27%, Lag= 5.4 min
 Primary = 0.30 cfs @ 12.26 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 186.10' @ 12.26 hrs Surf.Area= 1,941 sf Storage= 601 cf

Plug-Flow detention time= 149.6 min calculated for 0.027 af (75% of inflow)
 Center-of-Mass det. time= 78.0 min (820.5 - 742.5)

Volume	Invert	Avail.Storage	Storage Description
#1	185.75'	2,772 cf	Ponding (Prismatic) Listed below (Recalc)
#2	183.50'	186 cf	Filter Media Voids (Prismatic) Listed below (Recalc) 620 cf Overall x 30.0% Voids
#3	182.50'	165 cf	Coarse Gravel Voids (Prismatic) Listed below (Recalc) 413 cf Overall x 40.0% Voids
#4	182.25'	26 cf	3/8" Stone Voids (Prismatic) Listed below (Recalc) 103 cf Overall x 25.0% Voids
3,149 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
185.75	572	0	0
186.25	757	332	332
187.25	1,200	979	1,311
188.25	1,722	1,461	2,772

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.50	413	0	0
185.00	413	620	620

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.50	413	0	0
183.50	413	413	413

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.25	413	0	0
182.50	413	103	103

Device	Routing	Invert	Outlet Devices
#1	Primary	184.80'	12.0" Round Culvert L= 20.5' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.80' / 183.70' S= 0.0537 ' / ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Device 1	185.75'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Dover - Redev0524

Prepared by CESO, Inc

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NRCC 24-hr D 2-Year Rainfall=3.15"

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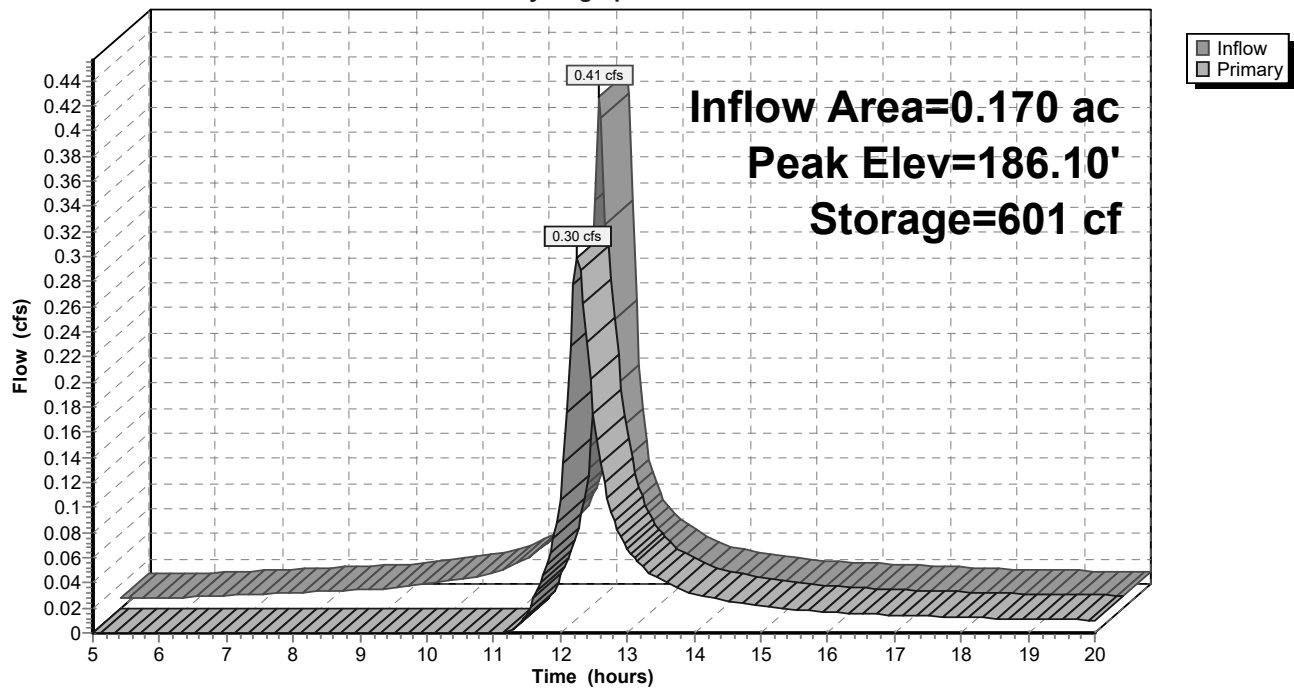
#3 Primary 188.40' **30.0' long Broad-Crested Rectangular Weir**
Head (feet) 189.00
Coef. (English) 4.00

Primary OutFlow Max=0.30 cfs @ 12.26 hrs HW=186.10' (Free Discharge)

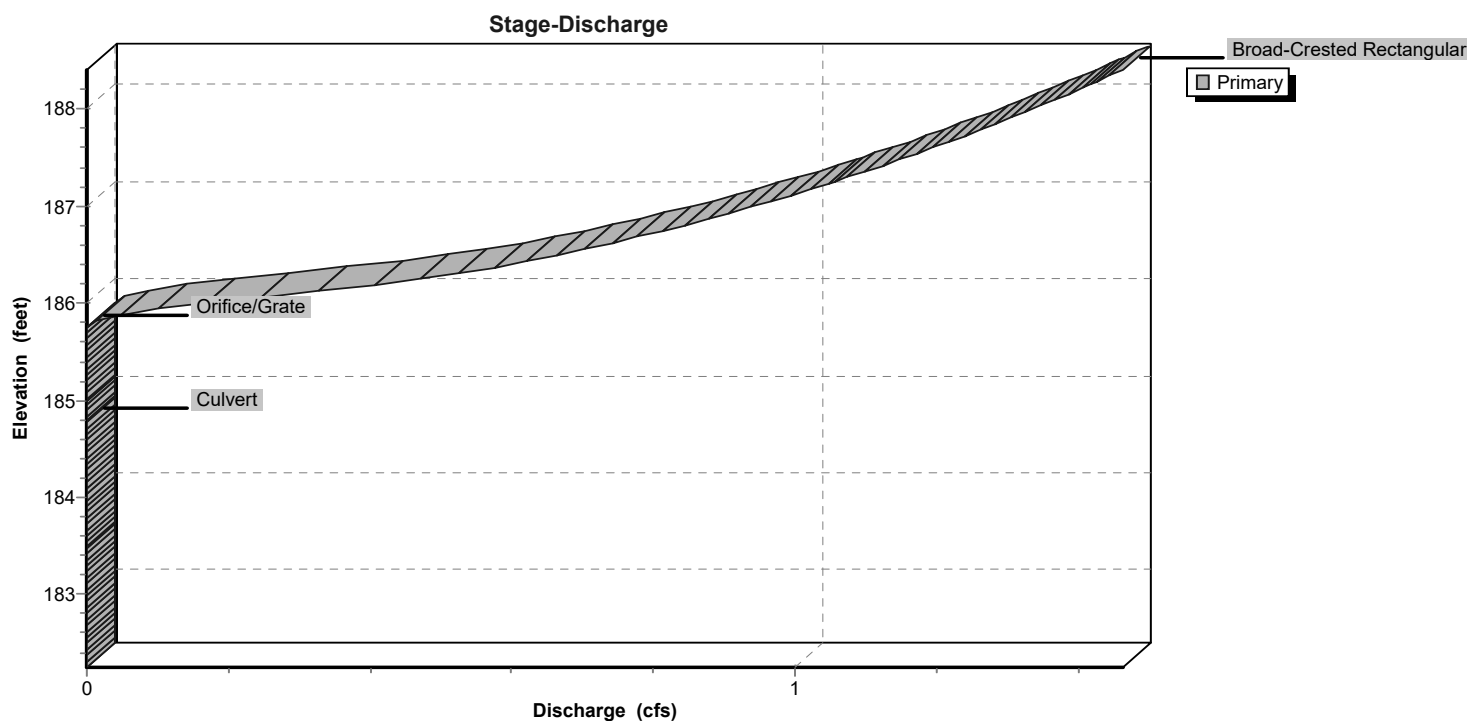
- 1=Culvert (Passes 0.30 cfs of 3.38 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.30 cfs @ 2.02 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: Pond

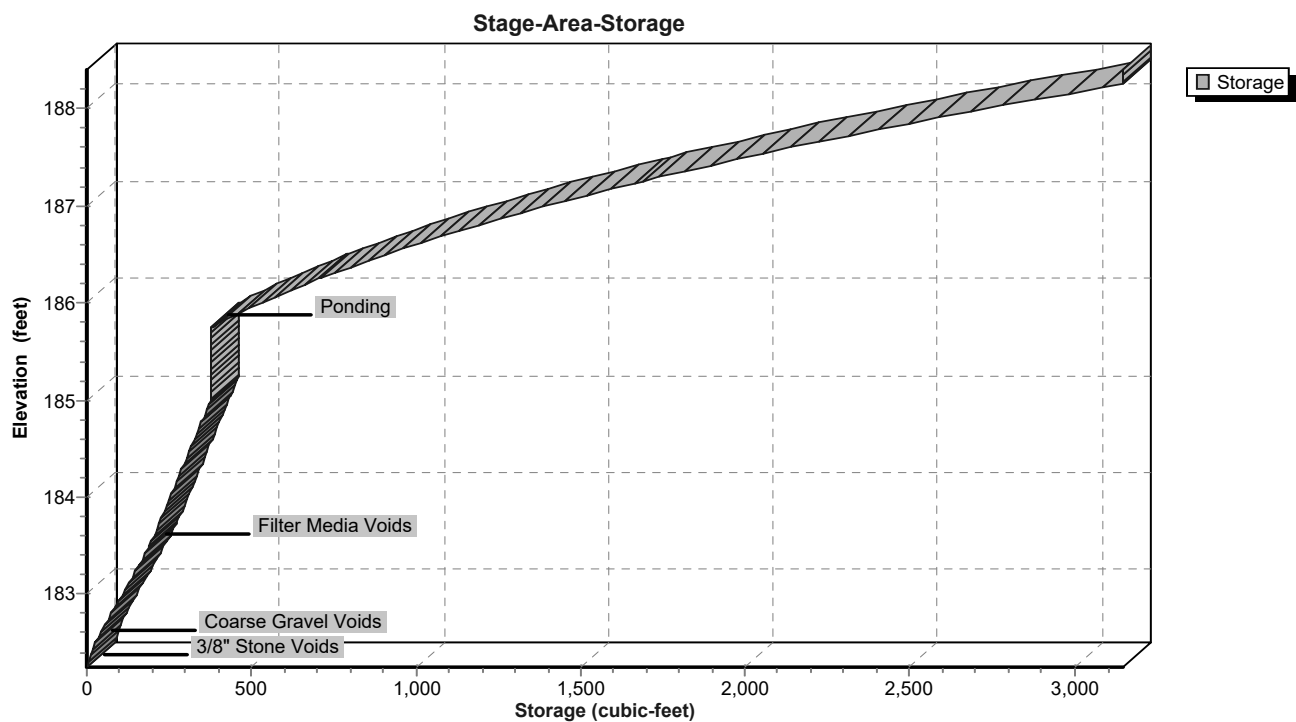
Hydrograph



Pond 2P: Pond



Pond 2P: Pond



Dover - Redev0524

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

Prepared by CESO, Inc

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Post-Developed

Runoff Area=0.170 ac 100.00% Impervious Runoff Depth>3.98"
Tc=10.0 min CN=98 Runoff=0.62 cfs 0.056 af

Pond 2P: Pond

Peak Elev=186.22' Storage=690 cf Inflow=0.62 cfs 0.056 af
Outflow=0.45 cfs 0.047 af

Total Runoff Area = 0.170 ac Runoff Volume = 0.056 af Average Runoff Depth = 3.98"
0.00% Pervious = 0.000 ac 100.00% Impervious = 0.170 ac

Summary for Subcatchment 1S: Post-Developed Conditions

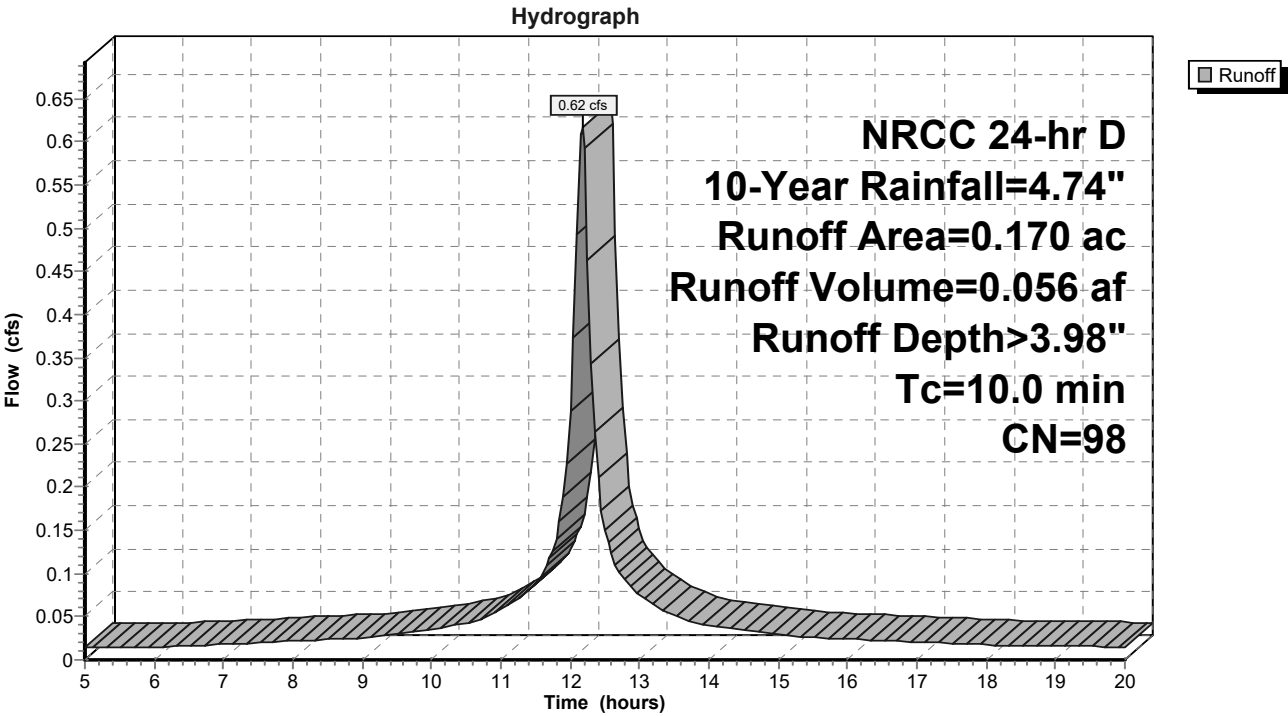
Runoff = 0.62 cfs @ 12.17 hrs, Volume= 0.056 af, Depth> 3.98"
Routed to Pond 2P : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.74"

Area (ac)	CN	Description
* 0.170	98	
0.170		100.00% Impervious Area

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

Subcatchment 1S: Post-Developed Conditions



Summary for Pond 2P: Pond

Inflow Area = 0.170 ac, 100.00% Impervious, Inflow Depth > 3.98" for 10-Year event
 Inflow = 0.62 cfs @ 12.17 hrs, Volume= 0.056 af
 Outflow = 0.45 cfs @ 12.26 hrs, Volume= 0.047 af, Atten= 28%, Lag= 5.5 min
 Primary = 0.45 cfs @ 12.26 hrs, Volume= 0.047 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 186.22' @ 12.26 hrs Surf.Area= 1,986 sf Storage= 690 cf

Plug-Flow detention time= 116.8 min calculated for 0.047 af (83% of inflow)
 Center-of-Mass det. time= 61.6 min (801.2 - 739.6)

Volume	Invert	Avail.Storage	Storage Description
#1	185.75'	2,772 cf	Ponding (Prismatic) Listed below (Recalc)
#2	183.50'	186 cf	Filter Media Voids (Prismatic) Listed below (Recalc) 620 cf Overall x 30.0% Voids
#3	182.50'	165 cf	Coarse Gravel Voids (Prismatic) Listed below (Recalc) 413 cf Overall x 40.0% Voids
#4	182.25'	26 cf	3/8" Stone Voids (Prismatic) Listed below (Recalc) 103 cf Overall x 25.0% Voids
3,149 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
185.75	572	0	0
186.25	757	332	332
187.25	1,200	979	1,311
188.25	1,722	1,461	2,772

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.50	413	0	0
185.00	413	620	620

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.50	413	0	0
183.50	413	413	413

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.25	413	0	0
182.50	413	103	103

Device	Routing	Invert	Outlet Devices
#1	Primary	184.80'	12.0" Round Culvert L= 20.5' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.80' / 183.70' S= 0.0537 ' / ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Device 1	185.75'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

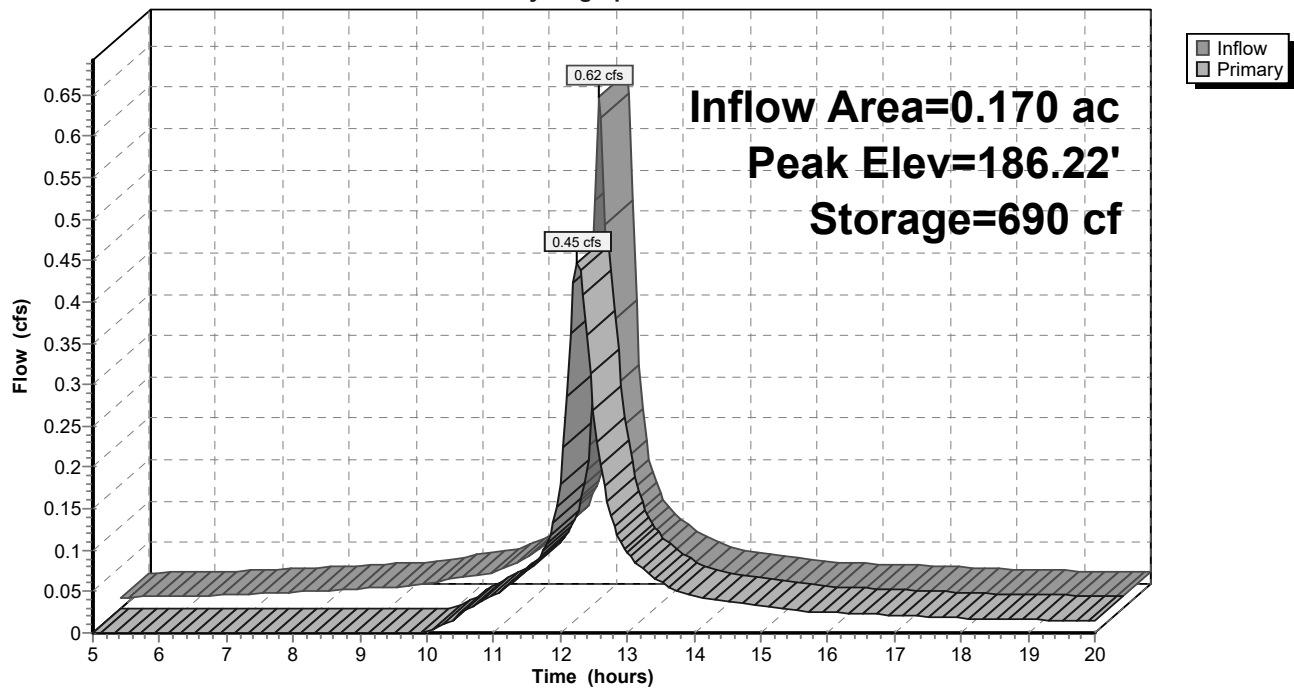
#3 Primary 188.40' **30.0' long Broad-Crested Rectangular Weir**
 Head (feet) 189.00
 Coef. (English) 4.00

Primary OutFlow Max=0.45 cfs @ 12.26 hrs HW=186.22' (Free Discharge)

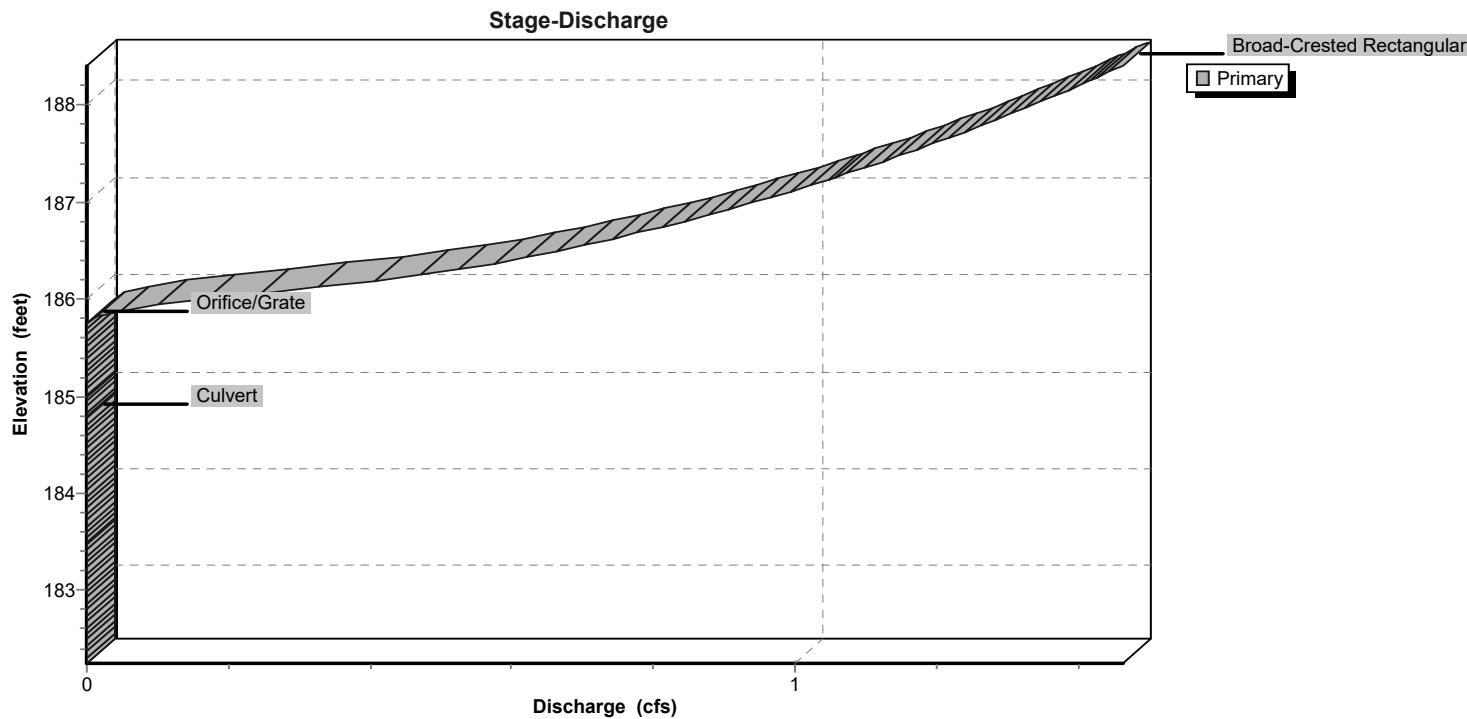
1=Culvert (Passes 0.45 cfs of 3.63 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.45 cfs @ 2.34 fps)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: Pond

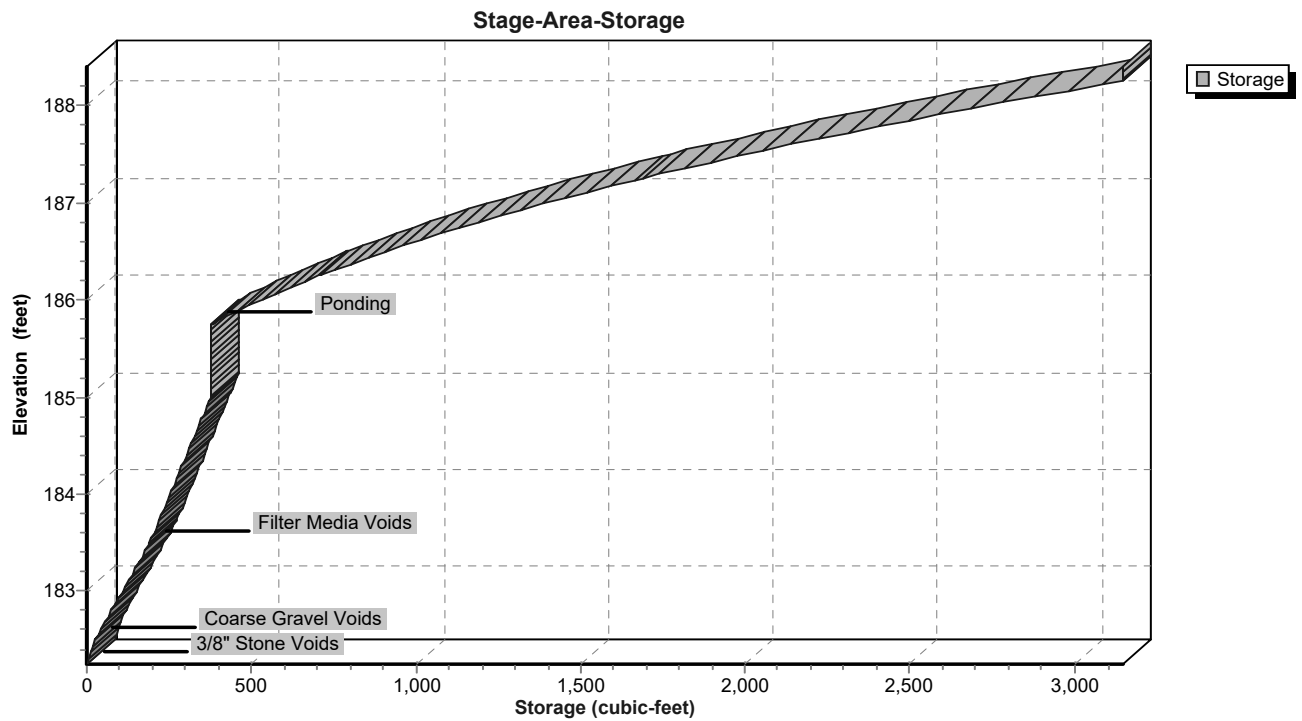
Hydrograph



Pond 2P: Pond



Pond 2P: Pond



Dover - Redev0524

NRCC 24-hr D 25-Year Rainfall=5.98"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Post-Developed

Runoff Area=0.170 ac 100.00% Impervious Runoff Depth>5.05"
Tc=10.0 min CN=98 Runoff=0.78 cfs 0.071 af

Pond 2P: Pond

Peak Elev=186.33' Storage=767 cf Inflow=0.78 cfs 0.071 af
Outflow=0.54 cfs 0.062 af

Total Runoff Area = 0.170 ac Runoff Volume = 0.071 af Average Runoff Depth = 5.05"
0.00% Pervious = 0.000 ac 100.00% Impervious = 0.170 ac

Summary for Subcatchment 1S: Post-Developed Conditions

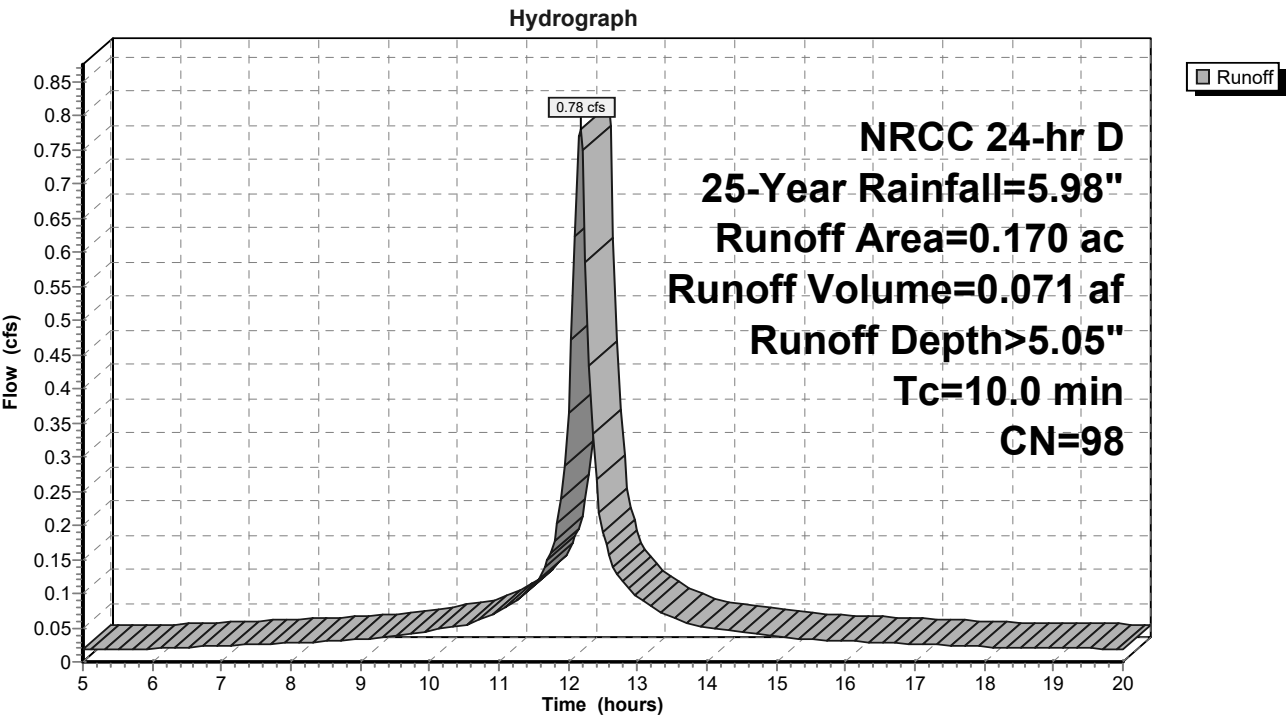
Runoff = 0.78 cfs @ 12.17 hrs, Volume= 0.071 af, Depth> 5.05"
Routed to Pond 2P : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=5.98"

Area (ac)	CN	Description
* 0.170	98	
0.170		100.00% Impervious Area

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

Subcatchment 1S: Post-Developed Conditions



Summary for Pond 2P: Pond

Inflow Area = 0.170 ac, 100.00% Impervious, Inflow Depth > 5.05" for 25-Year event
 Inflow = 0.78 cfs @ 12.17 hrs, Volume= 0.071 af
 Outflow = 0.54 cfs @ 12.27 hrs, Volume= 0.062 af, Atten= 31%, Lag= 6.0 min
 Primary = 0.54 cfs @ 12.27 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 186.33' @ 12.27 hrs Surf.Area= 2,029 sf Storage= 767 cf

Plug-Flow detention time= 101.6 min calculated for 0.062 af (86% of inflow)
 Center-of-Mass det. time= 53.8 min (792.4 - 738.6)

Volume	Invert	Avail.Storage	Storage Description
#1	185.75'	2,772 cf	Ponding (Prismatic) Listed below (Recalc)
#2	183.50'	186 cf	Filter Media Voids (Prismatic) Listed below (Recalc) 620 cf Overall x 30.0% Voids
#3	182.50'	165 cf	Coarse Gravel Voids (Prismatic) Listed below (Recalc) 413 cf Overall x 40.0% Voids
#4	182.25'	26 cf	3/8" Stone Voids (Prismatic) Listed below (Recalc) 103 cf Overall x 25.0% Voids
3,149 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
185.75	572	0	0
186.25	757	332	332
187.25	1,200	979	1,311
188.25	1,722	1,461	2,772

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.50	413	0	0
185.00	413	620	620

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.50	413	0	0
183.50	413	413	413

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.25	413	0	0
182.50	413	103	103

Device	Routing	Invert	Outlet Devices
#1	Primary	184.80'	12.0" Round Culvert L= 20.5' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.80' / 183.70' S= 0.0537 ' / Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Device 1	185.75'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

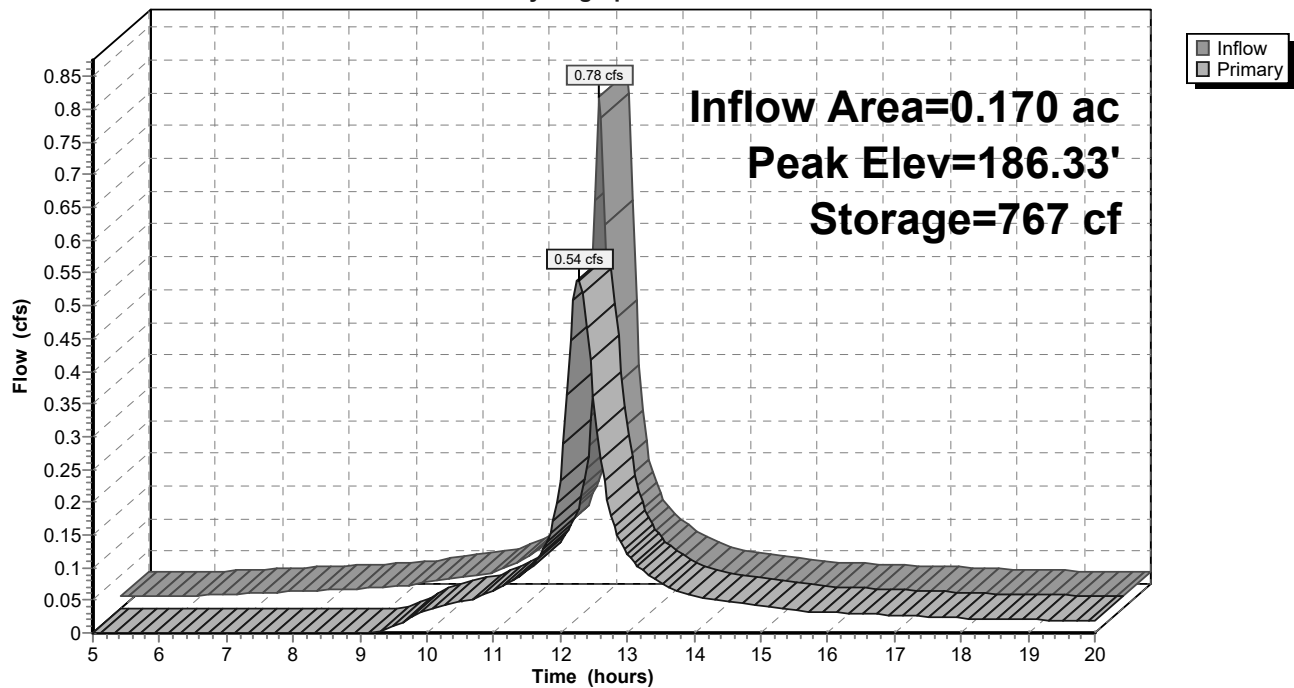
#3 Primary 188.40' **30.0' long Broad-Crested Rectangular Weir**
 Head (feet) 189.00
 Coef. (English) 4.00

Primary OutFlow Max=0.54 cfs @ 12.27 hrs HW=186.32' (Free Discharge)

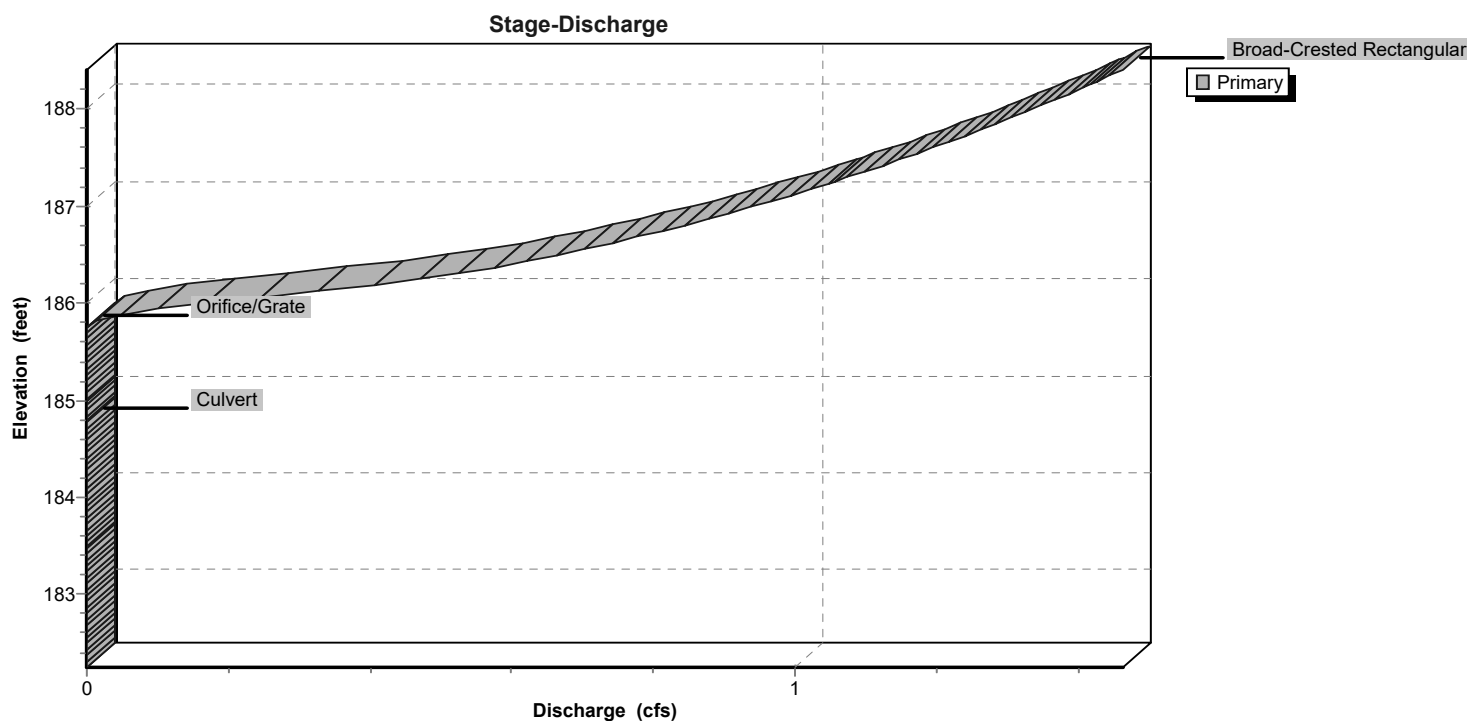
1=Culvert (Passes 0.54 cfs of 3.82 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.54 cfs @ 2.73 fps)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: Pond

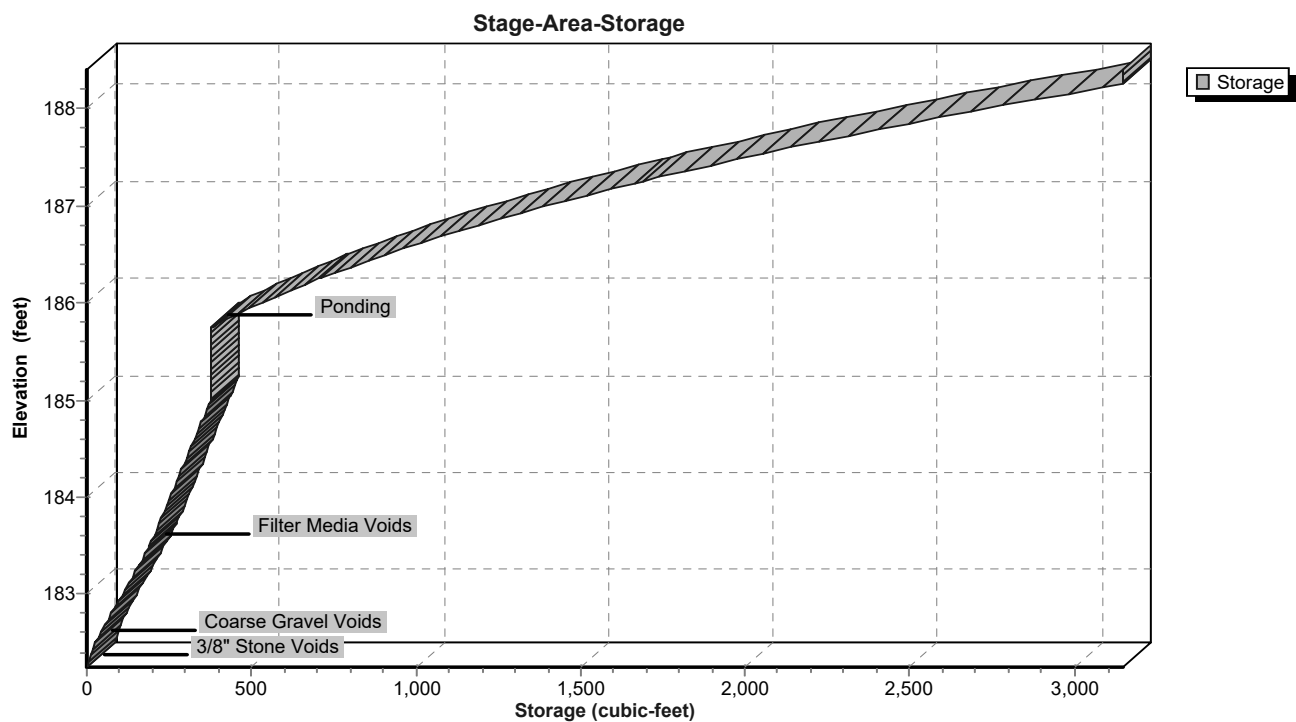
Hydrograph



Pond 2P: Pond



Pond 2P: Pond



Dover - Redev0524

NRCC 24-hr D 50-Year Rainfall=7.14"

Prepared by CESO, Inc

Printed 7/21/2023

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Post-Developed

Runoff Area=0.170 ac 100.00% Impervious Runoff Depth>6.04"
Tc=10.0 min CN=98 Runoff=0.93 cfs 0.086 af

Pond 2P: Pond

Peak Elev=186.42' Storage=847 cf Inflow=0.93 cfs 0.086 af
Outflow=0.61 cfs 0.076 af

Total Runoff Area = 0.170 ac Runoff Volume = 0.086 af Average Runoff Depth = 6.04"
0.00% Pervious = 0.000 ac 100.00% Impervious = 0.170 ac

