



CITY OF WATERTOWN

Conservation Commission

The BOARD of the City known as the City of Watertown will hold a public meeting on the second WEDNESDAY, February, 9th, 2022 at 7:00 p.m. in accordance with the Governor's Order Suspending Certain Provisions of the Open Meeting Law, G. L. c. 30A, § 20, relating to the 2020 COVID-19 emergency and to avoid group congregation, this meeting has only remote opportunities for participation with public access provided as follows:

CONSERVATION COMMISSION MEETING WEDNESDAY, FEBRUARY 9, 2022 AT 7:00 PM AGENDA

ACCESS INFORMATION:

- A. The meeting will be televised through WCATV (Watertown Cable Access Television): <http://vodwcatv.org/CablecastPublicSite/?channel=1>
 - B. The Public may join the virtual meeting online: <https://watertown-ma.zoom.us/j/99597080710>
 - C. Public may join the virtual meeting audio only by phone: (877) 853-5257 or (888) 475-4499 (Toll Free) and enter Webinar ID: 995 9708 0710
 - D. Public may comment through email: lschwab@watertown-ma.gov
-

- 1. Commission Discussion-Public Hearing
 - A. **(Continued from December meeting). Request for Determination of Applicability- Gore Place-** to make improvements to the existing farmstead in the southwest portion of the site, including a new pole barn and threshing barn with associated fenced barnyards, gravel driveway, utility service upgrades and relocated swale. Gore Place Society, Applicant; Highpoint Engineering, representative.
- 2. Commission Discussion-Public Hearing
 - A. **(Continuance was requested to the March meeting). Notice of Intent- 0 Arlington St. (Williams Pond Parcel)** to construct a 2-story commercial building and parking lot on property known as the Williams Pond parcel. Max Hatziliandes, Applicant/Owner
- 3. Agent Report
 - A.
 - a. CPA
 - b. Climate and Energy Plan
 - c. Pollinators
 - d. Ongoing Orders of Conditions

- e. Arsenal Park
 - f. Con Comm representative for Comprehensive Plan Advisory Committee
 - i. Whitney Hill
- 4. Acceptance of Minutes
 - A. Minutes from the January 19 Special Meeting

February 2, 2022

Ms. Laurel Schwab
Senior Environmental Planner & Conservation Agent
Watertown Administration Building
149 Main Street
Watertown, MA 02472

Re: Supplemental Submission for Request for Determination of Applicability
Barn Improvement Project - Gore Place
249 Waltham Street
Watertown, Massachusetts

Dear Ms. Schwab,

On behalf of our Client, Gore Place Society (Applicant), Highpoint Engineering Inc. (Highpoint) is submitting the enclosed supplemental package in support of the Request for Determination of Applicability (RDA) Application originally submitted on October 13, 2021 for the above referenced project.

Gore Place is a 50±-acre historic country estate located at 52 Gore Street in Waltham, Massachusetts. The southwest portion of the property consist of a 27-acre farmstead located at 249 Waltham St in Watertown. The farmstead portion of the site consists of an active agricultural operation including the cultivation of land and, currently, the raising of sheep. The farmstead produces agricultural goods for sale and consumption which qualifies the farmstead as a Land in Agricultural Use per 310 CMR 10.00 Wetlands Protection Act Regulations Section 10.04 Agricultural (a).

The farmstead operation is located in the south side of the estate, just west of an existing intermittent stream and a Bordering Vegetated Wetland (BVW). The Applicant proposes new upgrades to the existing farmstead to improve the day to day operations of the farm, and enhance public participation in farmstead events.

The Project proposes the following improvements:

- Construction of a new Pole Barn for farm use only.
- Construction of a new Threshing Barn for the public to view the farm animals.
- New wood split rail and post fence to define the South Pasture, Barnyard, and Paddock areas.
- New 24-foot wide curb-cut off Waltham Street southeast of the existing farmhouse.
- New 20-foot wide gravel driveway from new curb cut. The gravel driveway extends west, south of the farmhouse, and connects to the existing gravel driveway, and extends north from the new curb cut to the new barns.
- Extension of utility service upgrades to the existing structures to remain and the new barns.
- Relocation of the existing drainage swale to intercept runoff from the South Pasture and reconnect to the existing swale northwest of the proposed improvements.

The existing ground covers of the farmstead consists of hard-packed gravel areas, grass area and a small concrete walkway behind the farmhouse. The roof area attributed to multiple structures; including the farmhouse, garage, sheds, greenhouses, etc, contribute to the impervious cover of the area. The Project

will demolish various existing structures and construct new barns resulting in a reduction of approximately 500 ft² of impervious area with respect to existing conditions.

The new gravel driveway, barns and utility upgrades will be located outside of the Watertown 150-foot buffer to the BVW. A portion of the wood split rail fencing, and the grading associated with the relocation of the existing drainage swale will occur within the 150-foot and 100-foot buffer zones to the BVW. No work will take place within 50-feet of the BVW.

Per 310 CMR 10.00: Preface to 1993 Regulations Regarding Normal Maintenance and Improvement of Land in Agricultural Use, "normal maintenance of land in agricultural use is exempt from the Wetlands Protection Act (The Act) and is not subject to regulations adopted pursuant to The Act provided that the activities fall within the newly adopted definitions". Section 10.04 Definitions b(6) and (7) of The Act defines Normal Maintenance of Land in Agricultural Use as maintenance and repairs of fence lines and the cleaning, clearing, grading, repairing dredging, or restoring of existing man-made water management features such as channels and grass waterways.

The proposed farmstead improvements will result in a decrease in the overall impervious area of the property and maintain existing drainage patterns by relocating the existing grassed swale, and discharging the collected runoff to the berm area parallel to the intermittent stream where it will travel overland to the south of the property. Based on the above statute and the farmstead's classification as a Land in Agricultural Use, Highpoint requests the Commission issue a Negative Determination associated with the proposed improvements.

Included with this letter are two (2) copies of the following documents:

1. Site Development Plans, revised through February 2, 2022, prepared by Highpoint Engineering, Inc.
2. Existing Site Photos.
3. Construction-Phase and Long-Term Operation and Maintenance Plans.

We look forward to presenting this supplemental presentation to the members of the Conservation Commission at their regularly scheduled hearing on February 9, 2022. If in the meantime, you should have any questions please contact our office at 781-770-0971.

Sincerely,
HIGHPOINT ENGINEERING, INC.



Associate/Senior Project Manager

cc: Gore Place Society, c/o Scott Clarke
EcoTec, Inc., c/o Arthur Allen

GORE PLACE ESTATES

BARN IMPROVEMENT PROJECT

**249 WALTHAM STREET
WATERTOWN, MA 02472**

ISSUED FOR PERMIT: OCTOBER 13, 2021



LOCUS MAP
1"=200'

OWNER/APPLICANT:

GORE PLACE SOCIETY
249 WALTHAM STREET
WATERTOWN, MA 02742
TEL: (781) 894-2798
FAX: (781) 894-5745
ATTN: SCOTT CLARKE
www.goreplace.org

ASSESSOR'S ID:

MAP 702
PARCEL 1A

PROJECT TEAM:

CIVIL ENGINEER:
HIGHPOINT ENGINEERING
45 DAN ROAD, SUITE 140
CANTON, MA 02021
TEL: (781) 770-0971
ATTN: NICHOLE DUNPHY
www.highpointeng.com

LAND SURVEYOR:
FELDMAN LAND SURVEYORS
152 HAMPDEN ST
BOSTON, MA 02119
TEL: (617) 357-9740
ATTN: MARC BENEDICT

WETLAND SCIENTIST:
ECOTEC, INC.
102 GROVE STREET
WORCESTER, MA 01605
TEL: (508) 752-9666
ATTN: ARTHUR ALLEN

INDEX OF DRAWINGS										
						ISSUED FOR PERMIT OCTOBER 13, 2021				
						RESPONSE TO COMMENTS FEBRUARY 2, 2022				
ISSUE HISTORY:										
CIVIL										
TS100	TITLE SHEET					•	•			
EC 1 OF 2	EXISTING CONDITIONS PLAN (BY OTHERS)					•	•			
EC 2 OF 2	EXISTING CONDITIONS PLAN (BY OTHERS)					•	•			
C100	SITE PREPARATION & DEMOLITION SHEET					•	•			
C200	LAYOUT & MATERIALS SHEET					•	•			
C300	GRADING, DRAINAGE & UTILITY SHEET					•	•			
C400	DETAIL SHEET					•	•			
C401	DETAIL SHEET					•	•			



HIGHPOINT ENGINEERING, INC.
 LAND PLANNING
 PERMIT EXPEDITING
 CIVIL ENGINEERING
 CONSULTING

DEDHAM EXECUTIVE CENTER
 980 WASHINGTON ST., SUITE 216
 DEDHAM, MA 02026

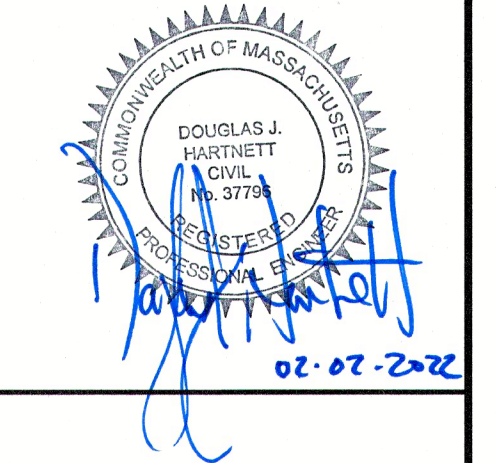
www.HighpointEng.com

CLIENT: _____

GORE PLACE
The Historic Governor Gore Estate

CONSULTANT:

SEAL



BARN IMPROVEMENT PROJECT

249 WALTHAM STREET
WATERTOWN, MA

OWNER/APPLICANT: GORE PLACE SOCIETY

[illegible]

ISSUE TYPE:

PERMITTING

ISSUE DATE:
10/12/2024

10/13/2021
PROJECT NUMBER:
20019

DRAWN BY: CA

CHECKED BY: NCD

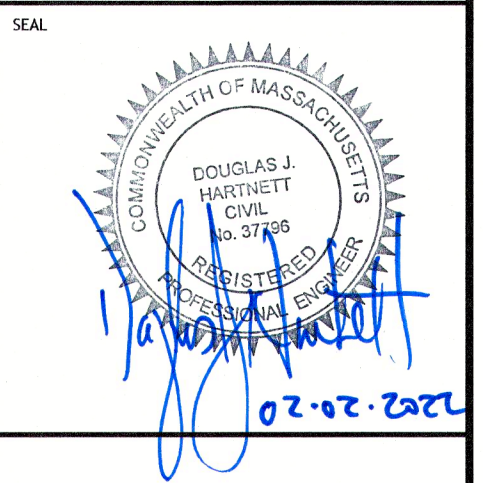
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SHEET TITLE:

TITLE SHEET

SHEET NUMBER:

TS100



249 WALTHAM STREET
WATERTOWN, MA

OWNER/APPLICANT: GORE PLACE SOCIETY

ISSUE TYPE:
PERMITTING

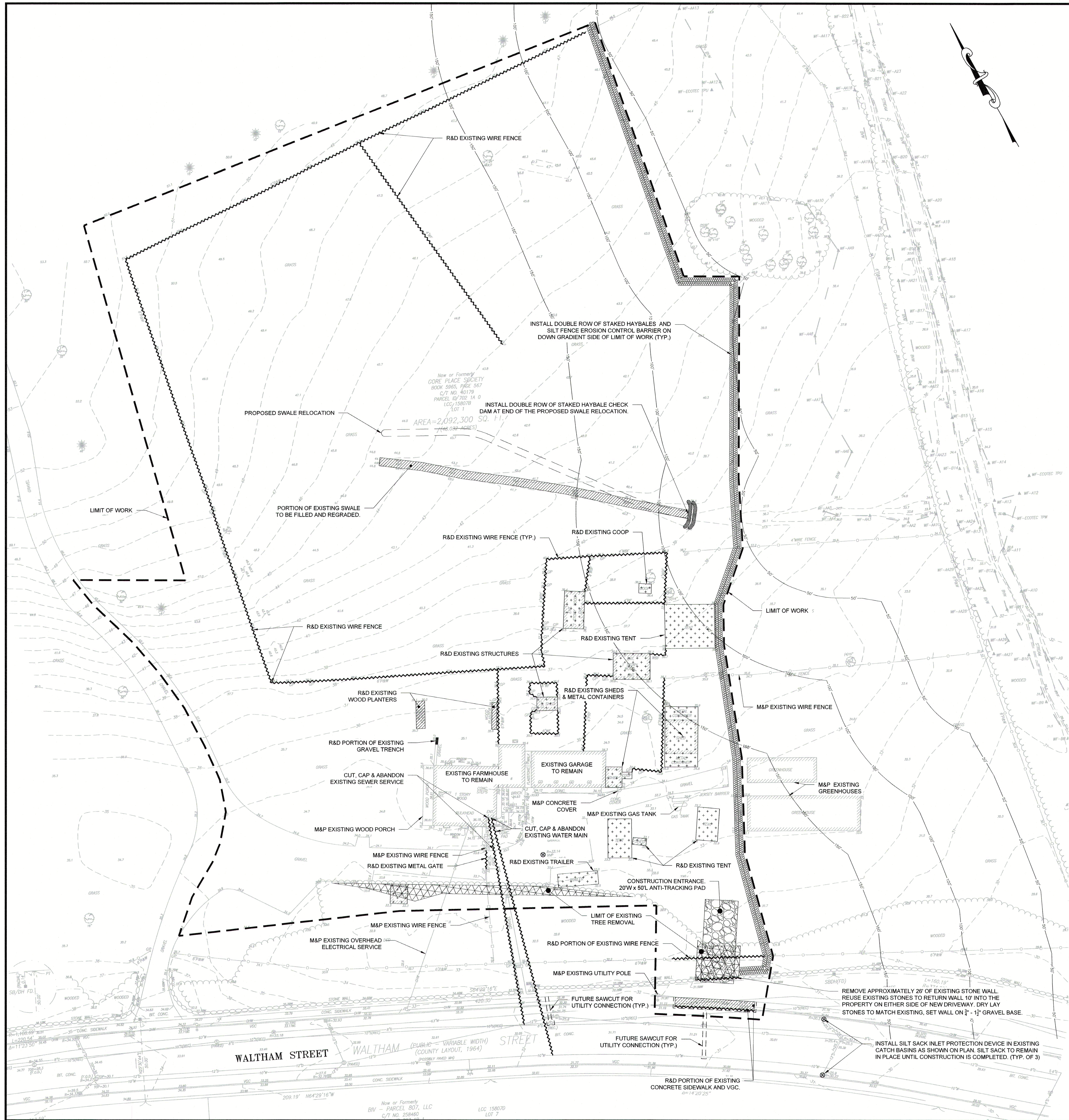
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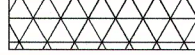
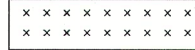
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SHEET TITLE:

**SITE
PREPARATION
& DEMOLITION
PLAN**

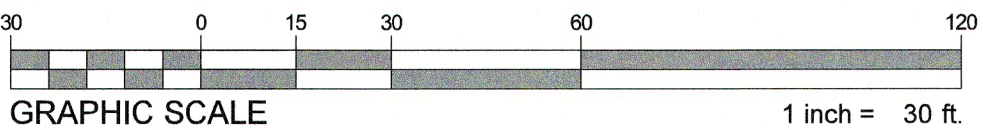
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C100

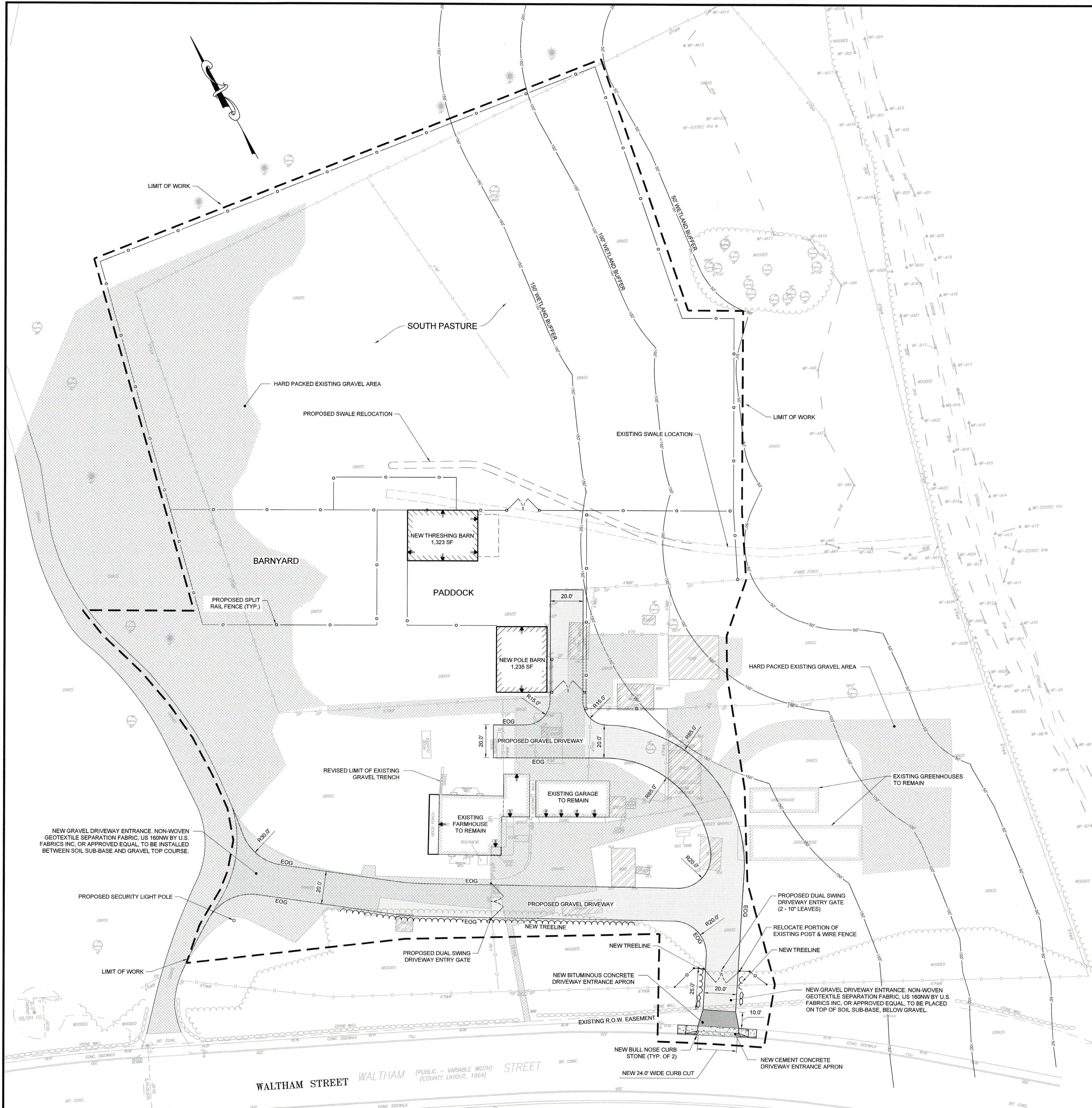


SYMBOL LEGEND	
	DOUBLE ROW OF STAKED HAYBALES EROSION CONTROL BARRIER
	SILTSACK® CATCH BASIN INLET PROTECTION
	ANTI-TRACKING PAD / CONSTRUCTION ENTRANCE
	SAWCUT LINE
	LIMIT OF WORK
M&P	MAINTAIN AND PROTECT
R&D	REMOVE AND DISPOSE
	DENOTES OBJECTS TO BE REMOVED
	OBJECT TO BE REMOVED AND DISPOSED
	BITUMINOUS CONCRETE WALK REMOVAL
	LIMIT OF EXISTING TREE REMOVAL
	EXISTING BUILDING/STRUCTURE REMOVAL

DEMOLITION NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING **DIG-SAFE** PRIOR TO THE START OF ANY DEMOLITION OR CONSTRUCTION FOR LOCATION OF BELOW-GRADE UTILITY SYSTEMS BOTH ON AND OFF THE SITE WITHIN CONSTRUCTION LIMITS.
2. THE CONTRACTOR SHALL OBTAIN ALL DEMOLITION PERMITS REQUIRED FROM THE TOWN OF WATER TOWN.
3. DURING THE CONSTRUCTION PHASE, METAL DUMPTSTER TYPE WASTE DISPOSAL RECEPTACLES SHALL BE LOCATED ON SITE.
4. THE CONTRACTOR SHALL REGULARLY INSPECT THE PERIMETER OF THE PROPERTY TO CLEAN UP AND REMOVE LOOSE CONSTRUCTION DEBRIS BEFORE IT LEAVES THE SITE.
5. CONSTRUCTION/DEMOLITION DEBRIS SHALL BE RECYCLED TO THE EXTENT POSSIBLE. CONSTRUCTION/DEMOLITION DEBRIS SUITABLE FOR RECYCLING SHALL BE SEPARATED FROM THE WASTE STREAM AND STORED IN METAL DUMPTSTER DESIGNATED FOR RECYCLING MATERIAL ONLY. CONSTRUCTION/DEMOLITION WASTE SHALL BE SEPARATED ON SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SEPARATION AND HAULING OF THE RECYCLABLE AND WASTE MATERIAL.
6. REMOVAL OF COMMERCIAL SOLID WASTE SHALL BE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.
7. ANY ITEMS OR MATERIALS ABOVE OR BELOW GRADE INDICATED AS "PROTECT (MAP)" SHALL REMAIN IN PLACE AND PROTECTED FROM DAMAGE THROUGHOUT CONSTRUCTION. DAMAGED ITEMS INDICATED TO BE PROTECTED (MAP) SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.
8. ANY ITEMS OR MATERIALS ABOVE OR BELOW GRADE INDICATED AS "REMOVE AND DISPOSE (RAD)" SHALL BE REMOVED/DEMOLISHED AND LEGALLY DISPOSED OFF SITE. NO ITEMS OR MATERIALS SHALL BE DISPOSED OR BURIED ON-SITE.
9. ANY DAMAGE TO ITEMS OR MATERIALS BEYOND THE INDICATED LIMIT OF WORK SHALL BE REPLACED/REPAIRED TO ORIGINAL CONDITION AT THE CONTRACTORS EXPENSE.
10. CONTRACTOR TO VERIFY ABANDONMENT OF PUBLIC AND PRIVATE UTILITIES PRIOR TO START OF DEMOLITION AND COORDINATE WITH THE TOWN OF WATER TOWN D.P.W. AND UTILITY SERVICE PROVIDERS.
11. ALL EXCESS EARTH EXCAVATIONS SHALL BE DISPOSED OFF-SITE BY CONTRACTOR.
12. REMOVAL / DISPOSAL OF EXISTING BUILDINGS SHALL INCLUDE ALL BELOW GRADE FOUNDATIONS AND SLABS. NO PART OF FOUNDATIONS AND SLABS SHALL BE BURIED.
13. ALL ORGANIC SOLIDS, TOPOIL, LOAM AND LAWNS SHALL BE REMOVED AND DISPOSED OF OFF SITE.
14. THE CONTRACTOR SHALL DISCONNECT, CAP/PLUG, ALL EXISTING WATER AND SEWER SERVICES TO ALL EXISTING BUILDINGS ON SITE. CONTRACTOR TO COORDINATE WITH THE TOWN OF WATER TOWN FOR APPROPRIATE DISCONNECT STANDARDS.
15. THE CONTRACTOR SHALL COORDINATE WITH SERVICE PROVIDERS FOR DISCONNECT AND CAPPING OF ALL GAS AND ELECTRICAL SERVICES THAT SERVICE ALL EXISTING BUILDING ON THE SITE.



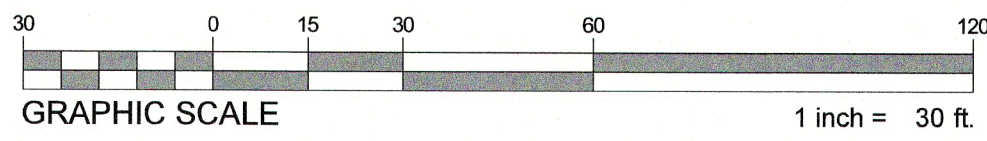


- GENERAL NOTES**
1. THE CONTRACTOR SHALL REPORT TO THE OWNER AND ENGINEER ANY SIGNIFICANT VARIATIONS IN EXISTING SITE CONDITIONS FROM THOSE SHOWN ON THESE PLANS. ANY PROPOSED REVISIONS TO THE WORK, IF REQUIRED BY THESE SITE CONDITIONS, SHALL NOT BE UNDERTAKEN UNTIL REVIEWED AND APPROVED BY THE OWNER AND THE ENGINEER.
 2. IN ORDER TO PROTECT THE PUBLIC SAFETY DURING CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING AND MAINTAINING AT ALL TIMES ALL NECESSARY SAFETY DEVICES AND PERSONNEL, WARNING LIGHTS, BARRICADES, AND POLICE OFFICERS.
 3. UNLESS OTHERWISE SPECIFIED ON THE PLANS AND SPECIFICATIONS ALL SITE CONSTRUCTION MATERIALS AND METHODOLOGIES ARE TO CONFORM TO THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, 1988 EDITION.