Summary for Subcatchment 1S: Post-Developed Conditions

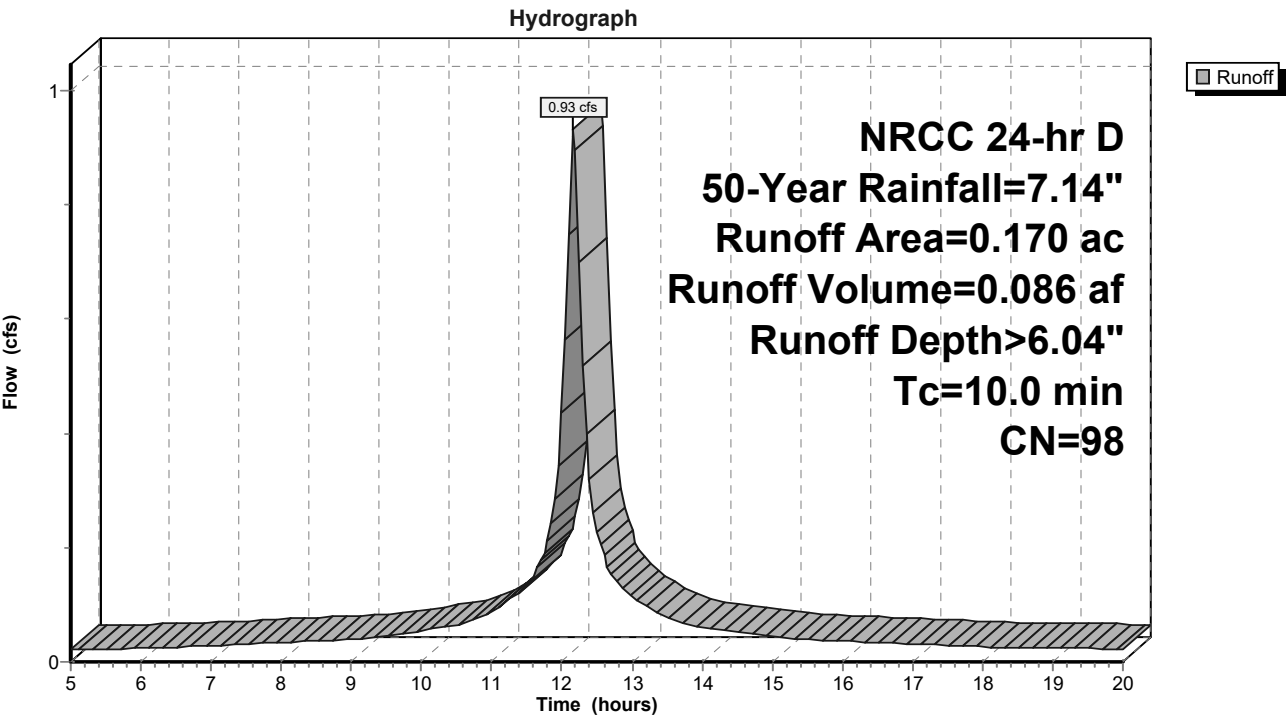
Runoff = 0.93 cfs @ 12.17 hrs, Volume= 0.086 af, Depth> 6.04"
Routed to Pond 2P : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 50-Year Rainfall=7.14"

Area (ac)	CN	Description
* 0.170	98	
0.170		100.00% Impervious Area

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

Subcatchment 1S: Post-Developed Conditions



Summary for Pond 2P: Pond

Inflow Area = 0.170 ac, 100.00% Impervious, Inflow Depth > 6.04" for 50-Year event
 Inflow = 0.93 cfs @ 12.17 hrs, Volume= 0.086 af
 Outflow = 0.61 cfs @ 12.27 hrs, Volume= 0.076 af, Atten= 34%, Lag= 6.4 min
 Primary = 0.61 cfs @ 12.27 hrs, Volume= 0.076 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 186.42' @ 12.27 hrs Surf.Area= 2,073 sf Storage= 847 cf

Plug-Flow detention time= 90.5 min calculated for 0.076 af (89% of inflow)
 Center-of-Mass det. time= 48.4 min (786.4 - 738.0)

Volume	Invert	Avail.Storage	Storage Description
#1	185.75'	2,772 cf	Ponding (Prismatic) Listed below (Recalc)
#2	183.50'	186 cf	Filter Media Voids (Prismatic) Listed below (Recalc) 620 cf Overall x 30.0% Voids
#3	182.50'	165 cf	Coarse Gravel Voids (Prismatic) Listed below (Recalc) 413 cf Overall x 40.0% Voids
#4	182.25'	26 cf	3/8" Stone Voids (Prismatic) Listed below (Recalc) 103 cf Overall x 25.0% Voids
3,149 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
185.75	572	0	0
186.25	757	332	332
187.25	1,200	979	1,311
188.25	1,722	1,461	2,772

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.50	413	0	0
185.00	413	620	620

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.50	413	0	0
183.50	413	413	413

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.25	413	0	0
182.50	413	103	103

Device	Routing	Invert	Outlet Devices
#1	Primary	184.80'	12.0" Round Culvert L= 20.5' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.80' / 183.70' S= 0.0537 ' / ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Device 1	185.75'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Dover - Redev0524

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NRCC 24-hr D 50-Year Rainfall=7.14"

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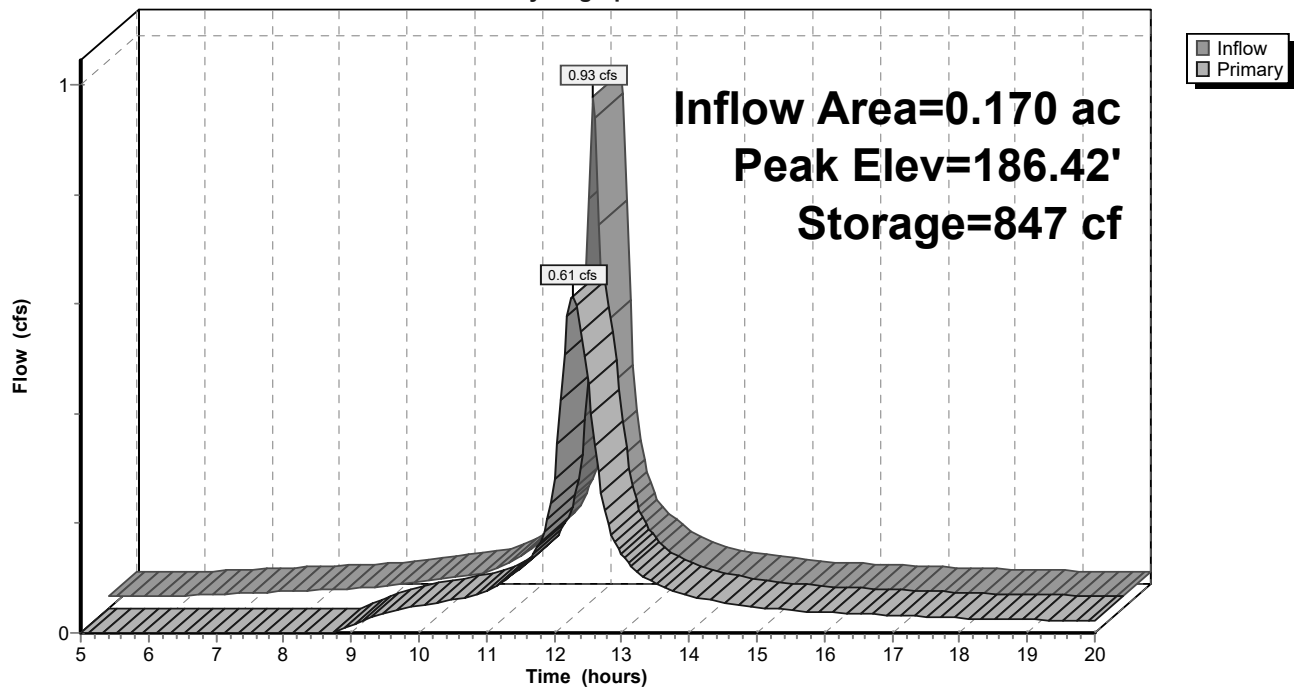
#3 Primary 188.40' **30.0' long Broad-Crested Rectangular Weir**
Head (feet) 189.00
Coef. (English) 4.00

Primary OutFlow Max=0.61 cfs @ 12.27 hrs HW=186.42' (Free Discharge)

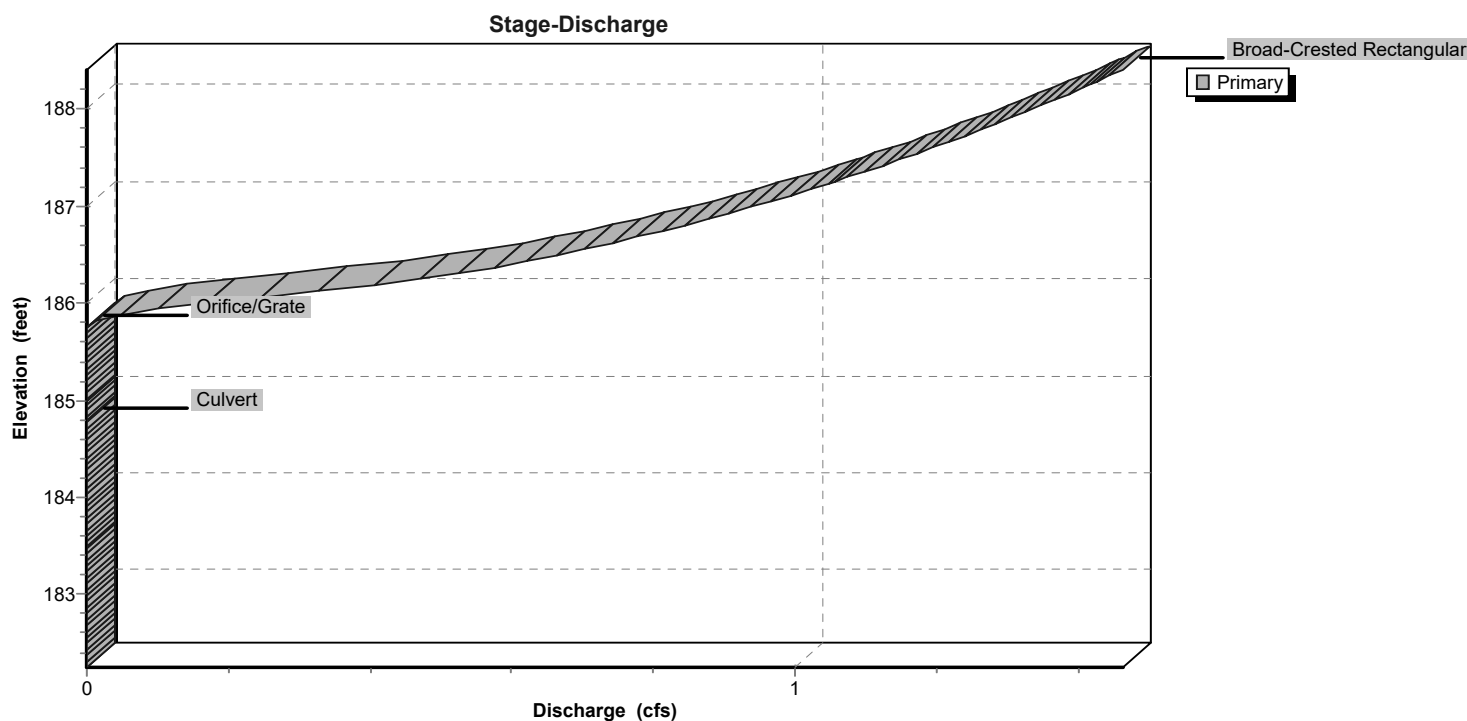
- 1=Culvert (Passes 0.61 cfs of 4.00 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.61 cfs @ 3.11 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: Pond

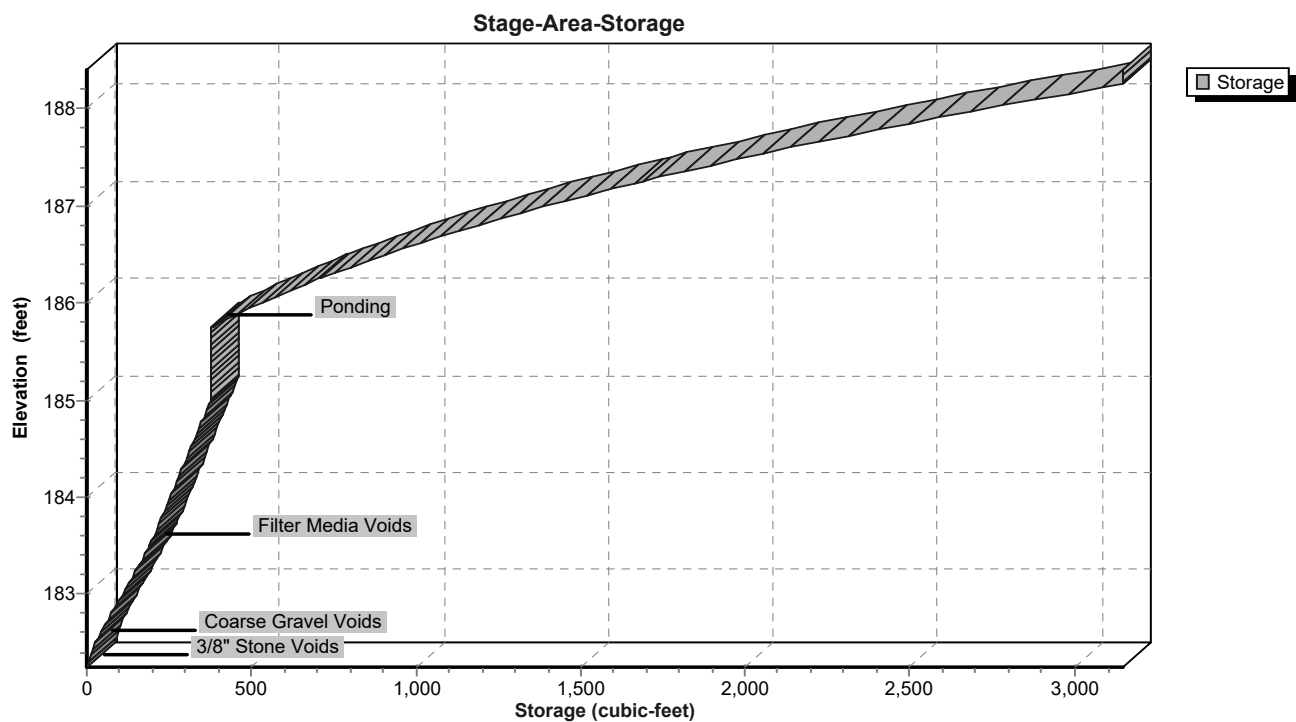
Hydrograph



Pond 2P: Pond



Pond 2P: Pond



Dover - Redev0524

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Multi-Event Tables

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Events for Subcatchment 1S: Post-Developed Conditions

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	3.15	0.41	0.037	2.60
10-Year	4.74	0.62	0.056	3.98
25-Year	5.98	0.78	0.071	5.05
50-Year	7.14	0.93	0.086	6.04

Dover - Redev0524

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Multi-Event Tables

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Events for Pond 2P: Pond

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.41	0.30	186.10	601
10-Year	0.62	0.45	186.22	690
25-Year	0.78	0.54	186.33	767
50-Year	0.93	0.61	186.42	847

APPENDIX B: STORMWATER PIPE CALCULATIONS

Line No.	Line ID	Line Length	Line Size	Line Slope	Drng Area	Total Area	Flow Rate	Capac Full	Invert Dn	Invert Up	HGL Dn	Gnd/Rim El Dn	HGL Up	Gnd/Rim El Up	Junct Type	Inlet Depth	Vel Ave	Cover Up	Tc	n-val Pipe
		(ft)	(in)	(%)	(ac)	(ac)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft/s)	(ft)	(min)	
1	B2-B1	147.594	18	0.17	0.42	0.86	3.08	4.32	185.25	185.50	185.92	187.26	186.55	188.54	MH		3.18	1.54	10.3	0.013
2	B3-B2	37.846	12	2.54	0.44	0.44	1.82	5.67	185.50	186.46	186.57	188.54	187.03 j	188.96	MH		3.11	1.50	10.0	0.013
3	A1-EX	50.440	12	1.51	0.00	0.34	1.93	4.37	180.46	181.22	180.96	186.41	181.81	188.33	MH		4.45	6.11	11.5	0.013
4	A2-A1	165.609	12	1.50	0.34	0.34	2.00	4.36	181.22	183.70	181.81	188.33	184.30	189.10	MH		4.09	4.40	10.5	0.013
5	A3-A2	20.506	12	5.36	0.00	0.00	0.58	8.94	183.70	184.80	184.30	189.10	185.12 j	187.75	MH		1.95	1.95	10.0	0.012
Project File: storm.stm												Number of lines: 5				Date: 5/24/2023				
NOTES: ** Critical depth																				

**APPENDIX C:
USDA NRCS Web Soil Survey**

Hydrologic Soil Group—Strafford County, New Hampshire



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

2/2/2023
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 1:20,000.

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: Strafford County, New Hampshire
 Survey Area Data: Version 23, Sep 9, 2022

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

Date(s) aerial images were photographed: Jun 19, 2020—Sep 20, 2020

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
HaB	Hinckley loamy sand, 3 to 8 percent slopes	A	0.3	30.7%
HaC	Hinckley loamy sand, 8 to 15 percent slopes	A	0.3	32.3%
HbE	Hinckley loamy sand, 15 to 60 percent slopes	A	0.4	37.0%
Totals for Area of Interest			1.1	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

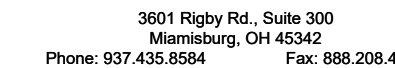
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

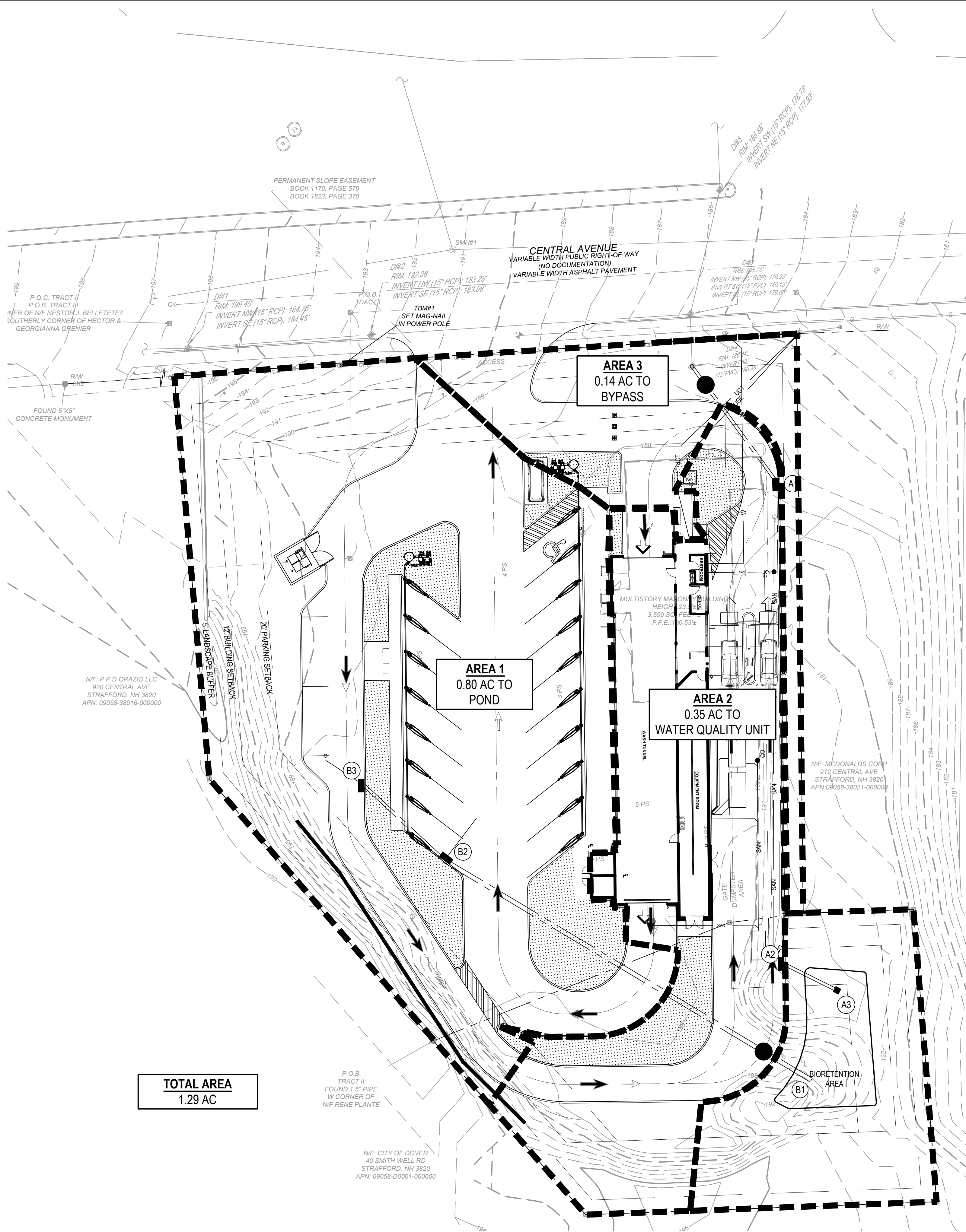
Tie-break Rule: Higher

APPENDIX D: DRAINAGE AREA MAPS

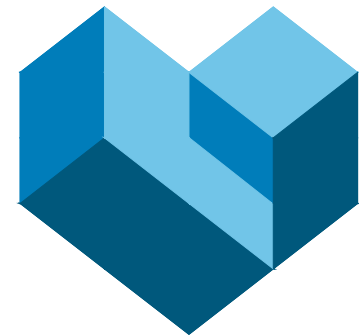
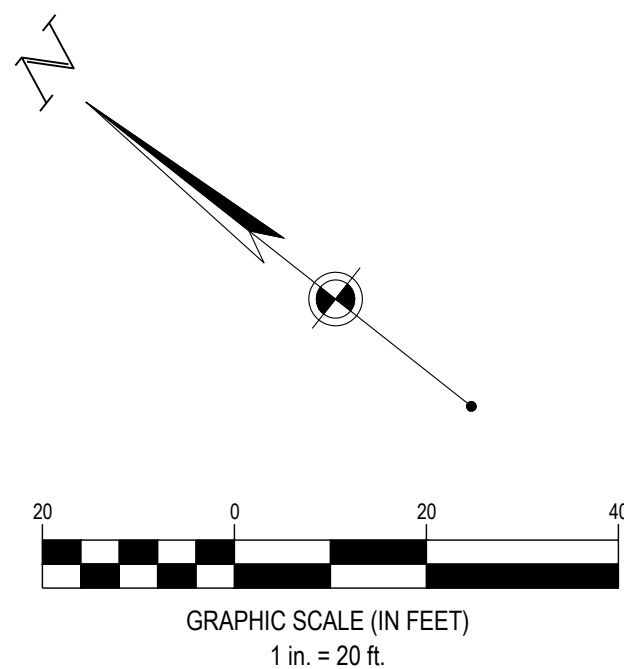
**APPENDIX D1:
EXISTING CONDITIONS DRAINAGE AREA MAP**



**APPENDIX D2:
PROPOSED CONDITIONS DRAINAGE AREA MAP**



SEVENTY-TWO (72) HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTORS SHALL NOTIFY THE FOLLOWING AGENCIES: NEW HAMPSHIRE UTILITIES PROTECTION SERVICE AT 811 OR 888-344-7233 AND ALL OTHER AGENCIES WHICH MIGHT HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NONMEMBERS OF STATE UTILITIES PROTECTION SERVICE



CESO
WWW.CESONC.COM

3601 Rigny Rd., Suite 200
Merrimack, NH 03042
Phone: 937.435.8584 Fax: 888.208.4826

HANG TEN CAR WASH

DOVER, NH

914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions

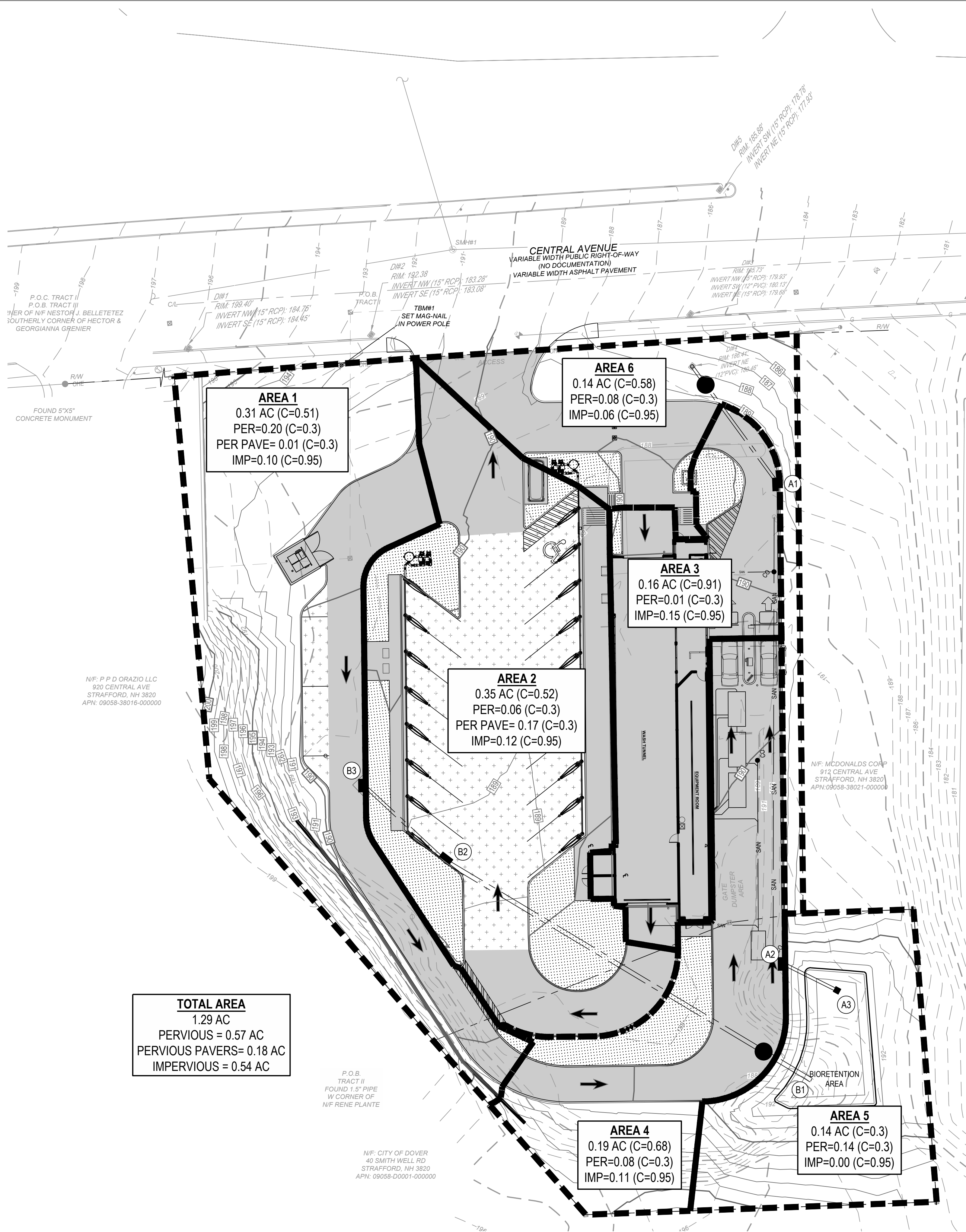
ID	Description	Date
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Project Number: 761168
Scale: 1"=20'
Drawn By: NTV
Checked By: HGC
Date: 06/22/2023
Issue: PERMIT

Drawing Title:
**POST-DRAINAGE
EXHIBIT**

EX1.2

**APPENDIX D3:
TRIBUTARY DRAINAGE AREA MAP**

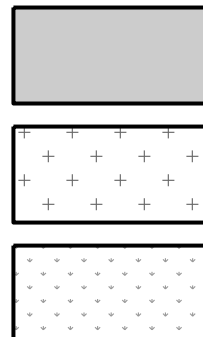


SITE LEGEND

EXISTING

REFER TO C1.0 FOR EXISTING FEATURES LEGEND

PROPOSED



PROPOSED IMPERVIOUS PAVEMENT

PROPOSED PERVIOUS PAVEMENT

PROPOSED PERVIOUS AREA

PIPE DATA

PIPE	SLOPE (%)	n	DIAMETER (IN)	VELOCITY (FT/S)	CAPACITY (CFS)	10-YR FLOW (CFS)
A1-EX	1.51	0.012	12.00	6.00	4.72	4.34
A2-A1	1.50	0.012	12.00	6.00	4.71	3.38
A3-A2	5.36	0.012	12.00	11.30	8.89	2.53
B2-B1	0.17	0.013	18.00	2.20	2.65	2.25
B3-B2	2.54	0.013	12.00	7.20	5.65	1.05

PEAK DISCHARGE

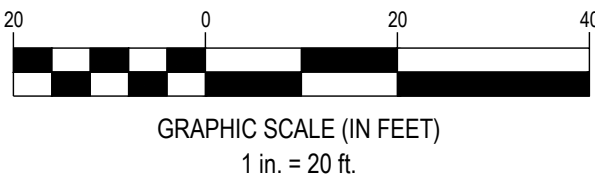
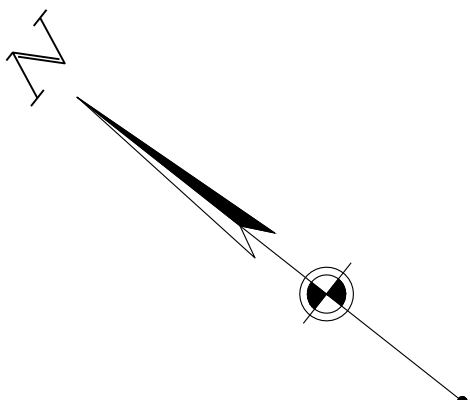
DRAINAGE AREA	C	I (IN/HR)	A (AC)	10-YR FLOW (CFS)
AREA 1	0.51	6.61	0.31	1.05
AREA 2	0.52	6.61	0.35	1.20
AREA 3	0.91	6.61	0.16	0.96
AREA 4	0.68	6.61	0.19	0.85
AREA 5	0.30	6.61	0.14	0.28
AREA 6	0.58	6.61	0.14	0.54

PRE-DEVELOPED CONDITIONS
IMP. % = 44%
TOTAL = 1.29 AC
PERVIOUS = 0.72 AC
IMPERVIOUS = 0.57 AC
PERMEABLE PAVERS = 0.00 AC

POST-DEVELOPED CONDITIONS
IMP. % = 42%
TOTAL = 1.29 AC
PERVIOUS = 0.57 AC
IMPERVIOUS = 0.54 AC
PERMEABLE PAVERS = 0.18 AC



SEVENTY-TWO (72) HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTORS SHALL NOTIFY THE FOLLOWING AGENCIES: NEW HAMPSHIRE UTILITIES PROTECTION SERVICE AT 811 OR 888-344-7233 AND ALL OTHER AGENCIES WHICH MIGHT HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NONMEMBERS OF STATE UTILITIES PROTECTION SERVICE



3601 Rigby Rd., Suite 300
Merrimack, NH 03042
Phone: 937.435.8584 Fax: 888.208.4826

HANG TEN CAR WASH

DOVER, NH

914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions

ID	Description	Date
----	-------------	------

Project Number: 761766
Scale: 1"=20'
Drawn By: NTV
Checked By: HGC
Date: 06/23/2023
Issue: PERMIT

Drawing Title:
POST-DRAINAGE EXHIBIT

EX1.1

HYDROTERRA ENVIRONMENTAL SERVICES

272 ½ Dover Point Road Dover, NH 03820
Phone (603) 743-5728 Fax (603) 742-3433
E-mail - hydroterr @ aol.com



CESO
3601 Rigby Road, Suite 300
Dayton, Ohio 45342
Attn: Kelly Schwieterman, P.E.
Senior Project Manager

December 20, 2023

**RE: Hydrogeological Evaluation for the Proposed Car Wash Facility 914 Central Avenue,
Dover, New Hampshire (Job # 834658-1)**

Dear Ms. Schwieterman:

HYDROTERRA Environmental Services (HYDROTERRA) is pleased to submit this hydrogeological assessment of the proposed car wash facility at 914 Central Avenue, Dover, New Hampshire (the Study Area). The Study Area property is approximately 1.29 acres and is located at coordinates 43° 13.2139' N, 70° 53.1690' W, as shown on Figure 1. Figure 2 shows the features of the Study Area and surrounding properties.

PROJECT UNDERSTANDING

The proposed car wash is to be located at 914 Central Street in Dover New Hampshire. The layout of the car wash is shown on the CESO Site Plan drawings dated June 28, 2023 (see Figure 3). The project includes an approximately 34-foot-wide by 118-foot long carwash single-story, slab-on-grade building. The proposed facility will include vac-boom assemblies, remote kiosk payment islands, and associated parking and drive areas.

Due to the location of the Study Area within the City of Dover (the City) Groundwater Protection Area, as shown on Figure 1, a hydrogeological study is required in accordance with Chapter 170-28.3. D.(7) of the City Zoning regulations. The objective of this study is to assess hydrogeologic conditions on and adjacent to the Study Area in order to evaluate the potential impacts of the proposed development on the groundwater resources.

In addition, the study will review the proposed Site plans to assess the percentage of impervious areas proposed and determine whether modifications to stormwater drainage and/or the need to develop a Stormwater Management Plan is required to protect the surrounding water resources.

The scope of work includes: a file review of existing available Site Plans, environmental assessments conducted on and adjacent to the Study Area and regional/local hydrogeological information for characterization of the subsurface geology of the property, and development of a conceptual model of groundwater flow and aquifer properties surrounding the Study Area.

Existing Study Area Conditions

The Study Area property is currently developed with a vacant 1 to 1.5-story building (formerly a restaurant) with associated paved parking and driveway (see Site Photographs - Attachment 1). Attachment 1 also includes a property lot layout and historical topographic maps for the Study Area and surrounding area. Figure 4 shows the existing layout and features of the Study Area property.

The property is generally level with an approximate elevation (El.) of 190 feet mean sea level (msl). The site slopes up to approximately El. 200 feet msl near the north property boundary, and down to El. 180 feet south of the property. As shown on Figure 4, existing surface drainage is sheet flow from the pavement and building roof drains to the southeast towards Central Avenue. Located along the north and west edges of the property is a 10 to 15 foot berm (see Figure 5). Historical information suggests significant grading and earth movement has occurred on the property, cutting the upper topsoil and upper stratified drift materials and forming the upward graded banks. Historical topographic data (see Attachment 1) suggests that the Study Area and surrounding properties to the north were topographic ridge highland areas, likely the result of higher bedrock elevations.

Regional Geology

According to the Surficial Geologic Map of the Dover West Quadrangle, Strafford County, New Hampshire and other sources, the regional subsurface soils are derived from marine / glacial depositional environments. Within the Study Area region, four key deposits have been identified, as shown on Figure 5. These deposits include:

- * Glacial Stratified Drift: Associated with glacial fluvial depositional events along a deltaic marine contact, these deposits consist of well sorted silty sands that were deposited along the ocean - glacial ice margin edge. These soils tend to be permeable to groundwater flow and potentially provide high groundwater yield pending deposit thickness;
- * Glacial Till: Dense silty sand associated with shallow glacial deposits over bedrock highland areas. These deposits are poorly sorted silty sand and are not very permeable and often tend to act as a barrier to groundwater flow;

- * Glacial Swamp: These deposits consist of silt, clay, and muck associated with poor drainage areas. Typically they are underlain by shallow bedrock. These deposits can represent a combination of recent features as well as meltwater stagnant zones during glacial movement across the region caused by some type of structural barrier such as a bedrock high; and
- * Glacial Marine: These deposits consist of interbedded layers of silt and clay associated with a shallow marine depositional environment. This deposit varies greatly in thickness and typically blankets the bedrock surface.

Based upon the regional geological information review performed during this assessment, bedrock is mapped as a Silurian aged, brown- grey, thin-bedded biotite schist of the Berwick Formation (Sb). The Study Area is close to the fault contact between the Berwick Formation and the Elliot Formation (grey qtz. phyllite rock type) (Sqe). Potential water bearing bedrock joints and fractures trend northeast to southwest across the area. Depth to bedrock varies greatly across the region, from near surface outcrops encountered southeast of the Study Area (Garrison Hill) to well over 100 feet below grade south of the Study Area near No Bottom Pond and north of the Study Area near Willard Pond. Potential water bearing bedrock joints and fractures trend northeast to southwest across the area. Data suggests that most of the bedrock surface in the region is covered with a marine clay deposit and/or till suggesting that bedrock groundwater is confined and likely to exhibit artesian conditions.

Regional Hydrogeology

As shown on Figure 6, the area surrounding the Study Area is within a mapped stratified drift aquifer. Transmissivity (a measurement of the rate in which water can flow through the stratified soil deposits) reportedly ranges from 2,000 to 8,000 feet² per day. In general, the thicker the saturated stratified drift encountered the higher the transmissivity and the more groundwater is able to move through the aquifer. There appears to be a thinning of the saturated aquifer materials at or directly north of the Study Area, as shown on Figure 7, which generally corresponds to the mapped surface water drainage divide across this area. Based upon borings and historical regional surface topography of the region, this thinning of the aquifer across this area is believed to be associated with northeast trending shallowing of bedrock and incursion of thickening of the marine clay deposits from the east. Regional groundwater flow, south of the surface water divide is to the south, southwest while flow north of the divide is northward. Figure 8 shows regional stratified drift groundwater elevations obtained by the City of Dover monitoring well network of the Smith and Cummings well field, as well as regional borings/monitoring wells used for this study analysis.

A City of Dover municipal water supply well field (Id 0651010 - 004 and 016) (Smith and Cummings) is located about 1,200 feet to the southwest of the Study Area. The well field reportedly has a total pumping yield of approximately 600 gallons per minute. A second City of Dover municipal water supply well field (Willand Pond Well (0651010-019) is located about 3,500 feet to the north of the Study Area. The well field reportedly has a pumping yield of approximately 300 gallons per minute. The Study Area is mapped within the wellhead protection radius of both well fields, as shown on Figure 9.

Wetlands and ponded water areas located about 400 feet to the west and 425 feet to the east are the only surface water bodies evident within 1,000 feet of the Study Area.

As mentioned earlier, bedrock groundwater is likely confined and flow is along fractures in a northeast, southwest directly.

Study Area Hydrogeological Conditions

Test borings drilled for recent geotechnical engineering analysis for re-development of the Study Area, as wells as borings/monitoring wells installed for previous environmental site assessments completed on and adjacent to the Study Area indicate that the Study Area subsurface soils consist of:

- * **Pavement** 1.5 inches of bituminous concrete;
- * **Fill:** Well sorted sand, trace gravel, brown to orange-brown 1 to 5 feet below grade;
- * **Unsaturated Stratified Drift Deposits:** Silty sand to poorly sorted sand with silt, light brown, loose to dense 5 to 30 feet below grade;
- * **Saturated Stratified Drift Deposits:** Silty sand to poorly sorted sand with silt, light brown and orange brown (iron staining), loose to dense 30 to 50 (bottom depth estimate) feet below grade;
- * **Marine Clay and Silts;** laminated fine sand, silt and clay - estimated 50 to 70 feet below grade; and
- * **Grey Phyllite Bedrock;** estimated 70 to 90 feet below grade.

The locations of Study Area borings/monitoring wells are shown on Figure 10 and boring logs are included in Attachment 2. Portions of the Geotechnical report, as well as the previous environmental reports are included in Attachment 3.

Study Area Groundwater

Groundwater is expected at approximately 30 feet below grade (approx. 160' msl elevation) with a flow direction to the south, southeast. This flow direction is believed to be side gradient of the Smith and Cummings well field. The measured static water levels generally coincide with the first observed saturated soils in the test borings, suggesting that overburden ground water on the Study Area is flowing under unconfined aquifer conditions above the laterally continuous clay layer. Previous environmental site assessment reports from the Study Area calculated a groundwater hydraulic gradient of 0.005 ft/ft. Using an estimated hydraulic conductivity range between 40 and 60 ft/day (estimated K range - silty sand), groundwater movement across the area is estimated between 0.8 to 1.2 feet per day.

Study Area Hydrogeological Conceptual Model

To provide a foundation for evaluating the potential impacts of the proposed development on the groundwater resources and to assess if modifications to stormwater drainage plans, including the need for a long term Stormwater Management Plan is needed for site redevelopment, HYDROTERRA developed the following conceptual model of the Study Area hydrogeologic conditions:

- * Wetlands and ponded surface water areas are located about 400 feet to the west and 425 feet to the east of the Study Area. Existing stormwater drainage is sheet flow from the pavement and building roof drains to the southeast towards Central Avenue. Limited rainfall infiltration (recharge) to the subsurface is expected under existing conditions;
- * The Study Area is within a mapped thinning edge of the stratified drift aquifer. Saturated thickness of this silty sand aquifer material is estimated at 10 to 20 feet deep and is expected to be underlain by a marine silt clay confining layer;
- * Depth to groundwater at the Study Area is expected at approximately 30 feet below grade giving a site groundwater elevation near 160 feet above msl. Groundwater flow is to the southeast with an estimated flow seepage velocity of 1 ft/day. Based upon regional groundwater elevation data, surface topography as well as expected thinning of the stratified drift aquifer materials, Study Area groundwater flow direction is believed to be side gradient to the Smith and Cummings well field capture zone; and
- * Bedrock groundwater is likely confined and flow is along fractures in a northeast, southwest direction.

Redevelopment Impact Analysis to Regional Groundwater Resources

The following sections provides an analysis of potential hydrogeological impacts that may be associated with the redevelopment of the Study Area. As discussed earlier, the redevelopment project includes the construction of an approximately 34-foot-wide by 118-foot long carwash single-story, slab-on-grade building. The proposed facility will include vac-boom assemblies, remote kiosk payment islands, and associated parking and drive areas, as shown on Figure 3.

Construction Phase

Based upon review of proposed construction details, the construction earthwork is anticipated to include demolition, removing existing landscape areas, pavements, and underground utilities, excavations, and fill placement. A portion of the proposed building will be constructed within the footprint of the existing restaurant building, which will need to be demolished, along with exterior sidewalks, pavements, and utilities. Earthwork details include:

- * All existing foundations, slabs, and utilities will be removed offsite from within the proposed building footprint and at least 5 feet beyond the outer edge of foundations;
- * The areas outside the proposed building footprint and foundation bearing zones, existing foundations, floor slabs, and utilities will be removed where they conflict with proposed utilities, retaining walls, and pavements. These materials will be removed to a depth of at least 2 feet below the affected utility or design pavement subgrade elevation; and
- * Areas disturbed from demolition activities will be undercut to undisturbed material and the excavation backfilled with compacted general fill or structural fill depending on the intended future use.

Based upon depth to groundwater at the Study Area (30 feet below grade), and the hydraulic conceptual model as discussed in the previous section, no impacts from site construction activities to groundwater resources are anticipated. It is recommended that during all construction phases that a southeastward drainage grading towards Central Avenue be maintained and that the amount of direct rainfall infiltration over unpaved areas be limited.

Car Wash Proposed Operations

The proposed re-development Site Plan is shown on Figure 3. The proposed grading plan is shown on Figure 11. Based upon the layouts shown on Figures 3 and 11 the proposed vehicle flow will allow cars to enter the property along the north side, move around the rear of the property southward and back up to the east side to enter the wash facility in an east-west direction. The main roadway will be constructed with normal asphalt pavement with drainage to the southeast via a storm drain system. Vehicles will exit the wash building to the west and enter the vacuum area (vac boom assemblies). This area is proposed to be paved with previous pavement for direct infiltration to the subsurface. A stormwater detention area is to be located along the southwest portion of the property. The detailed layout of the detention system is shown on Figure 11. Proposed bottom elevation of this system is to be set at an elevation of 182 feet (msl). Assuming groundwater elevation is at 160 feet msl, the detention system would be approximately 22 feet above groundwater levels. Given the permeability of the underlying unsaturated stratified drift, no significant mounding or alteration in groundwater flow is expected. However, it is recommended that during all construction of the detention system, a monitoring well be constructed downgradient of the system, to establish base line groundwater conditions and provide a method to monitor drainage conditions and provide guidance for stormwater management at the Study Area.

Conclusions

HYDROTERRA completed a hydrogeological assessment of the proposed car wash facility at 914 Central Avenue, Dover, New Hampshire. The objective of this study was to assess hydrogeologic conditions on and adjacent to the Study Area in order to evaluate the potential impacts of the proposed development on the groundwater resources.

Based upon the conceptual model developed for hydrogeological conditions within the Study Area, using previous environmental assessments conducted on and adjacent to the Study Area, and available regional/local hydrogeological information, the proposed car wash development is not likely to pose a significant risk to the regional groundwater resources. HYDROTERRA does make the following recommendations for Study Area redevelopment:

- * During all construction phases, a southeastward drainage grading towards Central Avenue be maintained and the amount of direct rainfall infiltration over unpaved areas be limited; and
- * During all construction of the detention system, a monitoring well be constructed downgradient of the system, to establish base line groundwater conditions and provide a method to monitor drainage and stormwater conditions at the Study Area.

Please feel free to call me at (603) 743-5728 if you have any questions about this hydrogeologic assessment of the proposed 914 Central Avenue re-development

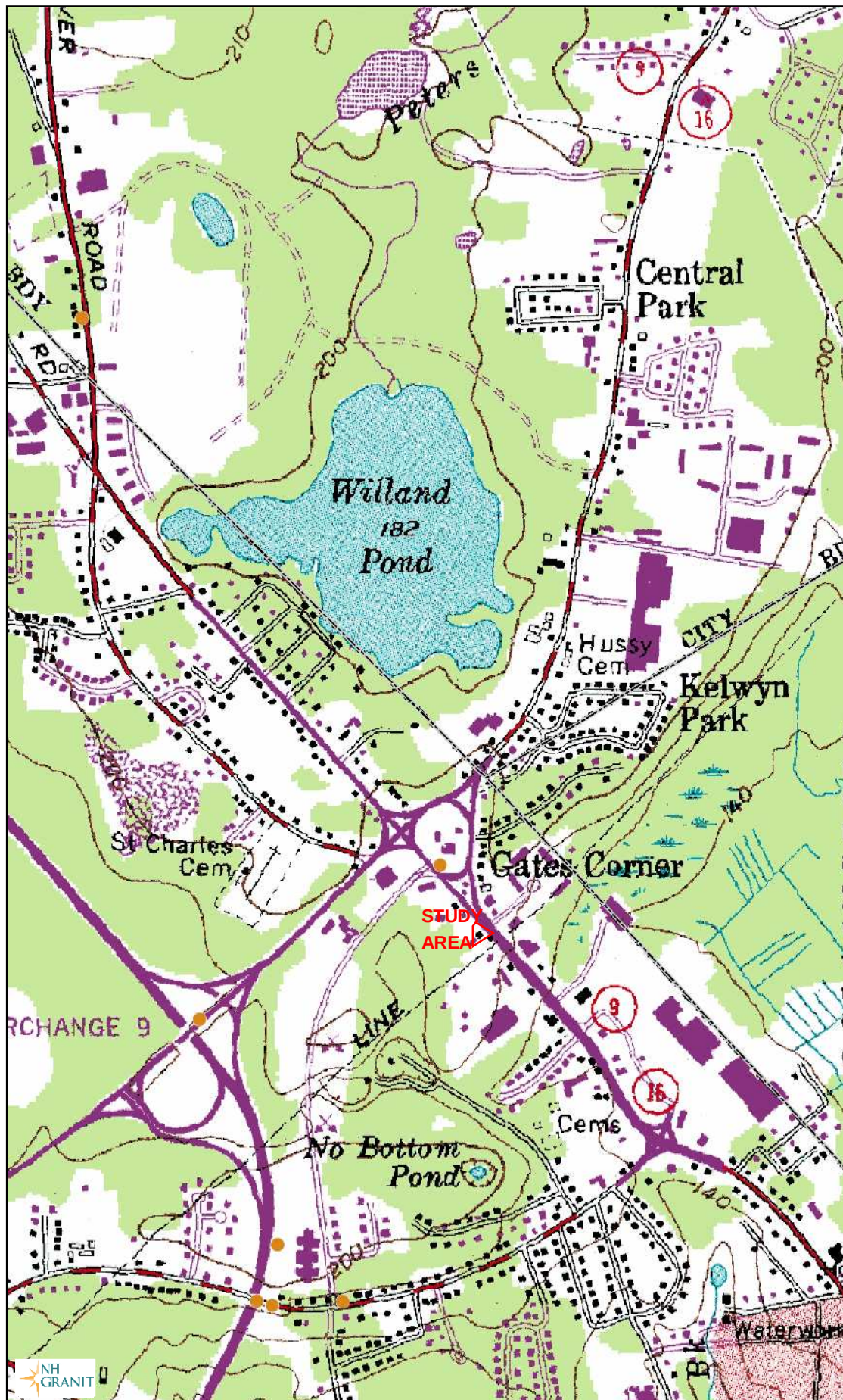
Sincerely,

Jack M. McKenna, PG, PHG
Manager



FIGURES

FIGURE 1 Study Area Location



Legend

- State
- County
- City/Town
- Geodetic Control Points

HYDROTERRA
Environmental Services

Map Scale

1: 12,988

© NH GRANIT, www.granit.unh.edu

Map Generated: 12/16/2023



Notes



FIGURE 2
Adjacent Properties



- 20 0 20
- GRAPHIC SCALE (IN FEET)
1 in. = 20 ft.

FIGURE 4
Existing Site Plan

DEMOLITION LEGEND

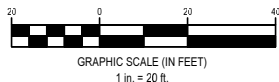
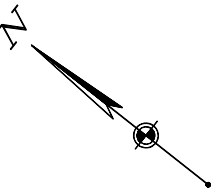
- EXISTING
REFER TO C0.1 FOR EXISTING FEATURES LEGEND
- PROPOSED
- SITE CLEARING LIMITS
 - REMOVE EXISTING BUILDING
 - REMOVE EXISTING GRAVEL PAVEMENT
 - REMOVE EXISTING ASPHALT PAVEMENT (OR AS NOTED ON THE PLANS)
 - SAWCUT LINE
 - UTILITY LINE TO BE REMOVED / RELOCATED
 - REMOVE EXISTING CURB & GUTTER
 - REMOVE EXISTING FENCE

GENERAL NOTES:

SEE SHEET C0.1

CODED NOTES:

- EXISTING GAS LINE TO BE REMOVED.
- EXISTING GAS STRUCTURE TO BE REMOVED.
- EXISTING ELECTRIC STRUCTURE TO BE REMOVED.
- EXISTING OVERHEAD ELECTRIC LINE TO BE REMOVED.
- EXISTING UTILITY POLE TO BE REMOVED.
- EXISTING RETAINING WALL TO REMAIN AND TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
- EXISTING RETAINING WALL TO BE REMOVED.
- EXISTING GUY WIRE AND ANCHOR TO BE REMOVED.
- EXISTING STORM LINE TO REMAIN AND TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
- EXISTING STORM STRUCTURE TO REMAIN AND TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
- EXISTING GUY WIRES TO REMAIN TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
- EXISTING UTILITY POLE TO REMAIN AND TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
- EXISTING WATER METER TO REMAIN AND BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
- EXISTING GAS LINE TO REMAIN AND TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
- EXISTING CURB AND SIDEWALK TO REMAIN AND TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.



SEVENTY-TWO (72) HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTORS SHALL NOTIFY THE FOLLOWING AGENCIES: NEW HAMPSHIRE UTILITIES PROTECTION SERVICE AT 811 OR 888-344-7233 AND ALL OTHER AGENCIES WHICH MIGHT HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NONMEMBERS OF STATE UTILITIES PROTECTION SERVICE



HANG TEN CAR WASH

DOVER, NH

914 CENTRAL AVE.
DOVER, NH 03820

Revisions / Submissions

ID	Description	Date
761766		
1"=20'		
NTV		
HGC		
06/28/2023		
PERMIT		

EXISTING COND. &
DEMO PLAN

C1.0

FIGURE 5 3D Topographic Map



Legend

Hillshade Image

High : 1906

Low : -2

1:4,514

FIGURE 6 Surficial Geology

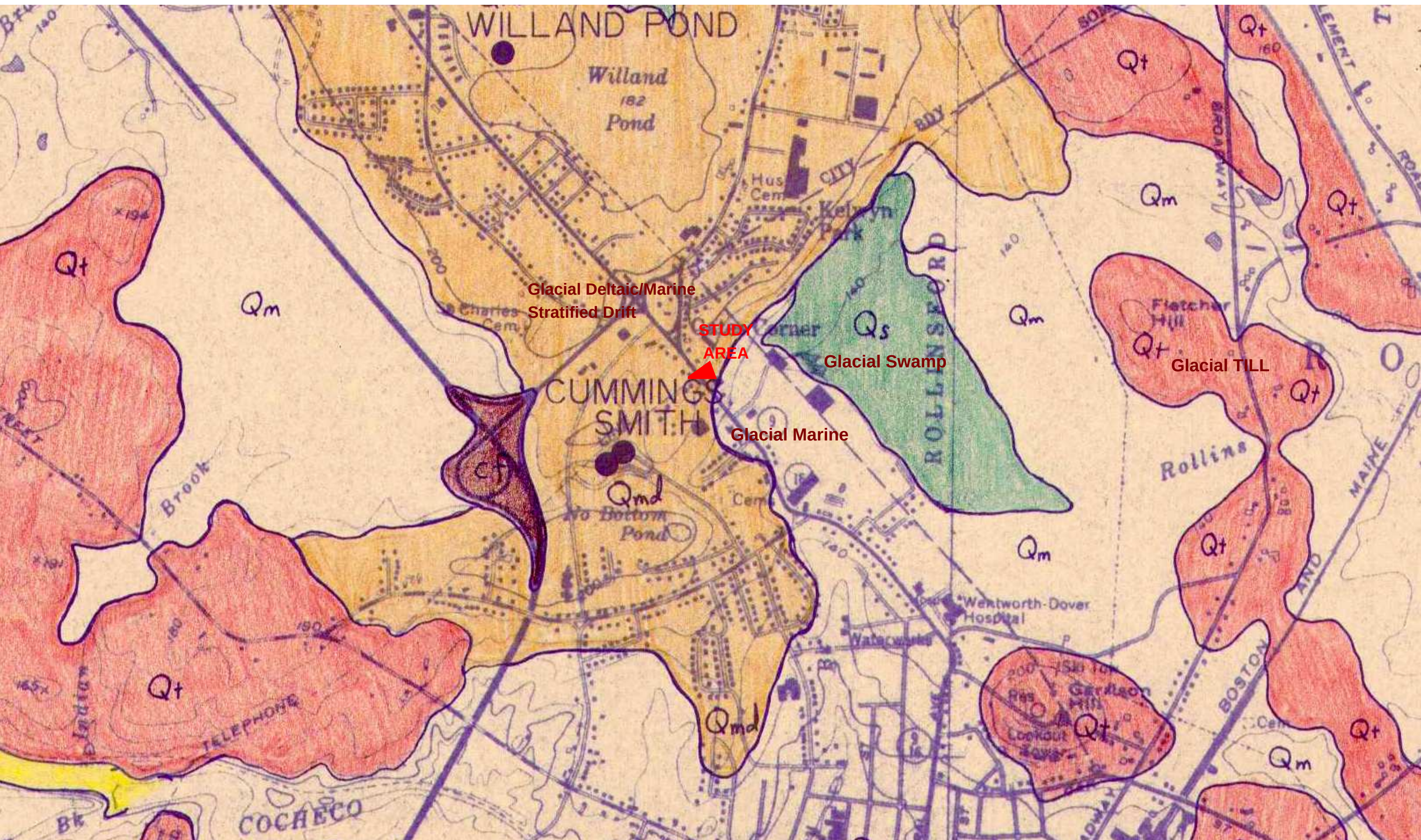
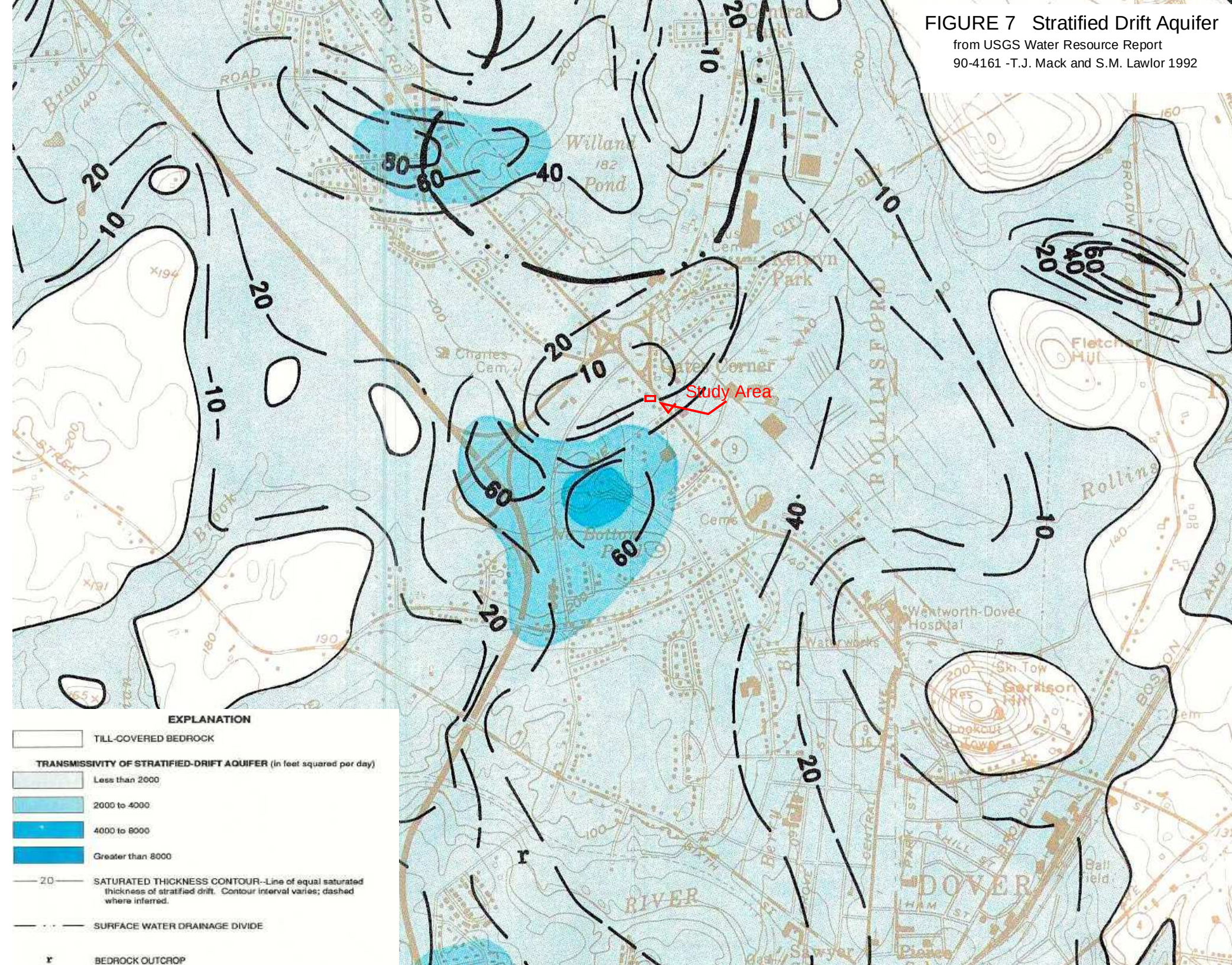
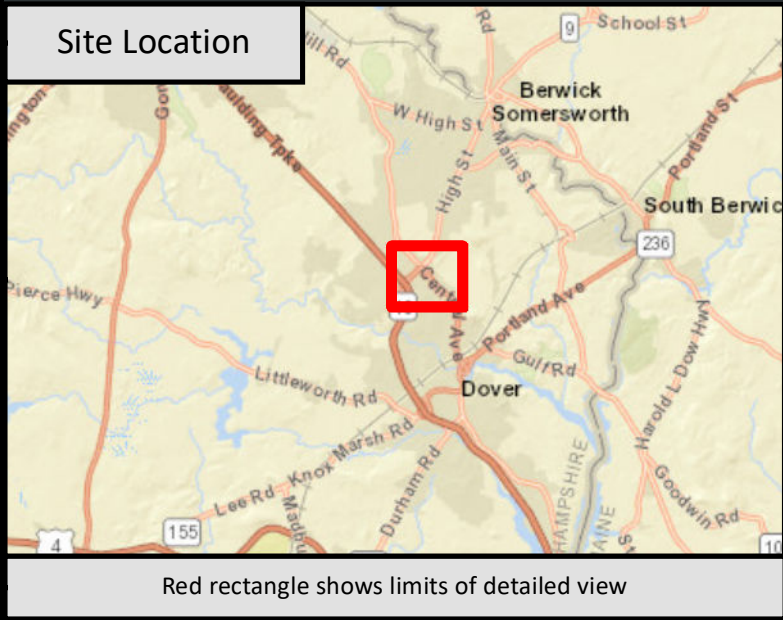
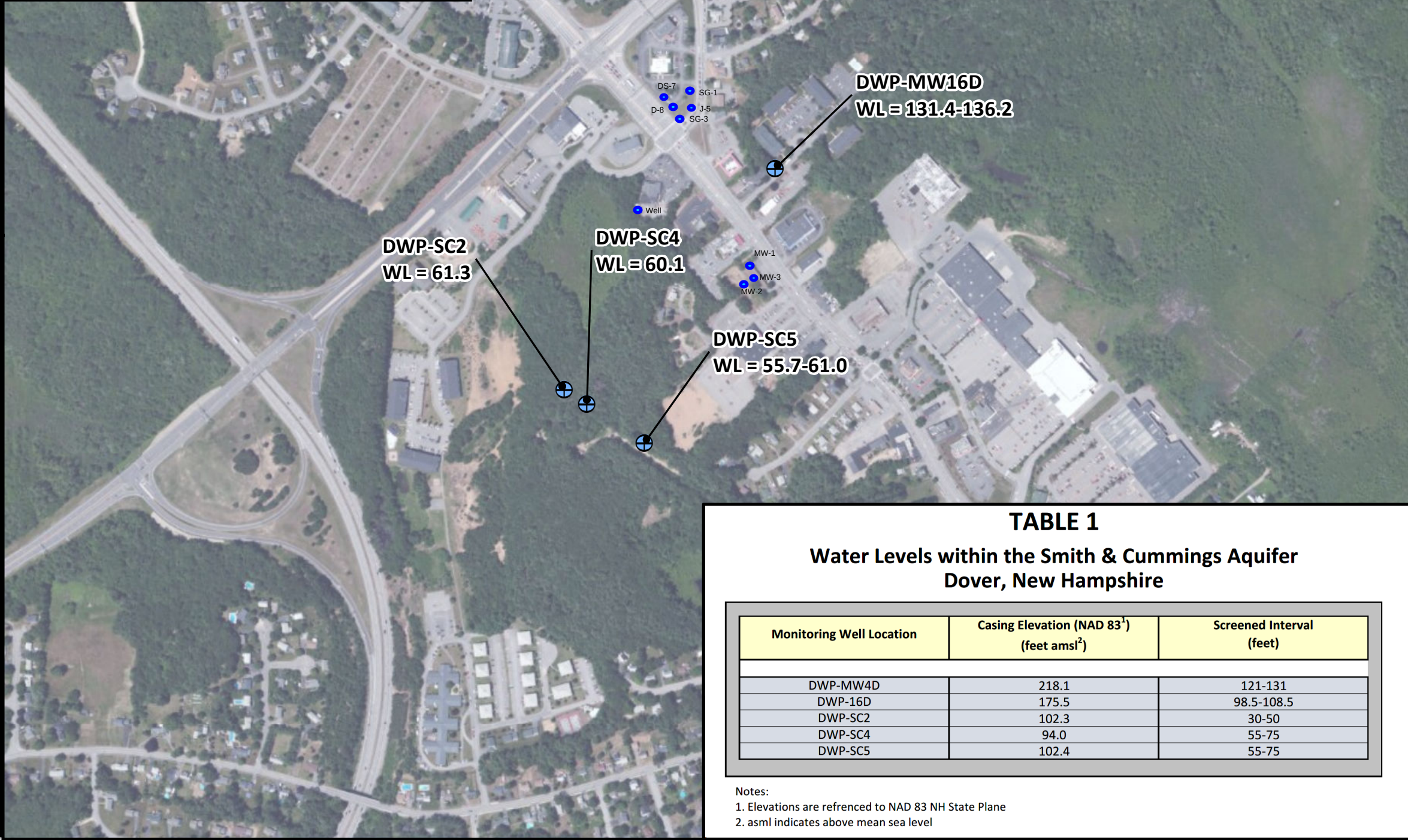


FIGURE 7 Stratified Drift Aquifer
from USGS Water Resource Report
90-4161 -T.J. Mack and S.M. Lawlor 1992





Red rectangle shows limits of detailed view



DWP-MW4D
WL = 169.9-178.2

DWP-MW16D
WL = 131.4-136.2

DWP-SC2
WL = 61.3

DWP-SC4
WL = 60.1

DWP-SC5
WL = 55.7-61.0

TABLE 1

**Water Levels within the Smith & Cummings Aquifer
Dover, New Hampshire**

Monitoring Well Location	Casing Elevation (NAD 83 ¹) (feet amsl ²)	Screened Interval (feet)
DWP-MW4D	218.1	121-131
DWP-16D	175.5	98.5-108.5
DWP-SC2	102.3	30-50
DWP-SC4	94.0	55-75
DWP-SC5	102.4	55-75

Notes:
1. Elevations are referenced to NAD 83 NH State Plane
2. amsl indicates above mean sea level

Water Levels within the Smith and Cummings Aquifer

December 2022 through December 2023

Dover, New Hampshire

Legend

Smith and Cummings Monitoring Wells

⊕ Monitoring Well - Unconsolidated

NOTE: The information hereon is being provided at the request of the City of Dover for use in connection to a required hydrogeologic study at 915 Central Avenue, Dover, New Hampshire. The information cannot be used for any other purpose.

● Offsite Monitoring Well Location
used for data analysis for
Hydrogeological Study

**FIGURE 8
Regional Monitoring
Well Network**



Scale is 1:9,000
1 inch = 750 feet

0 95 190 380 Meters
0 375 750 1,500 Feet

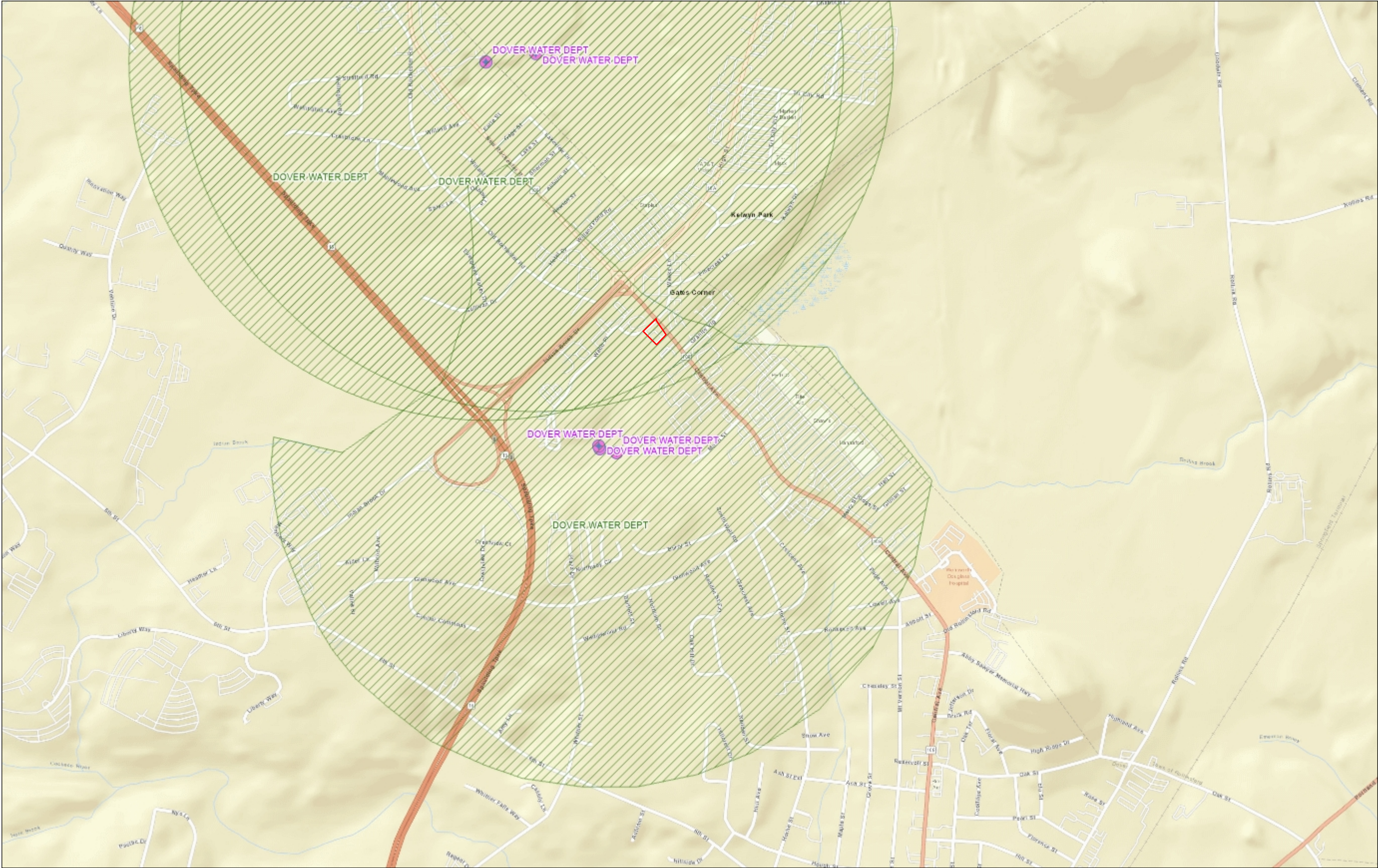
**Emery & Garrett
Groundwater Investigations, A Division of GZA**

FIGURE 8

FIGURE 9 Mapped Well Head Protection Areas

HYDROTERRA Environmental Services

FIGURE 9



- Legend
- Wellhead Protection Areas
 - Public Water Supply Wells
 - Groundwater Classification Area
 - Outstanding Resource Water V

1: 17,637



0.6 0 0.28 0.6 Miles
WGS_1984_Web_Mercator_Auxiliary_Sphere
© Latitude Geographics Group Ltd.

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.
THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes
This map was automatically generated using Geocortex Essentials.

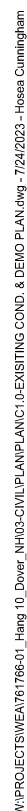
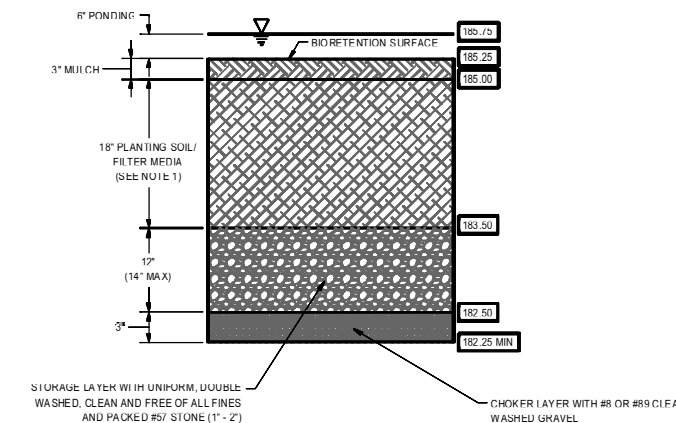


Diagram illustrating the Outlet Structure (A3) with the following details:

- CLOSED MANHOLE**: Located at the top of the structure.
- 3'x3' PRE-CAST CONCRETE OUTLET STRUCTURE**: The main body of the structure.
- RIM ≈ 187.00** : Elevation of the top rim.
- 6" ORIFICE INV. 185.75**: Elevation of the 6-inch orifice.
- 12" OUTLET PIPE INV. 184.80**: Elevation of the 12-inch outlet pipe.

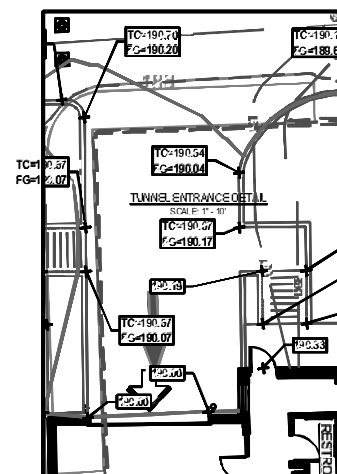
OUTLET STRUCTURE (A3)

NTS



- NUMERICAL NOTES:**
1. FILTER MEDIA SHALL BE EITHER (PER THE NEW HAMPSHIRE'S STORMWATER MANUAL VOLUME 2, BIORETENTION SYSTEM):
- A. FILTER MEDIA OPTION A
- 50 TO 55% - ASTM C-33 CONCRETE SAND
 - 20 TO 30% - LOAMY SAND TOPSOIL, WITH FINES AS INDICATED (15 TO 25% PERCENT BY WEIGHT PASSING STANDARD #200 SIEVE)
 - 20 TO 30% - MODERATELY FINE SHREDDED BARK OR WOOD FIBER MULCH, WITH FINES AS INDICATED (<5% PERCENT BY WEIGHT PASSING STANDARD #200 SIEVE)
- B. FILTER MEDIA OPTION B
- 20 TO 30% - MODERATELY FINE SHREDDED BARK OR WOOD FIBER MULCH, WITH FINES AS INDICATED (<5% PERCENT BY WEIGHT PASSING STANDARD #200 SIEVE)
 - 70 TO 80% - LOAMY COARSE SAND
 - 85 TO 100% PERCENT BY WEIGHT PASSING STANDARD #10 SIEVE
 - 70 TO 100% PERCENT BY WEIGHT PASSING STANDARD #20 SIEVE
 - 15 TO 40% PERCENT BY WEIGHT PASSING STANDARD #60 SIEVE
 - 8 TO 15% BY WEIGHT PASSING STANDARD #200 SIEVE

BIORETENTION SECTION
NTS



NO.	STRUCTURE	GRATE	INVERT
A1	CURB INLET	189.02	181222(12') SW 181222(12') N
A2	CURB INLET	189.44	183.94(12') NE 184.80(12') S
A3	OUTLET CONTROL STRUCTURE	185.25	183.70(12') N
E1	HEADWALL	-	185.25(18') N
B2	CURB INLET	189.54	185.50(12') N 185.50(18') S
B3	CURB INLET	188.96	186.46(12') S
EX1	EXISTING INLET	187.52	180.46(12') S

PIPE NAME	DIAMETER	LENGTH	SLOPE
A1-A X	12"	50'	1.51%
A2-A1	12"	166'	1.50%
A3-A2	12"	21'	5.38%
B2-B1	18"	148'	0.17%
B3-B2	12"	38'	2.54%

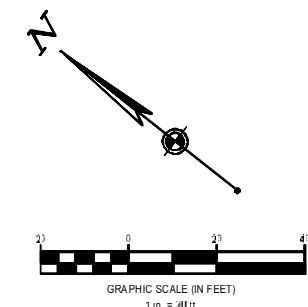
<u>GRADING LEGEND</u>	
<u>EXISTING</u>	
TO CUT FOR EXISTING FEATURES LEGEND	
<u>PROPOSED</u>	
	RIGHT-OF-WAY
	PROPERTY LINE
	SETBACK
	EASEMENT
	BUILDING
	MAJOR CONTOUR
	MINOR CONTOUR
	GRADE BREAK
	FLOW LINE
	STRUCTURE NUMBER
	STORM MANHOLE
	CURB INLET
	CLEANOUT
	DOWNSPOUT
	FINISHED GRADE ELEVATION
	RIM ELEVATION
	BACK UP CURB ELEVATION
	TOP OF CURB ELEVATION
	FINISHED GRADE ELEVATION
	TOP OF PAVEMENT ELEVATION
	TOP OF FOOTING ELEVATION
	MATCH EXISTING ELEVATION

GENERAL NOTES:
SFF SHEET C01

CODED NOTES:

1. PROPOSED HYDRODYNAMIC SEPARATOR. CONTRACTOR SHALL USE STORMTRAP STORMSETTI FR OR APPROVED EQUI

2. PROPOSED U4" SUBGRADE UNDER PAVEMENT. SEE DETAIL ON SHEET C600



ATTACHMENT 1

Study Area Photographs and General Information

S





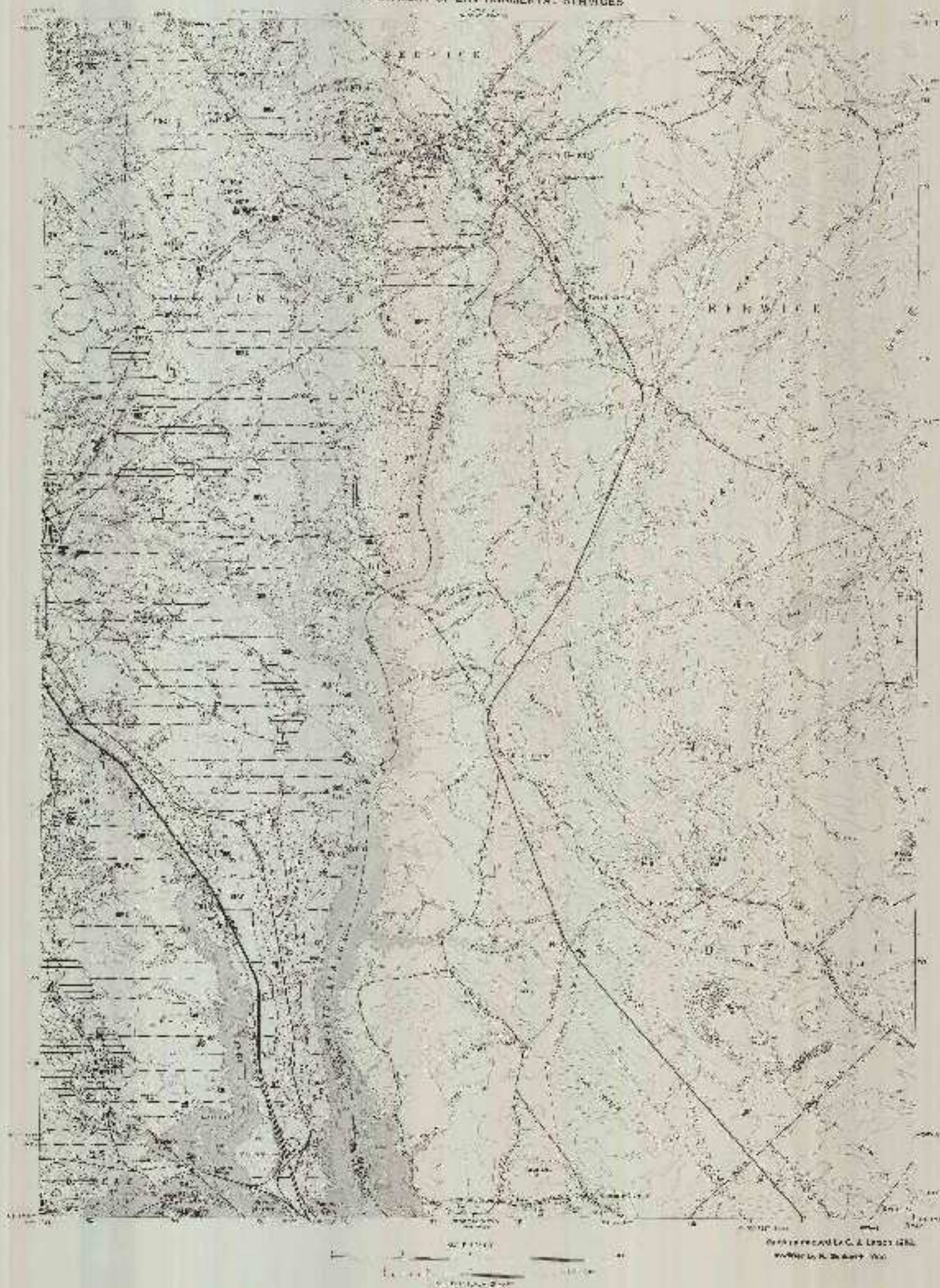
67. NAME _____ DOB (dd) (mm) (yy) _____

09.00129-18 455

Y. Iwata, M. Shimizu, and T. Shimizu, *Journal of the Mathematical Society of Japan*, **45**, 103 (1993).

- [illegible]

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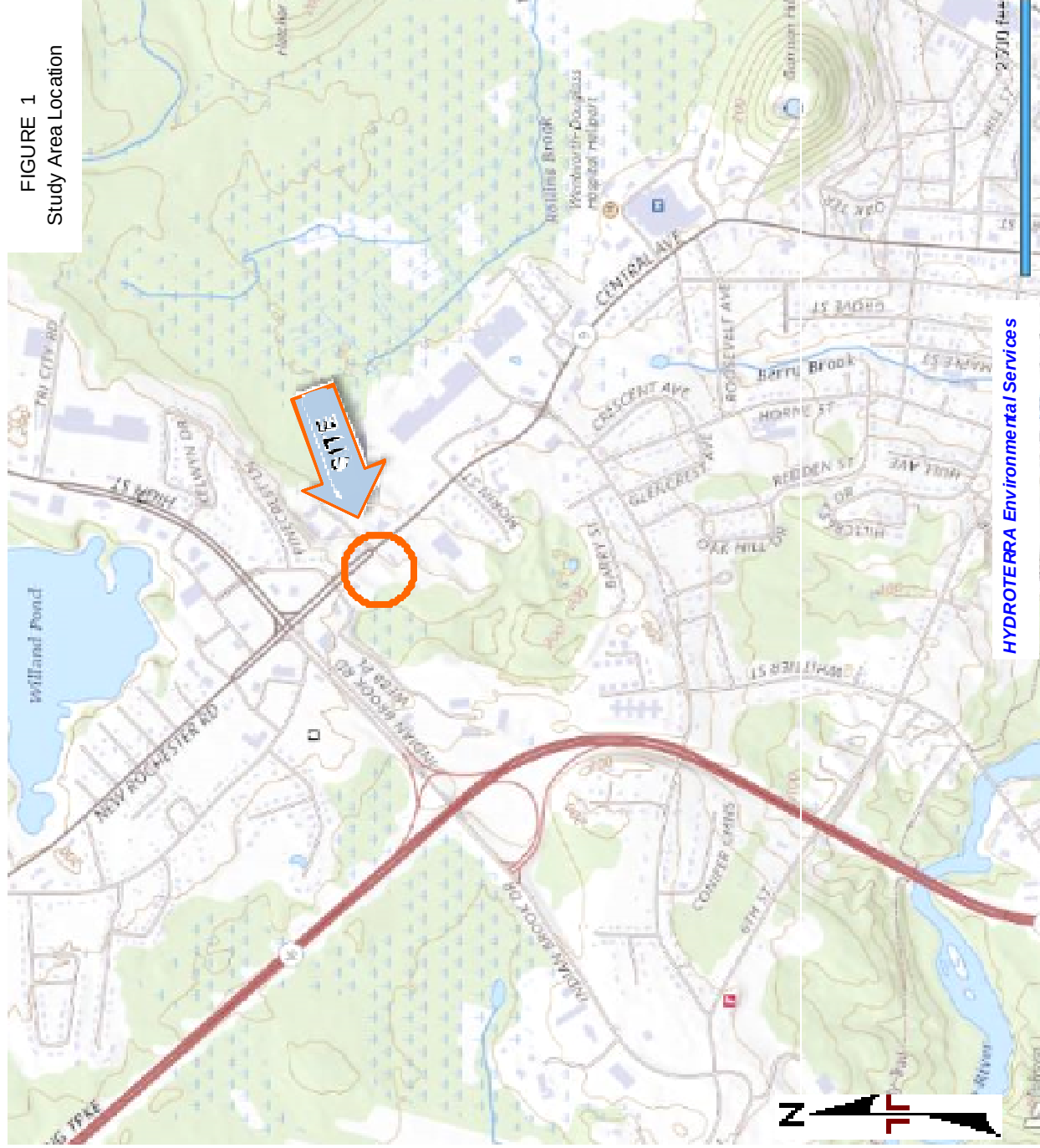
BY