SYMBOL LEGEND	
EN	BUILDING ENTRANCE
GD	GARAGE DOOR
EOG	EDGE OF GRAVEL
---	LIMIT OF WORK
- - - -	PROPOSED SPLIT RAIL FENCE
~~~~~	NEW TREE LINE
▒	PROPOSED BITUMINOUS CONCRETE APRON
▒	PROPOSED GRAVEL DRIVEWAY
▒	EXISTING BUILDING/STRUCTURE TO BE REMOVED
▒	EXISTING GRAVEL AREA

ZONING CONFORMANCE SUMMARY				
PRIMARY ZONING DISTRICT: OPEN SPACE/CONSERVANCY (OSC)				
BUILDING DIMENSIONAL REQUIREMENTS				
CRITERIA	REQUIRED	EXISTING	PROPOSED	ZONING COMPLIANCE
LOT AREA (MIN.)	-	27.57 AC.*	NO CHANGE	YES
LOT FRONTAGE (MIN.)	50 FT	1821.43 FT	NO CHANGE	YES
FRONT YARD SETBACK (MIN.)	50 FT	>100 FT±	NO CHANGE	YES
SIDE YARD SETBACK (MIN.)	25 FT	>100 FT±	NO CHANGE	YES
REAR YARD SETBACK (MIN.)	50 FT	>100 FT±	NO CHANGE	YES
BUILDING COVERAGE (MAX.)	15%	0.54%	0.49%	YES
IMPERVIOUS COVER (MAX.)	25%	0.56%**	0.51%**	YES
BUILDING HEIGHT (MAX.)	35 FT / 2.5 STORIES	1 STORY	1 STORY	YES

* LOT SIZE OF GORE PLACE WITHIN TOWN OF WATERTOWN = 27.57 ACRES  
** EXISTING IMPERVIOUS AREA = 6,671 S.F. (ROOF AREAS & CONCRETE WALK)  
PROPOSED IMPERVIOUS AREA = 6,148 S.F. (REVISED ROOF AREAS AND CONCRETE WALK)



REV	DATE	DESCRIPTION
1	2-02-2022	RESPONSE TO COMMENTS

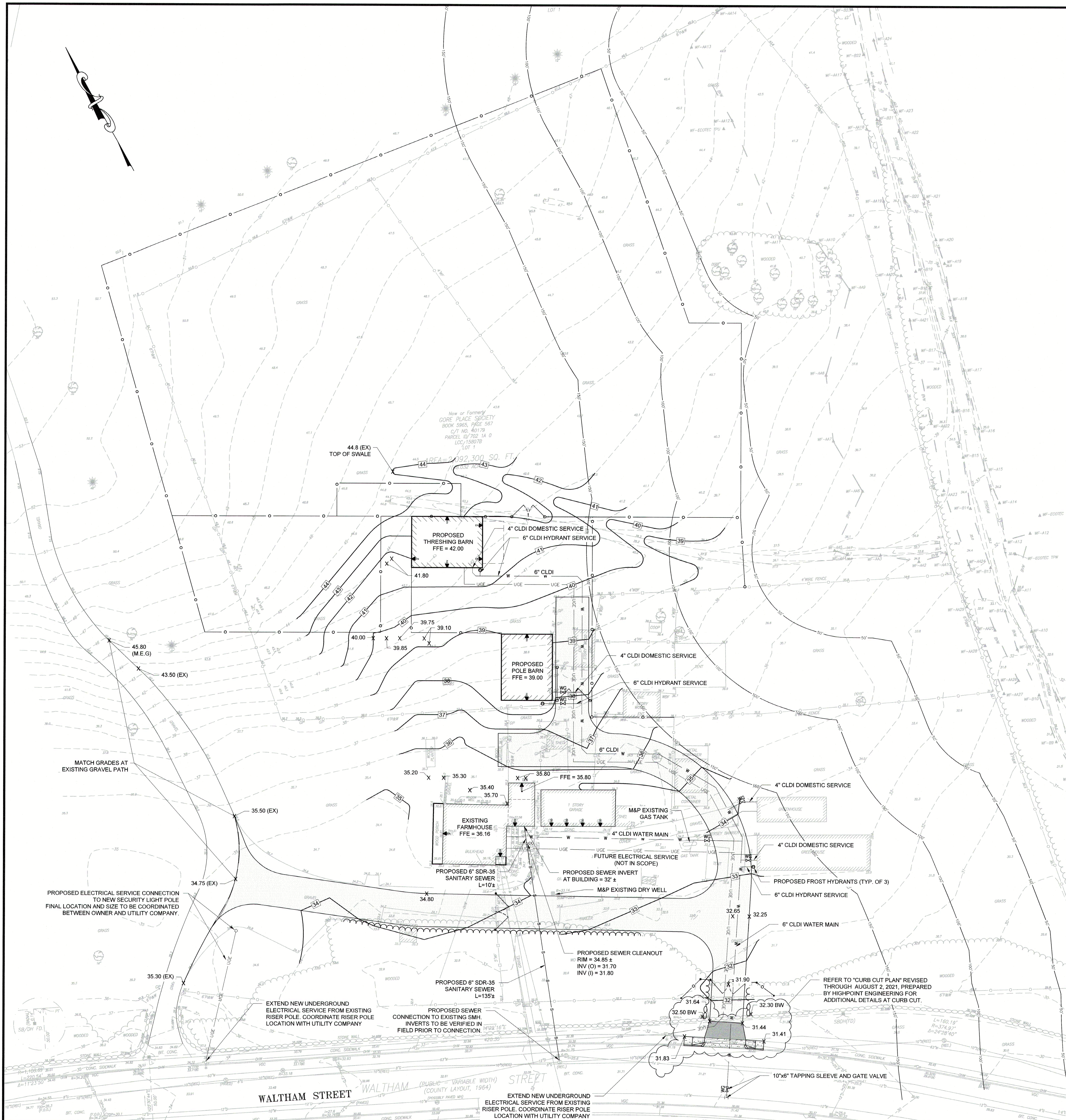
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**PERMITTING**  
ISSUE DATE:  
10/13/2021  
PROJECT NUMBER:  
20019

DRAWN BY: CA  
CHECKED BY: ND

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SHEET TITLE:  
**LAYOUT & MATERIALS PLAN**





SYMBOL LEGEND	
	PROPOSED ELEVATION CONTOUR
	PROPOSED SPOT ELEVATION
	PROPOSED WATER SERVICE
	PROPOSED SEWER LINE
	PROPOSED UNDERGROUND ELECTRICAL SERVICE
	PROPOSED GATE VALVE
	PROPOSED FROST HYDRANT
	PROPOSED SEWER CLEANOUT

- GRADING & DRAINAGE NOTES**
1. AT THE END OF CONSTRUCTION, AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, THE CONTRACTOR SHALL CLEAN THE SUMPS OF ALL CATCH BASINS.