GRAHAM J. LARSON AND RICHARD GOLDSMITH

1983

This report is a preliminary and preliminary
preliminary preliminary preliminary preliminary
preliminary preliminary preliminary preliminary
preliminary preliminary preliminary preliminary
preliminary preliminary preliminary preliminary

FIGURE 1
Study Area Location



ATTACHMENT 2

Boring Logs

S

BORING LOG NO. B-1

Page 1 of 1

PROJECT: Dover Carwash Facility

CLIENT: Hang 10 Car Wash
Boston, Massachusetts

SITE: 914 Central Ave
Dover, New Hampshire

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2201° Longitude: -70.8865° Approximate Surface Elev.: 188 (Ft.) +/- ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS
		SILTY SAND (SM) , light brown, medium dense 2.0 186+/-				12	6-7-8-8 N=15
		POORLY GRADED SAND WITH SILT (SP-SM) , fine grained, orange brown, medium dense 7.0 181+/-	5			19	8-8-9-8 N=17
		SILTY SAND (SM) , light brown to light brownish gray, medium dense 10 17				16	3-5-7-9 N=12
						14	7-9-13-15 N=22
			15			17	10-14-12-14 N=26
			20			21	7-10-10-12 N=20
						17	10-10-12-13 N=22
		Boring Terminated at 22 Feet 22.0 166+/-					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic
Samples obtained using a 2" O.D. split spoon sampler

Advancement Method:
3-1/4-inch I.D. hollow stem augers

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

WATER LEVEL OBSERVATIONS

Groundwater not encountered during drilling

Terracon
77 Sundial Ave, Ste 401W
Manchester, NH

Boring Started: 03-09-2022

Boring Completed: 03-09-2022

Drill Rig: Diedrich D-50

Driller: C. Johnston

Project No.: J1235002

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1235002 DOVER CARWASH.GPJ TERRACON_DATATEMPLATE.GDT 4/5/23

BORING LOG NO. B-2

Page 1 of 1

PROJECT: Dover Carwash Facility

CLIENT: Hang 10 Car Wash
Boston, MassachusettsSITE: 914 Central Ave
Dover, New Hampshire

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2200° Longitude: -70.8864° Approximate Surface Elev.: 188 (Ft.) +/- DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS
3		SILTY SAND (SM) , orange brown to light brown, loose to medium dense Pocket of Silt at 3 feet	5			14	1-2-4-4 N=6
						20	5-6-8-9 N=14
						18	4-6-7-5 N=13
						17	5-9-11-14 N=20
		10.0	178+/-				
3		POORLY GRADED SAND WITH SILT (SP-SM) , fine grained, light brown, medium dense to dense	10			16	7-9-16-14 N=25
		20.0	168+/-				
3		SILTY SAND (SM) , light brown, medium dense	20			22	9-10-14-18 N=24
		22.0	166+/-				
		Boring Terminated at 22 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic
Samples obtained using a 2" O.D. split spoon samplerAdvancement Method:
3-1/4-inch I.D. hollow stem augersSee [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with soil cuttings upon completion.See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

WATER LEVEL OBSERVATIONS

Groundwater not encountered during drilling

Terracon
77 Sundial Ave, Ste 401W
Manchester, NH

Boring Started: 03-09-2022

Boring Completed: 03-09-2022

Drill Rig: Diedrich D-50

Driller: C. Johnston

Project No.: J1235002

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1235002 DOVER CARWASH.GPJ TERRACON_DATATEMPLATE.GDT 4/5/23

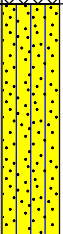
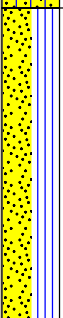
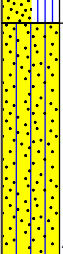
BORING LOG NO. B-3

Page 1 of 1

PROJECT: Dover Carwash Facility

CLIENT: Hang 10 Car Wash
Boston, Massachusetts

SITE: 914 Central Ave
Dover, New Hampshire

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2203° Longitude: -70.8862° Approximate Surface Elev.: 188 (Ft.) +/- DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS
2		FILL - POORLY GRADED SAND , trace gravel, fine grained, brown to orange brown 5.0 183+/-	5			10 16	6-2-8-6 N=10 5-7-10-14 N=17
3		SILTY SAND (SM) , light brown, loose to medium dense 10.0 178+/-	10			16 22	3-3-4-5 N=7 5-5-6-6 N=11
		POORLY GRADED SAND WITH SILT (SP-SM) , fine grained, orange brown, medium dense 17.0 171+/-	15			20 21	3-5-5-7 N=10 5-9-10-12 N=19
		SILTY SAND (SM) , orange brown, medium dense 22.0 166+/-	20			20	6-8-9-10 N=17
	Boring Terminated at 22 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic
Samples obtained using a 2" O.D. split spoon sampler

Advancement Method:
3-1/4-inch I.D. hollow stem augers

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

WATER LEVEL OBSERVATIONS

Groundwater not encountered during drilling

Terracon
77 Sundial Ave, Ste 401W
Manchester, NH

Boring Started: 03-09-2022

Boring Completed: 03-09-2022

Drill Rig: Diedrich D-50

Driller: C. Johnston

Project No.: J1235002

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1235002 DOVER CARWASH.GPJ TERRACON_DATATEMPLATE.GDT 4/5/23

BORING LOG NO. B-4

Page 1 of 1

PROJECT: Dover Carwash Facility

CLIENT: Hang 10 Car Wash
Boston, Massachusetts

SITE: 914 Central Ave
Dover, New Hampshire

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2201° Longitude: -70.8863°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS
		Approximate Surface Elev.: 189 (Ft.) +/-					
		DEPTH ELEVATION (Ft.)					
		0.1 1.5 inches of bituminous concrete	188.9+/-				
		SILTY SAND (SM) , orange brown, medium dense				18	3-5-6-7 N=11
		2.5	186.5+/-			19	7-8-10-7 N=18
		POORLY GRADED SAND WITH SILT (SC-SM) , trace gravel, fine grained, orange brown, medium dense				16	5-7-9-8 N=16
		5.0	184+/-			4	12-14-14-11 N=28
		SILTY SAND (SM) , light brown, medium dense				18	5-7-7-9 N=14
						24	8-8-9-9 N=17
						24	6-8-9-13 N=17
		22.0	167+/-				
		Boring Terminated at 22 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic
Samples obtained using a 2" O.D. split spoon sampler

Advancement Method:
3-1/4-inch I.D. hollow stem augers

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with soil cuttings upon completion.
Sealed with bituminous cold patch at surface.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

WATER LEVEL OBSERVATIONS

Groundwater not encountered during drilling

Terracon
77 Sundial Ave, Ste 401W
Manchester, NH

Boring Started: 03-09-2022

Boring Completed: 03-09-2022

Drill Rig: Diedrich D-50

Driller: C. Johnston

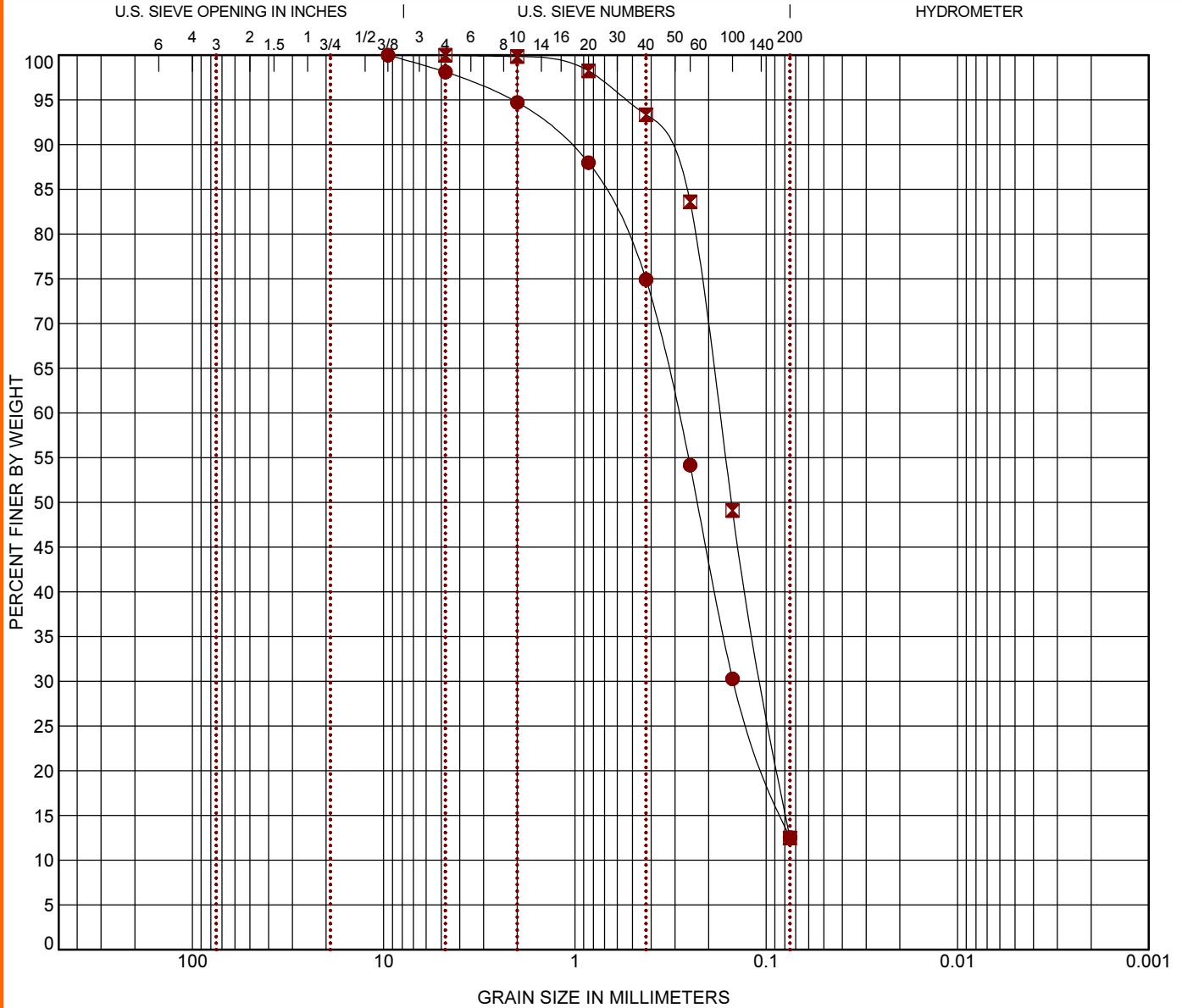
Project No.: J1235002

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1235002 DOVER CARWASH.GPJ TERRACON_DATATEMPLATE.GDT 4/5/23

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 J1235002 DOVER CARWASH.GPJ TERRACON_DATATEMPLATE.GDT 4/5/23



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
● B-1	0 - 2	SILTY SAND (SM)	4.4					
✕ B-3	5 - 7	SILTY SAND (SM)	6.0				0.87	2.46

Boring ID	Depth (Ft)	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
● B-1	0 - 2	9.5	0.29	0.148		0.0	1.9	85.6		12.5	
✕ B-3	5 - 7	4.75	0.176	0.105		0.0	0.0	87.5		12.5	

PROJECT: Dover Carwash Facility

SITE: 914 Central Ave
Dover, New Hampshire

Terracon
77 Sundial Ave, Ste 401W
Manchester, NH

PROJECT NUMBER: J1235002

CLIENT: Hang 10 Car Wash
Boston, Massachusetts

APPENDIX B

SOIL BORING LOGS

LEGEND

Proportions Used

TRACE (tr.)	0-10%
LITTLE (li.)	10-20%
SOME (so.)	20-35%
AND	35-50%

Cohesionless Density

BLOWS/FEET	DENSITY
0-10	loose
10-30	med. dense
30-50	dense
50-100	very dense
100+	refusal

Cohesive Density

BLOWS/FEET	DENSITY
0-2	very soft
2-5	medium soft
5-15	soft
15-25	stiff
25+	hard

Abbreviations

f. - fine	gr. - gray
m. - medium	bn. - brown
c. - coarse	yel. - yellow
v. - very	bl. - blue

Organic Vapor Instrument Used

MAKE: HNU
MODEL: PI-101
RANGE: 1-20 PPM
ND: Not Detected
PPM: Parts per Million

SOIL BORING LOG



PROJECT : 914 Central Avenue

BORING NO. : MW-1

LOCATION: Dover, New Hampshire

SHEET : 1 of 1

BORING CO.: Great Works Test Boring

GROUNDWATER READINGS

FILE NO. : 90063

FOREMAN : D. Dionne

DATE : 6-25 TIME : 11:00 DEPTH : 29.2 ft CASING : Screen-In STAB. T. : 1 hour

ARIES REP.: M. Towle

CASING : HSA SAMPLER : 18" Split Spoon

DATE : 6-25-90

SIZE I.D. : 4-1/4" I.D. 1-3/8" I.D.

GROUND EL.:

HAMMER WT. : - 140 lbs.

DEPTH FEET	SAMP NO.	BLOWS PER 6-INCHES	SAMPLE INTERVAL	ADV./ RECOV	INSTRU READ -PPM	SAMPLE DESCRIPTION	STRATA CHANGE	EQUIPMENT INSTALLED	NOTES
			FEET	INCHES				—Steel Road Box	
5	S-1	2-3-2	0-1.5	18/10	0	Gravelly SAND, well graded, f.-c. SAND, so. f.-m. Gravel, tr. Silt, loose, dry, bn., SW.	Gravelly SAND	—Concrete Seal 1'	
	S-2	1-5-8	4.5-6	18/10	0	Silty SAND, well graded, f. SAND, so. Silt, loose, damp, bn., SM.	4.0' Si SAND 5.5'		
10	S-3	3-4-5	9.5-11	18/14	0	SAND, well graded, f.-c. SAND, li. f. Gravel, loose, damp, bn., SW.			
15	S-4	3-4-5	14.5-16	18/18	0	SAND, poorly graded, f.-m. SAND, loose, damp, bn., SP.		—Natural Backfill	
20	S-5	3-4-7	19.5-21	18/18	0	SAND, poorly graded, f. SAND, tr. Silt, loose, damp, gr., SP.	SAND	18.5' —Bentonite Seal	
25	S-6	6-10-12	24.5-26	18/18	0	SAND, poorly graded, f. SAND, tr. Silt, loose, damp, bn./gr., SP.		22'	
30	S-7	3-6-9	29.5-31	18/18	0	SAND, poorly graded, f. SAND, tr. Silt, loose, moist-saturated, gr., SP. (iron stained layers)		24.5'	
35							34.5'	10' of 2" I.D. PVC wellscreen	
								—Filter Sand	
40									1., 2.
45									
						Bottom of boring at approximately 34.5 ft			

- The boring was terminated at a depth of approximately 34.5 feet.
- The monitoring well was constructed of Sched. 40 2"-diam. PVC solid riser and .010"-slot well screen set at a depth of approximately 34.5 feet. A protective steel road box was set in concrete at the ground surface.

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Project No: P-8233-02

Contractor: GWTB

Logged by: MJF

Drilling Method: HSA

Project Name: Charter Fuel/Dover

Date Completed: 6/16/93

Location: 90± feet NNE of kiosk

Total Depth: 102± feet

BORING NO: B-1

Surface Elevation: 195.00 ft

WELL NO: SG-1

Wellhead Elevation: 194.58 ft

Sheet 1 of 2

Depth (feet)	Sample Depth (feet)	Blows per 6 inches	Recovery (Inches)	Soil Boring Log	USCS Soil Class	PID* (ppm)	Monitoring Well Log		Well Detail
0	0' - 2'			brown, medium-coarse SAND and gravel (fill).			Roadbox Diameter 9.0"		
5	5' - 7'	13,20, 22,16	08"	orange-brown, m-c SAND and gravel.	GP	39.4	Cement Seal -0.5'		
10	10' - 12'	8,15, 19,14	18"	6"/ m-c SAND, gravel; 12"/ grey, fine silty SAND w/ iron laminae.	SM	5.3	Bottom of Casing -1.0'		
15	15' - 17'	10,25, 24,18	06"	orange-brown, m-c SAND and gravel.	GP	23.3	Top of Bentonite -2.0'		
20	20' - 22'	10,12, 15,12	14"	or-br, m-c SAND and gravel; some silt.		47.9	Riser Material PVC		
25	25' - 27'	29,35, 34,31	20"	grey, fine silty SAND w/ iron laminae.	SM	20.3	Inside Diameter 2.0"		
30	30' - 32'	20,23, 11,10	20"	tan, f-m SAND w/ iron laminae.	SW	12.0	Back Fill Material native		
35	35' - 37'	6,10, 11,8	16"	tan, f-m SAND w/ iron laminae; moist.		3.9			
40	40' - 42'	3,6, 10,12	22"	tan, f-m SAND w/ iron laminae; wet.		7.4			
45	45' - 47'	10,21, 28,36	24"	(as above)		2.9			
50	50' - 52'	18,40, 52,22	04"	m-c SAND and gravel, some cobbles.	GP	3.4			
55	55' - 57'	17,16, 14,17	04"	(as above)		3.1			
60	60' - 62'	30,20, 26,20	02"	(as above)		3.2			
							Water Level (7/14/93) -38.33'		

Remarks: PID calibrated to 100 ppm isobutylene, and then adjusted to display values which are equivalent to benzene. No odors or staining indicative of petroleum were observed during the advancement of the boring. Depth measurements given in feet below ground surface.

Test Boring Log and Monitoring Well Construction Detail for B-1/SG-1.

CHARTER FUEL #2614 PROPERTY
1 New Rochester Road
Dover, New Hampshire

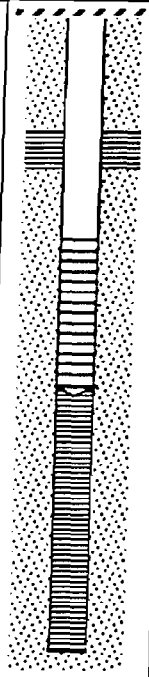
SHEVENELL~GALLEN and Associates, Inc.
195 Commerce Way
Portsmouth, New Hampshire 03801

Project No: P-8233-02
 Contractor: GWTB
 Logged by: MJF
 Drilling Method: HSA

Project Name: Charter Fuel/Dover
 Date Completed: 6/16/93
 Location: 90± feet NNE of kiosk
 Total Depth: 102± feet

BORING NO: B-1
 Surface Elevation: 195.00 ft
 WELL NO: SG-1
 Wellhead Elevation: 194.58 ft

Sheet 2 of 2

Depth (feet)	Sample Depth (feet)	Blows per 6 inches	Recovery (inches)	Soil Boring Log	USCS Soil Class	PID* (ppm)	Monitoring Well Log		Well Detail
65	65' - 67'	27,23, 28,30	06"	m-c SAND and gravel, some cobbles.	GP	3.0	Top of Bentonite	-69.5'	
70	70' - 72'	25,26, 25,27	00"	(as above)		-	Top of Sand Pack	-71.5'	
75	75' - 77'	53,50, 74,75	10"	tan, f-m silty SAND w/ iron laminae.	SM	2.6	Type of Sand Pack	filter	
80	80' - 82'	54,50, 71,71	12"	2"/ grey, clay SILT; 10"/ tan, silty SAND.	SC	1.9	Top of Screen	-75.0'	
85	85' - 87'	37,46, 38,43	24"	grey-grm, silty CLAY, w/f-m SAND laminae.	CL	1.3	Screen Material	PVC	
90	90' - 92'	98,93, 116,	12"	tan, m-c SAND w/ iron laminae; dense.	SP	3.0	Inside Diameter	2.0"	
95	95' - 97'	108, 53,88, 115, 150	18"	(as above)		3.1	Slot Size	0.01"	
100				BEDROCK at 102'.			Bottom of Screen	-85.0'	
105							Top of Bentonite	-85.0'	
							(Extended boring sealed with bentonite)		
							Bottom of Bentonite	-102.0'	
							Depth of Bore Hole	-102.0'	
							Bore Hole Diameter	7.75"	

Remarks: PID calibrated to 100 ppm isobutylene, and then adjusted to display values which are equivalent to benzene. No odors or staining indicative of petroleum were observed during the advancement of the boring. Depth measurements given in feet below ground surface.

Test Boring Log and Monitoring Well Construction Detail for B-1/SG-1.

CHARTER FUEL #2614 PROPERTY
 1 New Rochester Road
 Dover, New Hampshire

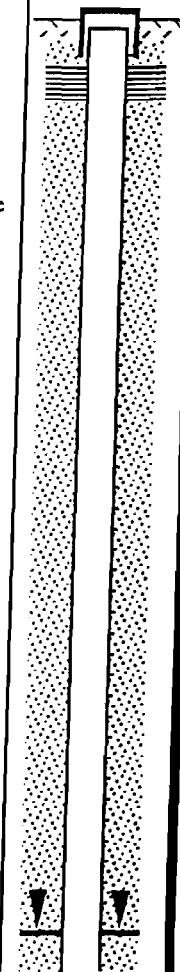
SHEVENELL~GALLEN and Associates, Inc.
 195 Commerce Way
 Portsmouth, New Hampshire 03801

Project No: P-8233-02
 Contractor: GWTB
 Logged by: MJF
 Drilling Method: HSA

Project Name: Charter Fuel/Dover
 Date Completed: 6/17/93
 Location: 90± feet NNW of kiosk
 Total Depth: 111.5± feet

BORING NO: B-2
 Surface Elevation: 193.57 ft
 WELL NO: SG-2
 Wellhead Elevation: 193.25 ft

Sheet 1 of 2

Depth (feet)	Sample Depth (feet)	Blows per 6 inches	Recovery (inches)	Soil Boring Log	USCS Soil Class	PID* (ppm)	Monitoring Well Log		Well Detail
0	0' - 2'			brown, medium-coarse SAND and gravel (fill).			Roadbox Diameter	9.0"	
5	5' - 7'	8,39, 50,45	18"	tan, m-c SAND and gravel.	GP	77.2	Cement Seal	-0.5'	
10	10' - 12'	8,16, 17,20	16"	(as above)		19.5	Bottom of Casing	-1.0'	
15	15' - 17'	8,13, 18,21	14"	(as above)		12.8	Top of Bentonite	-2.0'	
20	20' - 22'	14,19, 21,14	18"	tan, f-m SAND w/ iron and grey silt laminac.	SW	39.8	Riser Material Inside Diameter Back Fill Material	PVC 2.0" native	
25	25' - 27'	21,22, 19,15	20"	14"/ grey, fine silty SAND w/ iron laminac; 6"/ m-c SAND, gravel.	GP	22.7			
30	30' - 32'	7,12, 15,21	16"	tan, f-m SAND w/ iron laminac.	SW	8.9			
35	35' - 37'	16,32, 34,34	20"	(as above); moist.		4.8			
40	40' - 42'	12,27, 22,22	20"	14"/ (as above), wet; 6"/ grey, silty SAND.	SM	2.9			
45									
50									
55				Split-spoon samples were not collected below the water table.					
60									
Water Level (7/14/93)							-59.90'		

Remarks: PID calibrated to 100 ppm isobutylene, and then adjusted to display values which are equivalent to benzene. No odors or staining indicative of petroleum were observed during the advancement of the boring. Depth measurements given in feet below ground surface.

Test Boring Log and Monitoring Well Construction Detail for B-2/SG-2.

CHARTER FUEL #2614 PROPERTY
 1 New Rochester Road
 Dover, New Hampshire

SHEVENELL-GALLEN and Associates, Inc.
 195 Commerce Way
 Portsmouth, New Hampshire 03801

Project No: P-8233-02

Contractor: GWTB

Logged by: MJF

Drilling Method: HSA

Project Name: Charter Fuel/Dover

Date Completed: 6/17/93

Location: 90± feet NNW of kiosk

Total Depth: 111.5± feet

BORING NO: B-2

Surface Elevation: 193.57 ft

WELL NO: SG-2

Wellhead Elevation: 193.25 ft

Sheet 2 of 2

Depth (feet)	Sample Depth (feet)	Blows per 6 inches	Recovery (inches)	Soil Boring Log	USCS Soil Class	PID* (ppm)	Monitoring Well Log	Well Detail
65				Stratigraphy, based on auger cuttings:				
70				-----				
75				(silty, f-m SAND w/ clay laminae)	SC			
80				=====				
85				(m-c SAND)	SP			
90				(dense, grey CLAY)	CL		Top of Bentonite Top of Sand Pack Type of Sand Pack	-84.0' -88.0' filter
95				(m-c SAND)	SP			
100							Top of Screen Screen Material Inside Diameter Slot Size Bottom of Screen Depth of Bore Hole Bore Hole Diameter	-101.0' PVC 2.0" 0.01" -111.0' -111.5' 7.75"
105								
110				BEDROCK at 111.5'				
				Well SG-2 seated at bedrock, in couplet with well SG-4.				

Remarks: PID calibrated to 100 ppm isobutylene, and then adjusted to display values which are equivalent to benzene. No odors or staining indicative of petroleum were observed during the advancement of the boring. Depth measurements given in feet below ground surface.

Test Boring Log and Monitoring Well Construction Detail for B-2/SG-2.

CHARTER FUEL #2614 PROPERTY
1 New Rochester Road
Dover, New Hampshire

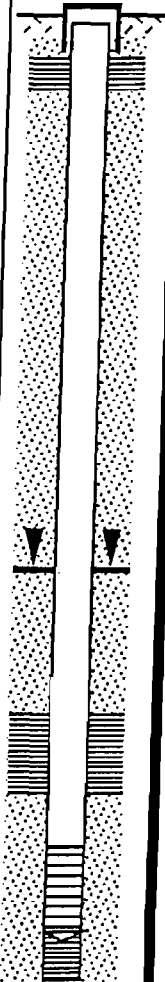
SHEVENELL-GALLEN and Associates, Inc.
195 Commerce Way
Portsmouth, New Hampshire 03801

Project No: P-8233-02
 Contractor: GWTB
 Logged by: MJF
 Drilling Method: HSA

Project Name: Charter Fuel/Dover
 Date Completed: 7/1/93
 Location: 20± feet SSW of kiosk
 Total Depth: 75± feet

BORING NO: B-3
 Surface Elevation: 192.42 ft
WELL NO: SG-3
 Wellhead Elevation: 192.08 ft

Sheet 1 of 1

Depth (feet)	Sample Depth (feet)	Blows per 6 inches	Recovery (inches)	Soil Boring Log	USCS Soil Class	PID* (ppm)	Monitoring Well Log	Well Detail
0	0' - 2'			brown, medium-coarse SAND and gravel (fill).			Roadbox Diameter 9.0" Cement Seal -0.5' Bottom of Casing -1.0' Top of Bentonite -2.0'	
5	5' - 7'	9,10, 12,10	08"	tan, m-c SAND and gravel.	GP	36.0	Riser Material PVC Inside Diameter 2.0" Back Fill Material native	
10	10' - 12'	5,10, 15,14	14"	(as above)		30.0		
15	15' - 17'	6,12, 10,8	18"	tan, f-m SAND and gravel.	SW	20.6		
20	20' - 22'	5,8, 10,9	16"	(as above)		24.2		
25	25' - 27'	7,8, 10,12	12"	tan, m-c SAND and gravel.	GP	12.5		
30	30' - 32'	18,32, 23,17	10"	(as above)		0.9		
35	35' - 37'	11,19, 23,32	20"	tan, f-m SAND w/ iron laminae; moist.	SW	367	Water Level (7/14/93) -36.39'	
40	40' - 42'	12,20, 13,19	24"	(as above); wet.		679		
45				(m-c SAND and gravel)	GP		Top of Bentonite -46.0'	
50	Split-spoon samples were not collected below the water table.			(dense CLAY)	CL		Top of Sand Pack -51.0'	
60				(m-c SAND and gravel)	GP		Type of Sand Pack filter Top of Screen -60.0'	
70	Scale of log changed to 10' intervals.			(dense CLAY)	CL		Screen Material PVC Inside Diameter 2.0" Slot Size 0.01" Bottom of Screen -70.0' Depth of Bore Hole -75.0' Bore Hole Diameter 7.75"	

Remarks: PID calibrated to 100 ppm isobutylene, and then adjusted to display values which are equivalent to benzene. No odors or staining indicative of petroleum were observed during the advancement of the boring. Depth measurements given in feet below ground surface.

Test Boring Log and Monitoring Well Construction Detail for B-3/SG-3.

CHARTER FUEL #2614 PROPERTY
 1 New Rochester Road
 Dover, New Hampshire

SHEVENELL~GALLEN and Associates, Inc.
 195 Commerce Way
 Portsmouth, New Hampshire 03801

Project No: P-8233-02

Contractor: GWTB

Logged by: MJF

Drilling Method: HSA

Project Name: Charter Fuel/Dover

Date Completed: 7/14/93

Location: 95± feet NNW of kiosk

Total Depth: 84± feet

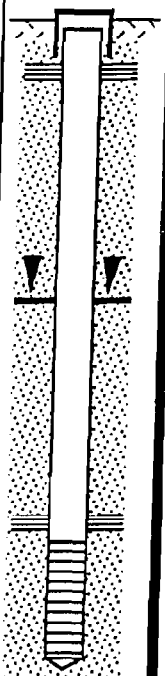
BORING NO: B-4

Surface Elevation: 193.79 ft

WELL NO: SG-4

Wellhead Elevation: 193.46 ft

Sheet 1 of 1

Depth (feet)	Sample Depth (feet)	Blows per 6 inches	Recovery (inches)	Soil Boring Log	USCS Soil Class	PID* (ppm)	Monitoring Well Log	Well Detail
0	Split-spoon samples were not collected for SG-4; placed in couplet with SG-2. Scale of log changed to 10' intervals. Stratigraphy, based on auger cuttings:						Roadbox Diameter 9.0"	
10							Cement Seal -0.5'	
							Bottom of Casing -1.0'	
							Top of Bentonite -2.0'	
20				(m-c SAND and gravel)	GP		Riser Material PVC	
				(f-m SAND)	SW		Inside Diameter 2.0"	
30				(m-c SAND and gravel)	GP		Back Fill Material native	
				(f-m SAND)	SW		Water Level (7/14/93) -37.33'	
40							Top of Bentonite -65.0'	
50							Top of Sand Pack -67.0'	
				(f-m silty SAND)	SM		Type of Sand Pack filter	
60							Top of Screen -69.0'	
				(f-m SAND with clay laminae)	SC		Screen Material PVC	
70							Inside Diameter 2.0"	
				(m-c SAND)	SP		Slot Size 0.01"	
80				(dense CLAY)	CL		Bottom of Screen -84.0'	
							Depth of Bore Hole -84.0'	
							Bore Hole Diameter 7.75"	
							15' of screen installed to encompass clay stringers in overlying sand.	

Remarks: PID calibrated to 100 ppm isobutylene, and then adjusted to display values which are equivalent to benzene. No odors or staining indicative of petroleum were observed during the advancement of the boring. Depth measurements given in feet below ground surface.

Test Boring Log and Monitoring Well Construction Detail for B-4/SG-4.

CHARTER FUEL #2614 PROPERTY
1 New Rochester Road
Dover, New Hampshire

SHEVENELL~GALLEN and Associates, Inc.
195 Commerce Way
Portsmouth, New Hampshire 03801



BORING NO: B(MW)-1

SHEET NO.:	1 of 1
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TOC ELEVATION:	102.11
----------------	--------

DATE STARTED:	9/17/21
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WELL CONSTRUCTION			DEPTH (ft)	SAMPLE			CLASSIFICATION	PID (ppm) RF = 0.6
				NO.	RECOVERY (ft)	BLOWS PER 0.5 FOOT		
Road box (Flush-mounted)	Concrete	—			6	0-0.5: ASPHALT, crushed.		
		1		0.9/ 1.25	5	0.5- 1.25: Medium dense, Brown, fine to coarse SAND, some Silt, some Gravel, Moist.	0.0	
					21			
2-inch PVC Riser (8 ft bgs-gs)	Native cutting (5- 0.5 ft bgs)	2			--	Spoon will not advance past 1.25 ft bgs, auger to 2 ft bgs.		
		3		0.7/ 2	22	2-3: Medium dense, Brown, fine to coarse SAND, some Silt, some Gravel, trace Asphalt (cave in).	0.1	
					20			
		4			3	3-4: Medium dense, White/light gray, fine to coarse SAND and crushed COBBLES. Rock in sampler tip.	0.1	
					16			
		5				Moved rig ~ 3 feet due to refusal on cobbles. Auger to 5 ft bgs.		
Bentonite (5-6 ft bgs)		6		1.4/ 2	7	Medium dense, Tan, medium to coarse SAND.	0.1	
					5			
		7			6		0.0	
Filter Sand (18-6 ft bgs)					6			
		8		1.5/ 2	7	7-8.5: Medium dense, Tan/orange, fine to coarse SAND.	0.1	
					9			
		9			11		0.1	
					11	8.5-9: Medium dense, Tan, fine to medium SAND, trace Silt.		
		10				Auger to 10 ft bls.		
	Apparent Groundwater							
		11		2.0/ 2	1	Tannish/gray, SILT, some Clay, Wet (exterior). Thin layer of fine to medium SAND at 11 ft bgs.	0.1	
					2			
2-inch PVC Screen (18-8 ft bgs)		12			2		0.1	
					7			
		13				Auger to 15 ft bls.		
		14						
		15						
		16		1.3/ 2	4	Medium dense, Tan/brown, fine to medium SAND, trace Silt, Wet.	0.1	
					5	Laboratory sample B(MW)-1 collected 15-16 ft bgs.		
		17			6		0.1	
					8			
		18				Auger to 18 ft bls. Set monitoring well.		
		19				Boring terminated at 18 ft bls.		
		20						
		21						
		22						
		23						
		24						
		25						
		26						
		27						
		28						
		29				HSA = hollow stem auger.		
						SS = split spoon.		
		30				ft (a/b)gs = feet (above/below) ground surface.		
						PID = Photoionization detector, measuring organic vapors in parts per million (ppm) by volume.		
		31				RF = Response factor.		
		32						
		33						

EXCEL FILENAME: GVLD0003 Bore Logs

EXCEL FILENAME: GVLD0003 Bore Logs

ATTACHMENT 3

Previous Reports

S



Legend

- * Remediation Sites
- Public Water Supply Wells
- All Lakes, with a Quarter Mile Buffer
- ▨ Outstanding Resource Water V
- ▨ Surface Waters with Impaired Mile Buffer
- ▨ Watersheds with Chloride Imp
- Boring Logs Included in this Report

1: 9,028



Notes

This map was automatically generated using Geocortex Essentials.

0.3 0 0.14 0.3 Miles



Geotechnical Engineering Report

**Proposed Carwash Facility
Dover, New Hampshire**

April 27, 2023

Terracon Project No. J1235002

Prepared for:

Hang 10 Car Wash
Boston, Massachusetts

Prepared by:

Terracon Consultants, Inc.
Manchester, New Hampshire



April 27, 2023

Hang 10 Car Wash
1380 Soldiers Field Road
Boston, Massachusetts 02135



Attn: Mr. Steve Lukin
E: steve.lukin@hang10carwash.com

Re: Geotechnical Engineering Report
Proposed Carwash Facility
914 Central Avenue
Dover, New Hampshire
Terracon Project No. J1235002

Dear Mr. Lukin:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PJ1235002 dated February 10, 2023. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and floor slabs for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.



Scott M. Carter
Geotechnical Department Manager

A handwritten signature in black ink, appearing to read "M. A. Ciance".

Michael A. Ciance, P.E.
Principal/Office Manager



REPORT TOPICS

INTRODUCTION	1
SITE CONDITIONS	1
PROJECT DESCRIPTION	2
GEOTECHNICAL CHARACTERIZATION	3
GEOTECHNICAL OVERVIEW	4
EARTHWORK	5
SHALLOW FOUNDATIONS	10
SEISMIC CONSIDERATIONS	12
FLOOR SLABS	13
FROST CONSIDERATIONS	14
GENERAL COMMENTS	15
FIGURES	16

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the [GeoReport](#) logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
PHOTOGRAPHY LOG
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
SUPPORTING INFORMATION

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report

Proposed Carwash Facility

914 Central Avenue

Dover, New Hampshire

Terracon Project No. J1235002

April 27, 2023

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed carwash facility to be located at 914 Central Avenue in Dover, New Hampshire. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Demolition considerations
- Excavation considerations
- Foundation design and construction
- Seismic site classification per IBC
- Frost considerations
- Dewatering considerations
- Floor slab design and construction

The geotechnical field Scope of Services for this project included the advancement of four test borings to depths of approximately 22 feet below existing site grades.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The boring logs and laboratory results are shown in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at 914 Central Avenue in Dover, New Hampshire. The property is approximately 1.29 acres and is located at coordinates 43.2202°N, 70.8862°W. See Site Location .
Existing Improvements	The site is currently developed with a 1 to 1.5-story restaurant with associated paved parking and driveway.

Item	Description
Current Ground Cover	Predominantly bituminous pavement with wooded areas along the southern portion of the property.
Existing Topography (from contours illustrated on Concept Plan CSP1.0)	The property is generally level near approximately elevation (El.) 190 feet. The site slopes up to approximately El. 200 feet near the north property boundary, and down to El. 180 feet south of the property.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	CBRE provided the following information: ■ Concept Plan CSP1.0 dated December 7, 2022, prepared by CESO and provided by CBRE on January 10, 2023. ■ Scope of services and email correspondence between CBRE and Terracon.
Project Description	We understand the project consists of constructing a new carwash facility with vac-boom assemblies, remote kiosk payment islands, and associated parking and drive areas.
Proposed Structure	The project includes an approximately 34-foot-wide by 118-foot-long carwash building. We expect the building to be a single-story with a slab-on-grade (no basement).
Building Construction	Not provided but expected to be load bearing masonry walls supported on conventional shallow footing foundations.
Finished Floor Elevation	Not provide but anticipated to be near existing grade.
Maximum Loads	Structural loads were not provided but based on our experience with similar type projects, the following loads were assumed for our geotechnical evaluation: ■ Columns: 5 to 10 kips ■ Walls: 1 to 3 kips per linear foot (klf) ■ Slabs: 150 pounds per square foot (psf)
Estimated Start of Construction	Not provided.

GEOTECHNICAL CHARACTERIZATION

Subsurface Conditions

The test borings generally encountered glacial outwash sand deposits. Existing undocumented fill, likely associated with the current development, was encountered in test boring B-3 and extended to a depth of approximately 5 feet below existing grade. The undocumented fill generally consists of medium dense poorly graded sand and trace gravel. The natural outwash sand generally consists of loose to dense silty sand to poorly graded sand with silt.

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting, and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration Results** section and the GeoModel can be found in the **Figures** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	Pavement	1.5 inches of bituminous concrete.
2	Fill	Poorly graded sand, trace gravel, brown to orange-brown.
3	Outwash Deposits	Silty sand to poorly graded sand with silt, light brown and orange-brown, loose to dense.

Groundwater Conditions

Groundwater was not observed during drilling operations. Although not observed, groundwater may be perched in fine-grained overburden soils during seasonal wet periods. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the boring was performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

GEOTECHNICAL OVERVIEW

General

As discussed above, existing fill material was encountered at boring B-3 from ground surface to a depth of approximately 5 feet below existing grade. We understand the existing building footprint will be completely within the proposed building and it is not known if the fill observed within the test boring is present within the footprint of the existing building.

Demolition

We understand a portion of the proposed building will be constructed within the footprint of the existing building, which will be demolished as part of site development, as well as exterior sidewalks, pavements, and utilities. We recommend existing foundations, slabs, pavements, and utilities be removed from within the proposed building footprint and at least 5 feet beyond the outer edge of foundations. Demolition considerations are provided in the **Earthwork** section.

Foundations

Based on the results of our field exploration, it is our opinion the site is suitable to support the proposed building on shallow spread footing foundations bearing on the native sand deposit or on compacted Structural Fill placed over proof-rolled native sand. Recommendations for shallow spread footing foundations are presented in the **Foundations** section.

As presented above, existing undocumented fill was encountered in one test boring extending to a depth of approximately 5 feet below existing grade. Supporting new foundations on undocumented fill may cause the building to settle beyond tolerable limits. As such, this zone is not considered suitable for support of new foundations. Based on the anticipated depth of excavation to construct foundations, the majority of this zone will be removed; however, areas of deeper fill material may be encountered. Existing fill, as well as unstable or unsuitable material encountered at foundation subgrade elevation, should be over-excavated from the footing bearing zones (defined as the area beneath 1 Horizontal:1 Vertical [1H:1V] lines extending downward and outward from footing edges) and replaced with compacted Structural Fill. Excavation, subgrade preparation and fill placement are discussed further in the **Earthwork** section.

Floor Slabs

Floor Slabs can be constructed as soil supported slabs-on-grade bearing on a minimum 12 inches of compacted Floor Slab Base Course placed over compacted Structural Fill, proof-rolled existing fill and/or native outwash sand. Unstable or otherwise unsuitable material encountered at slab subgrade elevation should be over-excavated and replaced with compacted Structural Fill. Design recommendations are presented in the **Floor Slabs** section.

Support of floor slabs on or above existing undocumented fill is discussed in this report. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report. To take advantage of the cost benefit of not removing the entire amount of undocumented fill, the owner must be willing to accept the risk associated with building over the undocumented fills following the recommended reworking of the material.

Construction Considerations

Exposed subgrades could become unstable with typical earthwork and construction traffic, especially after precipitation events. Effective site drainage should be completed early in the construction sequence and maintained after construction to avoid potential issues. If possible, the grading should be performed during the warmer and drier times of the year (typically May to October). If grading is performed during the winter months (typically November to April), and increased risk for possible undercutting and replacement of unstable subgrade will persist. Additional site preparation recommendations, including subgrade improvement and fill placement, are provided in the **Earthwork** section.

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the **Exploration Results**), engineering analyses, and our current understanding of the proposed project. The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork is anticipated to include demolition, removing existing landscape areas, pavements, and underground utilities, excavations, and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations and floor slabs.

Demolition

A portion of the proposed building will be constructed within the footprint of the existing restaurant building which will need to be demolished, as well as exterior sidewalks, pavements, and utilities. We recommend existing foundations, slabs, and utilities be removed from within the proposed building footprint and at least 5 feet beyond the outer edge of foundations.

For areas outside the proposed building footprints and foundation bearing zones, existing foundations, floor slabs, and utilities should be removed where they conflict with proposed utilities,

retaining walls, and pavements. In such cases, existing foundations, floor slabs, and utilities should be removed to a depth of at least 2 feet below the affected utility or design pavement subgrade elevation.

Areas disturbed from demolition activities should be undercut to undisturbed material and the excavation backfilled with compacted General Fill or Structural Fill depending on the intended future use.

Subgrade Preparation

As noted in the **Geotechnical Characterization** section, existing undocumented fill was encountered at boring B-3 to a depth of approximately 5 feet below existing grade. The fill appears to have been placed in a controlled manner, but we have no records to indicate the degree of control. Based on the anticipated depth of excavation to construct foundations, a majority of the existing fill zone will be removed; however, areas of deeper may be present. Where fill, unstable or otherwise unsuitable material is encountered at foundation subgrade elevation, it should be over-excavated and replaced with compacted Structural Fill.

Existing fill may be left in-place beneath planned floor slabs; however, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report.

If the owner elects to construct floor and/or exterior slabs over the existing fill, the following protocol should be followed. Once the planned subgrade elevation has been reached the entire area should be proof-rolled, as discussed below. Areas of soft or otherwise unsuitable material should be undercut and replaced with either imported Structural Fill or suitable existing on-site soil.

Subgrades should be proof-rolled with at least six passes in perpendicular directions using a minimum 10-ton vibratory roller in open areas; or a minimum 1-ton self-propelled vibratory roller or large vibratory plate compactor in trenches. The proof-rolling should be performed under the direction of the Geotechnical Engineer. Areas excessively deflecting under the proof-roll should be delineated and subsequently addressed by the Geotechnical Engineer. Soft or unstable areas should be over-excavated to more competent material and replaced with compacted Structural Fill or General Fill depending on the location of the fill placement. Excessively wet or dry material should either be removed, or moisture conditioned and recompacted.

Fill Material Types

The following section presents material property requirements and suitable placement locations for various types of fill. Regardless of its source, compacted fill should consist of approved

materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade.

Reuse of On-site Soil: Excavated on-site soil may be selectively reused as raise-in-grade fill (General Fill) within pavement and landscaping areas. Excavated on-site soil is not suitable for reuse as Structural Fill and should not be placed beneath settlement sensitive structures and within foundation bearing zones. Portions of the on-site soil have an elevated fines content and will be sensitive to moisture conditions (particularly during seasonally wet periods) and may not be suitable for reuse when above optimum moisture content. On-site soil may be used as General Fill provided it has the following properties:

- Free of deleterious materials
- A maximum particle size equal to the lesser of 6 inches or 2/3 of the lift thickness
- A suitable moisture content allowing for effective compaction
- Compactive efforts yield a firm and stable surface

Imported Fill Materials: Imported fill materials should meet the material property requirements in the following table.

Fill Type	New Hampshire Department of Transportation (NHDOT) Item	Acceptable Location for Placement
General Fill	209.4 – Granular Backfill (Gravel)	General raise-in-grade fill within pavement and landscaping areas. General Fill should not be placed beneath settlement sensitive structures and within foundation bearing zones.
Structural Fill	304.3 – Crushed Gravel	Beneath foundations, within foundation bearing zones, and as backfill within 5 feet of exterior foundation walls. Structural Fill should also be used as raise-in-grade fill to achieve subgrade elevations beneath floor slabs and settlement sensitive structures.
Crushed Stone ¹	703 – No. 57 Graded Coarse Aggregate	Backfill of underdrains and over wet subgrades as needed. Crushed Stone may be substituted for Structural Fill when approved by the Geotechnical Engineer.
Non-Frost Susceptible Fill ²	304.4 – Crushed Stone (Fine) or 703 – No. 57 Graded Coarse Aggregate	Below exterior slabs, sidewalks, pavements, or other ancillary structures where frost heave may be a concern.
Floor Slab Base Course	304.4 – Crushed Stone (Fine)	Below floor slabs as aggregate base course.

1. Crushed Stone should be separated from soil subgrades, excavation sidewalls, and backfill using a Class 3 non-woven geotextile included on the NHDOT Qualified Products List (such as Mirafi 140N or similar).
2. Non-Frost Susceptible (NFS) Fill should contain less than 5 percent material passing No. 200 sieve size.

Fill Compaction Requirements

Fill materials should meet the following compaction requirements.

Item	Description
Maximum Lift Thickness	<i>Vibratory Rollers:</i> 12 inches or less in loose thickness <i>Plate Compactors:</i> 6 inches or less in loose thickness when hand-guided equipment (i.e., jumping jack or plate compactor) is used
Minimum Compaction Requirements ^{1, 2}	<i>General Fill:</i> At least 92% of the material's maximum dry density <i>Structural Fill:</i> At least 95% of the material's maximum dry density <i>Crushed Stone:</i> Densified and compacted using at least six (6) passes of a vibratory roller or large vibratory plate compactor
Water Content Range ¹	±3% of optimum water content

1. Maximum density and optimum water content as determined by the Modified Proctor test (ASTM D1557, Method C).
2. We recommend testing fill for moisture content and compaction during placement. If the results of in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested, as required, until the specified moisture and compaction requirements are achieved.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge into the site drainage system.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the

structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Shallow excavations for the proposed structure are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompact prior to floor slab construction.

We do not anticipate the groundwater table affecting shallow excavation efforts. If dewatering becomes necessary, a temporary dewatering system consisting of filtered sumps with pumps or closely spaced well point systems could be necessary to achieve the desired depth of excavation. Dewatering is a means and methods consideration for the contractor.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of demolition debris, pavements, landscape islands, underground utilities, and unsuitable fill. Foundation excavations and subgrade preparation should also be observed by the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should be notified to evaluate the need for supplemental mitigation recommendations.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. One density and water content test should be performed for every 50 linear feet of compacted utility trench backfill.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in the **Earthwork** section, the following design parameters are applicable for shallow foundations.

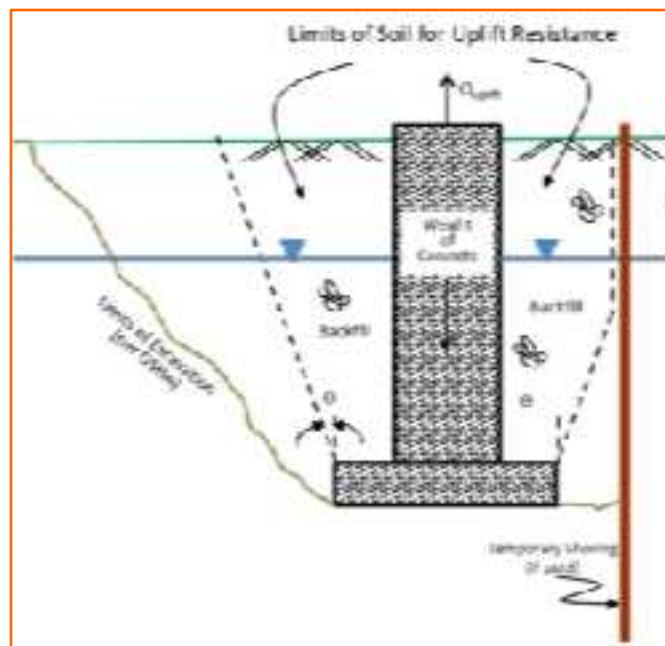
Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing Pressure ^{1, 2}	3,000 psf
Required Bearing Stratum ³	Proof-rolled native outwash sand or compacted Structural Fill placed over proof-rolled native soil
Minimum Foundation Dimensions	Columns: 30 inches Continuous: 18 inches
Ultimate Passive Resistance ⁴ (Equivalent Fluid Pressures)	390 pcf (Structural Fill)
Ultimate Coefficient of Sliding Friction ⁵	0.45 (Concrete on native sand or Structural Fill)
Minimum Embedment below Finished Grade ⁶	Exterior footings: 48 inches Interior footing in unheated areas: 48 inches Interior footings in heated areas: 18 inches
Estimated Total Settlement from Structural Loads ²	Less than about 1 inch
Estimated Differential Settlement ^{2, 7}	About 1/2 of total settlement

Item	Description
1.	The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. Values assume that exterior grades are no steeper than 2H:1V next to the structure.
2.	Values provided are for maximum loads noted in the Project Description section.
3.	Unsuitable or soft soils should be over-excavated and replaced per the recommendations presented in the Earthwork section.
4.	Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed, and compacted Structural Fill is placed against the vertical footing face.
5.	Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
6.	Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure. Interior footings in heated areas may be seated at the 18-inch depth if allowed by local building codes.
7.	Differential settlements are as measured over a span of 50 feet.

Design Parameters - Uplift Loads

Uplift resistance of spread footings can be developed from the effective weight of the footing and the overlying soils. As illustrated on the subsequent figure, the effective weight of the soil prism defined by diagonal planes extending up from the top of the perimeter of the foundation to the ground surface at an angle, θ , of 20 degrees from the vertical can be included in uplift resistance. The maximum allowable uplift capacity should be taken as a sum of the effective weight of soil plus the dead weight of the foundation, divided by an appropriate factor of safety. A maximum total unit weight of 120 pcf should be used for the backfill. This unit weight should be reduced to 57.6 pcf for portions of the backfill or natural soils below the groundwater elevation.



Foundation Construction Considerations

As noted in the **Earthwork** section, the foundation excavations should be evaluated under the direction of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the foundation excavations should be removed/reconditioned before foundation concrete is placed.

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC).

Based on the soil properties encountered at the site and as described on the exploration logs and results, it is our professional opinion that the **Seismic Site Classification is D**. Subsurface explorations at this site were extended to a maximum depth of 22 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

FLOOR SLABS

Design parameters for floor slabs assume the requirements in the **Earthwork** section have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the base course beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support ^{1, 2}	Minimum 12 inches of compacted Floor Slab Base Course over proof-rolled existing granular fill, native soil, and/or compacted Structural Fill
Estimated Modulus of Subgrade Reaction ³	100 pounds per square inch per inch (psi/in) for point loads
Modulus Correction Factor, K_c ³	$K_c = k \left(\frac{b + 1}{2b} \right)^2$

1. Floor slabs should be structurally independent of building foundations or walls to reduce the possibility of floor slab distress caused by differential movements between the slab and foundation.
2. Other design considerations such as cold temperatures and condensation development could warrant a different base course material.
3. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in the **Earthwork** section, and the floor slab support as noted in this table. It is provided for point loads. It is common to reduce the k-value to account for dimensional effects of large, loaded areas using the modulus correction factor provided, where K_c is the corrected or design modulus value and b is the mat width (short dimension) or tributary loaded area. The native soil at subgrade is expected to develop a subgrade modulus value of 100 psi/in when combined with the base course. Soft or unstable subgrade will be remediated by scarifying and re-compacting or by over-excavation and replacement.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and

slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of control joints, appropriate reinforcing, or other means.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and compacted Structural Fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should approve the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

FROST CONSIDERATIONS

The soils on this site are frost susceptible, and small amounts of water can affect the performance of the slabs on-grade, sidewalks, and pavements. Exterior slabs and pavements should be anticipated to heave during winter months. If frost action needs to be eliminated in critical areas, we recommend the use of Non-Frost Susceptible (NFS) Fill. Placement of NFS Fill in large areas may not be feasible; however, the following recommendations are provided to help reduce potential frost heave:

- Provide surface drainage away from the building and slabs, and toward the site storm drainage system.
- Install drains around the perimeter of the building, stoops, below exterior slabs, and pavements, and connect them to the site storm drainage system.
- Grade subgrades so groundwater potentially perched in overlying more permeable subgrades, such as sand or aggregate base, slope toward a site drainage system.
- Place NFS Fill as backfill beneath sidewalks, slabs, and pavements critical to the project.
- Place a 3 horizontal to 1 vertical (3H:1V) transition zone between NFS Fill and other soils.

As an alternative to extending NFS Fill to the full frost depth, consideration can be made to placing extruded polystyrene or cellular concrete under a buffer of at least 2 feet of NFS Fill.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

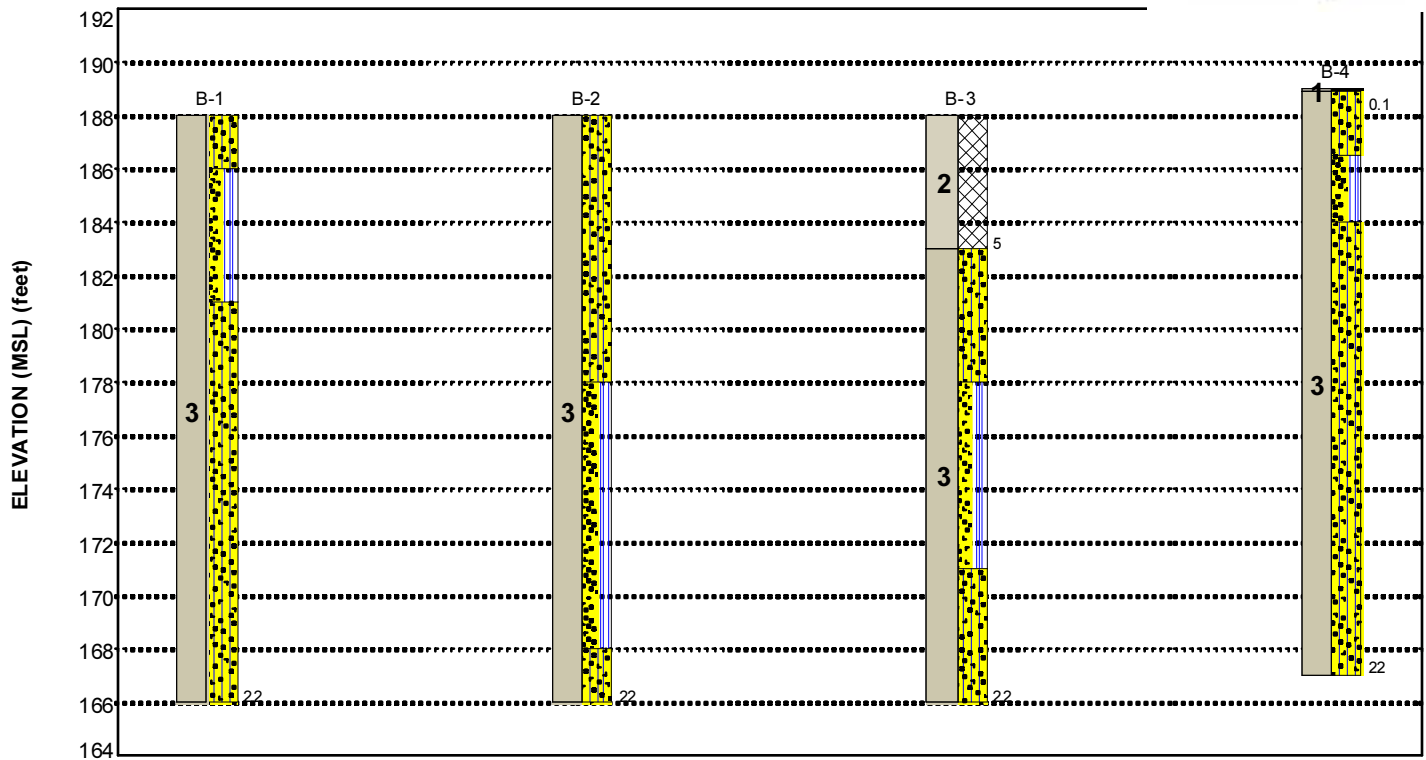
FIGURES

Contents:

GeoModel

GEOMODEL

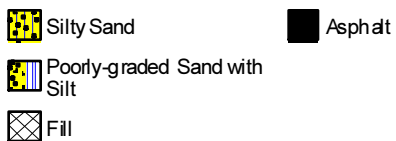
Dover Carwash Facility ■ Dover, New Hampshire
Terracon Project No. J1235002



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Pavement	1.5 inches of bituminous concrete
2	Fill	Poorly graded sand, trace gravel, brown to orange-brown
3	Outwash Deposits	Silty sand to poorly graded sand with silt, light brown and orange-brown, loose to dense

LEGEND



NOTES:

Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.

Numbers adjacent to soil column indicate depth below ground surface.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)	Location
4	22	Proposed carwash building

Boring Layout and Elevations: Unless otherwise noted, Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ± 10 feet) and approximate elevations were interpolated from contours illustrated on the provided topographic site plan. If elevations and a more precise boring layout are desired, we recommend borings be surveyed following completion of fieldwork.

Subsurface Exploration Procedures: The test borings were advanced with a track-mounted rotary drill rig using continuous flight hollow stem augers. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the middle 12 inches of a typical 24-inch penetration was recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels while drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings upon completion. Pavements were patched with cold-mix asphalt.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D422 Standard Test Method for Particle-Size Analysis of Soils

The laboratory testing program included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System, as shown in the **Supporting Information** section.

PHOTOGRAPHY LOG



Photo 1 – Site Overview (Front)



Photo 2 – Site Overview (Rear)

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location
Exploration Plan

Note: All attachments are one page unless noted above.

SITE LOCATION

Proposed Carwash Facility ■ Dover, New Hampshire

April 27, 2023 ■ Terracon Project No. J1235002

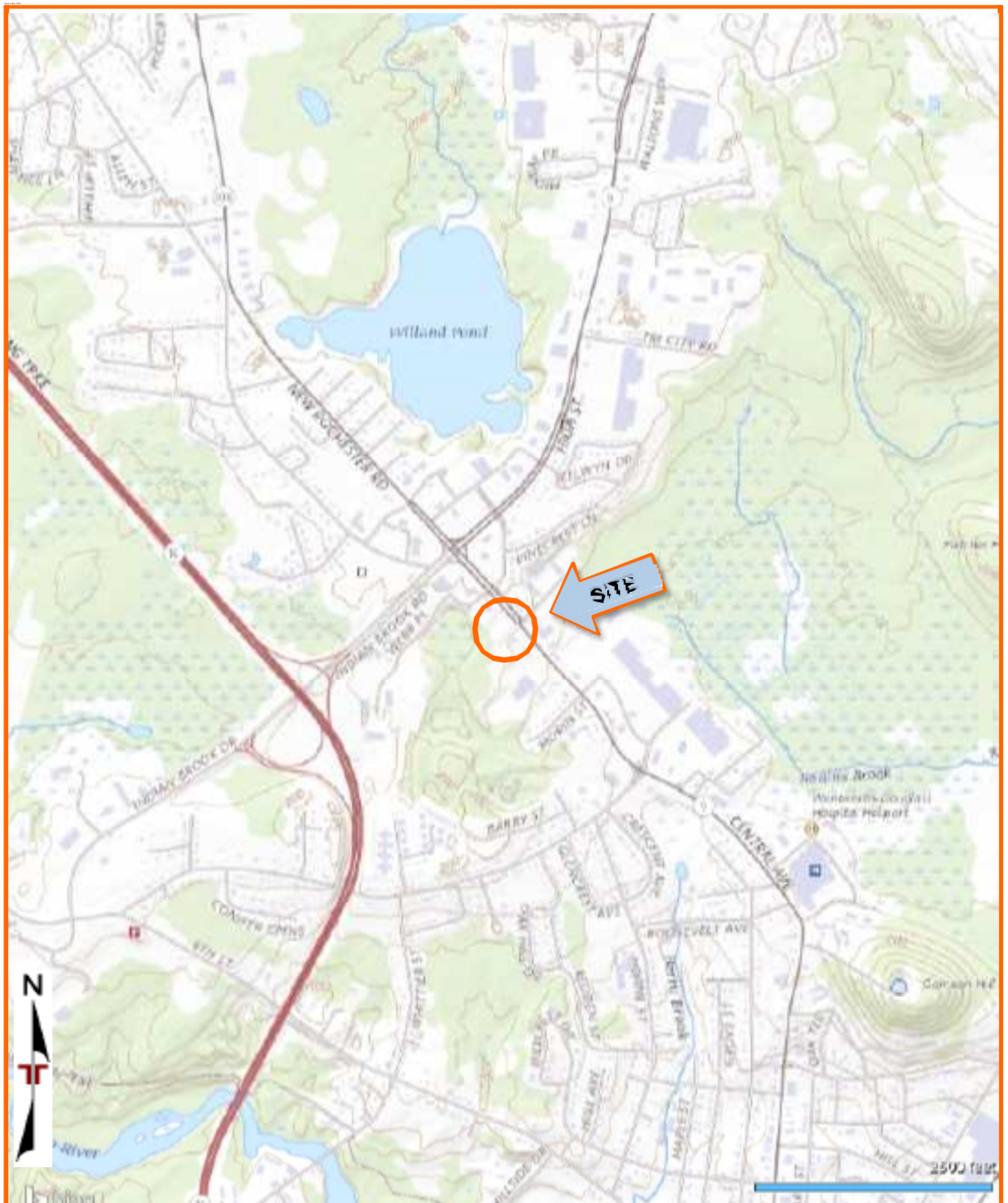


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP COURTESY OF THE U.S. GEOLOGICAL SURVEY

EXPLORATION PLAN

Proposed Carwash Facility ■ Dover, New Hampshire

April 27, 2023 ■ Terracon Project No. J1235002

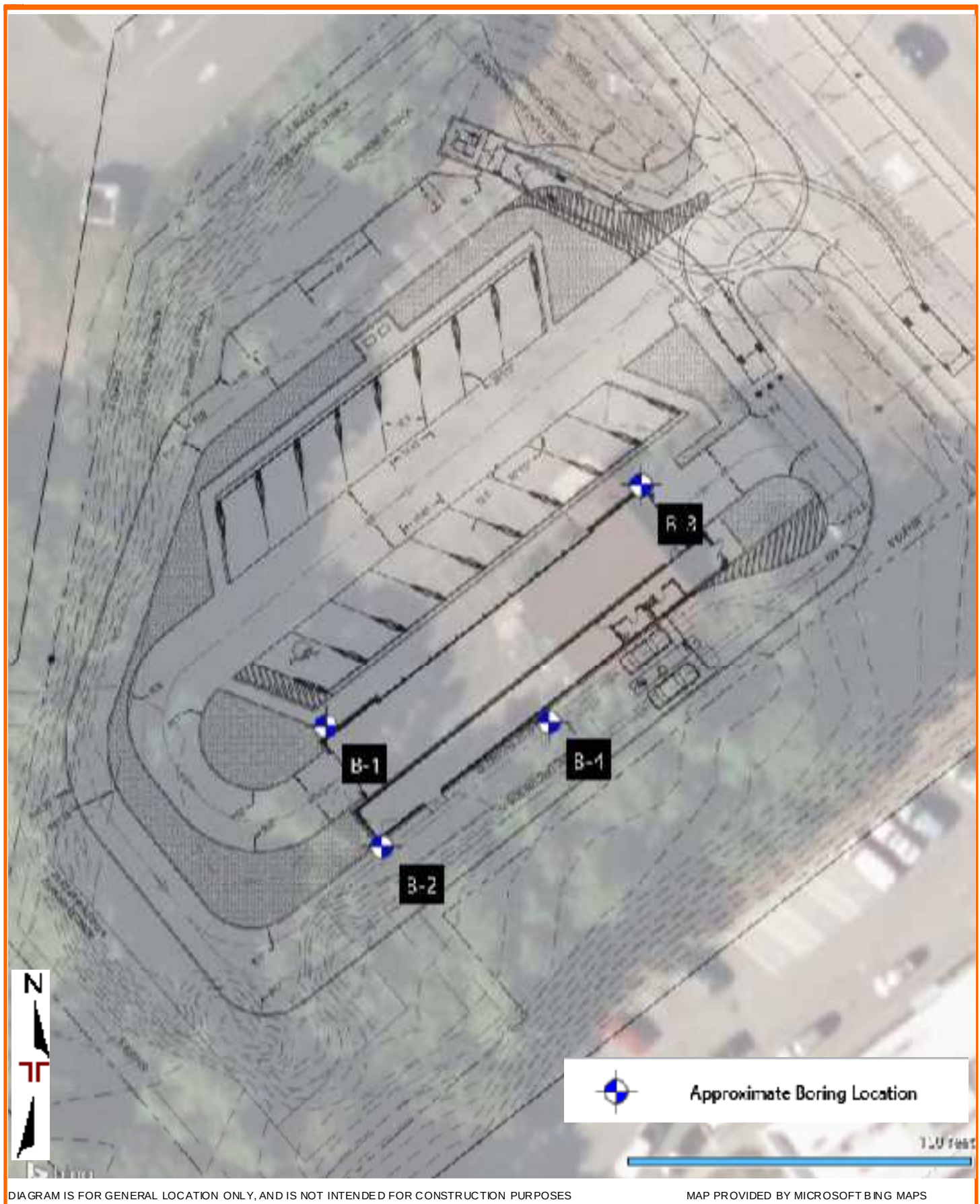


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Boring Logs (B-1 through B-4)

Grain Size Distribution

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

Page 1 of 1

PROJECT: Dover Carwash Facility

CLIENT: Hang 10 Car Wash
Boston, MassachusettsSITE: 914 Central Ave
Dover, New Hampshire

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2201° Longitude: -70.8865° Approximate Surface Elev.: 188 (Ft.) +/- DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS
3		SILTY SAND (SM) , light brown, medium dense 2.0 186+/-			X	12	6-7-8-8 N=15
		POORLY GRADED SAND WITH SILT (SP-SM) , fine grained, orange brown, medium dense 7.0 181+/-	5		X	19	8-8-9-8 N=17
					X	16	3-5-7-9 N=12
					X	14	7-9-13-15 N=22
					X	17	10-14-12-14 N=26
			15		X	21	7-10-10-12 N=20
			20		X	17	10-10-12-13 N=22
		Boring Terminated at 22 Feet 22.0 166+/-					
Stratification lines are approximate. In-situ, the transition may be gradual.			Hammer Type: Automatic Samples obtained using a 2" O.D. splitspoon sampler				
Advancement Method: 3-14-inch I.D. hollow stem augers		See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).	Notes:				
Abandonment Method: Boring backfilled with soil cuttings upon completion.		See Supporting Information for explanation of symbols and abbreviations.					
		Elevation interpolated from a topographic site plan.					
WATER LEVEL OBSERVATIONS		 77 Sundial Ave, Ste 401W Manchester, NH	Boring Started: 03-09-2022		Boring Completed: 03-09-2022		
Groundwater not encountered during drilling			Drill Rig: Diedrich D-50		Driller: C. Johnston		
			Project No.: J1235002				

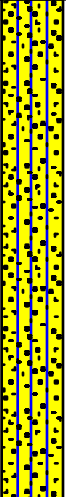
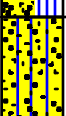
THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1235002 DOVER CARWASH.GPJ TERRACON_DATATEMPLATE.GDT 4/5/23

BORING LOG NO. B-2

Page 1 of 1

PROJECT: Dover Carwash Facility

CLIENT: Hang 10 Car Wash
Boston, MassachusettsSITE: 914 Central Ave
Dover, New Hampshire

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2200° Longitude: -70.8864° Approximate Surface Elev.: 188 (Ft.) +/- DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS
		SILTY SAND (SM) , orange brown to light brown, loose to medium dense Pocket of Silt at 3 feet	5		X	14	1-2-4-4 N=6
				X	20	5-6-8-9 N=14	
				X	18	4-6-7-5 N=13	
				X	17	5-9-11-14 N=20	
				X	16	7-9-16-14 N=25	
3		POORLY GRADED SAND WITH SILT (SP-SM) , fine grained, light brown, medium dense to dense	10		X	16	7-9-16-14 N=25
			15		X	18	9-17-23-29 N=40
		SILTY SAND (SM) , light brown, medium dense	20		X	22	9-10-14-18 N=24
		Boring Terminated at 22 Feet					
Stratification lines are approximate. In-situ, the transition may be gradual.							
Hammer Type: Automatic Samples obtained using a 2" O.D. splitspoon sampler							
Advancement Method: 3-14-inch I.D. hollow stem augers		See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).	Notes:				
Abandonment Method: Boring backfilled with soil cuttings upon completion.		See Supporting Information for explanation of symbols and abbreviations.					
		Elevation interpolated from a topographic site plan.					
WATER LEVEL OBSERVATIONS							
Groundwater not encountered during drilling			Boring Started: 03-09-2022		Boring Completed: 03-09-2022		
			Drill Rig: Diedrich D-50		Driller: C. Johnston		
			Project No.: J1235002				

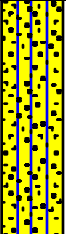
Terracon
77 Sundial Ave, Ste 401W
Manchester, NH

BORING LOG NO. B-3

Page 1 of 1

PROJECT: Dover Carwash Facility

CLIENT: Hang 10 Car Wash
Boston, MassachusettsSITE: 914 Central Ave
Dover, New Hampshire

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2203° Longitude: -70.8862° Approximate Surface Elev.: 188 (Ft.) +/- DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS
2		FILL - POORLY GRADED SAND , trace gravel, fine grained, brown to orange brown 5.0 183+/-	5		X	10	6-2-8-6 N=10
					X	16	5-7-10-14 N=17
		SILTY SAND (SM) , light brown, loose to medium dense 10.0 178+/-	10		X	16	3-3-4-5 N=7
					X	22	5-5-6-6 N=11
3		POORLY GRADED SAND WITH SILT (SP-SM) , fine grained, orange brown, medium dense 17.0 171+/-	15		X	21	5-9-10-12 N=19
		SILTY SAND (SM) , orange brown, medium dense 22.0 166+/-	20		X	20	6-8-9-10 N=17
		Boring Terminated at 22 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic
Samples obtained using a 2" O.D. split spoon samplerAdvancement Method:
3-14-inch I.D. hollow stem augersSee [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:
Boring backfilled with soil cuttings upon completion.See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

WATER LEVEL OBSERVATIONS

Groundwater not encountered during drilling

Terracon77 Sundial Ave, Ste 401W
Manchester, NH

Boring Started: 03-09-2022

Boring Completed: 03-09-2022

Drill Rig: Diedrich D-50

Driller: C. Johnston

Project No.: J1235002

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1235002 DOVER CARWASH.GPJ TERRACON_DATATEMPLATE.GDT 4/5/23

BORING LOG NO. B-4

PROJECT: Dover Carwash Facility

CLIENT: Hang 10 Car Wash
Boston, Massachusetts

SITE: 914 Central Ave
Dover, New Hampshire

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2201° Longitude: -70.8863° Approximate Surface Elev.: 189 (Ft.) +/-	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS
		DEPTH ELEVATION (Ft.)					
		0.1 1.5 inches of bituminous concrete SILTY SAND (SM) , orange brown, medium dense	188.9 +/-			18	3-5-6-7 N=11
		2.5 POORLY GRADED SAND WITH SILT (SC-SM) , trace gravel, fine grained, orange brown, medium dense	186.5 +/-			19	7-8-10-7 N=18
		5.0 SILTY SAND (SM) , light brown, medium dense	184 +/-			16	5-7-9-8 N=16
						4	12-14-14-11 N=28
						18	5-7-7-9 N=14
						24	8-8-9-9 N=17
						24	6-8-9-13 N=17
		22.0 Boring Terminated at 22 Feet	167 +/-				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic
Samples obtained using a 2" O.D. splitspoon sampler

Advancement Method:
3-14-inch I.D. hollow stem augers

Abandonment Method:
Boring backfilled with soil cuttings upon completion.
Sealed with bituminous cold patch at surface.

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered during drilling

Terracon

77 Sundial Ave, Ste 401W
Manchester, NH

Boring Started: 03-09-2022

Drill Rig: Diedrich D-50

Project No.: J1235002

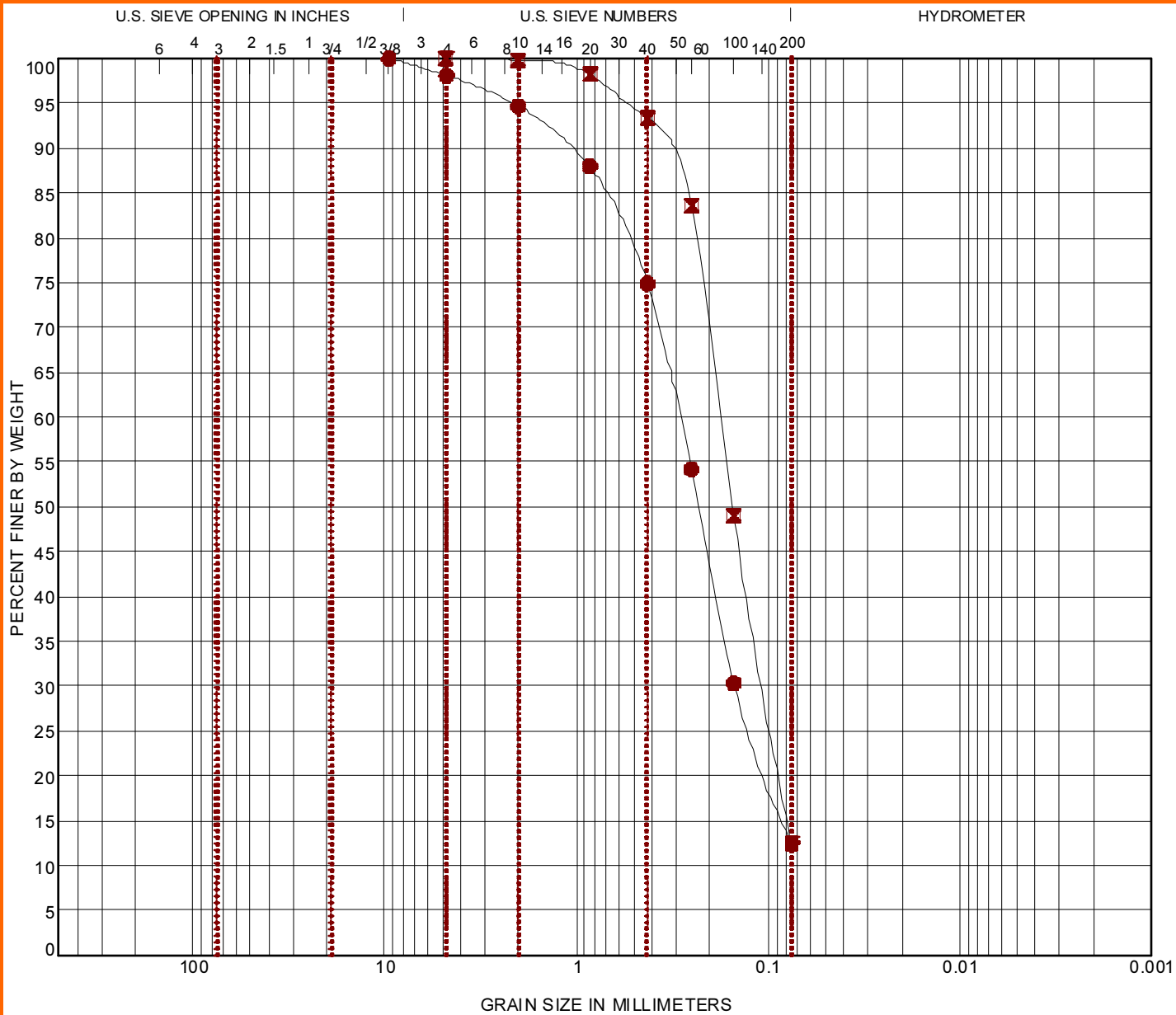
Boring Completed: 03-09-2022

Driller: C. Johnston

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1235002 DOVER CARWASH.GPJ TERRACON_DATATEMPLATE.GDT 4/5/23

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID	Depth (Ft)	USCS Classification				WC (%)	LL	PL	PI	Cc	Cu
B-1	0 - 2	SILTY SAND (SM)				4.4					
B-3	5 - 7	SILTY SAND (SM)				6.0				0.87	2.46
Boring ID	Depth (Ft)	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
B-1	0 - 2	9.5	0.29	0.148		0.0	1.9	85.6		12.5	
B-3	5 - 7	4.75	0.176	0.105		0.0	0.0	87.5		12.5	

PROJECT: Dover Carwash Facility

SITE: 914 Central Ave
Dover, New Hampshire**Terracon**
77 Sundial Ave, Ste 401W
Manchester, NH

PROJECT NUMBER: J1235002

CLIENT: Hang 10 Car Wash
Boston, Massachusetts

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-S-2 J1235002 DOVER CARWASH.GPJ TERRACON DATATEMPLATE.GDT 4/5/23

SUPPORTING INFORMATION

Contents:

General Notes

Unified Soil Classification System

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

Dover Carwash Facility ■ Dover, New Hampshire

Terracon Project No. J1235002

SAMPLING	WATER LEVEL	FIELD TESTS
 Standard Penetration Test	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time  Cave In Encountered Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See [Exploration and Testing Procedures](#) in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (tsf)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification		
				Group Symbol	Group Name ^B	
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F	
			$Cu < 4$ and/or $[Cc < 1$ or $Cc > 3.0]$ ^E	GP	Poorly graded gravel ^F	
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}	
			Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I	
			$Cu < 6$ and/or $[Cc < 1$ or $Cc > 3.0]$ ^E	SP	Poorly graded sand ^I	
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}	
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}	
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots on or above “A” line ^J	CL	Lean clay ^{K, L, M}	
			$PI < 4$ or plots below “A” line ^J	ML	Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K, L, M, N}
			Liquid limit - not dried			Organic silt ^{K, L, M, O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above “A” line	CH	Fat clay ^{K, L, M}	
			PI plots below “A” line	MH	Elastic Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K, L, M, P}
			Liquid limit - not dried			Organic silt ^{K, L, M, Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat	

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

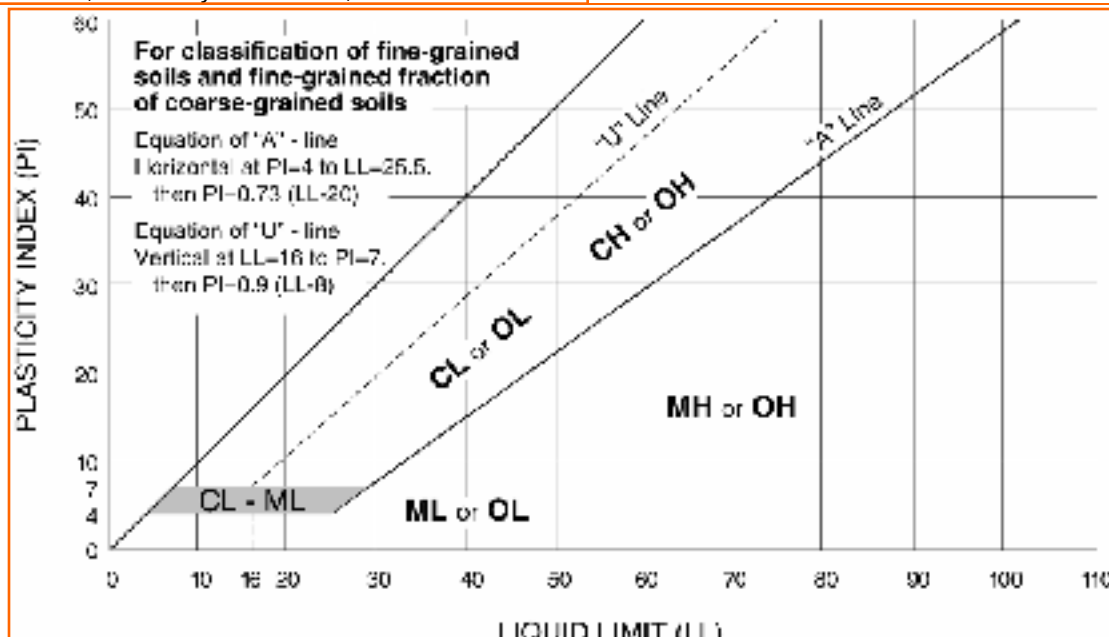
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



901036

RECEIVED

DEC 21 1990

Department of
Environmental Services

ADDITIONAL SITE INVESTIGATIONS
FORMER WAIKIKI RESTAURANT SITE
DOVER, NEW HAMPSHIRE

Prepared for:

Mr. Joe Yung
Berwick, Maine

Prepared by:

Nobis Engineering, Inc.
Concord, New Hampshire

December 1990
File 90-229

NOBIS ENGINEERING, INC.

HYDROGEOLOGICAL & ENVIRONMENTAL CONSULTING

December 21, 1990
File 90-229

Mr. Joe Yung
387 Hubbard Road
Berwick, Maine 03901

Re: Additional Site Investigations
Former Waikiki Restaurant Site
914 Central Avenue
Dover, New Hampshire

Dear Mr. Yung:

This report summarizes additional site investigations performed by Nobis Engineering, Inc. at the above-referenced site in Dover, New Hampshire. This work was performed to further investigate the presence of contaminated groundwater as reported during an environmental site assessment¹ performed in October 1990 by Aries Engineering, Inc. of Concord, New Hampshire. A locus plan is provided as Figure 1. This report is subject to the limitations included in Appendix A.

OBJECTIVE AND SCOPE OF WORK

The objective of our work was to confirm the presence of groundwater contamination observed at the site, as reported by Aries, and to better assess the source of the contamination and the impact, if any, on downgradient water supplies.

To meet this objective, Nobis Engineering 1) performed a site visit to assess site conditions as well as observe surficial hydrogeologic characteristics of the site area; 2) reviewed the environmental site assessment performed by Aries Engineering; 3) contacted City of Dover officials as to the presence of drinking water supply wells within approximately one-half mile of the site; 4) obtained and reviewed topographic maps, aerial photographs and groundwater availability maps of the site area; 5) performed nine hand auger probes and field screened soil samples for the presence of total volatile organic compounds; 6) performed an additional round of groundwater sampling and laboratory analysis of the existing monitoring wells; 7) assessed the impact of on-site contamination on downgradient wells; and 8) prepared this report summarizing the results of these additional investigations.