  2. THE LOCATION OF UNDERGROUND UTILITIES AS REPRESENTED ON THESE PLANS IS BASED UPON PLANS AND INFORMATION PROVIDED BY FELDMAN LAND SURVEYORS. NO WARRANTY IS MADE AS TO THE ACCURACY OF THESE LOCATIONS OR THAT ALL UNDERGROUND UTILITIES ARE SHOWN. THE CONTRACTOR SHALL CONTACT DIG SAFE AT LEAST 72 HOURS PRIOR TO THE START OF CONSTRUCTION. DIG SAFE TELEPHONE NUMBER IS 1-888-DIG-SAVE.
  3. THE CONTRACTOR SHALL VERIFY THE LOCATION, SIZE AND DEPTH OF EXISTING UTILITIES PRIOR TO TAPPING INTO, CROSSING OR EXTENDING THEM. IF THE NEW WORK POSES A CONFLICT WITH EXISTING UTILITIES, THE ENGINEER IS TO BE NOTIFIED PRIOR TO THE CONTRACTOR CONTINUING.
  4. THE CONTRACTOR SHALL NOTIFY THE TOWN OF WATERTOWN DEPARTMENT OF PUBLIC WORKS AT LEAST 48 HOURS IN ADVANCE OF ANY REQUIRED INSPECTIONS.
  5. FILL MATERIAL SHALL BE AS SPECIFIED BY THE ARCHITECT/ENGINEER AND SELECTED FROM ON-SITE EXCAVATION MATERIAL WHERE POSSIBLE.
  6. MATERIAL FOR BACKFILL SHALL NOT INCLUDE UNSUITABLE MATERIAL SUCH AS PEAT, TRASH, STUMPS, DEBRIS OR HAZARDOUS WASTE.
  7. ALL STUMPS, PEAT, CONSTRUCTION DEBRIS AND OTHER DELETERIOUS MATERIALS ON THE SITE AT THE TIME OF CONSTRUCTION ARE TO BE REMOVED FROM THE SITE TO AN APPROVED LANDFILL. NO SUCH MATERIALS ARE TO BE BURIED OR OTHERWISE DISPOSED OF ON THE SITE.



BARN IMPROVEMENT PROJECT

249 WALTHAM STREET  
WATERTOWN, MA

OWNER/APPLICANT: GORE PLACE SOCIETY

REV	DATE	DESCRIPTION
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ISSUE TYPE:  
PERMITTING  
ISSUE DATE:  
10/13/2021  
PROJECT NUMBER:  
20019

DRAWN BY: CA  
CHECKED BY: ND

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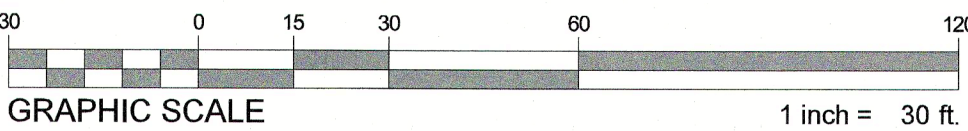
SHEET TITLE:

GRADING,  
DRAINAGE &  
UTILITY PLAN

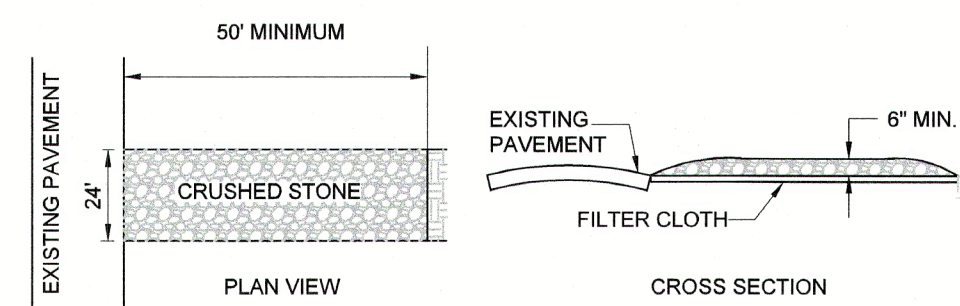
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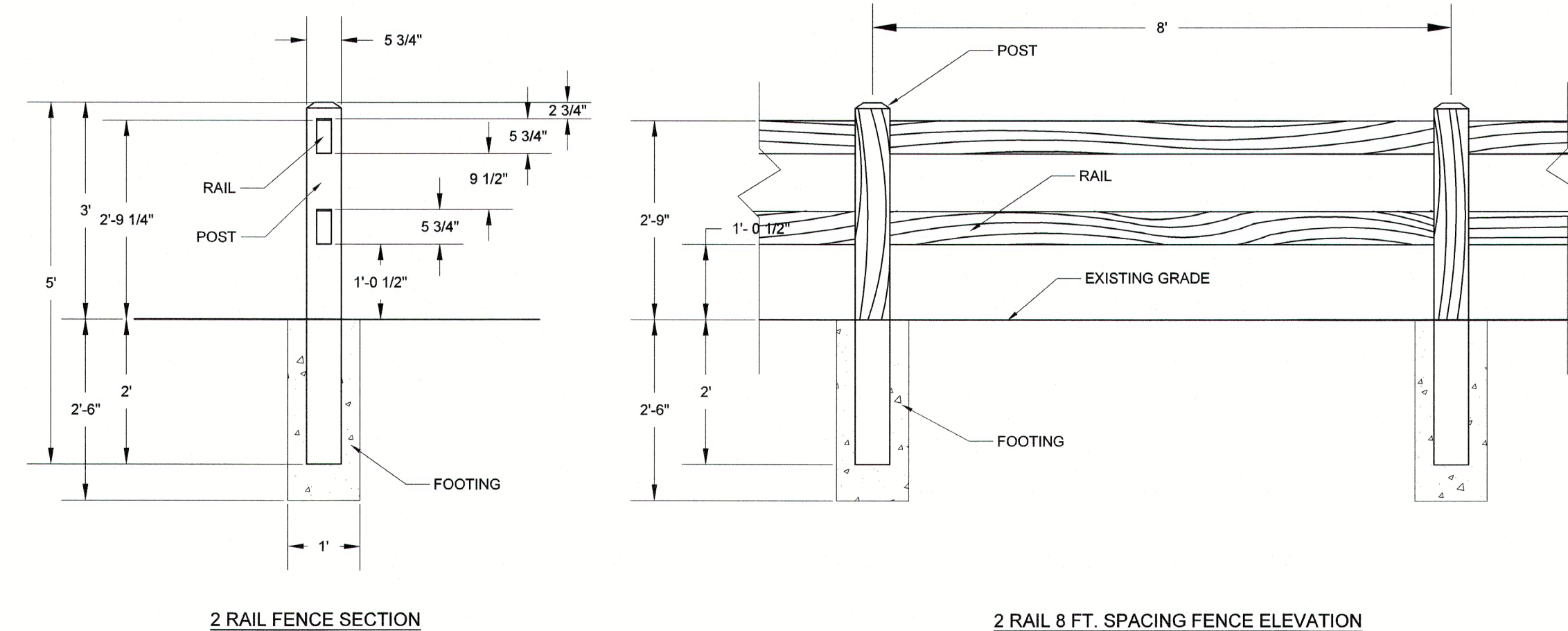
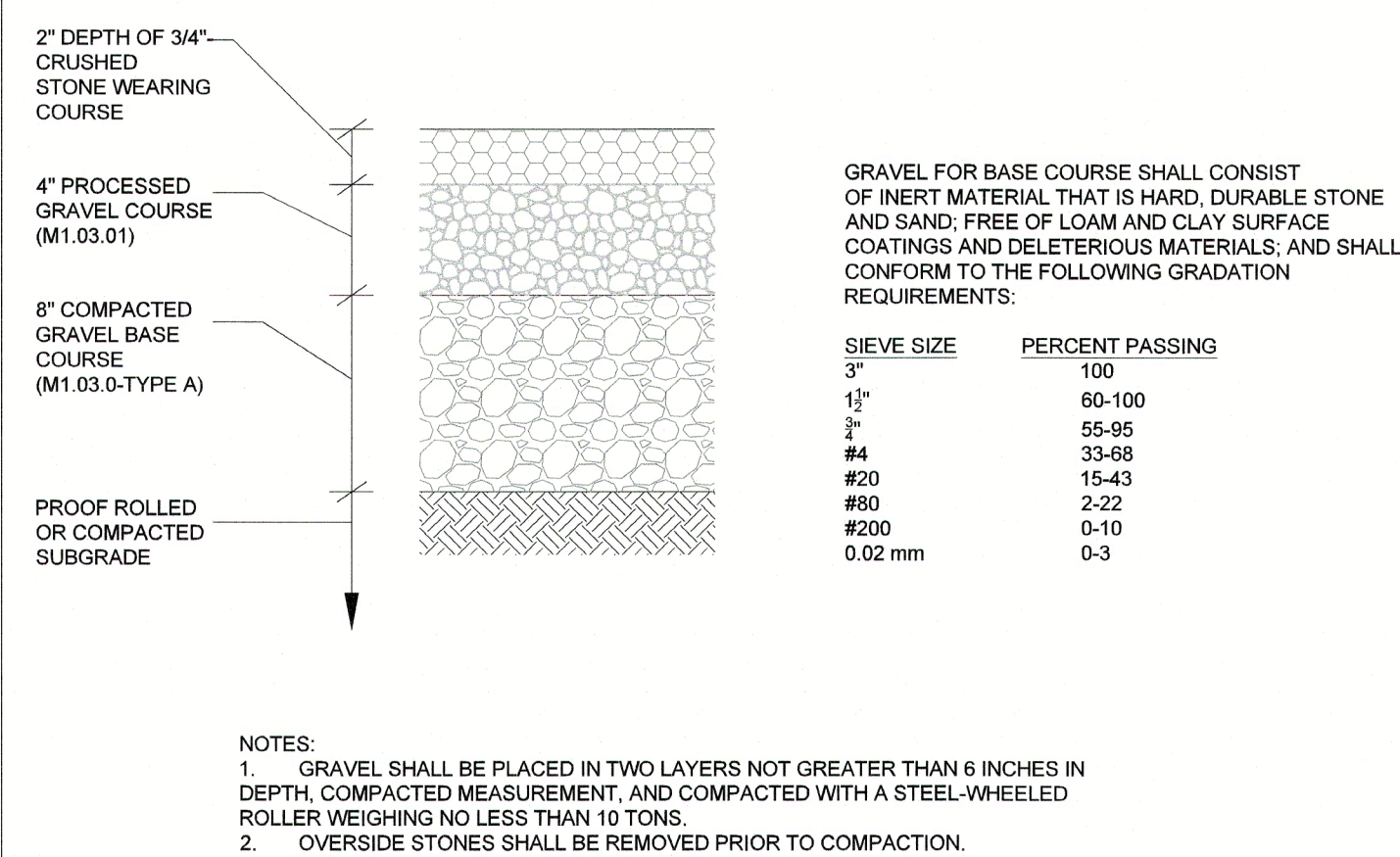
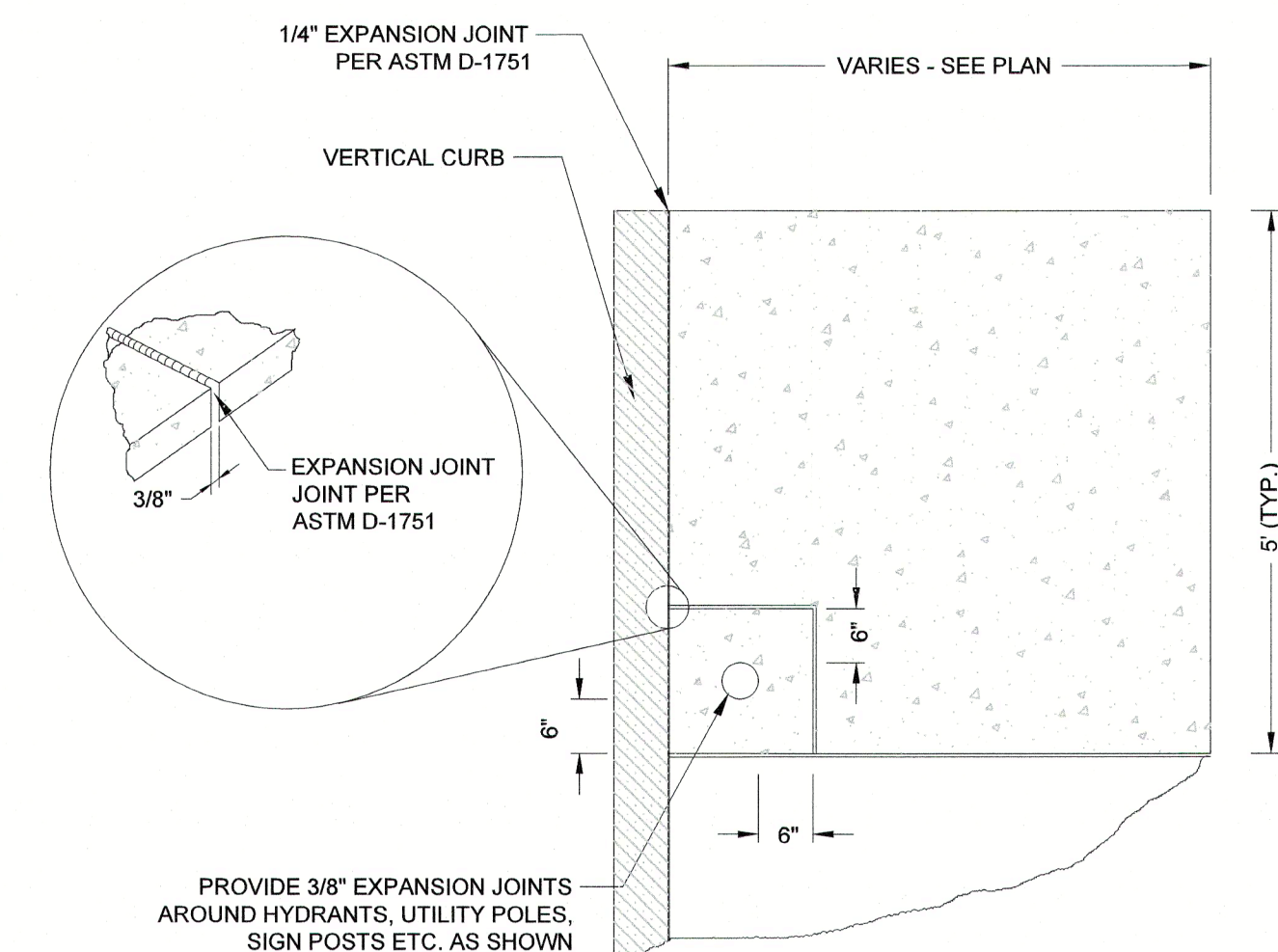
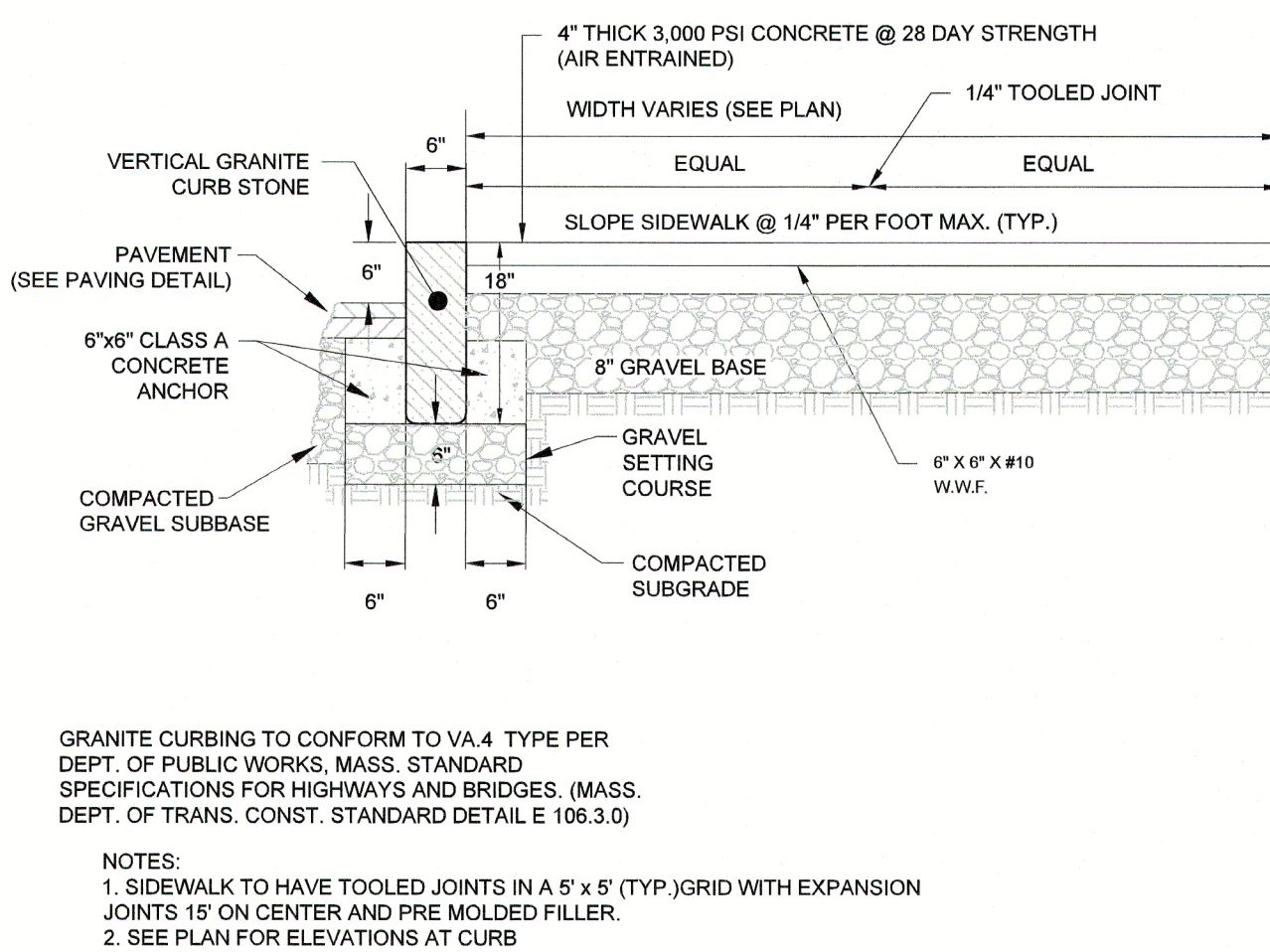
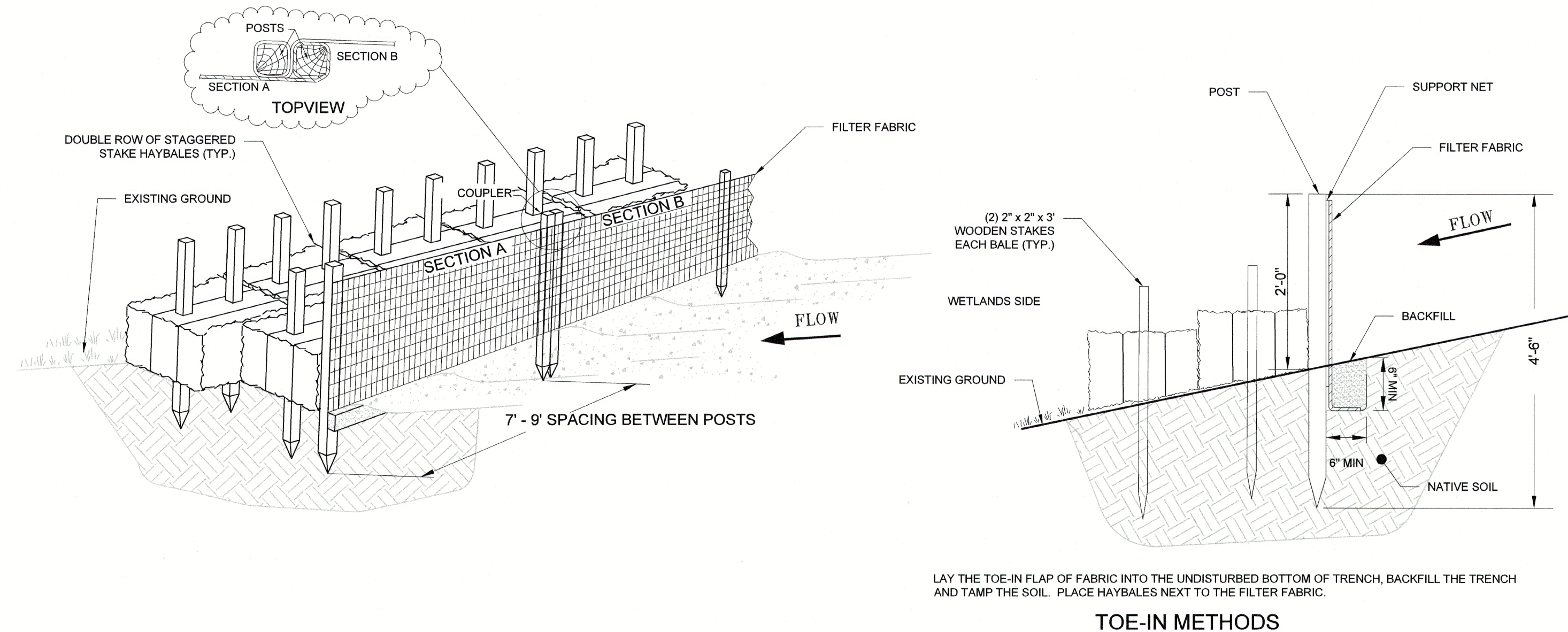
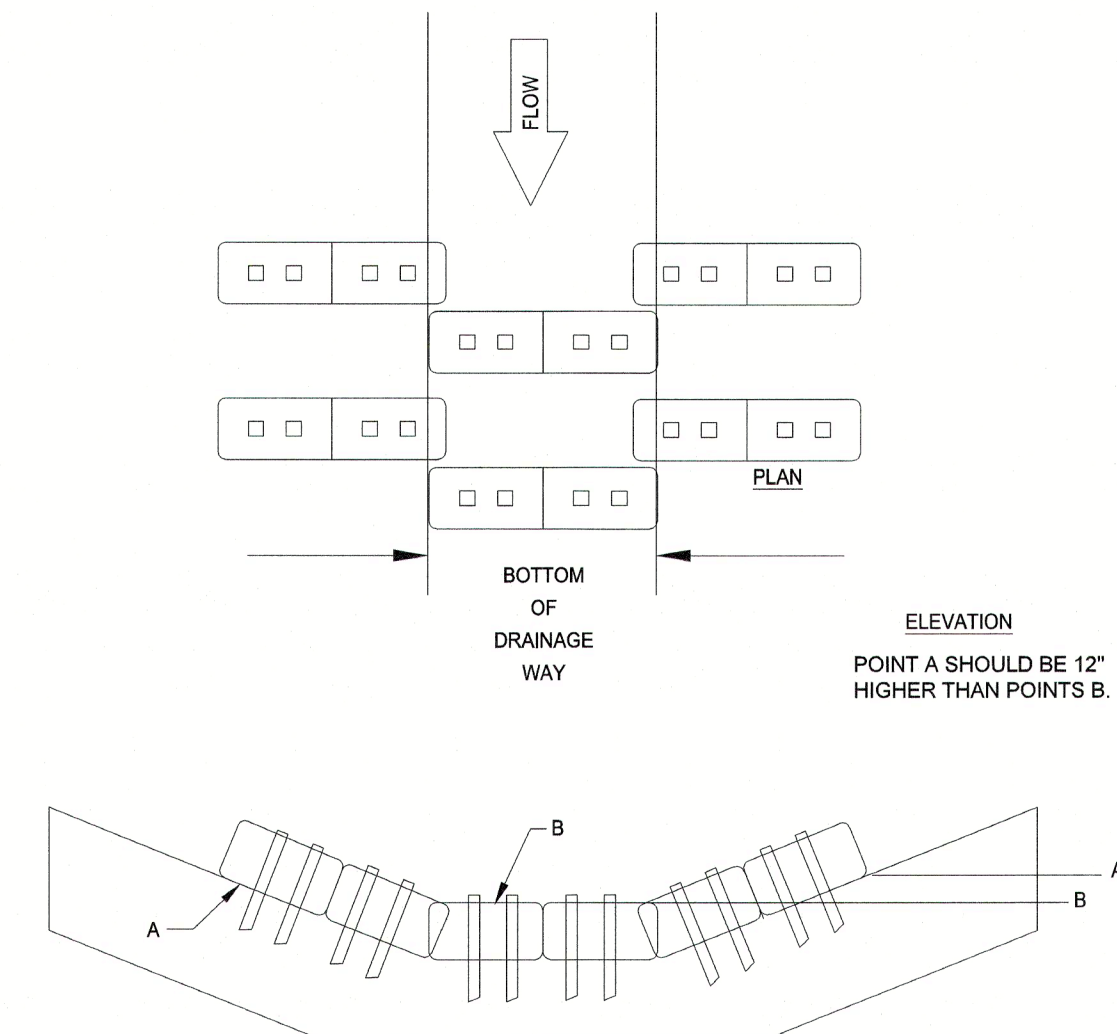
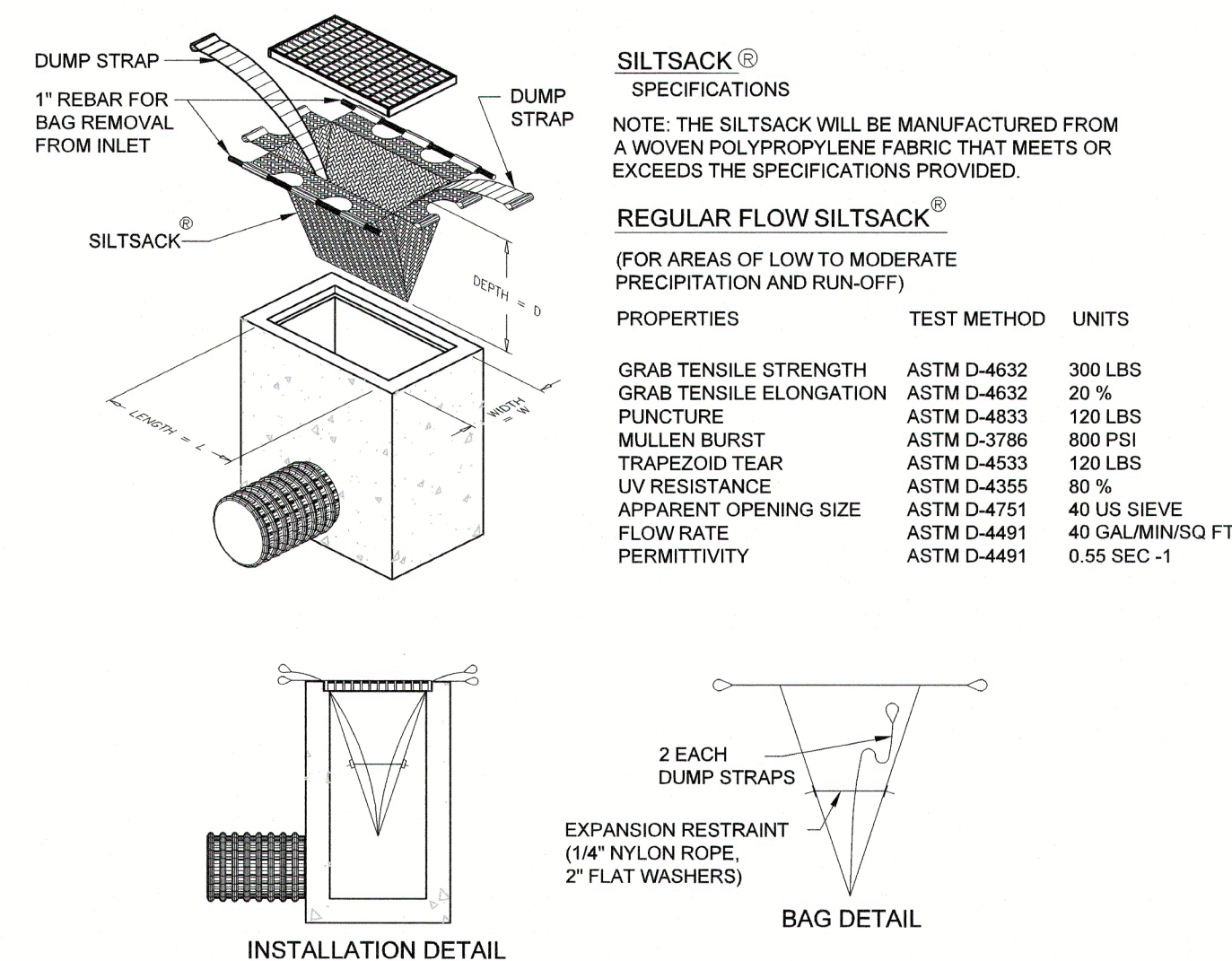