PREVIOUS INVESTIGATIONS

The site consists of a vacant building (formerly the Waikiki Restaurant), associated paved parking areas and unpaved, excavated areas. Aries reported that the on-site building served as an automobile body shop from 1935 to 1963, and as a restaurant from 1963 to the present. Also, a Citgo gasoline station and a motor oil storage garage were formerly located within the northeastern portion of the site. Two underground gasoline storage tanks were formerly located within the

¹ "Environmental Site Assessment, 914 Central Avenue, Dover, New Hampshire" (File No. 90063), performed by Aries Engineering, Inc. of Concord, New Hampshire, dated October 12, 1990.

northeastern portion of the site and were removed in approximately 1983 or 1984. That portion of the site was subsequently excavated such that the former location of the tanks was above the current ground surface. It was reported by Aries that soils in the vicinity of the tanks were removed as part of the tank excavations. The site was reported to be serviced by municipal sewer and water. A general site area plan is included as Figure 2.

Soil Analyses - June 1990

Four test boring/groundwater monitoring well installations were performed at the site by Aries in June 1990. The approximate locations of the test boring/monitoring well installations are shown on Figure 3. Results of screening of the soils obtained from the test borings indicated that no volatile organic compounds (VOCs) were observed by Aries in the unsaturated soils (above the water table). Two saturated soil samples (below the water table), however, indicated the presence of VOCs at locations MW-2 and MW-4, likely indicating the presence of contaminated groundwater. Results of laboratory analyses performed on these two soil samples indicated the presence of benzene, toluene, ethylbenzene and xylenes (collectively referred to as BTEX) at concentrations of about 436 and 205 micrograms per kilogram (ug/kg). Also, trichloroethylene was observed at concentrations of 114 and 196 ug/kg.

Groundwater Analyses - June 1990

Results of groundwater sampling and analysis performed by Aries indicated the presence of total BTEX concentrations ranging from 1,312 to 6,910 micrograms per liter (ug/L) at wells MW-1, MW-2 and MW-4. No VOCs were observed at well MW-3. Also, tetrachloroethylene (inadvertently referred to as trichloroethylene in the Aries report) was observed at well MW-2 at a concentration of 10.3 ug/L. BTEX are common constituents of gasoline and other petroleum distillates, while trichloroethylene and tetrachloroethylene are commonly used as degreasing agents. Results of the Aries groundwater analyses are summarized in Table 3.

ADDITIONAL SITE INVESTIGATIONS

Site Visit

Nobis Engineering personnel visited the site on October 30 and November 15, 1990 to observe current conditions at the site and in the vicinity of the site. The site appeared as described in the Aries report of October 1990. Observations of the general site vicinity, however, indicated the presence of at least two underground gasoline storage tanks (not reported by Aries) at the State highway garage located along the exit ramp for the Spaulding Turnpike (approximately 1000 feet to the west of the site). Also, Varney's Cleaners was observed at the traffic circle located approximately 600 feet to the north of the site, although it was not determined whether Varney's Cleaners performs on-site dry cleaning.

Discussions with Local Officials

On November 15, 1990, Nobis Engineering personnel contacted City of Dover personnel regarding the location of water supply wells in the vicinity of the site. Information available at the Dover Tax Assessor's Office indicated that the general site vicinity is serviced by municipal water and there was no indication of private water supply wells within one-half mile of the site. Field observations by Nobis Engineering personnel affirmed the lack of residential supply wells within one-half mile of the site. Tax Assessor's Office personnel did indicate, however, that two municipal water supply wells (the Smith and Cummings wells) are located in the vicinity of the site. Dover Engineer's Office personnel identified the approximate locations of the two city wells

on Tax Assessor's Map 38, indicating that the city wells are located about 1,200 feet to the southwest of the site. The approximate locations of the wells are shown on Figure 2.

Review of Topographic Maps, Aerial Photographs and U.S.G.S. Information

Topographic Maps

Based on field observations of the site area and a review of topographic maps, two wet areas are evident within 1,000 feet of the site, one located about 300 feet to the west of the site and the other about 700 feet to the east of the site. In addition, the site is likely located in the vicinity of a surface water divide. Surface water to the east of Central Avenue appears to drain in a general easterly direction, whereas surface water to the west of Central Avenue appears to drain toward the Cocheco River, located approximately one mile to the southwest of the site.

Aerial Photographs

Nobis Engineering reviewed two aerial photographs of the site area (one flown in 1962 (scale: 1"=100') and one flown in 1974 (scale: 1"=200')) to assess historical use of the site. A building is evident within the northern portion of the site (former underground tank area) in both photographs, which is apparently the former gasoline station reported in the Aries report. The scale and poor resolution of the aerial photographs, however, precluded a more detailed assessment of the site.

U.S.G.S. Information

Nobis Engineering reviewed several documents made available at the U. S. Geological Survey (USGS) office in Bow, New Hampshire, including:

- Hydrogeology of the Cocheco River Basin, Southeastern New Hampshire, prepared by John E. Cotton, U. S. Geological Survey, Water-Resources Investigations Report 87-4130, prepared in cooperation with the State of New Hampshire Department of Environmental Services, dated 1989;
- Hydrogeologic Analysis of the Impact of the Plaza Drive Development, Dover, New Hampshire on City of Dover Municipal Well, prepared by Caswell, Eichler and Hill, Inc. of Portsmouth, New Hampshire, dated April 1987; and
- Review of Hydrogeologic Impact Analysis for a Proposed Condominium Project Near the Smith and Cummings Wells, Dover, New Hampshire, prepared by BCI Geonetics, Inc. of Laconia, New Hampshire, dated June 2, 1987.

A review of the USGS report indicated that the site is located within a stratified-drift aquifer consisting of sand with varying amounts of gravel. The two city wells, which supply approximately 20% of Dover's drinking water, were reported to pump at a combined rate of about 500 gpm. The Caswell, Eichler and Hill report indicated that the bedrock surface in the vicinity of the city wells rises rapidly to the north, with a groundwater divide being located between the city wells and Willand Pond (located about 3,000 feet to the north of the wells). The groundwater divide roughly corresponds to the surface water divide to the north of the site. The report also described considerable vertical and horizontal heterogeneity of the soils in the vicinity of the city wells, with ice contact deposits (predominantly sand and gravel) contacting marine deposits (predominantly silt and clay). The ice contact deposits are buried beneath the marine deposits in some locations. No Bottom Pond (located about 1,000 feet to the southeast of the city wells) reportedly represents a local, perched water table, possibly due to silting of the pond bottom.

from: ADDIT. SITE INVESTIGATION - FORMER WAIKIKI RESTAURANT, DIVER
NOBIS ENGINEERING DEC, 1990

The Caswell, Eichler and Hill report indicates that static (non-pumping) water levels at the city wells are about 26 feet below ground surface, with groundwater flow directions during non-pumping periods to the southeast of the subject site. The water levels during pumping of the city wells were reported to be 40 to 50 feet below ground surface, with the radius of influence of the pumping wells estimated at approximately 3,000 feet to the northeast and west of the city wells, which would include the subject site area. The BCI Geonetics report suggests an even greater radius of influence.

ADDITIONAL SUBSURFACE INVESTIGATIONS

Hand Auger Probes

On November 15, 1990, Nobis Engineering personnel performed nine hand auger probes (designated HA-1 through HA-9) in the vicinity of the former underground storage tank locations within the northern portion of the site. The hand auger probes were performed to depths of about 0.5 to 1.5 feet, at which point the hand auger could not be advanced any further due to the gravelly nature of the soil. Soil samples were collected from each 0.5-foot interval of the probe hole and were field screened for total concentrations of VOCs using a Photovac MicroTIP organic vapor meter (OVM) equipped with a photoionization detector. The MicroTIP OVM responds readily to most VOCs but does not register methane or natural components of air such as oxygen, nitrogen or carbon dioxide. The MicroTIP OVM detection limit is approximately one part per million (ppm) by volume, referenced to an isobutylene-in-air standard. No VOCs were detected above the instrument detection limit of one ppm in any of the soil samples, indicating that soils in the former underground tank area do not appear to serve as a continuing source of subsurface contamination. The approximate locations of the hand auger probes are shown on Figure 3.

Groundwater Monitoring

Groundwater samples were collected on October 30, 1990 by Nobis Engineering personnel from the four existing groundwater monitoring wells. Groundwater level measurements were obtained prior to sampling. The water samples were field tested for pH and specific conductance and subsequently submitted to Analytics Environmental Laboratory, Inc. of Portsmouth, New Hampshire for analysis for Hazardous Substance List volatile organic compounds (VOCs) using EPA Method 624. Groundwater elevation data are summarized in Table 1. A summary of the field testing results are included in Table 2. A summary of the laboratory analyses are included in Table 3. A plan showing the spatial distribution of VOC concentrations is shown on Figure 5. A description of the water sampling procedures is included in Appendix B. Copies of the analytical laboratory reports are included in Appendix C.

Groundwater Flow Directions

Groundwater levels measured during the October 30, 1990 sampling round ranged from about 27 to 30 feet below the existing ground surface, similar to those observed by Aries in June 1990. A groundwater elevation contour map based on the October 30, 1990 observations is presented as Figure 4. Based on the observed groundwater elevations, groundwater appears to flow in a general southeasterly direction, indicating that the two Dover municipal supply wells are likely located sidegradient of the site.

Fluctuations in groundwater levels will occur due to variations in rainfall, surface runoff, temperature, and other factors. Local groundwater flow anomalies may also exist due to the influence of paved areas, and localized topography. Long-term groundwater level monitoring of the monitoring wells would be necessary to establish groundwater flow directions more definitively.

Results of Groundwater Analyses - October 1990

Results of laboratory analyses of the groundwater samples indicated total BTEX concentrations ranging from 109 to 2,869 ug/L at wells MW-1, MW-2 and MW-4. In addition, tetrachloroethylene was observed at wells MW-1 and MW-2 at 70.9 and 5.7 ug/L, respectively, and bromodichloromethane was observed at well MW-1 at 9.3 ug/L. No VOCs were detected at well MW-3. As previously mentioned, BTEX are common constituents of gasoline and other petroleum distillates, while tetrachloroethylene is a common degreasing agent commonly used by dry cleaners. Bromodichloromethane is also used as a degreasing agent and is a common laboratory chemical. The current BTEX levels do not exceed their respective E.P.A. Maximum Contaminant Levels (MCLs)¹ or proposed MCLs. (The level of ethylbenzene (801 ug/L) observed by Aries at well MW-1 in June 1990 exceeded the proposed MCL (700 ug/L) for that compound). The current levels of tetrachloroethylene observed at wells MW-1 and MW-2 (71 and 6 ug/L, respectively), however, exceed the proposed MCL of 5 ug/L for that compound.

The pH of the groundwater samples ranged from 6.8 to 7.3. The specific conductance of the groundwater samples ranged from 390 to 860 microSiemens per centimeter (uS/cm). The pH and specific conductance values are generally within the range of values typically observed in New Hampshire groundwater in developed areas, although the specific conductance of 860 uS/cm observed at well MW-4 is somewhat elevated above typical background values.

PRELIMINARY DILUTION ANALYSIS

The above-referenced Caswell, Eichler and Hill report indicated that the recharge area for the two city wells was approximately 330 acres. Assuming that the contaminated area of the subject site comprises approximately 0.6 acres, comparing the total recharge area for the city wells and the area of contamination within the subject site indicates a dilution factor of about 550. Applying this dilution factor to the highest observed contaminant concentrations at the site yielded the following estimated concentrations at the city wells:

<u>Parameter</u>	<u>Highest Observed Concentration (ug/L)</u>	<u>Dilution Factor</u>	<u>Highest Estimated Concentration at City Wells (ug/L)</u>	<u>MCLs (ug/L)</u>
Benzene	Not Detected	550	-	5 (Final)
Toluene	500	"	< 1	2,000 (Proposed)
Ethylbenzene	801	"	1	700 (Proposed)
Xylenes	5,609	"	10	10,000 (Proposed)
Tetrachloroethylene	71	"	0.2	5 (Proposed)
Bromodichloromethane	9	"	0.02	None Available

These estimated concentrations at the city wells are several orders of magnitude below their respective MCLs. This preliminary analysis is conservative due to: 1) the assumption that the highest concentrations observed at the site to date exist throughout the 0.6-acre area (the results of the most recent sampling round generally indicated contaminant concentrations much lower than those used in the analysis (with the exception of tetrachloroethylene and bromodichloromethane)), and 2) the groundwater flow direction in the vicinity of the site is to the southeast, indicating that the city wells appear to be located sidegradient of the site.

¹ Maximum Contaminant Levels (MCLs) referenced in "Drinking Water Regulations and Health Advisories" from the U.S. E.P.A. Office of Drinking Water, dated October 1989.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the additional site investigations as well as the results of work performed by previous investigators at the former Waikiki Restaurant site in Dover, New Hampshire, the following conclusions are presented:

- 1) Based on field observations of existing topographic conditions and a review of topographic maps, aerial photographs, and information available from the U.S. Geological Survey, it appears that the site is located near a surface water divide. Surface water to the east of Central Avenue appears to drain in a general easterly direction, whereas surface water to the west of Central Avenue appears to drain in a general southwesterly direction toward the Cocheco River, located approximately one mile to the southwest of the site. A groundwater divide is also located approximately 1,500 feet to the north of the site, between the site and Willand Pond.
- 2) Two Dover municipal water supply wells are located about 1,200 feet to the southwest of the site. The wells, which supply approximately 20% of Dover's drinking water, were reported to pump at a combined rate of approximately 500 gallons per minute. No other drinking water supply wells were evident within one-half mile of the site. Wet areas located about 300 feet to the west of the site and 300 feet to the east of the site are the only surface water bodies evident within 1,000 feet of the site. A review of hydrogeologic information provided to Nobis Engineering by the U.S. Geological Survey indicated the radius of influence of the city wells during pumping may be 3,000 feet or greater to the northeast and west of the wells, which would include the subject site.
- 3) Based on the observed groundwater elevations, groundwater flows in a general southeasterly direction, indicating that the two Dover municipal supply wells (to the southwest of the site) appear to be located hydraulically sidegradient of the site.
- 4) Results of confirmatory groundwater sampling in October 1990 of the existing on-site groundwater monitoring wells generally indicated lower levels of VOCs than levels observed by Aries in June 1990. The October 1990 levels of benzene, toluene, ethylbenzene and xylenes (BTEX) do not exceed their respective E.P.A. Maximum Contaminant levels (MCLs) or proposed MCLs. Tetrachloroethylene and bromodichloromethane, however, were observed at upgradient well MW-1, with the level of tetrachloroethylene exceeding the proposed MCL for that compound. Tetrachloroethylene and bromodichloromethane were not previously observed at that well location.
- 5) Results of a preliminary dilution analysis, based on conservative assumptions, indicated that the estimated concentrations of contaminants from the subject site, if they reach the city wells, would be several orders of magnitude below their respective MCLs.
- 6) Field screening of soils collected from nine hand auger probes performed in the former underground tank area did not indicate the presence of volatile organic compounds (VOCs) in the soils, indicating that the former tank area does not appear to serve as a continuing source of subsurface contamination.

In summary, it is the opinion of Nobis Engineering, Inc. that the former underground tank area does not appear to serve as a continuing source of subsurface contamination. Two City of Dover water supply wells are located in the vicinity of the site but the impact, if any, that the on-site contamination may have on the City wells is anticipated to be very slight in light of: 1) the currently-observed contaminant concentrations are below MCLs, except for tetrachloroethylene; 2) the observed groundwater flow directions indicated that the city wells are likely located

sidegradient of the site; 3) a preliminary dilution analysis indicated that estimated contaminant concentrations at the city wells would be several orders of magnitude below their respective MCLs; and 4) . We recommend, however, that periodic (tri-annual) groundwater monitoring of the on-site monitoring wells be performed.

Thank you for the opportunity to be of service to you. If you have any questions or need additional information, please feel free to call us at your convenience.

Sincerely,

NOBIS ENGINEERING, INC.



M. Patrick Mulheren
Environmental Engineer



Nannu Nobis, P.E.
Principal

attachments/ Tables
Figures
Appendices

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TABLE 1

SUMMARY OF GROUNDWATER ELEVATIONS

WELL No.	REFERENCE ELEVATION (feet)	DEPTH TO WATER SURFACE (feet)		GROUNDWATER ELEVATION (feet)	
		6/26/90	10/30/90	6/26/90	10/30/90
MW-1	100.00	29.2	29.7	70.8	70.3
MW-2	98.00	27.7	28.2	70.3	69.8
MW-3	97.95	28.2	28.8	69.7	69.2
MW-4	96.88	27.0	27.5	69.9	69.4

NOTES:

1. Elevations are referenced to an arbitrary elevation of 100 feet assumed to be the elevation of the top of the PVC riser pipe in the monitoring well MW-1.
2. The June 26, 1990 groundwater levels were obtained by Aries Engineering, Inc. The October 30, 1990 groundwater levels were obtained by Nobis Engineering, Inc.
3. Groundwater levels were measured with a Solinst electronic water level indicator.
4. Reference elevations were obtained by Aries Engineering, Inc. personnel using a Realist Transit and a surveyor's rod.

TABLE 2

SUMMARY OF WATER QUALITY FIELD TESTING

WELL No.	pH (Standard Units)	SPECIFIC CONDUCTANCE (uS/cm)
MW-1	7.3	390
MW-2	6.9	470
MW-3	7.1	460
MW-4	6.8	860

NOTES:

1. Sampling and field testing performed by Nobis Engineering, Inc. on October 30, 1990.
2. Measurements of pH were made with Hanna Instruments Model 0624-00 pH Electronic Paper. Measurements of specific conductance were made with a Hanna Instruments Model 0661-30 Dissolved Solids Tester.

TABLE 3

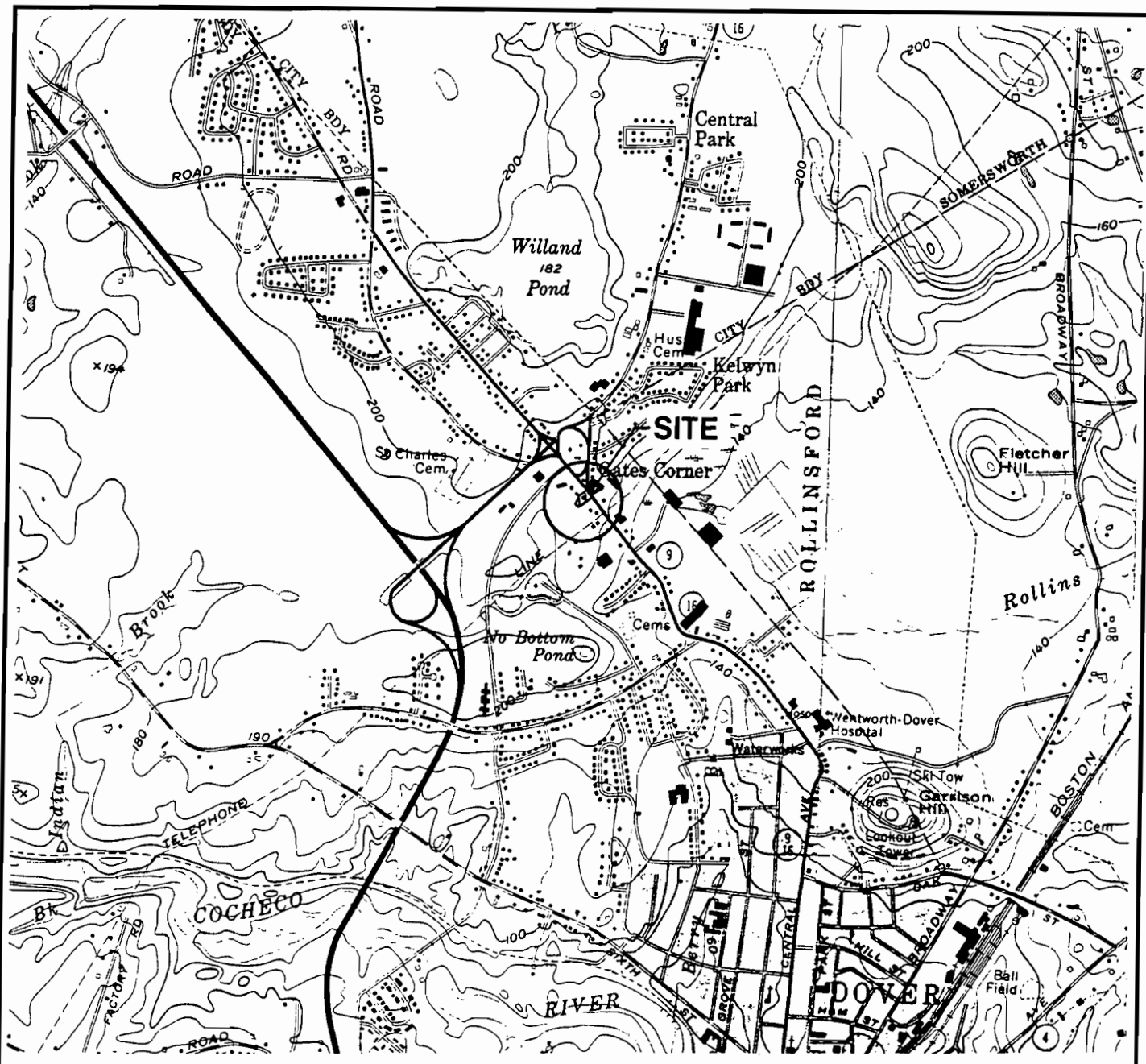
SUMMARY OF GROUNDWATER ANALYSES FOR VOLATILE ORGANIC COMPOUNDS

PARAMETER	DRINKING WATER STANDARD	MW-1		MW-2		MW-3		MW-4	
		6/26/90	10/30/90	6/26/90	10/30/90	6/26/90	10/30/90	6/26/90	10/30/90
<u>VOCs (ug/L)</u>									
Benzene	5 ¹	-	-	-	-	-	-	-	-
Toluene	2,000 ²	< 500	9	12.1	-	-	-	-	< 5
Ethylbenzene	700 ²	801	-	167	-	-	-	531	398
Xylenes	10,000 ²	5,609	> 2,000	1,133	110	-	-	3,862	2,400
Tetrachloroethylene	5 ²	-	71	10.3 *	6	-	-	-	-
Bromodichloromethane		-	9	-	-	-	-	-	-

NOTES:

1. VOC concentrations reported in micrograms per liter (ug/L).
2. "-" indicates that parameter was not detected above the analytical detection limits.
3. The 6/26/90 sampling round was performed by Aries Engineering, Inc. The 10/30/90 sampling round was performed by Nobis Engineering, Inc.
4. Analyses for the 6/26/90 and 10/30/90 sampling rounds were performed by Analytics Environmental Laboratories, Inc. of Portsmouth, New Hampshire. The 6/26/90 VOC analyses were performed using EPA Method 601/602; the 10/30/90 VOC analyses were performed using EPA Method 624.
5. "*" indicates that tetrachloroethylene was inadvertently labeled as trichloroethylene in Aries Engineering's October 1990 environmental site assessment.
6. Drinking Water Standards represent EPA Maximum Contaminant Levels (MCLs) referenced in "Drinking Water Regulations and Health Advisories" from the U.S. E.P.A., Office of Drinking Water, dated October 1989. "1" indicates final MCL; "2" indicates proposed MCL. No entry indicates that no drinking water standard is available.

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USGS TOPOGRAPHIC MAP
DOVER EAST AND WEST
QUADRANGLES
(PHOTOREVISED 1973)

APPROXIMATE SCALE:
1 INCH = 2,000 FEET

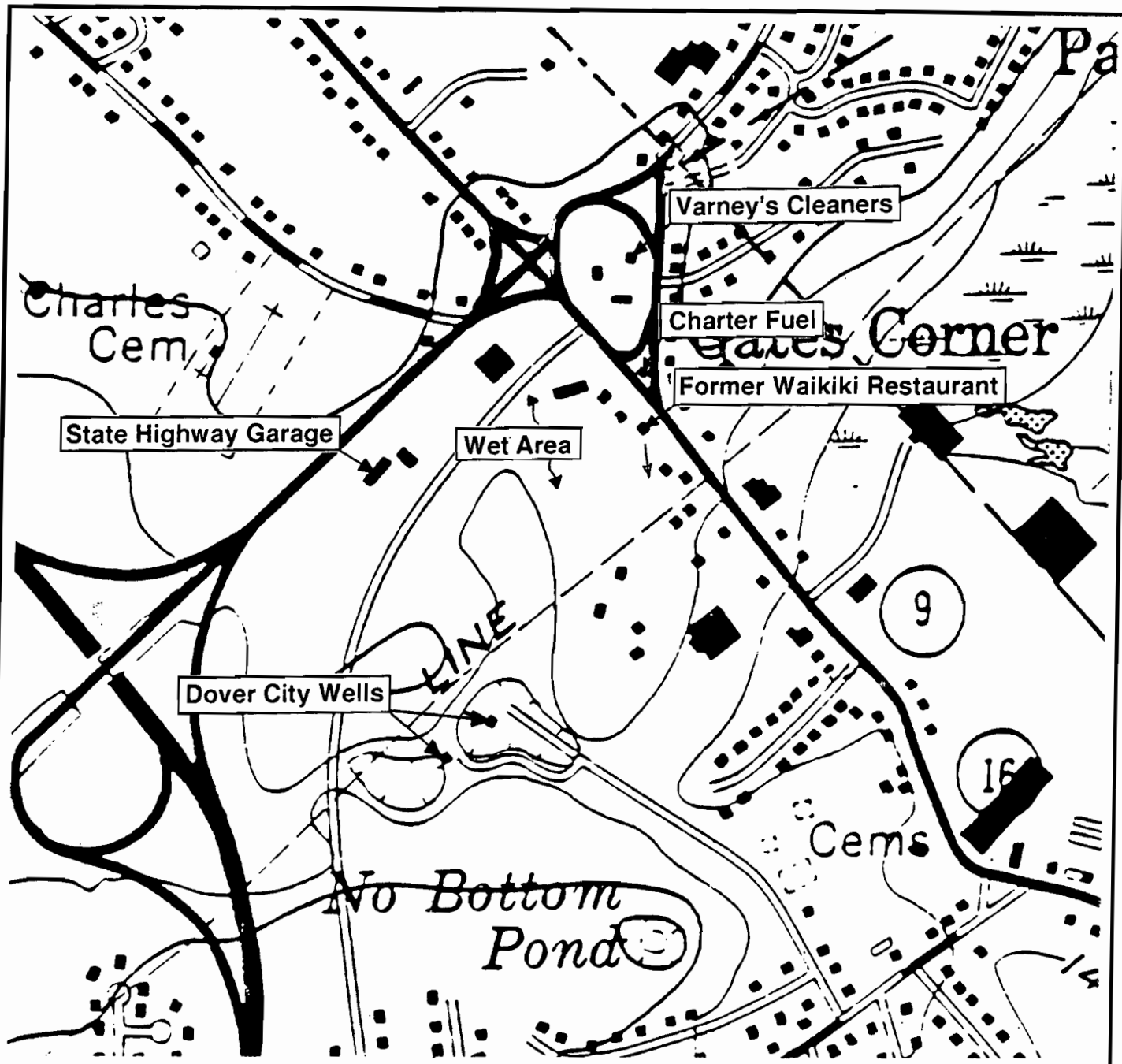
NOBIS
ENGINEERING, INC.
CONCORD • NEW HAMPSHIRE

ADDITIONAL SITE INVESTIGATIONS
FORMER WAIKIKI RESTAURANT
DOVER, NEW HAMPSHIRE

LOCUS PLAN

DECEMBER 1990

FIGURE 1



USGS TOPOGRAPHIC MAP
DOVER WEST QUADRANGLE
(PHOTOREVISED 1973)

APPROXIMATE SCALE:
1 INCH = 600 FEET

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ENGINEERING, INC.
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ADDITIONAL SITE INVESTIGATIONS
FORMER WAIKIKI RESTAURANT
DOVER, NEW HAMPSHIRE

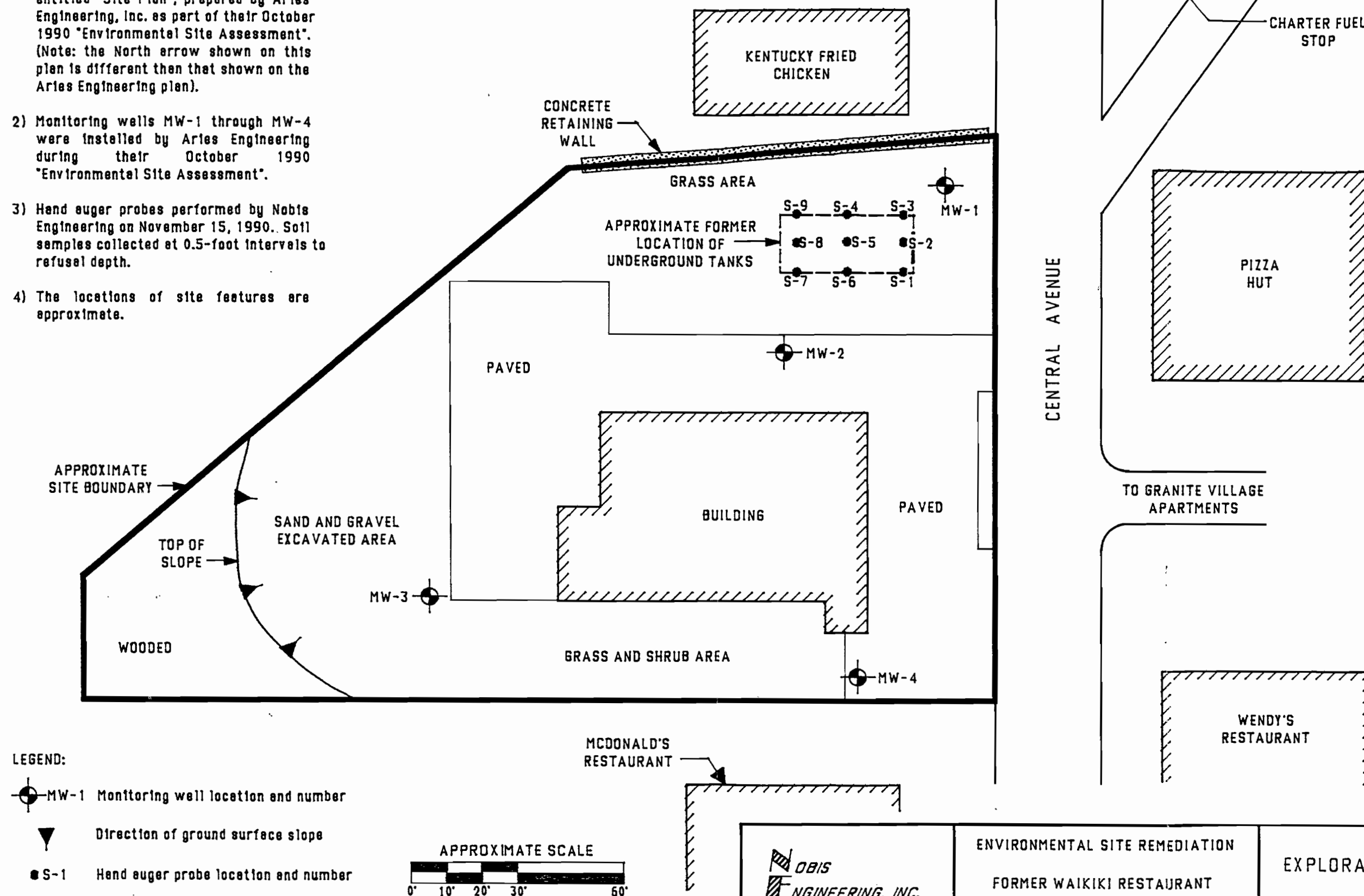
**GENERAL SITE
AREA PLAN**

DECEMBER 1990

FIGURE 2

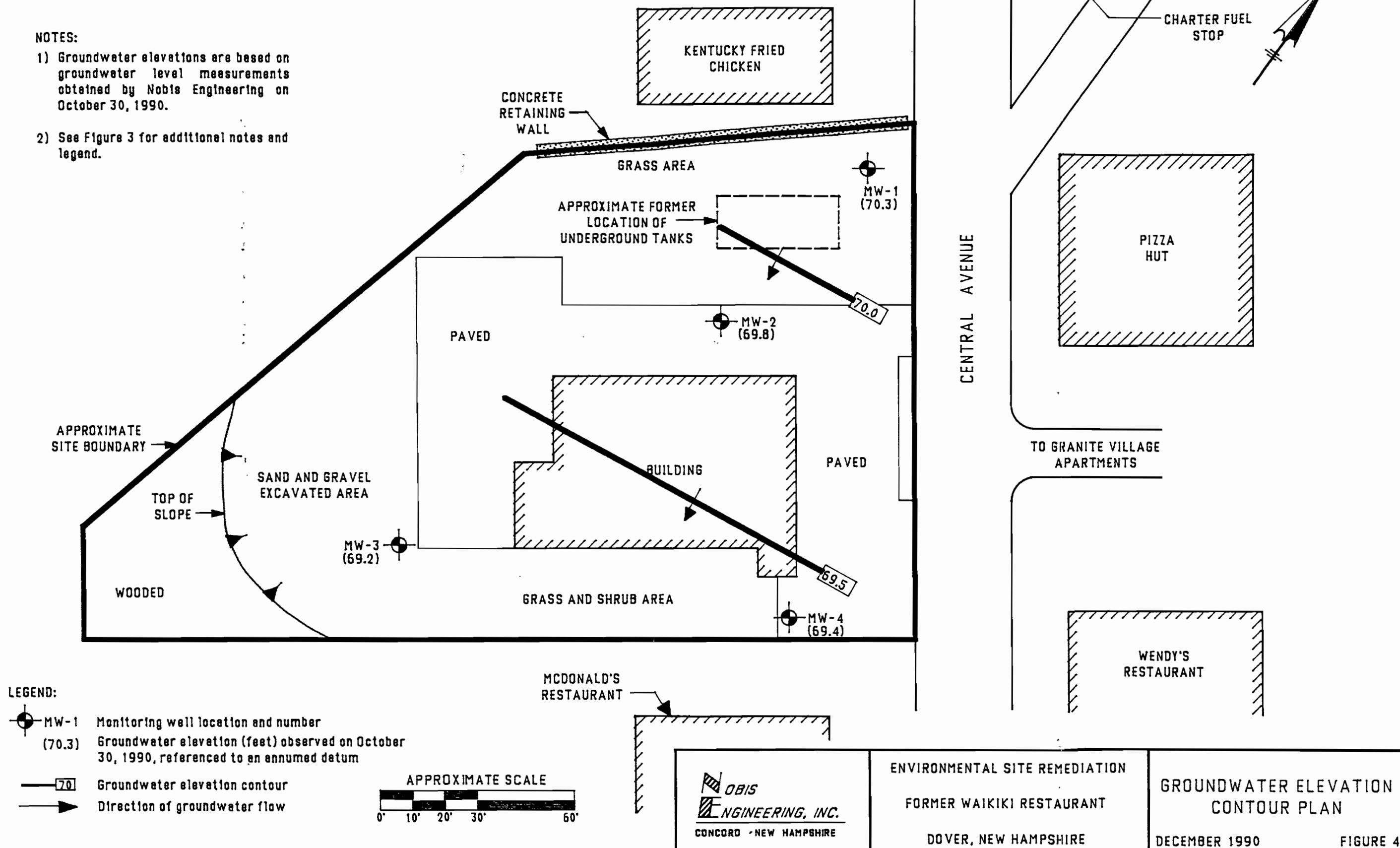
NOTES:

- 1) This plan was developed from a plan entitled "Site Plan", prepared by Aries Engineering, Inc. as part of their October 1990 "Environmental Site Assessment". (Note: the North arrow shown on this plan is different than that shown on the Aries Engineering plan).
- 2) Monitoring wells MW-1 through MW-4 were installed by Aries Engineering during their October 1990 "Environmental Site Assessment".
- 3) Hand auger probes performed by Noble Engineering on November 15, 1990. Soil samples collected at 0.5-foot intervals to refusal depth.
- 4) The locations of site features are approximate.



NOTES:

- 1) Groundwater elevations are based on groundwater level measurements obtained by Nobis Engineering on October 30, 1990.
- 2) See Figure 3 for additional notes and legend.



LEGEND:

VOCs	ug/L
Xylenes	110
Tetrachloroethylene	6

VOCs observed and concentration (ug/L)

MW-1 Monitoring well location and number

APPROXIMATE
SITE BOUNDARY

TOP OF
SLOPE

SAND AND GRAVEL
EXCAVATED AREA

WOODED

PAVED

VOCs: None Detected

MW-3

GRASS AND SHRUB AREA

MW-4

BUILDING

PAVED

VOCs	ug/L
Toluene	< 5
Ethylbenzene	398
Xylenes	2,400

APPROXIMATE FORMER
LOCATION OF
UNDERGROUND TANKS

VOCs	ug/L
Xylenes	110
Tetrachloroethylene	6

MW-2

CONCRETE
RETAINING
WALL

GRASS AREA

KENTUCKY FRIED
CHICKEN

VOCs	ug/L
Toluene	9
Xylenes	> 2,000
Tetrachloroethylene	71
Bromodichloromethane	9

MW-1

CENTRAL AVENUE

PIZZA
HUT

TO GRANITE VILLAGE
APARTMENTS

WENDY'S
RESTAURANT

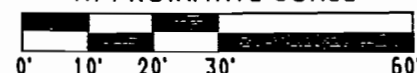
MCDONALD'S
RESTAURANT

NOTES:

1) VOC concentrations are based on laboratory analysis of samples collected by Nobis Engineering on October 30, 1990. Laboratory analyses were performed by Analytics Environmental Laboratories, Inc. of Portsmouth, New Hampshire using EPA Method 624.

2) See Figure 3 for additional notes and legend.

APPROXIMATE SCALE



OBIS
ENGINEERING, INC.
CONCORD - NEW HAMPSHIRE

ENVIRONMENTAL SITE REMEDIATION
FORMER WAIKIKI RESTAURANT
DOVER, NEW HAMPSHIRE

VOC CONCENTRATION
PLAN

DECEMBER 1990

FIGURE 5

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APPENDIX A

LIMITATIONS

- 1) The observations and conclusions presented in this report were made solely on the basis of conditions described in the report and not on scientific tasks or procedures beyond the scope of described services or the budgetary and time constraints imposed by the client. No other warranty, express or implied, is made.
- 2) Except as noted within the text of the report, no quantitative laboratory testing was performed as part of this investigation. Where such analyses have been conducted by an outside laboratory, Nobis Engineering has relied upon the data provided and has not conducted an independent evaluation of the reliability of these data.
- 3) Chemical analyses have been performed for specific parameters during the course of this investigation, as described in the text of the report. Additional chemical constituents not searched for during the current study may be present in soil and/or groundwater at the site.

**A
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APPENDIX B
FIELD PROCEDURES

Water Sampling Procedures

Groundwater levels were measured in each well prior to sampling using a Solinst electronic water level indicator. The wells were purged of at least three times the standing volume of water in the wells using pre-cleaned high density polyethylene (HDPE) disposable bailers. Individual, clean bailers were used for each well to limit the potential for cross-contamination of the wells. The first bailer volume was observed for the possible presence of a floating product layer. No floating product layer was observed in any of the wells. After purging the wells, groundwater samples were collected using the disposable bailers. The water samples were collected in appropriate sample containers supplied by the laboratory and placed in an ice-filled cooler for delivery to the laboratory.

A
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C



environmental
laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111

F RECEIVED NOV - 7 1990

Mr. Nannu Nobis
Nobis Engineering, Inc.
6 Chenell Drive, Suite 200
Concord, NH 03301

November 6, 1990

Re: Waikiki Restaurant - Dover, NH

EPA Method 624/8240 - Enclosed are the results of the analysis on your sample(s). Water samples were analyzed according to EPA Method 624 contained in 40 CFR Part 136. Solid waste samples were analyzed according to the methods in "Test Methods for Evaluating Solid Waste: SW-846, Method 8240."

If you have any further questions on the analytical methods or these results, do not hesitate to call.

<u>Lab Number</u>	<u>Sample date</u>	<u>Station Location</u>	<u>Analysis</u>	<u>Comments</u>
19896	10/30/90	MW-1	EPA 624	
19897	10/30/90	MW-1	EPA 624	Duplicate sample
19898	10/30/90	MW-2	EPA 624	
19899	10/30/90	MW-2	EPA 624	Duplicate sample
19900	10/30/90	MW-3	EPA 624	
19901	10/30/90	MW-3	EPA 624	Duplicate sample
19902	10/30/90	MW-4	EPA 624	
19903	10/30/90	MW-4	EPA 624	Duplicate sample

Analytics Environmental Laboratory is certified by the states of New Hampshire, Maine, Massachusetts and Florida. A list of actual certified tests is available upon request.

Authorized signature

Kenneth W. Teague
Laboratory Director



environmental
laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111

November 6, 1990

Mr. Nannu Nobis
Nobis Engineering, Inc.
6 Chenell Drive, Suite 200
Concord, NH 03301

CLIENT SAMPLE ID

Client Project: Waikiki Restaurant - Dover, NH
Project Number:
Station ID: MW-1

SAMPLE DATA

Lab #: 19896
Matrix: Water
Dilution Factor: 1
Collection date: 10/30/90
Lab receipt date: 10/30/90
Analysis date: 11/5/90

ANALYTICAL RESULTS

COMPOUND	detection limit $\mu\text{g/L}$	Result $\mu\text{g/L}$	COMPOUND	detection limit $\mu\text{g/L}$	Result $\mu\text{g/L}$
Vinyl chloride	5	ND	Benzene	5	ND
1,1-dichloroethene	5	ND	Toluene	5	9.1
1,2-dichloroethene (cis or trans)	5	ND	Ethylbenzene	5	ND
Trichloroethene	5	ND	m-xylene	5	>1000
Tetrachloroethene	5	70.9	o&p-xylene	5	>1000
Chloromethane	5	ND	Methyl t-butyl ether	5	ND
Methylene chloride	5	ND	m-dichlorobenzene	5	ND
Chloroform	5	ND	o&p-dichlorobenzene	5	ND
Carbon tetrachloride	5	ND	1,2-dichloropropane	5	ND
Bromodichloromethane	5	9.3	cis-1,3-dichloropropene	5	ND
Dibromochloromethane	5	ND	trans-1,3-dichloropropene	5	ND
Bromomethane	5	ND	2-chloroethylvinyl ether	5	ND
Chloroethane	5	ND	Acetone	15	ND
1,1-dichloroethane	5	ND	Methyl ethyl ketone	10	ND
1,2-dichloroethane	5	ND	Methyl isobutyl ketone	10	ND
1,1,1-trichloroethane	5	ND	Trichlorotrifluoroethane	5	ND
1,1,2-trichloroethane	5	ND	Dichlorodifluoroethane	5	ND
1,1,2,2-tetrachloroethane	5	ND	Trichlorofluoromethane	5	ND
Chlorobenzene	5	ND	Chlorofluoromethane	5	ND
Bromoform	5	ND	Tetrahydrofuran	15	ND
			Styrene	5	ND

ND=None Detected <=Less than >=Greater than PR=Present but not calibrated for

METHODOLOGY

Water sample analysis was conducted according to "40 CFR Part 136; EPA Method 624" and soil analysis was conducted according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8240".

SPECIAL COMMENTS

Concentration of xylenes shut down mass spectrometer; results are a conservative estimate.

Authorized signature

Kenneth W. Teague
Laboratory Director



environmental
laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111

November 6, 1990

Mr. Nannu Nobis
Nobis Engineering, Inc.
6 Chenell Drive, Suite 200
Concord, NH 03301

CLIENT SAMPLE ID

Client Project: Waikiki Restaurant - Dover, NH
Project Number:
Station ID: MW-2

SAMPLE DATA

Lab #: 19898
Matrix: Water
Dilution Factor: 1
Collection date: 10/30/90
Lab receipt date: 10/30/90
Analysis date: 11/5/90

ANALYTICAL RESULTS

COMPOUND	detection limit $\mu\text{g/L}$	Result $\mu\text{g/L}$	COMPOUND	detection limit $\mu\text{g/L}$	Result $\mu\text{g/L}$
Vinyl chloride	5	ND	Benzene	5	ND
1,1-dichloroethene	5	ND	Toluene	5	ND
1,2-dichloroethene (cis or trans)	5	ND	Ethylbenzene	5	ND
Trichloroethene	5	ND	m-xylene	5	5.3
Tetrachloroethene	5	5.7	o&p-xylene	5	104
Chloromethane	5	ND	Methyl t-butyl ether	5	ND
Methylene chloride	5	ND	m-dichlorobenzene	5	ND
Chloroform	5	ND	o&p-dichlorobenzene	5	ND
Carbon tetrachloride	5	ND	1,2-dichloropropane	5	ND
Bromodichloromethane	5	ND	cis-1,3-dichloropropene	5	ND
Dibromochloromethane	5	ND	trans-1,3-dichloropropene	5	ND
Bromomethane	5	ND	2-chloroethylvinyl ether	5	ND
Chloroethane	5	ND	Acetone	15	ND
1,1-dichloroethane	5	ND	Methyl ethyl ketone	10	ND
1,2-dichloroethane	5	ND	Methyl isobutyl ketone	10	ND
1,1,1-trichloroethane	5	ND	Trichlorotrifluoroethane	5	ND
1,1,2-trichloroethane	5	ND	Dichlorodifluoroethane	5	ND
1,1,2,2-tetrachloroethane	5	ND	Trichlorofluoromethane	5	ND
Chlorobenzene	5	ND	Chlorofluoromethane	5	ND
Bromoform	5	ND	Tetrahydrofuran	15	ND
			Styrene	5	ND

ND=None Detected <=Less than >=Greater than PR=Present but not calibrated for

METHODOLOGY

Water sample analysis was conducted according to "40 CFR Part 136; EPA Method 624" and soil analysis was conducted according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8240".

SPECIAL COMMENTS

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Laboratory Director



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November 6, 1990

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Nobis Engineering, Inc.
6 Chenell Drive, Suite 200
Concord, NH 03301

CLIENT SAMPLE ID

Client Project: Waikiki Restaurant - Dover, NH
Project Number:
Station ID: MW-3

SAMPLE DATA

Lab #: 19900
Matrix: Water
Dilution Factor: 1
Collection date: 10/30/90
Lab receipt date: 10/30/90
Analysis date: 11/5/90

ANALYTICAL RESULTS

COMPOUND	detection limit $\mu\text{g/L}$	Result $\mu\text{g/L}$	COMPOUND	detection limit $\mu\text{g/L}$	Result $\mu\text{g/L}$
Vinyl chloride	5	ND	Benzene	5	ND
1,1-dichloroethene	5	ND	Toluene	5	ND
1,2-dichloroethene (cis or trans)	5	ND	Ethylbenzene	5	ND
Trichloroethene	5	ND	m-xylene	5	ND
Tetrachloroethene	5	ND	o&p-xylene	5	ND
Chloromethane	5	ND	Methyl t-butyl ether	5	ND
Methylene chloride	5	ND	m-dichlorobenzene	5	ND
Chloroform	5	ND	o&p-dichlorobenzene	5	ND
Carbon tetrachloride	5	ND	1,2-dichloropropane	5	ND
Bromodichloromethane	5	ND	cis-1,3-dichloropropene	5	ND
Dibromochloromethane	5	ND	trans-1,3-dichloropropene	5	ND
Bromomethane	5	ND	2-chloroethylvinyl ether	5	ND
Chloroethane	5	ND	Acetone	15	ND
1,1-dichloroethane	5	ND	Methyl ethyl ketone	10	ND
1,2-dichloroethane	5	ND	Methyl isobutyl ketone	10	ND
1,1,1-trichloroethane	5	ND	Trichlorotrifluoroethane	5	ND
1,1,2-trichloroethane	5	ND	Dichlorodifluoroethane	5	ND
1,1,2,2-tetrachloroethane	5	ND	Trichlorofluoromethane	5	ND
Chlorobenzene	5	ND	Chlorofluoromethane	5	ND
Bromoform	5	ND	Tetrahydrofuran	15	ND
			Styrene	5	ND

ND=None Detected <=Less than >=Greater than PR=Present but not calibrated for

METHODOLOGY

Water sample analysis was conducted according to "40 CFR Part 136; EPA Method 624" and soil analysis was conducted according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8240".

SPECIAL COMMENTS

Authorized signature

Kenneth W. Teague
Laboratory Director



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195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111

November 6, 1990

Mr. Nannu Nobis
Nobis Engineering, Inc.
6 Chenell Drive, Suite 200
Concord, NH 03301

CLIENT SAMPLE ID

Client Project: Waikiki Restaurant - Dover, NH
Project Number:
Station ID: MW-4

SAMPLE DATA

Lab #: 19902
Matrix: Water
Dilution Factor: 1
Collection date: 10/30/90
Lab receipt date: 10/30/90
Analysis date: 11/5/90

ANALYTICAL RESULTS

COMPOUND	detection limit $\mu\text{g/L}$	Result $\mu\text{g/L}$	COMPOUND	detection limit $\mu\text{g/L}$	Result $\mu\text{g/L}$
Vinyl chloride	5	ND	Benzene	5	ND
1,1-dichloroethene	5	ND	Toluene	5	<5
1,2-dichloroethene (cis or trans)	5	ND	Ethylbenzene	5	398
Trichloroethene	5	ND	m-xylene	5	1335
Tetrachloroethene	5	ND	o&p-xylene	5	1131
Chloromethane	5	ND	Methyl t-butyl ether	5	ND
Methylene chloride	5	ND	m-dichlorobenzene	5	ND
Chloroform	5	ND	o&p-dichlorobenzene	5	ND
Carbon tetrachloride	5	ND	1,2-dichloropropane	5	ND
Bromodichloromethane	5	ND	cis-1,3-dichloropropene	5	ND
Dibromochloromethane	5	ND	trans-1,3-dichloropropene	5	ND
Bromomethane	5	ND	2-chloroethylvinyl ether	5	ND
Chloroethane	5	ND	Acetone	15	ND
1,1-dichloroethane	5	ND	Methyl ethyl ketone	10	ND
1,2-dichloroethane	5	ND	Methyl isobutyl ketone	10	ND
1,1,1-trichloroethane	5	ND	Trichlorotrifluoroethane	5	ND
1,1,2-trichloroethane	5	ND	Dichlorodifluoroethane	5	ND
1,1,2,2-tetrachloroethane	5	ND	Trichlorofluoromethane	5	ND
Chlorobenzene	5	ND	Chlorofluoromethane	5	ND
Bromoform	5	ND	Tetrahydrofuran	15	ND
			Styrene	5	ND

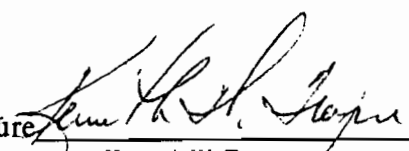
ND=None Detected <=Less than >=Greater than PR=Present but not calibrated for

METHODOLOGY

Water sample analysis was conducted according to "40 CFR Part 136; EPA Method 624" and soil analysis was conducted according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8240".

SPECIAL COMMENTS

Authorized signature


Kenneth W. Teague
Laboratory Director

CHAIN-OF-CUSTODY RECORD

STA. NO.	TIME	SAMPLER ID	LOCATION DESCRIPTION	SAMPLE TYPE	VOCs 624	VOCs 601/602	TPH	PEST/PCB	DISS. METAL	E.P. TOX				TOTAL # OF CONT.	NOTE #
MW-1	PM	Indirect	Monitor Well	H ₂ O	X									19896-897	2
MW-2	PM	↓	↓	↓	X									19898-899	2
MW-3	PM	↓	↓	↓	X									19900-901	2
MW-4	PM	↓	↓	↓	X									19802-903	2
TOTAL NUMBER OF CONTAINERS:					8									8	
RELINQUISHED BY: <u>Richard Chase</u> DATE/TIME <u>4:33 10/30/90</u> RECEIVED BY:					NOTES: <u>PO N-1080</u>										
RELINQUISHED BY: _____ DATE/TIME _____ RECEIVED BY: _____															
RELINQUISHED BY: _____ DATE/TIME <u>10/30/90</u> RECEIVED BY: <u>Sherron Manley</u>															
ANALYTICAL LABORATORY: <u>Analytix</u>															
LABORATORY CONTACT: _____															
NOBIS ENGINEERING CONTACT: <u>Monnie Nobis</u>															
NOBIS ENGINEERING, INC. 6 CHENELL DRIVE - SUITE 200 CONCORD, NH 03301 Telephone: (603) 224-4182 FAX: (603) 224-2507					Project: <u>Standard turnaround</u> Location: <u>Waikiki Restaurant</u> <u>Dover, NH</u> File No: _____ Date of Collection: <u>10/30/90</u>										



PHASE II LIMITED SITE INVESTIGATION REPORT

**Parcel ID 38022-A00000
900 Central Avenue
Dover, New Hampshire 03820**

Prepared for:
GVL Development, LLC
304 Maplewood Avenue
Portsmouth, New Hampshire 03801
Contact: Mr. Robert Graham, (603) 479-3666

Prepared by:
Wilcox & Barton, Inc.
#1B Commons Drive, Unit 12B
Londonderry, New Hampshire 03053
Contact: Mr. William Wilcox, (802) 272-8466

October 8, 2021

Wilcox & Barton, Inc. Project No. GVLD0003

CERTIFICATION

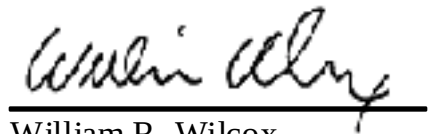
The following personnel have prepared and/or reviewed this report for accuracy, content, and quality of presentation.

Document Title: Phase II Limited Site Investigation Report
Parcel ID 38022-A00000
900 Central Avenue, Dover, New Hampshire 03820

Date/Version: October 8, 2021



Paul J. Plagge, E.I.T.
Senior Engineer



William R. Wilcox
President – Principal Geologist

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Appendices

Appendix A	Ground Penetrating Radar Systems, Inc. Report dated September 17, 2021
Appendix B	Soil Boring Logs and Monitoring Well Completion Details
Appendix C	Wilcox & Barton, Inc. Standard Operating Procedures
Appendix D	Laboratory Reports



1.0 INTRODUCTION

Wilcox & Barton, Inc. was retained by GVL Development, LLC to perform a Phase II Limited Site Investigation (LSI) of the property located at 900 Central Avenue in Dover, New Hampshire.

The work was performed to investigate for underground structures and/or anomalies associated with a former filling station on the property and evaluate soil and groundwater quality as part of due diligence activities supporting a real estate transaction.

The Phase II LSI included the following tasks:

- Oversight of a noninvasive subsurface geophysical investigation performed by Ground Penetrating Radar Systems, Inc. (GPRS);
- Advancement of three soil borings completed as monitoring wells by Geosearch, Inc. (Geosearch);
- Collection of soil and groundwater samples for laboratory analysis; and
- Preparation of this Phase II LSI Report.

2.0 SITE DESCRIPTION

The subject of this assessment consists of a 0.39-acre parcel identified by the City of Dover Assessor's Office as Parcel ID 38022-A00000. The property is currently owned by SAS Realty Company and used as an auto parts store and warehouse.

The City of Dover Cummings and Smith Public Water Supply Wells are situated approximately 1,100 feet to the southwest.

The location of the site is depicted on Figure 1 – *Site Location Map*.

3.0 SITE BACKGROUND

As documented in the *Phase I Environmental Site Assessment Report* (Phase I ESA) prepared by Wilcox & Barton, Inc. and dated September 8, 2021, the following findings were identified during performance of the Phase I ESA:

1. Historical on-site auto service operations. The subject property was listed in the EDR Historical Auto database and depicted on the 1971 Sanborn Map. This finding was corroborated with City Directory listings for a gasoline filling station operating on the property from 1960 to 1978. No records were found on the New Hampshire Department of Environmental Services (NHDES) OneStop database to indicate the underground storage of petroleum. Due to the lack of information regarding the storage of petroleum and absence of underground storage tank (UST) closure documentation, this finding is considered a *recognized environmental condition* (REC).

2. Upgradient historical dry-cleaning operations. The EDR report identified a historical dry-cleaning operation on an abutting, upgradient property at 903 Central Avenue. Common chemicals used at historical dry-cleaning facilities often contain chlorinated volatile organic compounds (VOCs). Although there have been no documented releases of chlorinated VOCs, the historical dry-cleaning facility at the upgradient 903 Central Avenue property needs to be evaluated. This finding constitutes an “other environmental concern” with respect to the subject property.
3. Historical groundwater contamination. According to the NHDES OneStop database, groundwater contamination has historically been present at the Former Waikiki Restaurant located at 914 Central Avenue and Charter Fuel Stop, #2614 Facility located at 1 New Rochester Road. Historical groundwater contamination from sites upgradient of the subject property constitute as a REC.
4. Historical industrial operations on abutting properties. The 1971 Sanborn Map depicts an electric motor sales and service operation on the west-abutting property located at 900B Central Avenue, and a tin shop and a residential dwelling on the north-abutting property located at 912 Central Avenue. Although no releases have been reported in association with these properties, the presence of historical electrical equipment repair and metalworking operations on abutting properties constitutes an “other environmental concern” with respect to the subject property.

Given these conditions, an investigation of subsurface conditions was warranted.

4.0 SUBSURFACE INVESTIGATION

A Wilcox & Barton, Inc. field scientist was on site during completion of the subsurface investigation work performed by GPRS and Geosearch. Investigation activities and results are described below.

4.1 Geophysical Subsurface Investigation

On September 17, 2021, GPRS conducted a geophysical subsurface investigation on the property to identify subsurface anomalies including utilities and undocumented USTs. GPRS utilized ground penetrating radar (GPR) and electromagnetic instruments capable of detecting objects to approximately four feet below ground surface (bgs). GPRS marked subsurface structures with spray paint and conveyed their findings to Wilcox & Barton, Inc in the field.

Two unknown subsurface anomalies, indicative of underground piping, were identified during the investigation. Subsurface utilities including electric, natural gas, and municipal sanitary sewer servicing the property were also located at depths ranging between approximately 3 and 4 feet bgs. The municipal water line was not identified during the investigation. It should be noted that the survey did not include areas under the existing building footprint. The GPRS Report is provided in Appendix A.

4.2 Soil Boring Advancement and Monitoring Well Installation

On September 17, 2021, Wilcox & Barton, Inc. oversaw the advancement of soil borings B(MW)-1 through B(MW)-3 using hollow-stem auger drilling techniques to depths ranging between 16 and 18 feet bgs. Drilling and monitoring well installation were performed by Geosearch. The locations of the soil borings and monitoring wells are depicted on Figure 2 – *Site Plan*.

Soil borings B(MW)-1, B(MW)-2 and B(MW)-3 were completed as monitoring wells MW-1, MW-2 and MW-3, respectively. The monitoring wells were constructed of 2-inch diameter, thread-coupled, schedule-40 polyvinyl chloride (PVC) materials. A 10-foot length of 0.010-inch machine-slotted well screen was placed across the apparent water table interface at each location. Clean silica sand was placed around each well screen, and a hydrated bentonite divider seal was placed above the filter pack. The annular space above the divider seal was backfilled with native material. The wells were completed with flush-mounted road boxes cemented at grade. Soil boring logs and monitoring well completion details are included in Appendix B.

Following installation, the three monitoring wells were developed using dedicated, polyethylene bailers to promote the flow of water through the sand pack and into the well. Well development continued until the wells were dry.

On September 17, 2021, Wilcox & Barton, Inc. surveyed the top-of-casing elevations of the newly installed monitoring wells relative to an arbitrary datum of 100.00 feet set at the top bolt of the fire hydrant at the southeast corner of the property, adjacent to Central Avenue.

4.3 Soil Sampling

Soil samples collected were classified using a modified Burmister Soil Classification System. Soil primarily consisted of fine to coarse grained sand with varying amounts of silt and/or gravel. Lenses of clay and/or silt were observed at depths below 7 feet bgs.

During boring advancement, apparent fill material (crushed cobbles and brick) was observed in borings B(MW)-1 and B(MW)-2 at depths of up to 4 feet bgs.

During advancement of soil borings, soil samples were collected and screened for organic vapors using a photoionization detector in accordance with the Wilcox & Barton, Inc. Standard Operating Procedure FP-01, which is included in Appendix C. Soil headspace vapor concentrations did not exceed 0.2 parts per million by volume (ppmv) in soil borings B(MW)-1 and B(MW)-2. Elevated vapor concentrations (413.0 ppmv and 887.5 ppmv) were reported in soil boring B(MW)-3 at depths of 8-9 and 10-11 feet bgs. Organic vapor concentrations and soil descriptions are presented on the attached soil boring logs.

Discrete soil samples were collected from each of the soil borings for laboratory analysis. The soil samples were submitted to Con-Test Analytical Laboratory (Con-Test) of East Longmeadow, Massachusetts for analysis of VOCs by U.S. Environmental Protection Agency

(EPA) Method 8260, polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270 and total petroleum hydrocarbons (TPH) by EPA Method 8015.

Soil samples were handled under standard chain of custody protocols. Analytical results are discussed in Section 4.5.1 and summarized in Table 1 – *Soil Samples – Summary of Analytical Results*. The laboratory report is provided in Appendix D.

4.4 Groundwater Sampling

On September 20, 2021, Wilcox & Barton, Inc. gauged monitoring wells MW-1, MW-2 and MW-3 for depth to water using a water level indicator capable of measuring depth to water to the nearest 0.01 foot. The presence of light non-aqueous phase liquid (LNAPL) was evaluated by slowly inserting a clean, clear, polyethylene bailer partway into the water column, removing the bailer, and visually inspecting the contents. LNAPL was not observed in any of the newly installed monitoring wells. Well gauging data are presented in Table 2 - *Well Gauging and Piezometric Head Elevation Data*. The gauging data were coupled with the survey data to create Figure 3 – *Piezometric Head Elevation Plan*, which indicates groundwater flow in a southeasterly direction, consistent with topography.

Groundwater samples were collected from the three monitoring wells using dedicated polyethylene bailers. Sampling was performed in accordance with the Wilcox & Barton, Inc. Standard Operating Procedure provided in Appendix C. The groundwater samples were submitted to Con-Test for analysis of VOCs by EPA Method 8260 and PAHs by EPA Method 8270. The groundwater samples collected for analysis of PAHs were filtered in the field using 0.40-micron filters.

The groundwater analytical results are discussed in Section 4.5.2 and summarized in Table 3 – *Groundwater Samples – Summary of Analytical Results* and a copy of the laboratory report is provided in Appendix D.

4.5 Analytical Results

4.5.1 Soil Analytical Results

The soil analytical results are summarized in Table 1.

VOCs

Several petroleum-related VOCs were detected at concentrations below the corresponding NHDES Soil Remediation Standard (SRS) in the soil sample collected from boring B(MW)-3. No other VOCs were detected in soil at concentrations above laboratory reporting limits.

PAHs

Naphthalene and 2-methylnaphthalene were detected at concentrations below their respective SRS in the sample from boring B(MW)-3. No other PAHs were detected in soil at concentrations above laboratory reporting limits.

Petroleum Hydrocarbons

TPH was detected at concentrations below SRS in the soil samples collected from borings B(MW)-1 and B(MW)-3. TPH was not detected above laboratory reporting limits (or SRS) in the sample from boring B(MW)-2.

4.5.2 Groundwater Analytical Results

The groundwater analytical results are summarized in Table 3.

VOCs

In the groundwater sample collected from MW-3, the petroleum-related VOCs naphthalene, 1,2,4-trimethylbenzene (TMB), and 1,3,5-TMB were detected at concentrations above the respective NHDES Ambient Groundwater Quality Standards (AGQS). The concentration of 1,2,4-TMB also exceeds the NHDES GW-2 (groundwater to indoor air) screening value of 1,300 micrograms per liter ($\mu\text{g/l}$); however, the well is located more than 30 feet horizontally from the site building and therefore the GW-2 standard does not currently apply. Additional VOCs were detected at concentrations below AGQS in the samples collected from monitoring wells MW-2 and MW-3. No VOCs were detected above laboratory reporting limits in the sample from well MW-1.

PAHs

Naphthalene was detected at a concentration above AGQS in the groundwater sample collected from well MW-3. Additional PAHs were detected at concentrations below AGQS in the sample from monitoring well MW-3. No PAHs were detected at concentrations above laboratory reporting limits in the samples from wells MW-1 and MW-2.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Wilcox & Barton, Inc. has completed a Phase II LSI to evaluate soil and groundwater conditions at the subject property. The Phase II LSI included performance of a geophysical subsurface investigation, advancement of soil borings, installation of groundwater monitoring wells, and collection of soil and groundwater samples for laboratory analysis.

The results of the geophysical subsurface investigation identified two subsurface anomalies which were indicative of underground piping. Subsurface utilities including electric, natural gas, and municipal sanitary sewer were also located on the site. No other subsurface anomalies/structures were identified; however, the survey did not include areas under the existing building footprint.

In soil, no compounds were detected at concentrations exceeding applicable SRS. However, elevated vapor concentrations (413.0 ppmv and 887.5 ppmv) were reported in boring B(MW)-3 at depths of 8-9 and 10-11 feet bgs.

During boring advancement, apparent fill material (crushed cobbles and brick) was observed in two borings at depths of up to 4 feet bgs. The presence of apparent fill material suggests that there is a possibility that demolition debris, which may be characterized as urban fill and/or solid

waste, may remain buried at the subject property. The presence of these materials may add additional costs to the project for the handling, transportation and disposal of the materials.

In groundwater, naphthalene, 1,2,4- and 1,3,5-TMB were detected at concentrations exceeding AGQS in the sample from monitoring well MW-3. Pursuant to the New Hampshire Code of Administrative Rules Env-Or 604.02, the responsible party (owner) is required to notify NHDES no more than 60 days after obtaining knowledge of a violation of groundwater quality criteria. In MW-3, the concentration of 1,2,4-TMB exceeds the NHDES GW-2 (groundwater to indoor air) screening value; however, the well is located more than 30 feet horizontally from the existing site building and therefore the GW-2 standard does not currently apply. If potential site redevelopment includes construction of a new building in the vicinity of monitoring well MW-3, potential impacts to indoor air should be evaluated.

Based on these results of the investigation, Wilcox & Barton, Inc. recommends the following:

1. Provide a copy of this report to the owner of the property informing them of the presence of petroleum-related VOCs in groundwater exceeding NHDES AGQS, and their obligation to notify the NHDES within 60 days of obtaining knowledge of this condition; and
2. Additional investigation to evaluate the source and extent of petroleum-related VOCs in groundwater.

Additionally, if the property is subject to redevelopment, Wilcox & Barton, Inc. recommends the following:

3. Evaluation of the potential impact to indoor air of proposed structures in the vicinity of existing monitoring well MW-3;
4. If soil export is anticipated as part of proposed construction, on-site soil should be characterized to determine costs associated with disposal at a licensed facility; and
5. Preparation of a Soil Management Plan and Health and Safety Plan in advance of construction on site to provide guidance regarding management of excavated materials.

TABLES

TABLE 1
Soil Samples - Summary of Analytical Results
900 Central Avenue
Parcel ID 38022-A00000
Dover, New Hampshire

Sample Identification Sample Date Depth (feet) / PID (ppmv)	NHDES Soil Remediation Standards (SRS) *	B(MW)-1 9/17/2021 15-16 / 0.1	B(MW)-2 9/17/2021 10-11 / 0.3	B(MW)-3 9/17/2021 10-11 / 887.5
Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270				
Acenaphthene	340	0.22 U	0.20 U	0.21 U
Acenaphthylene	490	0.22 U	0.20 U	0.21 U
Anthracene	1,000	0.22 U	0.20 U	0.21 U
Benzo(a)anthracene	1	0.22 U	0.20 U	0.21 U
Benzo(a)pyrene	0.7	0.22 U	0.20 U	0.21 U
Benzo(b)fluoranthene	1	0.22 U	0.20 U	0.21 U
Benzo(g,h,i)perylene	NS	0.22 U	0.20 U	0.21 U
Benzo(k)fluoranthene	12	0.22 U	0.20 U	0.21 U
Chrysene	120	0.22 U	0.20 U	0.21 U
Dibenz(a,h)anthracene	0.7	0.22 U	0.20 U	0.21 U
Fluoranthene	960	0.22 U	0.20 U	0.21 U
Fluorene	77	0.22 U	0.20 U	0.21 U
Indeno(1,2,3-cd)pyrene	1	0.22 U	0.20 U	0.21 U
2-Methylnaphthalene	96	0.22 U	0.20 U	0.37
Naphthalene**	28	0.22 U	0.20 U	0.084 J
Phenanthrene	NS	0.22 U	0.20 U	0.21 U
Pyrene	720	0.22 U	0.20 U	0.21 U
Volatile Organic Compounds (VOCs) by EPA Method 8260				
Benzene	0.3	0.0016 U	0.0014 U	1.5 U
n-Butylbenzene	110	0.0016 U	0.0014 U	13
sec-Butylbenzene	130	0.0016 U	0.0014 U	2.9
tert-Butylbenzene	100	0.0016 U	0.0014 U	0.31 J
Chloroform	3	0.0031 U	0.0028 U	0.46 J
Ethylbenzene	120	0.0016 U	0.0014 U	4.1
Isopropylbenzene (Cumene)	330	0.0016 U	0.0014 U	5.1
p-Isopropyltoluene (p-Cymene)	NS	0.0016 U	0.0014 U	2.6
Methyl tert-Butyl Ether (MTBE)	0.2	0.0031 U	0.0028 U	1.5 U
Naphthalene**	28	0.0031 UJ	0.0028 UJ	4.6
n-Propylbenzene	85	0.0016 U	0.0014 U	17
Tetrachloroethylene (PCE)	2	0.0016 U	0.0014 U	1.5 U
Toluene	100	0.0016 U	0.0014 U	1.5 U
1,2,4-Trimethylbenzene	130	0.0016 U	0.0014 U	120
1,3,5-Trimethylbenzene	96	0.0016 U	0.0014 U	56
Total Xylenes	500	0.0047 U	0.0042 U	18.32 J
Total Petroleum Hydrocarbons (TPH) by EPA Method 8015				
TPH (as Diesel)	10,000	13	9.9 U	18

All detected and selected other analytes listed; all others were not detected.

Results in milligrams per kilogram (mg/kg) unless otherwise noted.

PID Photoionization Detector. Results in parts per million by volume (ppmv).

U Not detected at or above the indicated laboratory reporting limit.

J Estimated concentration.

NS No standard established.

bold Detected concentration exceeds SRS.

bold italics Not detected; laboratory reporting limit exceeds SRS.

* Env-Or 606.19, Table 600-2, SRS, effective June 1, 2015.

** Standard per Risk Characterization and Management Policy Table B-2, revised September 2018.



TABLE 2
Well Gauging and Piezometric Head Elevation Data
 900 Central Avenue
 Parcel ID 38022-A00000
 Dover, New Hampshire

Well Identification	Gauging Date	Top of Casing Elevation (ft)	Depth to Water* (ft)	LNAPL Thickness (ft)	Piezometric Head Elevation (ft)
MW-1	9/20/21	102.11	13.01	--	89.10
MW-2	9/20/21	98.07	9.53	--	88.54
MW-3	9/20/21	97.87	9.34	--	88.53

NOTE: Site surveyed on September 17, 2021. Top of casing elevations are referenced to an arbitrary benchmark set at the top of the fire hydrant (assumed elevation 100.00 ft).

ft Feet.
 * Depth from top of casing or designated measuring point.
 LNAPL Light non-aqueous phase liquid.
 -- No measurable LNAPL present.



TABLE 3
Groundwater Samples - Summary of Analytical Results
 900 Central Avenue
 Parcel ID 38022-A00000
 Dover, New Hampshire

Sample Identification Sample Date	Ambient Groundwater Quality Standards (AGQS) †	GW-2 ††	MW-1 9/20/21	MW-2 9/20/21	MW-3 9/20/21
Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270					
Acenaphthene	420	NA	0.29 U	0.29 U	0.17 J
Acenaphthylene	420	NA	0.19 U	0.19 U	0.045 J
Anthracene	2,100	NA	0.19 U	0.19 U	0.19 U
Benzo(a)anthracene	0.1	NA	0.048 U	0.048 U	0.048 U
Benzo(a)pyrene	0.2	NA	0.097 U	0.096 U	0.097 U
Benzo(b)fluoranthene	0.1	NA	0.048 U	0.048 U	0.048 U
Benzo(g,h,i)perylene	210	NA	0.48 U	0.48 U	0.48 U
Benzo(k)fluoranthene	0.5	NA	0.19 U	0.19 U	0.19 U
Chrysene	5	NA	0.19 U	0.19 U	0.19 U
Dibenz(a,h)anthracene	0.1	NA	0.097 U	0.096 U	0.097 U
Fluoranthene	280	NA	0.48 U	0.48 U	0.48 U
Fluorene	280	NA	0.97 U	0.96 U	0.30 J
Indeno(1,2,3-cd)pyrene	0.1	NA	0.097 U	0.096 U	0.097 U
2-Methylnaphthalene	280	NA	0.97 U	0.96 U	79
Naphthalene	100	1,700	0.97 U	0.96 U	120
Phenanthrene	210	NA	0.048 U	0.048 U	0.048 U
Pyrene	210	NA	0.97 U	0.96 U	0.97 U
Volatile Organic Compounds (VOCs) by EPA Method 8260					
Benzene	5	2,900	1.0 U	1.0 U	40 U
n-Butylbenzene	260	NS	1.0 U	1.0 U	27 J
sec-Butylbenzene	260	NS	1.0 U	0.78 J	14 J
tert-Butylbenzene	260	NS	1.0 U	0.10 J	40 U
Chloroform	70	70	2.0 U	2.0 U	30 U
Ethylbenzene	700	1,500	1.0 U	1.0 U	160
Isopropylbenzene (Cumene)	800	NA	1.0 U	1.0 U	79
p-Isopropyltoluene (p-Cymene)	260	NS	1.0 U	1.0 U	11 J
Methyl tert-Butyl Ether (MTBE)	13	2,600	1.0 U	1.0 U	40 U
Methyl Cyclohexane	NS	NS	1.0 U	1.0 U	58
Naphthalene	100	1,700	2.0 UJ	2.0 UJ	180 J
n-Propylbenzene	260	NS	1.0 U	1.0 U	190
Tetrachloroethylene (PCE)	5	240	1.0 U	0.24 J	40 U
Toluene	1,000	50,000	1.0 U	1.0 U	40 U
1,2,4-Trimethylbenzene	330	1,300	1.0 U	1.0 U	2,100
1,3,5-Trimethylbenzene	330	NS	1.0 U	1.0 U	670
Total Xylenes	10,000	17,000	3.0 U	3.0 U	642 J

Detected and selected other analytes listed; all others were not detected.

Results in micrograms per liter (µg/L) unless otherwise noted.

U Not detected at or above the listed laboratory reporting limit.

J Estimated concentration.

NS No standard established/GW-2 not currently available.

bold Detected concentration exceeds AGQS.

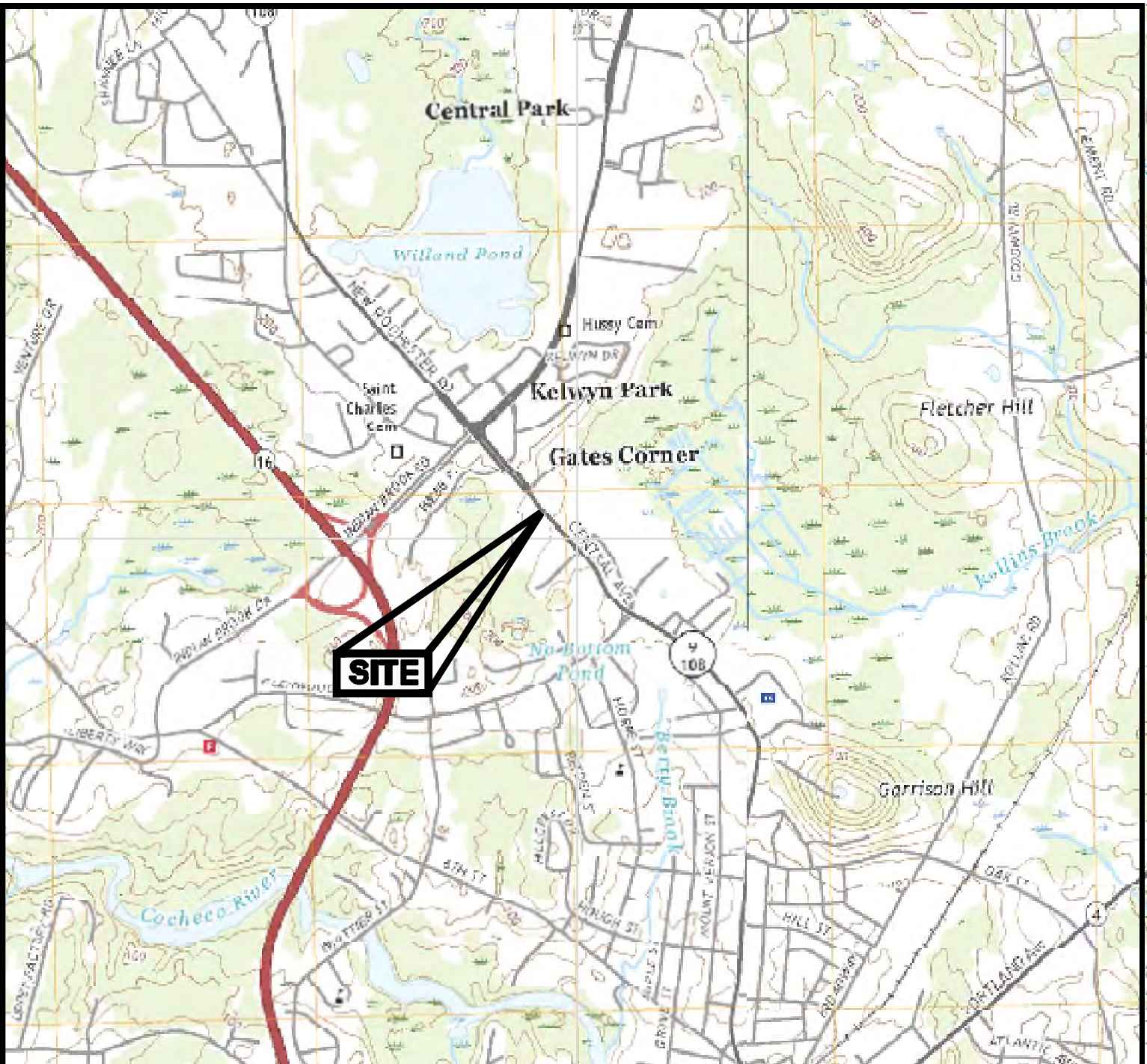
red Detected concentration exceeds GW-2.

bold italic Not detected; laboratory reporting limit exceeds AGQS.

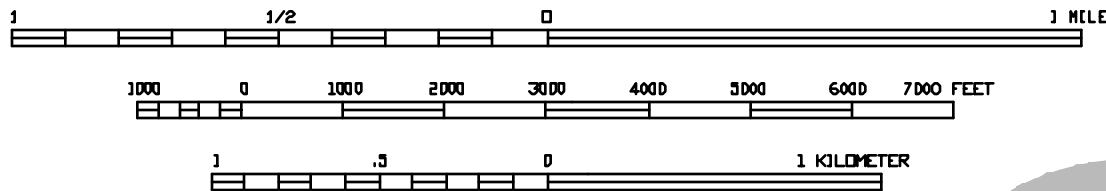
† Table 600-1 of Part Env-Or 603.03, AGQS, effective January 1, 2021.

†† Risk Characterization and Management Policy Section 7.4(4), revised September 1, 2018.