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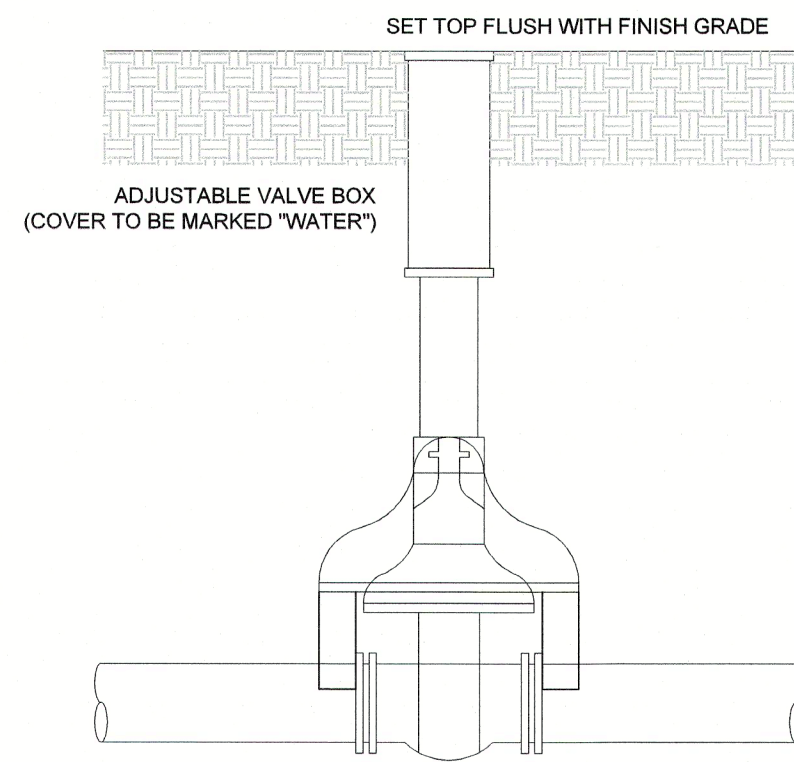
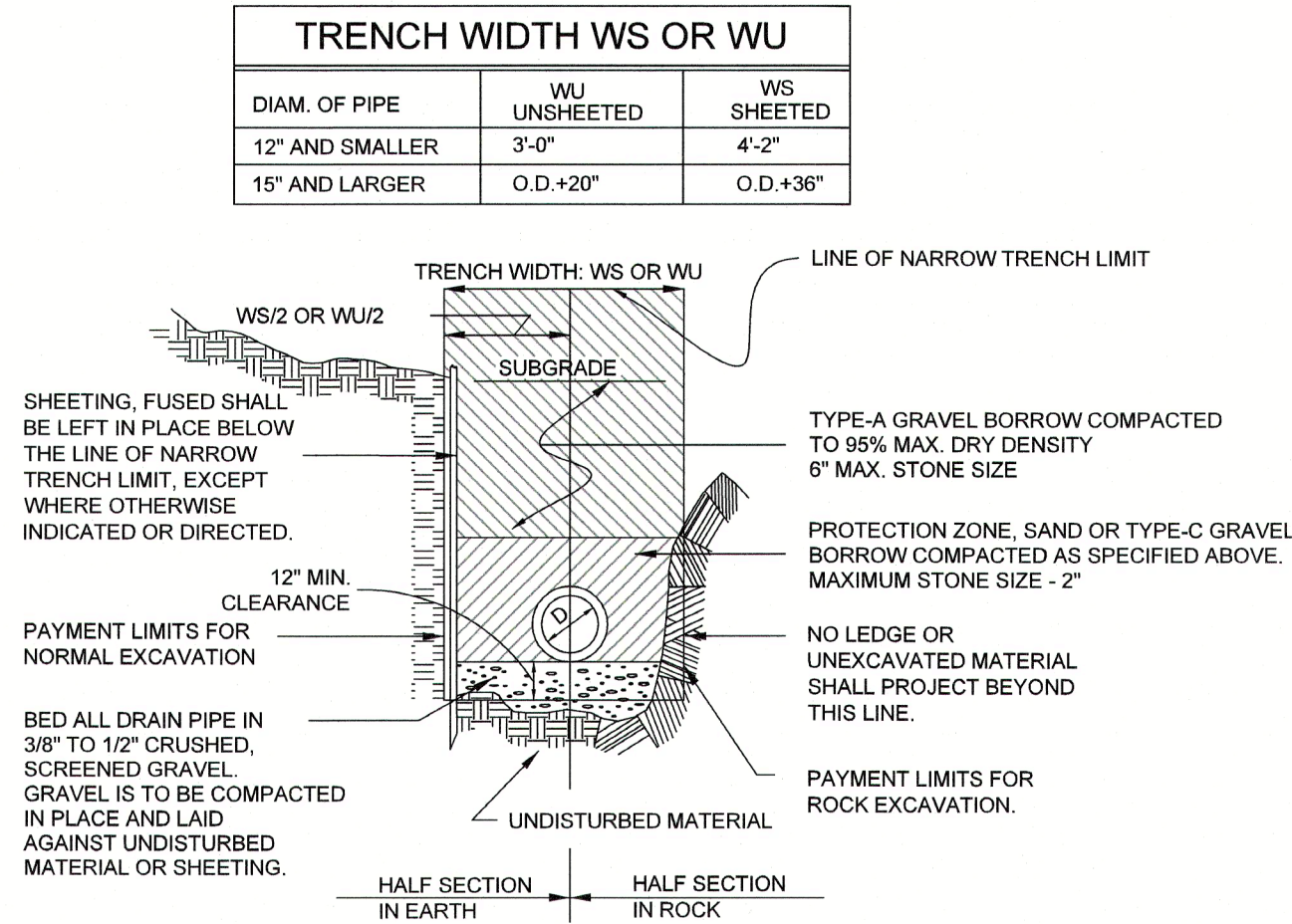




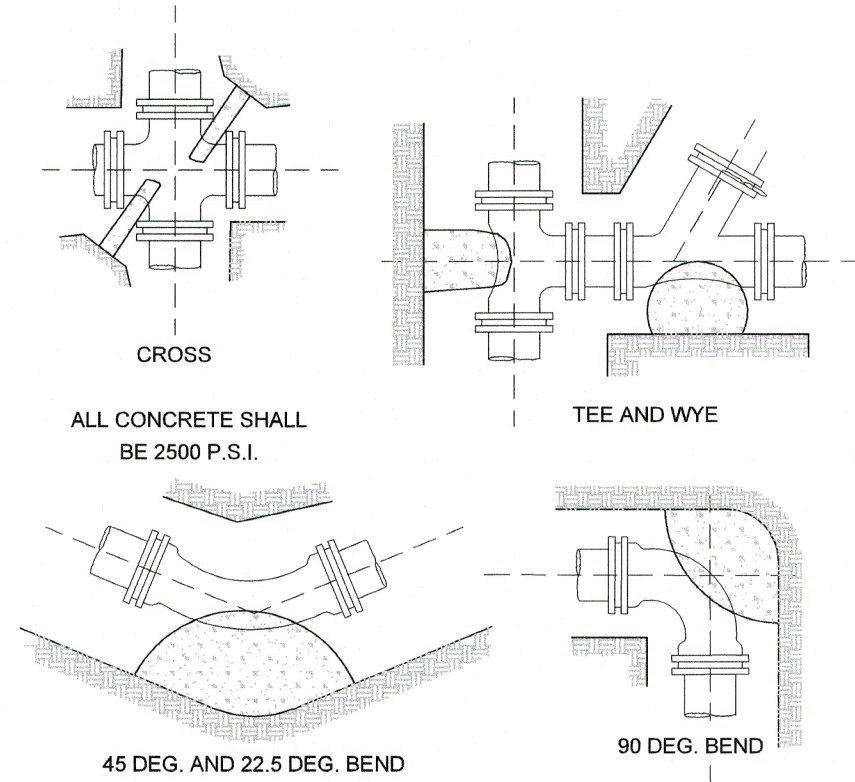
- TRACKING PAD NOTES**
1. STONE SIZE - USE 6" ANGULAR CRUSHED STONE
  2. FILTER CLOTH - SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
  3. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHOULD BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM SHOULD BE PERMITTED.
  4. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH PREVENTS TRACKING OF MATERIALS ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANING OF ANY MEASURES USED TO PREVENT SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.







THRUST BLOCK REQUIREMENTS			
FITTING	MIN BEARING AREA (SF)	FITTING	MIN BEARING AREA (SF)
8"X 1/8 BEND	12	12"X 8" REDUCER	8
12"X 8" TEE	12	10"X 8" REDUCER	6
10"X 8" TEE	10	8"X 8" REDUCER	4
8"X 8" TEE	9	8" 22 1/2" X 4 1/2" BENDS	8
8"X 6" TEE	5	ALL TEES AND VALVES	10
8" CAP / PLUG	12	HYDRANTS	12



NOTES:

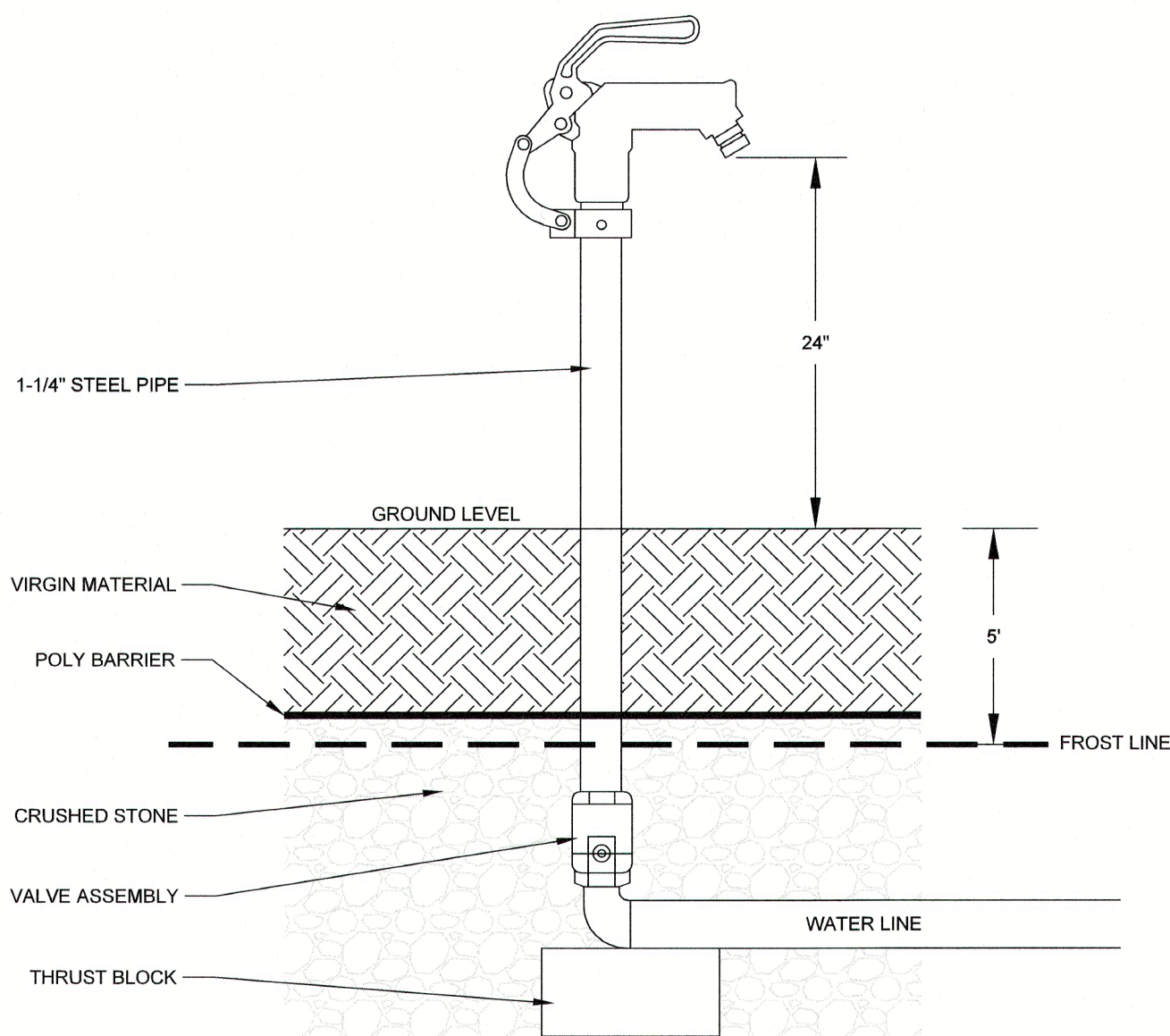
1. VALVE BOXES SHALL BE PROVIDED FOR EACH GATE VALVE AND TAPPING SLEEVE AND VALVE.
2. VALVE BOXES SHALL BE CAST IRON AND OF THE TELESCOPIC DESIGN WITH TWO PIECE CONSTRUCTION TOP WITH A COVER AND A BOTTOM. THE TOP SECTION SHALL HAVE A TOP FLANGE TO INCREASE THE STRENGTH OF THE BOX. THE REMAIN AT PRESENT HEIGHT. THE LOWER SECTION OF THE BOX SHALL HAVE A BELL SHAPED BOTTOM DESIGNED TO ENCLOSE THE OPERATING NUT AND STUFFING BOX OF THE VALVE WITHOUT SETTLING.
3. THE GATE BOX SHALL BECOME COMPLETE WITH COVER ON WHICH THE WORD "WATER" SHALL BE CAST. THE COVER OF THE GATE BOX SHALL BE CLOSE FITTING AND SUBSTANTIALLY TIGHT AND FLUSH WITH THE TOP OF THE BOX RIM.
4. GATE BOXES SHALL BE INSTALLED FOR EACH BURIED VALVE.
5. VALVE BOXES SHALL BE CP TEST SERVICES, INC. OR EQUAL.
6. CAST IRON BOXES SHALL BE GENERAL FOUNDRY BUFFALO BOXES OR EQUAL. VALVE SHALL OPEN RIGHT.

UTILITY CROSSING  
NOT TO SCALE