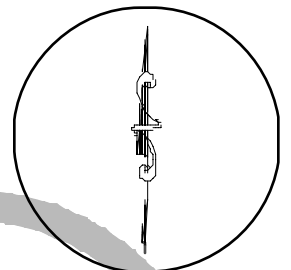
FIGURES



SCALE: 1:24,000



CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

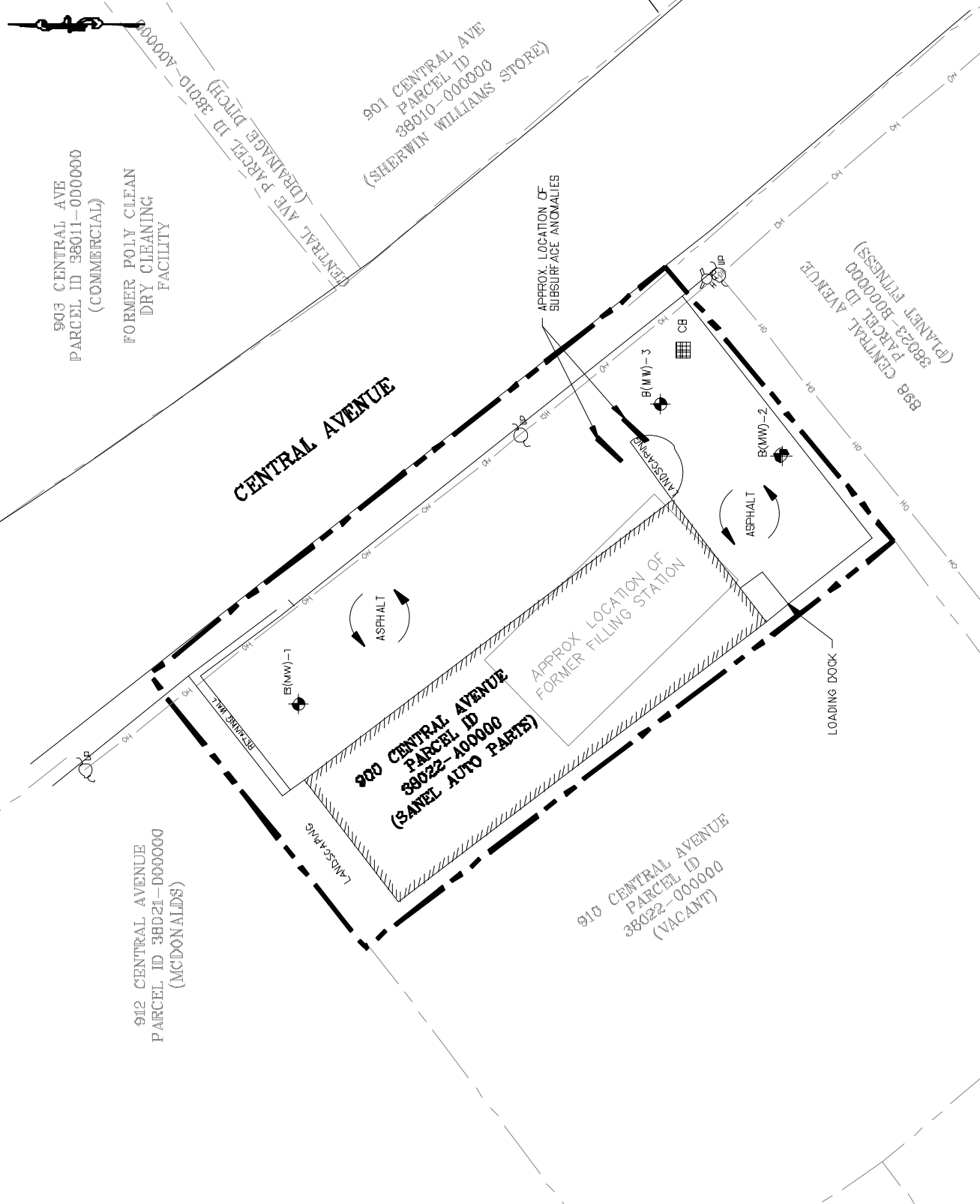


DATE September 3, 2021	SCALE As shown	FILE GVL00002_Site Location Map
APPROVED BY WRW	DRAWN BY PJP	REVISED
CLIENT GVL Development, LLC	JOB NUMBER GVL00003	
LOCATION 900 Central Avenue Parcel ID 38022-A00000 Dover, New Hampshire	MAP SOURCE Dover West and Dover East, NH USGS QUADS 2021	

Wilcox & Barton INC.
CIVIL • ENVIRONMENTAL • GEOTECHNICAL

SITE LOCATION MAP

Figure 1

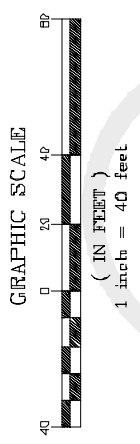


LEGEND

- APPROXIMATE SUBJECT PROPERTY BOUNDARY
- APPROXIMATE ADJUTING PROPERTY LINES
- OVERHEAD ELECTRIC LINE
- UTILITY POLE
- CATCH BASIN
- FIRE HYDRANT
- SOIL BORING COMPLETED AS A MONITORING WELL

NOTES

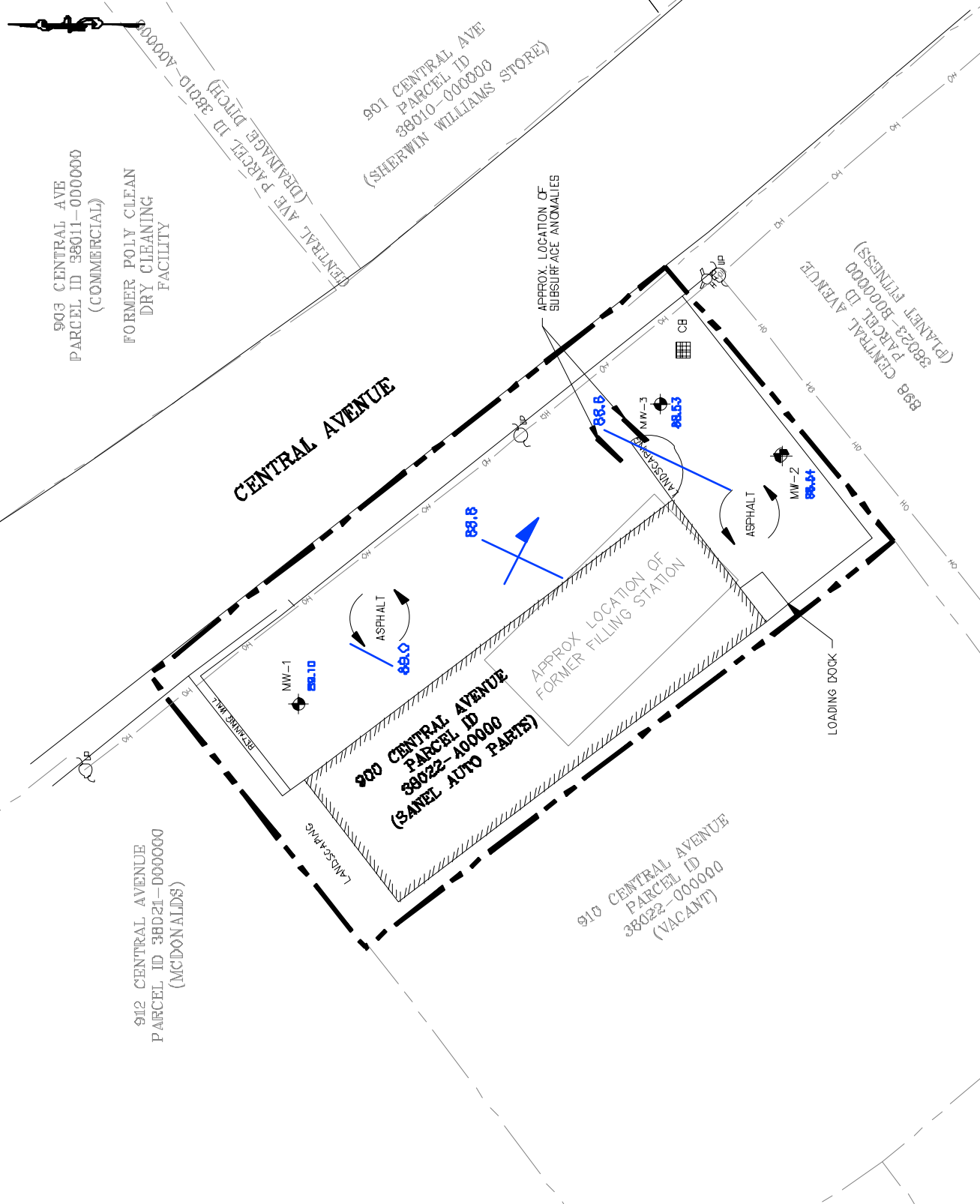
- 1 ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
- 2 PLAN BASED ON WILCOX & BARTON, INC. SITE VISITS AND CITY OF DOVER GIS INFORMATION.
- 3 THIS PLAN IS NOT A PROFESSIONAL SURVEY AND IS NOT INTENDED TO ESTABLISH PROPERTY BOUNDARIES



Wilcox & Barton
CIVIL ENGINEERING - ARCHITECTURE

SITE PLAN

TITLE	SCALE	FILE
DATE	GRAPHIC	Master Plan
October 5, 2021		
APPROVED BY	DRAWN BY	REVISED
PJP	MMN	
CLIENT	JOB NUMBER	
GVL Development, LLC	CVD00003	
LOCATION	DRAWING NUMBER	
800 Central Avenue Parcel ID 38022-400000 Dover, New Hampshire	FIGURE 2	

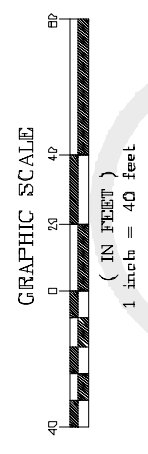


LEGEND

- APPROXIMATE SUBJECT PROPERTY BOUNDARY
- - - APPROXIMATE ADJUTING PROPERTY LINES
- CH OVERHEAD ELECTRIC LINE
- UP UTILITY POLE
- CB CATCH BASIN
- FIRE HYDRANT (BOLT AT TOP IS BENCHMARK- ASSUMED ELEVATION 100.00 FEET)
- MW-1 MONITORING WELL WITH PIEZOMETRIC HEAD ELEVATION RELATIVE TO BENCHMARK
- GROUNDWATER FLOW DIRECTION
- PIEZOMETRIC HEAD ELEVATION CONTOUR IN FEET RELATIVE TO BENCHMARK

NOTES

- 1 ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PLAN BASED ON WILCOX & BARTON, INC. SITE VISITS
- 2 AND CITY OF DOVER GIS INFORMATION. SITE VISITS
- 3 THIS PLAN IS NOT A PROFESSIONAL SURVEY AND IS NOT INTENDED TO ESTABLISH PROPERTY BOUNDARIES



Wilcox & Barton Inc. CIVIL ENGINEERING & SURVEYING	
TITLE PIEZOMETRIC HEAD ELEVATION PLAN	
DATE October 5, 2021	SCALE Master Plan
APPROVED BY PJP	DESIGNED BY MNN
CLIENT GVL Development, LLC	JOB NUMBER GVL00003
LOCATION 800 Central Avenue Parcel ID 38022-00000 Dover, New Hampshire	FIGURE 3



Shevenell-Gallen
and associates, Inc. Engineers and Geologists



1000 Highway 100
Dover
New Hampshire
03820

**HYDROGEOLOGICAL INVESTIGATION
REPORT P-8233-02**

**CHARTER FUEL STOP NO. 2614
1 ROCHESTER ROAD
DOVER, NEW HAMPSHIRE**

**HYDROGEOLOGICAL INVESTIGATION
REPORT P-8233-02**

**CHARTER FUEL STOP NO. 2614
1 ROCHESTER ROAD
DOVER, NEW HAMPSHIRE**

PREPARED FOR

Mr. Steve Belin
Gasoline Compliance Manager
The Circle K Corporation
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PREPARED BY

SHEVENELL-GALLEN and Associates, Inc.
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September 8, 1993

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EXECUTIVE SUMMARY

The subject property is located in a commercial setting at 1 Rochester Road in Dover, New Hampshire. The property is currently the site of a Charter Fuel Stop gasoline retail outlet. The subject property was formerly the site of an Old Colony automotive service station.

Purpose

The purpose of the hydrogeological investigation was to better define the extent of soil and groundwater contamination on the subject property.

Work Scope

The work scope included:

1. The advancement of four test borings to a confining layer or bedrock; collection of split-spoon samples at five-foot intervals to at least five feet below the water table; classification of soil types; field screening of 34 split-spoon samples for the presence of photoionizable compounds; and installation of a groundwater monitoring well in each of the borings.
2. The collection and analysis of five soil samples for the presence of volatile organic compounds according to EPA Method 8240.
3. A survey of the location and elevation of each newly installed monitoring well, and the seven existing shallow monitoring wells, to a common datum. The measurement of the static water level, and selected groundwater field parameters (pH, specific conductance and temperature) in each monitoring well.
4. The performance of a falling head slug test in one of the newly installed monitoring wells.
5. The collection and analysis of four groundwater samples from the newly installed wells, and from four of the existing shallow monitoring wells, for the presence of volatile organic compounds according to EPA Method 624.
6. The interpretation of the data collected to describe the site geology, the inferred direction of groundwater flow, the presence of photoionizable compounds in the soil, and the presence of volatile organic compounds in the soil and ground water; and the identification of potential sensitive receptors.

Key Findings

1. The soils on the subject property are consistent with the post-glacial outwash materials recorded for the area. The soils are intertongued in a complex pattern; generally, a series of silts, sands and gravels overlie a laterally continuous clay layer (encountered at 69 to 84± feet below ground surface), which in turn overlies an unconsolidated sand which drapes over bedrock. A localized clay lense was encountered at 47 to 50± feet below ground surface near the southwest boundary of the subject property. Bedrock was encountered at 102 to 112± feet below ground surface.

INTRODUCTION

A hydrogeological investigation of the Charter Fuel Stop No. 2614, located at 1 Rochester Road in Dover, New Hampshire, was conducted for Mr. Steve Belin of The Circle K Corporation, from June 15 to August 12, 1993.

Purpose

The purpose of the hydrogeological investigation was to better define the extent of soil and groundwater contamination on the subject property.

Work Scope

The work scope included:

1. The advancement of four test borings to a confining layer or bedrock; collection of split-spoon samples at five-foot intervals to at least five feet below the water table; classification of soil types; field screening of 34 split-spoon samples for the presence of photoionizable compounds; and installation of a groundwater monitoring well in each of the borings.
2. The collection and analysis of five soil samples for the presence of volatile organic compounds according to EPA Method 8240.
3. A survey of the location and elevation of each newly installed monitoring well, and the seven existing shallow monitoring wells, to a common datum. The measurement of the static water level, and selected groundwater field parameters (pH, specific conductance and temperature) in each monitoring well.
4. The performance of a falling head slug test in one of the newly installed monitoring wells.
5. The collection and analysis of four groundwater samples from the newly installed wells, and from four of the existing shallow monitoring wells, for the presence of volatile organic compounds according to EPA Method 624.
6. The interpretation of the data collected to describe the site geology, the inferred direction of groundwater flow, the presence of photoionizable compounds in the soil, and the presence of volatile organic compounds in the soil and ground water, and the identification of potential sensitive receptors.

This investigation is subject to the limitations stated in the *Limitations* section, and to the *Circle K Corporation Agreement* dated April 13, 1992.

Site Characterization

The subject property is located in a commercial setting at the southern extent of the Weeks Traffic Circle in Dover, New Hampshire (Figure 1). The 0.20± acre property is the site of Charter Fuel Stop No. 2614, a gasoline retail outlet.

2. Field screening results of the split-spoon samples for the presence of photoionizable compounds ranged from 1.3 to 679 ppb. The highest readings, and concentrations of toluene and m-xylene (volatile organic compounds indicative of petroleum), were detected in the soil sample collected from just above the water table in boring B-3, located near the southwestern property boundary. No volatile organic compounds were detected in the soil samples collected from borings B-1 or B-2.
3. Ground water was encountered at 33 to 39± feet below ground surface, and is inferred to flow to the south-southwest towards the Coconeo River. The seepage velocity of the overburden soils is estimated to be 0.017± ft/day.
4. No free product was detected in the initial bailer collected from the four newly installed monitoring wells, or the four existing monitoring wells selected for sampling, at the times the groundwater samples were collected.
5. No volatile organic compounds were detected in the groundwater samples collected from monitoring wells SG-1, SG-2, SG-3, SG-4 or Jet-3. Benzene, toluene, ethylbenzene, xylenes and methyl t-butyl ether (volatile organic compounds indicative of gasoline) were detected in the groundwater sample collected from monitoring well DS-6, and traces of methyl t-butyl ether (MTBE) and m-xylene were detected in the groundwater samples collected from monitoring wells Jet-4 and Jet-5, respectively. The detected concentrations of benzene, toluene, ethylbenzene and MTBE in the sample collected from DS-6 are above the Ambient Groundwater Quality Standards established by the New Hampshire Department of Environmental Services for ground water. Monitoring well DS-6 is located near the southwestern (downgradient) property boundary.
6. No tetrachloroethene, or other organic solvents, were detected in the groundwater samples collected from the newly installed and existing monitoring wells. These data are not consistent with previous groundwater sampling results for the subject property, and may indicate either errors in previous site investigations, or the dispersion of the solvents previously detected. Based on the groundwater sampling results from this investigation, the subject property is not likely the source of the tetrachloroethene contamination detected in the downgradient Cummings water supply well.

Recommendations

1. Copies of this hydrogeological investigation report, and the SHEVENELL-GALLEN and Associates, Inc. *Environmental Audit Report P-8233-01*, dated December 7, 1992, should be submitted as a Site Investigation Report for review by the New Hampshire Department of Environmental Services.
2. Groundwater samples should be collected from the three other pre-existing monitoring wells on the subject property (DS-7, DS-11, and DS-12) and analyzed for the presence of volatile organic compounds, to provide a comprehensive data set for better determining the source of the detected gasoline release.

The building on the subject property is a small, single-story concrete block kiosk set upon a concrete slab foundation. The subject property neighborhood is serviced by the Dover municipal water and sanitary sewer systems; however, the subject property is not currently connected to these systems. The Smith and Cummings water supply wells, providing drinking water to the Dover municipal water system, are located 0.25± miles southwest of the subject property. Three 10,000-gallon underground gasoline storage tanks are currently located on the subject property.

According to the *Surficial Geologic Map of the Dover West Quadrangle, Strafford County, New Hampshire*, prepared by the United States Geological Survey in cooperation with the State of New Hampshire Department of Environmental Services, the soils on the subject property are derived from post-glacial outwash deposits that are characterized by primarily sand and gravel. This type of soil tends to be permeable to groundwater flow.

According to the *Geologic Map of the Seacoast Region, New Hampshire Bedrock Geology* (prepared by R. N. Novorny and published by the New Hampshire Department of Resources and Economic Development, 1968), the bedrock geology on the subject property is of the Berwick Formation. The Berwick Formation consists of thin-bedded to massive schist, and thin to thick-bedded lime-silicate rock with some quartzite beds.

The topography of the subject property and neighborhood slopes downward to the south. Rollins Brook and associated wetlands are located 1,000± feet southeast of the subject property. The majority of the property not occupied by the kiosk is covered by asphalt paving, with borders of lawn grass along the northern and southern boundaries.

According to the records at the City of Dover Assessor's Office, the subject property is listed on Dover Tax Map 38 as Lot 39-1, and has been owned by the Sure Oil & Chemical Corporation since February 16, 1973. The subject property has had the same footprint area since 1969, when the property was first used as a gasoline outlet (Old Colony service station); the southern portion of the subject property reportedly contained two pump islands and two underground gasoline storage tanks at that time. Prior to 1969, the northern portion of the property was the site of a circa 1940 residence with an attached garage.

Previous Investigations

Site Evaluation Report

A November 26, 1990, *Site Evaluation Report*, conducted by Jet-Line Services, Inc. of Dover, New Hampshire, for the New Hampshire Department of Transportation included the installation of three monitoring wells on the Charter Fuel Stop property. Key findings noted in the report, regarding the subject property, were as follows:

1. No petroleum hydrocarbons were detected in soil samples collected from three borings advanced on the subject property. Trichloroethene was detected in the soil samples collected from the borings at the groundwater interface.
2. Total petroleum hydrocarbons were detected in the groundwater samples collected from three monitoring wells installed on the subject property (Jet-3, Jet-4, and Jet-5) at concentrations below the New Hampshire Department of Environmental Services (NHDES) action level. Tetrachloroethene (PCE) and toluene were detected in the groundwater sample collected from monitoring well Jet-4, located on the southern portion of the subject property, at concentrations above the federal drinking water standards (Maximum Contaminant Levels, or MCLs).
3. Jet-Line Services, Inc. concluded that there had been a release from either the underground gasoline storage tanks, from previous service station activities, or from subsurface utilities (i.e., sewer line) on the Charter

property; or that the contamination may have been the result of an old release from an off-site source which had migrated across the property over time.

Preliminary Hydrogeologic Study

The April 1991 study by Aries Engineering, Inc. of Concord, New Hampshire, was conducted for the City of Dover in the vicinity of the Weeks Traffic Circle to determine the possible sources of petroleum and organic solvent contamination detected in the Smith and Cummings municipal water supply wells, located 0.25± miles southwest of the subject property. Aries concluded that the potential sources of the petroleum-related compounds included the Charter Fuel Stop underground gasoline storage tanks, and that the potential sources of the PCE included dry-cleaning facilities, service stations and an auto body shop located on or near Central Avenue.

Environmental Services Report

A GZA GeoEnvironmental, Inc. (GZA), *Environmental Services Report*, dated July 1992, was conducted on the Weeks Traffic Circle Reconstruction Area for the New Hampshire Department of Transportation. Key findings noted in the report, regarding the subject property, were as follows:

1. The solvent PCE, and the gasoline constituents benzene, toluene, ethylbenzene, and total xylenes (BTEX), were detected at concentrations that exceed their respective MCLs in groundwater samples collected from a number of monitoring wells located in the vicinity of the Weeks Traffic Circle, including four wells installed on the subject property (DS-6, DS-7, DS-11 and DS-12). Concentrations of PCE were detected in monitoring well DS-6, as well as in pre-existing monitoring wells Jet-3 and Jet 5, located hydraulically upgradient of DS-6.
2. Since 1990, PCE, trichloroethene, and benzene had been detected in the Cummings municipal water supply well, and methyl t-butyl ether (MTBE) had been detected in the Smith municipal water supply well, both located hydraulically downgradient of the subject property.
3. Multiple potential sources, including the Charter Fuel Stop and areas upgradient of the subject property, were noted as likely sources of the contamination detected in the water supply wells. PCE is a solvent commonly used in dry cleaning operations, and is also an industrial solvent used for degreasing operations associated with automotive repair facilities. The observed concentrations of PCE and benzene in the groundwater collected from monitoring well DS-6 on the subject property indicated that the migration of these contaminants to the Cummings well from the subject property was possible.

Environmental Audit Report

An environmental audit of the subject property was conducted by SHEVENELL-GALLEN and Associates, Inc. (*Environmental Audit Report P-8233-01*, dated December 7, 1992) to evaluate the site with respect to potential liability exposure. Key findings noted in the report were as follows:

1. Previous investigations of the subject property and neighborhood document that benzene (to 12,000 µg/L), toluene (to 14,000 µg/L), ethylbenzene (1.2 - 710 µg/L), xylenes (2.7 - 2,400 µg/L), and tetrachloroethene (to 3,000 µg/L) have been detected in groundwater samples collected from seven shallow overburden monitoring wells located on the subject property. The highest concentration of tetrachloroethene was detected in monitoring well DS-6, located at the down-gradient southwestern property boundary with Rochester Road.
2. The three 10,000 gallon, 23-year old underground gasoline storage tanks on the subject property are presently in compliance with New Hampshire regulations (Env-Ws 411). The asphalt coated or bare steel tanks are

equipped with overfill and spill devices, and have passed tank, line and leak detector tests conducted in 1990, 1991, and 1992. Automotive repair services were reportedly performed during the tenure of the Old Colony gasoline service station at the site, circa 1969-1973.

3. Several potential off-site sources of the groundwater contamination were identified. The 60 Minute System, a complete dry-cleaning facility, and ZIP Instant Print, were formerly located on the northern abutting Weeks Restaurant property in the building presently occupied by a Care Pharmacy. The former dry-cleaning facility was reportedly serviced by an on-site septic system. The currently vacant Mattress Cloud building, abutting the subject property to the east, across Central Avenue, was a small truck repair garage prior to 1980. The properties at 925 and 927 Central Avenue had a number of used cars for sale on the front lawns; it is possible that cars are serviced on these properties.
4. Two active municipal water supply wells (Smith and Cummings wells), located 0.25± miles southwest of the subject property, are noted as potential receptors. Tetrachloroethene, trichloroethene and benzene have been detected in the Cummings well; methyl *n*-butyl ether has been detected in the Smith well. Twenty-one residential and commercial properties, located within 1,000± feet south-southwest of the subject property, are also identified as potential receptors. All of these properties are supplied by the municipal drinking water system.

METHODOLOGY

Test Borings

Four borings were advanced on the subject property between June 15 and July 14, 1993, by Great Works Test Boring, Inc. under the supervision of a representative of SHEVENELL-GALLEN and Associates, Inc. (Figure 2). Test borings were advanced to either a confining layer or bedrock refusal using a 7.75-inch outside diameter hollow-stem auger, and soil samples were collected at five-foot intervals ahead of the auger with a 24-inch long split-spoon sampler. Soil samples were collected at five-foot intervals to the bottom of boring B-1, and at five-foot intervals to 5± feet below the water table in borings B-2 and B-3; as boring B-4 was placed in couplet with boring B-2, split-spoon samples were not collected. Monitoring wells were installed in each of the four borings. Soil boring logs for B-1 through B-4 are included in Appendix A. The boring location rationale and details are summarized in the following table.

TABLE I. Test Boring Information.

Boring	Location	Reason for Location	Dominant Soils	P	Boring (ft.)
B-1	NE corner of property	Assess potential on-site contamination migration in overburden.	sand, gravel and clay	N	102.0±
B-2	NW corner of property	Assess potential on-site contamination migration at bedrock interface.	sand, silty sand, gravel and clay	N	111.5±
B-3	Downgradient of gasoline UST's	Assess potential releases of petroleum and PCE on subject property.	sand, gravel and clay	Y	75.0±
B-4	In couplet with well SG 2	Assess potential on-site contamination migration in overburden.	sand, silty sand, gravel and clay	N	84.0±

Note: P = petroleum odor.

Monitoring Well Installation

Each monitoring well consisted of 2.0-inch diameter, schedule 40 PVC solid riser above an appropriate length of 0.01-inch machine-slotted PVC screen. Wells were installed and screened to assess the presence of volatile organic compounds, specifically PCE, that may have settled to the upper boundary of a clay-rich confining layer or the bedrock interface. The bottom of the screen in each well was plugged to prevent sediment from rising into the well casing. The riser, screen and plug were connected by threaded joints; no cements or glues were used.

The boring annulus was filled with filter sand to one foot above the screen and sealed with two feet of bentonite, both immediately above the sand pack and at a depth of 2 to 4± feet below ground surface. Because monitoring well SG-2 was installed to sample water at the bedrock interface only, and monitoring well SG-3 was installed to compliment existing shallow well DS-6, additional bentonite seals were placed at appropriate depths in SG-2 and SG-3 so as to prevent cross-contamination from observed overlying clay layers. The lower portions of borings B-1 and B-3 not utilized for well placement were also sealed with bentonite before placing the well screening and casing. Filter sand was used to fill the remaining annulus, and a protective steel manbox was cemented into place to complete the well construction.

Each monitoring well was developed, using a high-density polyethylene bailer, subsequent to completion by surging the ground water in each well prior to removing at least one well volume; this process was repeated a minimum of five times, until turbidity was minimized and appeared constant by visual inspection. Development water was transferred to and stored on-site in labeled 55-gallon drums fitted with self venting caps.

Monitoring well construction details are included in Appendix A. The following table summarizes the monitoring well specifications.

TABLE II. Monitoring Well Specifications.

Monitoring Well	Monitoring Well Screen Interval (ft.)	Depth to Observed Saturated Soil	Bottom of	
			Boring (ft.)	MW (ft.)
SG-1	75.0 - 85.0	37±	102.0±	85.0±
SG-2	101.0 - 111.0	37±	111.5±	111.0±
SG-3	60.0 - 70.0	37±	75.0±	70.0±
SG-4	69.0 - 84.0	37±	84.0±	84.0±

Note: All measurements given in feet below ground surface.

Surveying and Field Measurements

Surveying

The top of the PVC riser in each of the four newly installed and seven existing monitoring wells was surveyed on July 20, 1993, relative to the ground surface elevation of monitoring well SG-1 (assumed to be 195.00 feet above mean sea level, as extrapolated from the *Dover West, New Hampshire* 7.5 minute quadrangle, USGS topographic map) using a Leitz/Sokkisha C40 Automatic Level. The survey data are provided in Appendix B.

Field Measurements

Field measurements (including static water level, groundwater temperature, specific conductance, and pH) were taken on July 14, 1993, using a YSI Model 3000 TLC (temperature-level-conductivity) instrument, and MEL pHydron Instacheck test paper, after allowing the wells to equilibrate for at least 14 days. Water quality measurements were conducted after water samples for laboratory analysis were collected.

Hydraulic Conductivity Test

A falling-head slug test was conducted on August 2, 1993, to determine the hydraulic conductivity of soils in the immediate vicinity of the screened portion of monitoring well SG-4. This well was selected because of its location between the previously detected release of PCE in existing well DS-6 and potential upgradient sources, as well as for its location within the thick silty-sand unit that appears to underlie the northwest portion of the property. The static water level was measured using a YSI Model 3000 TLC instrument, and then a fixed volume of distilled water was introduced into the well. Water levels were measured for ten minutes in the well, to allow ample time to evaluate the effect of the filter pack, and to determine the time over which the data are valid.

Sample Collection

Soil

Thirty-four (34) split- spoon soil samples were collected from the borings between June 15 and July 14, 1993, for field screening for the presence of photoionizable compounds by a representative of SHEVENELL-GALLEN and Associates, Inc. Each soil sample was placed into a dedicated 8-ounce sample jar sealed with aluminum foil, and was labelled with the corresponding boring (B-1 to B-4) and split-spoon sample number (SS-1 to SS-16).

On June 17 and 18, and July 1, 1993 a representative of SHEVENELL-GALLEN and Associates, Inc., collected a total of five soil samples from borings B-1, B-2 and B-3 for volatile organic compound analysis. Soil samples with the highest observed concentration of photoionizable compounds were selected for analysis; samples were not collected from boring B-4 due to its placement in couplet with B-2. The five samples, designated B-1/SS-4 and SS-16, B-2/SS-1 and SS-4, and B-3/SS-8, were packed to minimize headspace into duplicate clean two-ounce glass sample jars fitted with Teflon® cap liners, and then tightly sealed.

Ground Water

Between July 14 and August 12, 1993, a representative of SHEVENELL-GALLEN and Associates, Inc. collected groundwater samples SG-1, SG-2, SG-3 and SG-4 from the four newly installed monitoring wells, and groundwater samples DS-6, Jet-3, Jet-4 and Jet-5 from four of the existing shallow monitoring wells, for volatile organic compound analysis. During each sampling round, the initial bailer was inspected for the presence of free product, and then each well was purged, using a high-density polyethylene bailer, by the removal of at least three well volumes of ground water prior to sample collection. Purge water was transferred to and stored on-site in a labeled 55-gallon drum fitted with a self venting cap.

Each groundwater sample was collected using a dedicated high-density polyethylene bailer and transferred to duplicate sterile, 40 milliliter VOA vials fitted with Teflon® septa. Care was taken to

minimize the agitation of water flowing into the vials, which were then inspected to verify no headspace was present after filling and sealing. The groundwater samples were field preserved with 10 normal HCl.

Sample Custody

All soil and groundwater samples were stored on ice in a cooler while awaiting and during transport from the field to Analytical Environmental Laboratory, Inc. of Portsmouth, New Hampshire.

Soil samples B-1/SS-4 and SS-16, and B-2/SS-1 and SS-4 were logged into the laboratory at 3:05 PM on June 18, 1993. Soil sample B-3/SS-8 was logged into the laboratory at 6:05 PM on July 1, 1993. Groundwater samples SG-1, SG-2, and SG-3 were logged into the laboratory at 4:52 PM on July 14, 1993. Groundwater samples SG-4 and DS-6 were logged into the laboratory at 12:20 PM on August 2, 1993. Groundwater samples Jet-3, Jet-4 and Jet-5 were logged into the laboratory at 12:30 PM on August 12, 1993.

Analytical Methods

Photoionizable Compounds

A Photovac MicroTip® MP-1000 photoionization detector equipped with a 10.6 eV lamp source was used to field screen the soil samples for the presence of photoionizable compounds. The instrument was calibrated with zero gas and 100 parts per million (ppm) concentration of isobutylene, and was then programmed to display values which are equivalent to benzene. For this instrument, 100 ppm isobutylene is equivalent to 60 ppm benzene.

Volatile Organic Compounds

The soil samples were analyzed for the presence of volatile organic compounds according to EPA Method 8240, using a Hewlett Packard Model 5890/5970 Gas Chromatograph/Mass Spectrometer equipped with a packed column.

The groundwater samples were analyzed for the presence of volatile organic compounds according to EPA Method 624, using either a Hewlett Packard Model 5890/5970 Gas Chromatograph/Mass Spectrometer equipped with a packed column or a Hewlett Packard Model 5890 Series II/5971A Gas Chromatograph/Mass Spectrometer equipped with a capillary column.

RESULTS

Hydrogeology

Site Geology

Seven distinct soil types were observed in the split-spoon samples and auger cuttings: (1) an unconsolidated sand and gravel in the upper 15 to 20± feet below the ground surface, and from 45 to 65± feet below the ground surface; (2) 2 to 20± feet of tan, fine to medium sand with iron-stained laminae; (3) 2 to 5± feet of tan, silty sand; (4) 5 to 25± feet of grey, fine to medium silty sand; (5) 1 to 9± feet of fine sand with frequent clay laminae; (6) a dense, grey clay, encountered throughout the site at 69 to 84± feet below ground surface, and in a lense at 47 to 50± feet below

ground surface near the southwest property boundary (boring B-3); and (7) unconsolidated medium to coarse sand, encountered in a narrow lense overlying the clay layer, and in a 13 to 22± foot-thick layer overlying bedrock.

These soil types, consistent with the post-glacial outwash materials mapped for the area of the subject property, were observed to be intertongued in a complex pattern; generally, a series of silts, sands and gravels overlie a laterally continuous clay layer, which in turn overlies an unconsolidated sand which drapes over bedrock.

Water saturated soil was encountered within the iron-stained laminated sand layer at 35 to 39± feet below the ground surface. Bedrock was encountered at 102 to 112± feet below the ground surface in borings B-1 and B-2, respectively. An interpretive cross section of the property is included as Figure 3.

Groundwater Flow Direction

Based upon the static water elevations, ground water is generally inferred to flow south-southwest (Figure 2). The average water table gradient across the subject property is 0.009 ft/ft. The surveyed elevation of the top of the PVC riser, adjacent ground surface, and the static water level for each newly installed and existing monitoring well is provided in the table below.

TABLE III. Static Water Level Data.

Monitoring Well	Elevation		Static Water Level	
	Well	Ground	Depth	Elevation (July 14, 1993)
SG-1	194.58	195.00	38.33	156.25
SG-2	193.25	193.57	99.90*	133.35*
SG-3	192.08	192.42	36.39	156.03
SG-4	193.46	193.79	37.33	156.13
DS-6	193.08	NR	37.80	155.28
DS-7	193.47	NR	37.45	156.02
DS-11	186.26	NR	34.95	154.31
DS-12	195.96	NR	39.39	156.57
Jet-3	195.63	NR	39.17	156.46
Jet-4	191.69	NR	36.51	155.18
Jet-5	194.40	NR	38.23	156.17

- Notes: 1. All elevations are relative to a datum of 195.00 feet above mean sea level (MSL), assumed to be the ground surface adjacent to monitoring well SG-1.
2. Static water level measurements are in feet below the top of the PVC riser.
3. Ground surface elevations were not recorded for the existing monitoring wells.
4. *Groundwater elevation for bedrock-level monitoring well SG-2 indicates a downward vertical hydraulic gradient across the confining clay layer.

The survey data, which form the basis for the groundwater contours as shown in Figure 2, are presented in Appendix B.

Hydraulic Conductivity

The calculated hydraulic conductivity for monitoring well SG-4 was 0.77 ft/day, as presented in the table below. The representative soil types for the screened interval are also noted. The hydraulic conductivity value obtained for the well tested corresponds to published ranges (Freeze and Cherry, 1979) for the soil type noted over the screened interval.

TABLE IV. Hydraulic Conductivity.

Monitoring Well	K (ft/day)	K (cm/sec)	Soil Type
SG-4	0.77	2.71×10^{-4}	silty and clayey sands

Note: K = hydraulic conductivity; ft/day = feet per day; cm/sec = centimeters per second.

The Bouwer and Rice (1976) method of drawdown analysis was used to calculate the hydraulic conductivities. This method assumes that the well water volume (slug) is added instantaneously; however, in practice ground water is dispersed over a short period of time relative to the length of the test. The data were analyzed using Geraghty & Miller's AQTESOLV Aquifer Test Solver/Version 1.00 software on a DEI J. 433A microcomputer. An explanation of slug test theory and the parameters for the test are given in *Appendix C*.

Soil Quality

Photoionizable Compounds

The highest concentrations of photoionizable compounds detected in the soil samples ranged from 367 to 679 ppm, as referenced to benzene. These readings were detected in the samples collected from boring B-3 (downgradient of the gasoline USTs and the main dispenser island), 35.0 to 42.0± feet below the ground surface. Field screening data for the presence of photoionizable compounds are presented in the boring logs (*Appendix A*).

Volatile Organic Compounds

Toluene and m-xylene, volatile organic compounds indicative of petroleum, were detected in the soil sample collected from boring B-3. No volatile organic compounds were detected in the soil samples collected from borings B-1 or B-2. The following table summarizes the concentrations of volatile organic compounds detected in the soil samples.

TABLE V. Analytical Results for Soil Sample from Boring B-3 for Volatile Organic Compounds.

Compound	Concentration (µg/kg)
Toluene	440
Total xylenes	<60

Notes: < = less than. µg/kg is microgram per kilogram, which is equivalent to parts per billion.

Ground Water Quality

Field Parameters

The temperature, specific conductance, and pH measurements, as measured on July 14, 1993, are within the normal ranges for ground water in New England. The specific conductance is an indirect measurement of the dissolved inorganic constituents in the ground water. The pH is a measurement of the hydrogen ion concentration, typically defined in terms of acidity (pH less than 7.0) or alkalinity (pH greater than 7.0). Field parameter measurements are provided in the table below.

TABLE VI. Field Parameters for Ground Water from the Monitoring Wells.

Monitoring Well	Temperature (°C)	pH	Specific Conductance (µS/cm)
SG-1	10.5	6.5	89
SG-2	11.2	6.5	204
SG-3	10.2	6.5	91
SG-4	11.7	6.0	233
DS-6	11.2	6.5	138
DS-7	10.3	6.5	158
DS-11	9.9	6.5	129
DS-12	11.1	6.5	131
Jet-3	10.4	6.0	438
Jet-4	9.2	6.5	129
Jet-5	10.7	6.5	158

Note: µS/cm is micro-siemans per centimeter.

Volatile Organic Compounds

No volatile organic compounds were detected in the groundwater samples collected from newly installed monitoring wells SG-1, SG-2, SG-3 or SG-4, or from existing monitoring well Jet-3.

Benzene, toluene, ethylbenzene, xylenes and methyl t-butyl ether (volatile organic compounds indicative of gasoline) were detected in the groundwater sample collected from monitoring well DS-6. Traces of methyl t-butyl ether (MTBE) and m-xylenes were detected in the groundwater samples collected from monitoring wells Jet-4 and Jet-5, respectively.

The detected concentrations of benzene, toluene, ethylbenzene and MTBE in the sample collected from monitoring well DS-6 are above the Ambient Groundwater Quality Standards (AGQS) established by the New Hampshire Department of Environmental Services for ground water. The following table summarizes the concentrations of volatile organic compounds detected in the groundwater samples.

TABLE VII. Analytical Results for Groundwater Samples from the Monitoring Wells for Volatile Organic Compounds.

Compound	AGQS	Concentration (µg/L)		
		DS-6	Jet-4	Jet-5
Benzene	5	26,854	ND	ND
Toluene	1,000	30,809	ND	ND
Ethylbenzene	700	1,442	ND	ND
Total xylenes	10,000	7,809	ND	17
Methyl t-butyl ether	100	9,248	6	ND

Note: ND = none detected.

Analytical results from the laboratory with a complete listing of the compounds which were tested for, specific detection limits, and a copy of the chain-of-custody documentation are included in Appendix D.

DISCUSSION

Hydrogeology

Site Geology

The stratigraphic cross-section of the site indicates a consistency of lithology to just below the water table, and from the level of the clay layer to the underlying bedrock, for the study area in general (Figure 3). However, between the water table and the clay layer, it is evident that a consistent sand and gravel deposit, extending from northeast (B-1) to southwest (B-3) across the site, is cut by a lensed deposit of sand, clayey sand, and silty sand extending to the northwest (B-2, B-4). This stratigraphic structure is consistent with the glacial outwash deposits mapped for the area of the subject property. This lateral change in lithology, and the apparent upward slope of the clay layer southward between borings B-2/B-4 and B-3, may account for the compression of the groundwater contours noted for the southwestern portion of the subject property (Figure 2).

The clay lense encountered at 47± feet below ground surface in boring B-3, located near the southeastern property boundary, may account for the consistently high concentrations of gasoline constituents detected in the groundwater samples collected from shallow monitoring well DS-6, both previously and as part of this investigation. The confining nature of this localized clay lense may have retarded the dispersion of dissolved petroleum released nearby or migrating from the northeast, allowing the contamination to reside for a significant period of time in the area of well DS-6. The highest photoionization detector readings observed in this investigation, obtained from soils collected at 35 to 42± feet below ground surface in boring B-3, correspond to the dissolved gasoline detected in the groundwater collected from existing monitoring well DS-6; well DS-6 is screened to 42.5± feet depth, and has a measured static water level of 38± feet.

Static water level in the bedrock-level well (SG-2) was observed to be 22± feet below the average head measurements recorded for the overburden wells, indicating a downward vertical gradient between the saturated materials overlying and underlying the laterally continuous clay layer.

Overburden Hydrology

Saturated Thickness. The saturated thickness of the overburden aquifer is assumed to be the distance between the bedrock surface and the static water level as measured in the monitoring wells. The thickness of saturated soils on the subject property ranges from 63.7 to 74.5± feet in borings B-1 and B-2, respectively.

Unsaturated Zone. The unsaturated zone is the zone of soils above the water table in an unconfined aquifer. The depth to the overburden water table ranges from 35 to 39± feet below the ground surface (on sampling date July 14, 1993). The average thickness of the unsaturated zone within the study area is 37.6± feet.

Groundwater Flow Direction. The inferred groundwater flow direction on the subject property is to the south-southwest, towards the Cocheco River (Figure 2). The measured static water levels generally coincide with the first observed saturated soils in the test borings, suggesting that overburden ground water on the subject property is flowing under unconfined aquifer conditions above the laterally continuous clay layer (Figure 3). The flow conditions of the saturated sand layer between the clay layer and the bedrock surface were not determined, as only one well (SG-2) was screened below the confining clay layer.

Seepage Velocity. Seepage velocity, also referred to as average linear velocity, is the average speed at which a parcel of ground water flows through a cross section of soil. The seepage velocity of a contaminant can also be calculated, if the effects of retardation of the contaminant relative to the ground water are known. Retardation is dependent upon not only the type of contaminant, but also the nature of the soils. The seepage velocity of ground water can be estimated using Darcy's Law:

$$v_s = \frac{Ki}{n_e}$$

where

- v_s = seepage velocity (ft/day)
- K = hydraulic conductivity (ft/day)
- i = hydraulic gradient (ft/ft); and
- n_e = effective porosity (unit-less; assumed to be 0.40 for observed soil).

Using the data presented in Appendix C and Darcy's Law, the estimated overburden groundwater seepage velocity for monitoring well SG-4 is 0.017± feet/day. This translates to a groundwater seepage rate of 6± feet per year in the silty sand unit underlying the northwestern portion of the subject property.

Nature and Extent of Detected Releases

Sources

Concentrations of dissolved gasoline constituents were detected only in monitoring well DS-6, and not in the upgradient wells sampled. This result indicates that the release is likely from a localized, on-site source, specifically the main dispenser island or the area of the existing underground storage tank systems.

No tetrachloroethene, or other organic solvents, were detected in the groundwater samples collected from the newly installed and existing monitoring wells. These data are not consistent with previous groundwater sampling results for the subject property, and may indicate either errors in previous site investigations, or the dispersion of the solvents previously detected. Based on the groundwater sampling results from this investigation, the subject property is not likely the source of the tetrachloroethene contamination detected in the downgradient Cummings water supply well.

Pathways

The release of dissolved gasoline constituents on the subject property appears to be localized to the level of the groundwater table (measured at $38 \pm$ feet below the ground surface) in the area of wells SG-4 and DS-6. The multiple buried utilities located along the southwestern boundary of the subject property would be unlikely to affect or redirect the off-site migration of the detected groundwater contamination.

Potential Receptors

If the detected release of dissolved gasoline constituents on the subject property is migrating off-site, it would have the potential to impact up to twenty-one residential and commercial properties located to the south and southwest of the subject property, in addition to the Smith and Cummings municipal water supply wells.

LIMITATIONS

The findings embodied in this report are based upon the work scope as described in the *Work Scope* section of the *Introduction*, and the information available to SHEVENELL-GALLEN and Associates, Inc., at the time of this submittal. SHEVENELL-GALLEN and Associates, Inc., therefore, reserves the right to amend its findings if information obtained subsequent to this report so requires. In addition, the client recognizes that SHEVENELL-GALLEN and Associates, Inc., services are solely for the benefit of the client, its heirs, successors and assigns, and that any person or party designated by the client to receive information regarding work for the client, shall be subject to the *Terms and Conditions* contained or referenced herein.

Because of the limited scope of work, this report does not represent a comprehensive environmental assessment.

FIGURES

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