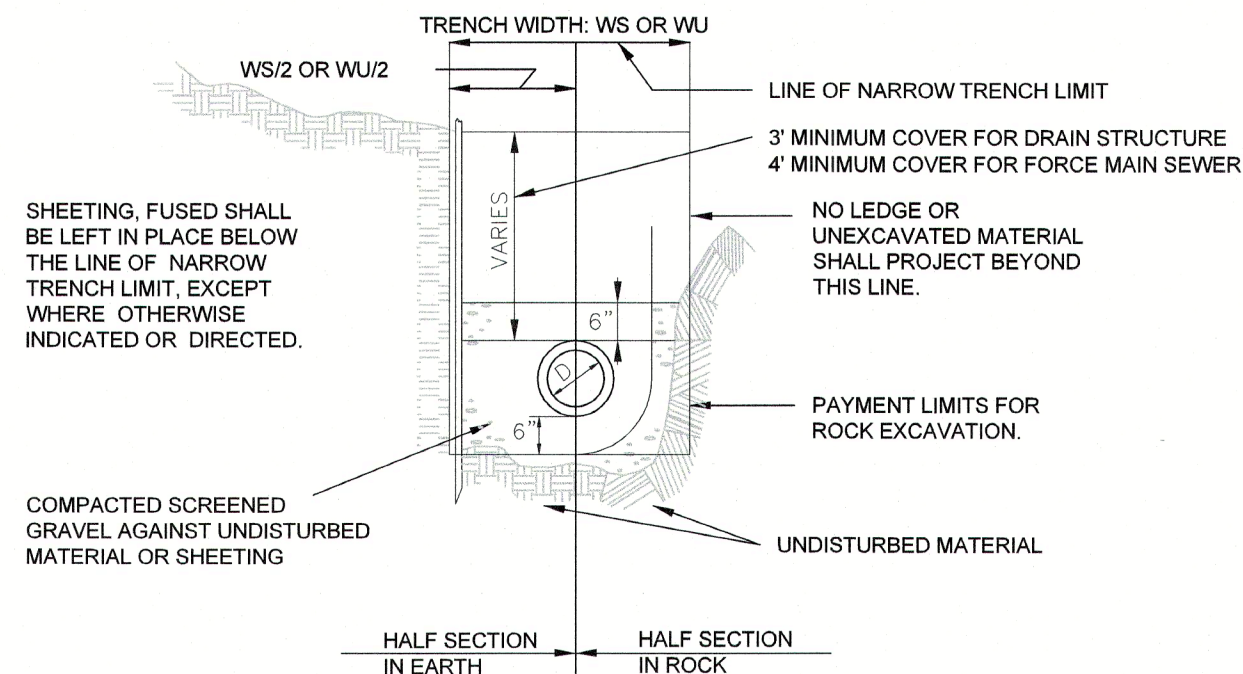
**WATER TRENCH**  
NOT TO SCALE

WATER GATE BOX  
NOT TO SCALE

THRUST BLOCKS  
NOT TO SCALE

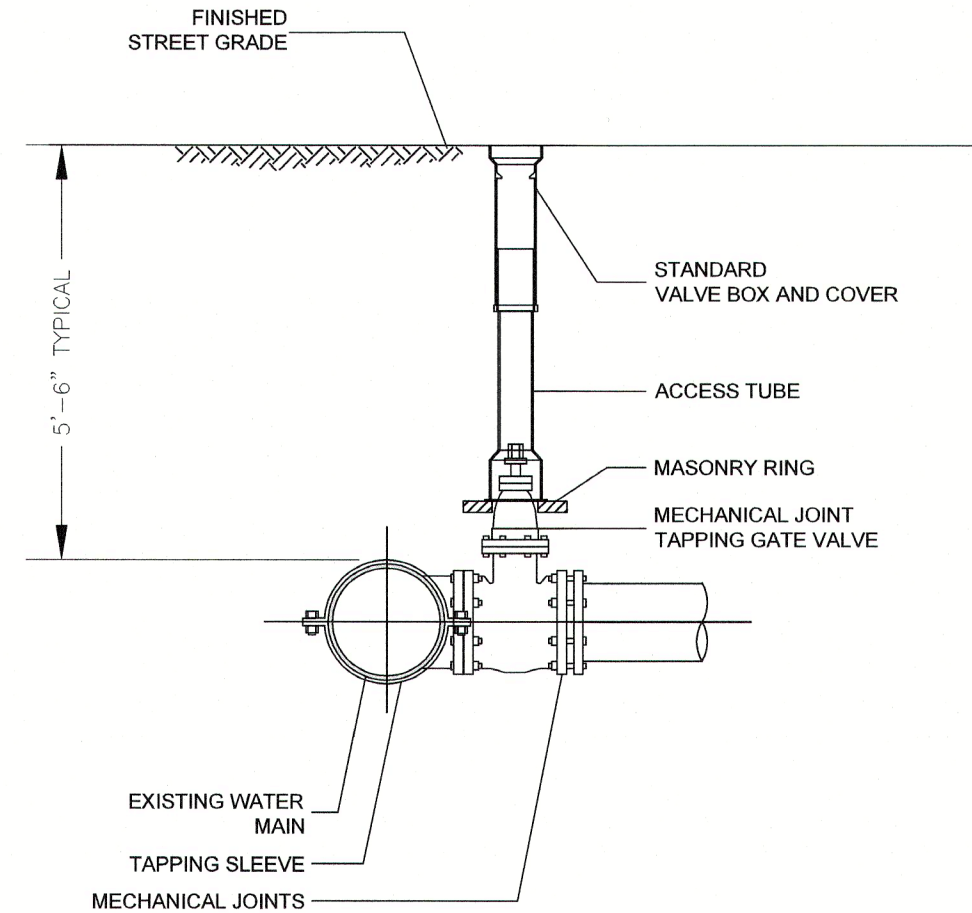


TRENCH WIDTH WS OR WU		
DIAM. OF PIPE	WU UNSHEETED	WS SHEETED
12" AND SMALLER	3'-0"	4'-2"
15" AND LARGER	O.D.+20"	O.D.+36"



**NOTES:**

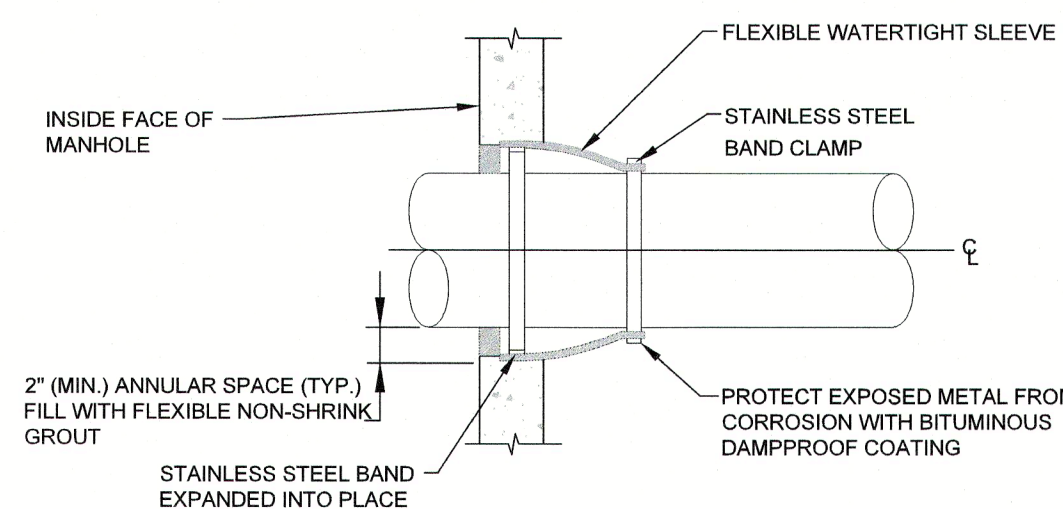
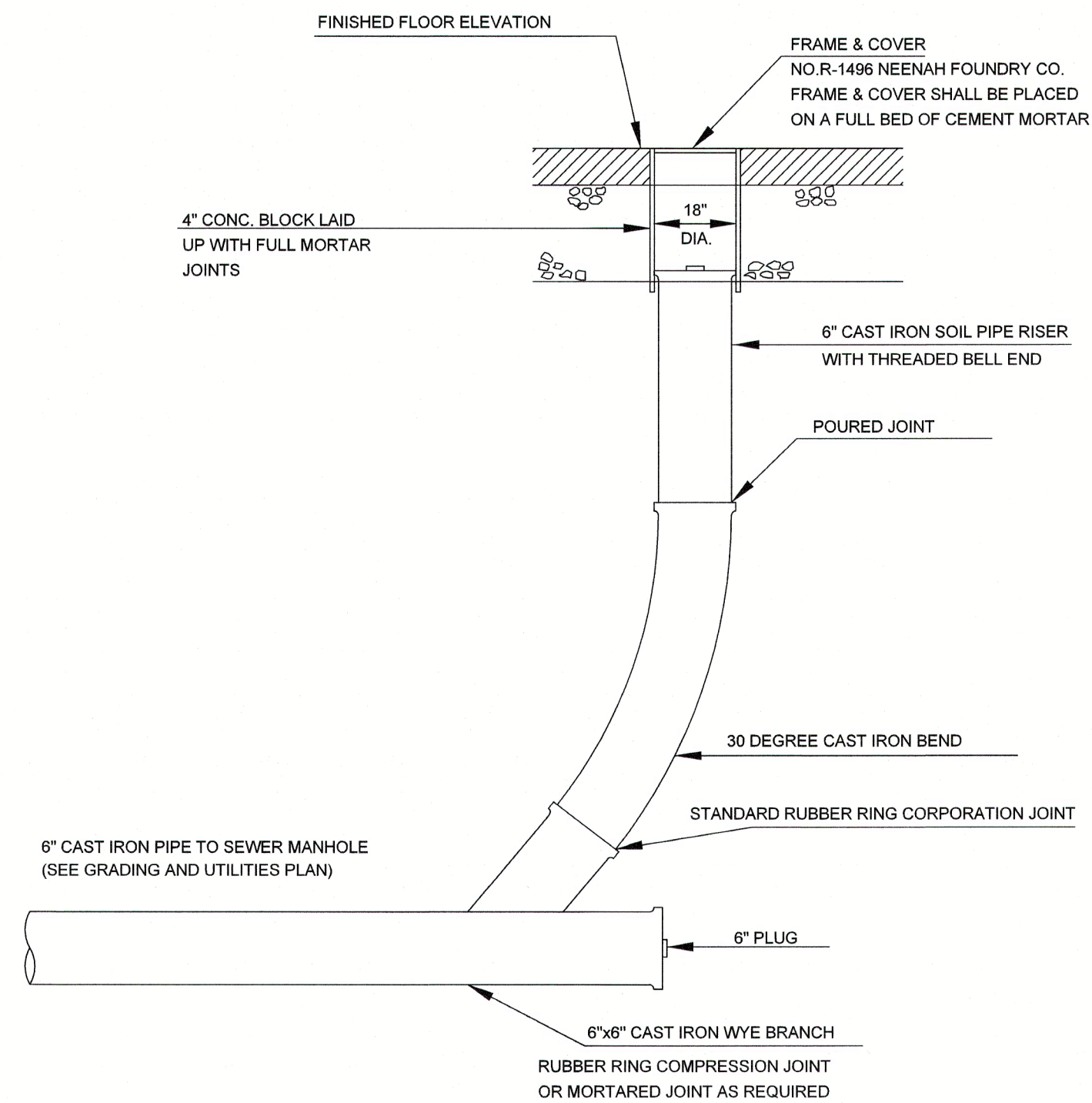
1. CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BEAR ON UNDISTURBED EARTH
2. USE RESTRAINED JOINT FITTINGS OR TIE RODS WHERE CONCRETE THRUST BLOCK IS UNACCEPTABLE
3. SIZE OF BLOCK OR MEGALUG TO BE DESIGNED FOR SPECIFIC CONDITIONS



FROST HYDRANT (TYP.)  
NOT TO SCALE

SEWER TRENCH  
NOT TO SCALE

TAPPING SLEEVE AND GATE VALVE CONNECTION DETAIL  
NOT TO SCALE



NOTE:  
PRECAST OPENING OR CORE DRILLED INTO EXISTING STRUCTURE. SIZE  
VARIES TO ACCOMMODATE EXTENSION BONNET FLANGE DIAMETER OR PIPE.

SEWER CLEANOUT DETAIL  
NOT TO SCALE

# C401

## DETAIL SHEET

ISSUE TYPE:  
PERMITTING

ISSUE DATE:  
10/13/2021

PROJECT NUMBER:  
20019

DRAWN BY: CA  
CHECKED BY: ND  
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SHEET TITLE:

SHEET NUMBER:

P:\Gore Place\20019 (Barn Improvement)\04_Design\Dwg\03_DD\20019_DS01.dwg



# GORE PLACE ESTATES

## BARN IMPROVEMENT PROJECT

249 WALTHAM STREET  
WATERTOWN, MA 02472

ISSUED FOR PERMIT: OCTOBER 13, 2021

OWNER/APPLICANT:

GORE PLACE SOCIETY  
249 WALTHAM STREET  
WATERTOWN, MA 02742  
TEL: (781) 894-2798  
FAX: (781) 894-5745  
ATTN: SCOTT CLARKE  
www.goreplace.org

ASSESSOR'S ID:

MAP 702  
PARCEL 1A

PROJECT TEAM:

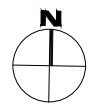
CIVIL ENGINEER:  
HIGHPOINT ENGINEERING  
45 DAN ROAD, SUITE 140  
CANTON, MA 02021  
TEL: (781) 770-0971  
ATTN: NICHOLE DUNPHY  
www.highpointeng.com

LAND SURVEYOR:  
FELDMAN LAND SURVEYORS  
152 HAMPDEN ST  
BOSTON, MA 02119  
TEL: (617) 357-9740  
ATTN: MARC BENEDICT

WETLAND SCIENTIST:  
ECOTEC, INC.  
102 GROVE STREET  
WORCESTER, MA 01605  
TEL: (508) 752-9666  
ATTN: ARTHUR ALLEN



LOCUS MAP  
1"=200'



INDEX OF DRAWINGS

		ISSUE HISTORY:		ISSUED FOR PERMIT OCTOBER 13, 2021	RESPONSE TO COMMENTS FEBRUARY 2, 2022				
CIVIL									
TS100	TITLE SHEET	•	•						
EC 1 OF 2	EXISTING CONDITIONS PLAN (BY OTHERS)	•	•						
EC 2 OF 2	EXISTING CONDITIONS PLAN (BY OTHERS)	•	•						
C100	SITE PREPARATION & DEMOLITION SHEET	•	•						
C200	LAYOUT & MATERIALS SHEET	•	•						
C300	GRADING, DRAINAGE & UTILITY SHEET	•	•						
C400	DETAIL SHEET	•	•						
C401	DETAIL SHEET	•	•						

HIGHPOINT ENGINEERING, INC.  
LAND PLANNING  
PERMIT EXPEDITING  
CIVIL ENGINEERING  
CONSULTING  
BENJAMIN EXECUTIVE CENTER  
380 WASHINGTON ST., SUITE 216  
SEAHAM, MA 02286  
www.HighpointEng.com

CLIENT:

**GORE PLACE**  
The Historic Governor Gore Estate

CONSULTANT:

SEAL

**BARN IMPROVEMENT PROJECT**

249 WALTHAM STREET  
WATERTOWN, MA

OWNER/APPLICANT: GORE PLACE SOCIETY

1	2-02-2022	RESPONSE TO COMMENTS
REV	DATE	DESCRIPTION

ISSUE TYPE:  
PERMITTING

ISSUE DATE:  
10/13/2021

PROJECT NUMBER:  
20019

DRAWN BY: CA  
CHECKED BY: NCD

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SHEET TITLE:  
**TITLE SHEET**

SHEET NUMBER:  
**TS100**

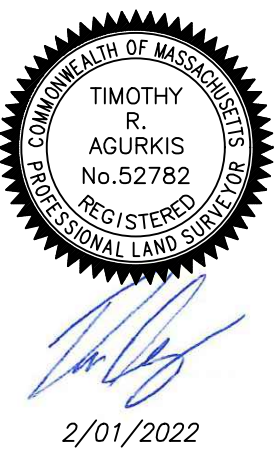
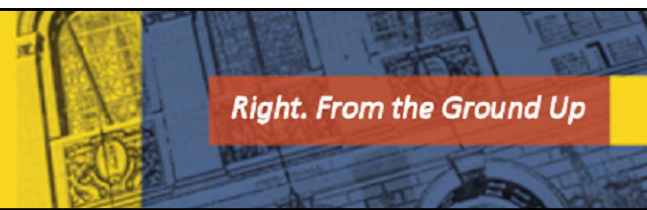
ISSUED FOR :







BOSTON HEADQUARTERS  
152 HAMPDEN STREET  
BOSTON, MA 02119  
WORCESTER OFFICE  
27 MECHANIC STREET  
WORCESTER, MA 01608  
(617)357-9740  
www.feldmangeo.com



2/01/2022

ADDRESS:

GORE PLACE FARM  
249 WALTHAM STREET  
WATERTOWN, MASS.

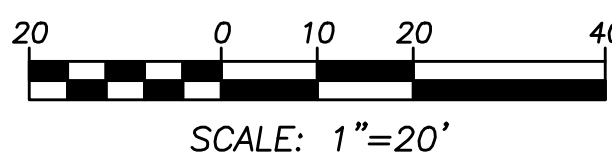
RESEARCH: -	FIELD CHIEF: DS
PROJ. MGR: MJB	APPROVED:
CALC: MJB	CADD: MJB
FIELD CHK:	CRD FILE: 17627

REVISIONS:

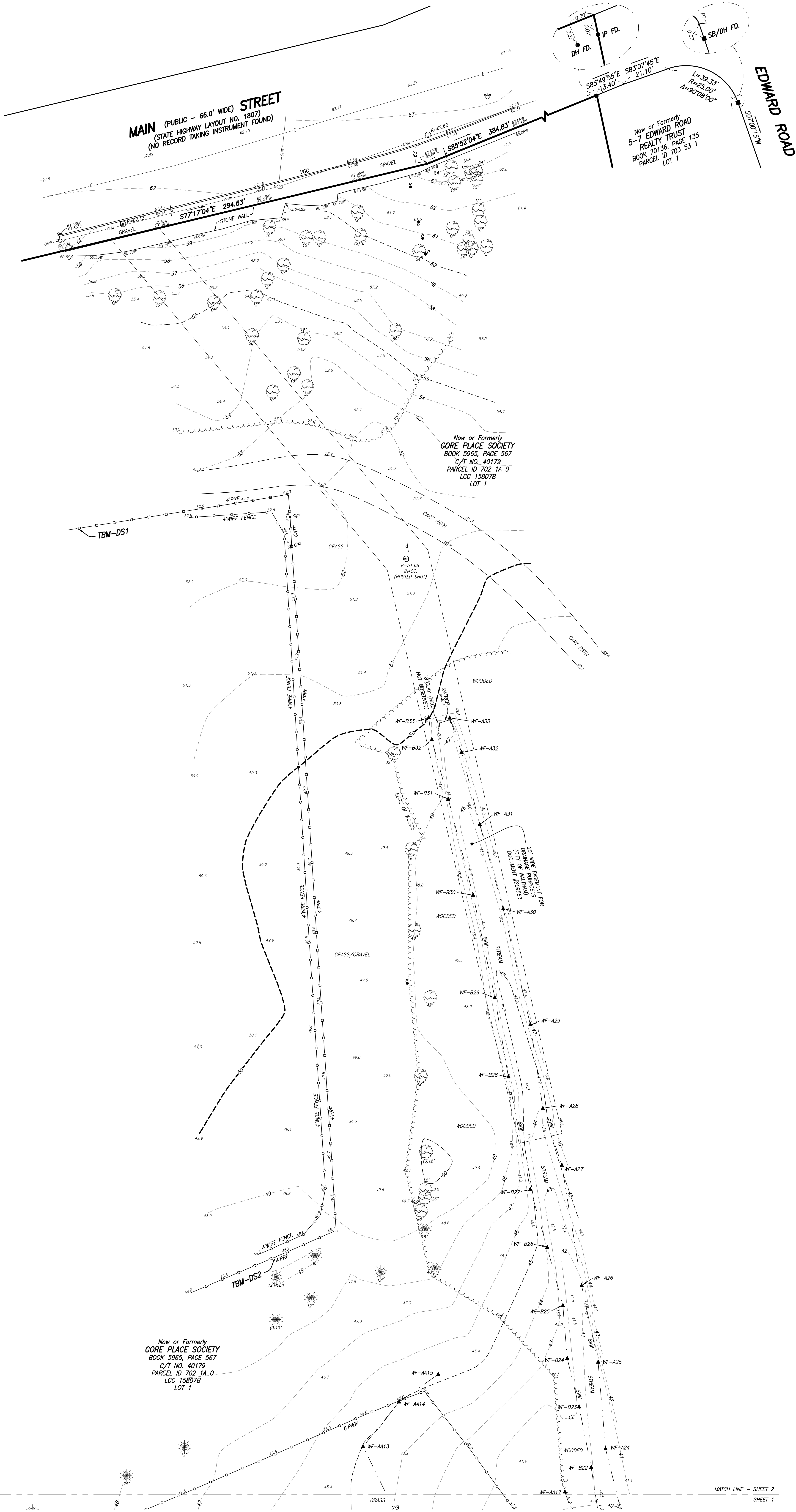
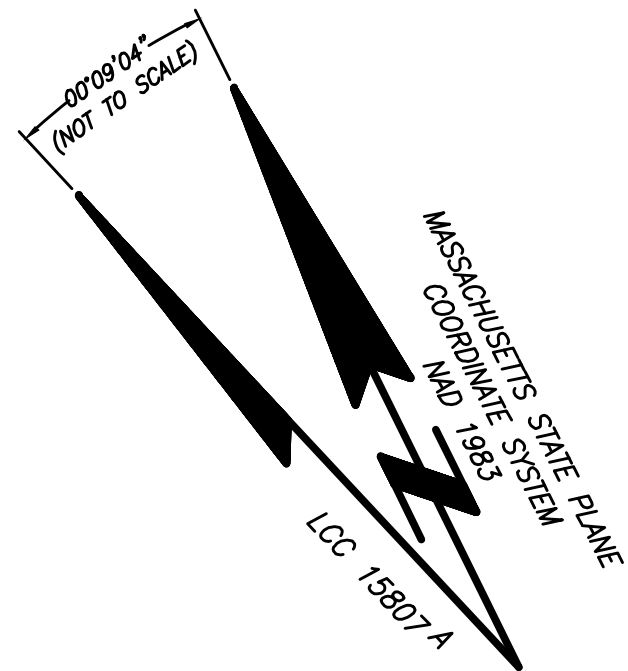
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EXISTING  
CONDITIONS PLAN

DATE: DECEMBER 7, 2020



SHEET NO. 2 OF 2



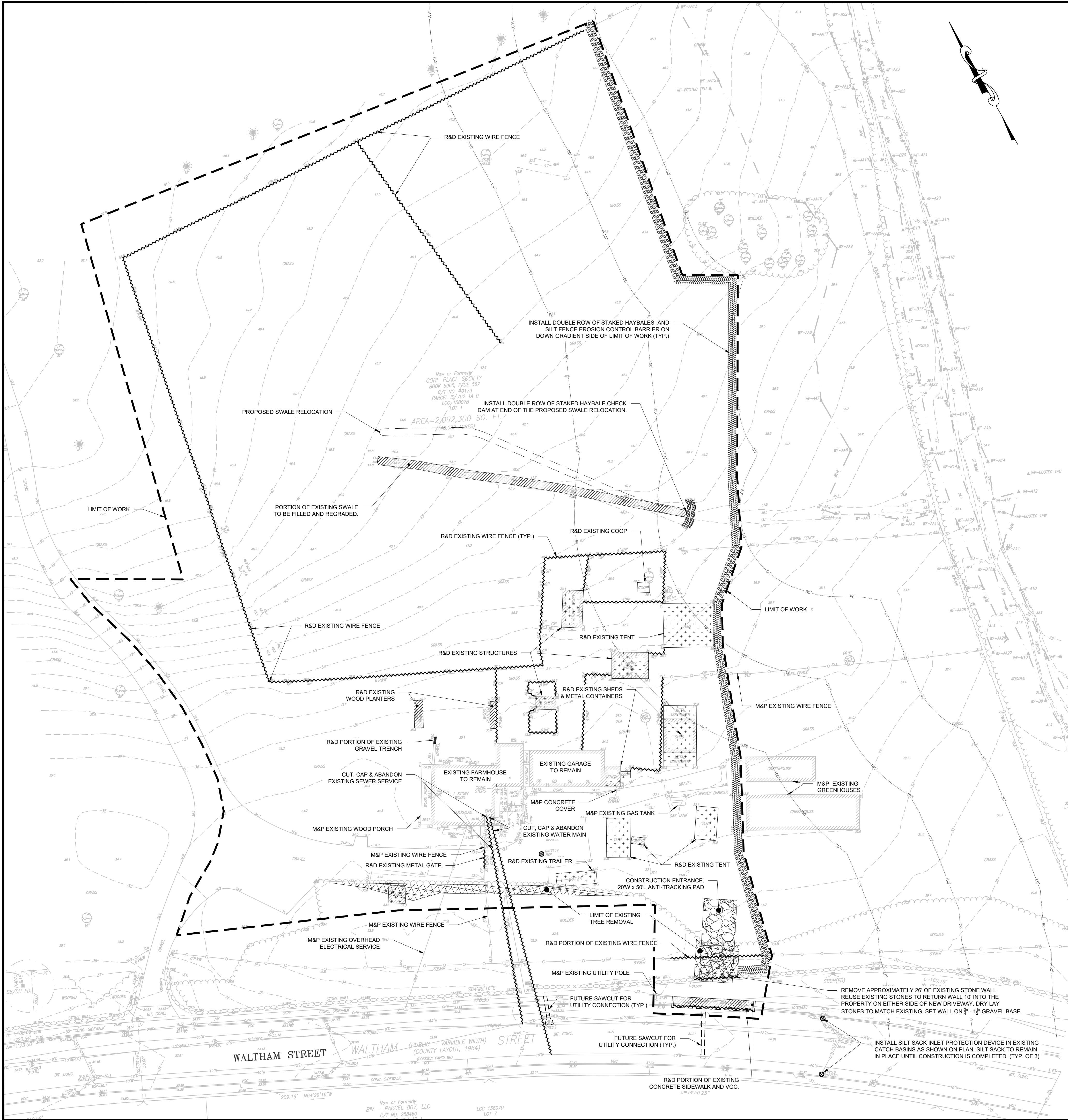
NOTES:

- BENCH MARK INFORMATION:  
BENCH MARKS USED:  
TBM-3: SOUTHWESTERLY CORNER OF STONE CAP ON A BRICK RETAINING WALL AT THE WESTERLY SIDE OF THE MANSION. ELEVATION=56.14  
TBM-4: RIGHT OUTER CORNER OF THE LOWEST STONE STEP AT THE MAIN ENTRANCE TO THE MANSION. ELEVATION=58.16  
TEMPORARY BENCH MARKS SET:  
TBM-DS1: MAG. NAIL SET IN FENCE POST, 1'± ABOVE GRADE, AS SHOWN HEREON. ELEVATION=53.76  
TBM-DS2: MAG. NAIL SET IN FENCE POST, 1'± ABOVE GRADE, AS SHOWN HEREON. ELEVATION=49.71  
TBM-DS3: RIGHT OUTER CORNER OF THE LOWEST STONE STEP AT #719 MAIN STREET, WATERTOWN. ELEVATION=63.47  
ELEVATIONS REFER TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).  
CONTOUR INTERVAL EQUALS ONE (1) FOOT.  
BY GRAPHIC PLOTTING ONLY, THE PARCEL SHOWN HEREON LIES WITHIN A ZONE "X" (UNSHADED), AN AREA OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD, AS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) FOR MIDDLESEX COUNTY, MASSACHUSETTS, MAP NUMBER 2501700552E, TOWN OF WATERTOWN, COMMUNITY NUMBER 250223, PANEL NO. 0522E, HAVING AN EFFECTIVE DATE OF JUNE 04, 2010.  
UTILITY INFORMATION SHOWN IS BASED ON BOTH A FIELD SURVEY AND PLANS OF RECORD. THE LOCATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE AFORESAID RECORD PLANS AND ARE APPROXIMATE ONLY. WE CANNOT ASSUME RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES THAT ARE OMITTED OR INACCURATELY SHOWN ON SAID RECORD PLANS, SINCE SUB-SURFACE UTILITIES CANNOT BE VISIBLY VERIFIED. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED AND THE ACTUAL LOCATION OF SUB-SURFACE STRUCTURES SHOULD BE DETERMINED IN THE FIELD. CALL, TOLL FREE, THE 800-SAFE-CALL CENTER AT 1-888-344-7233 SEVENTY-TWO HOURS PRIOR TO EXCAVATION.  
THIS DOCUMENT IS AN INSTRUMENT OF SERVICE OF FELDMAN LAND SURVEYORS, ISSUED TO OUR CLIENT FOR PURPOSES RELATED DIRECTLY AND SOLELY TO FELDMAN LAND SURVEYORS' SCOPE OF SERVICES UNDER CONTRACT TO OUR CLIENT FOR THIS PROJECT. ANY USE OR REUSE OF THIS DOCUMENT FOR ANY REASON BY ANY PARTY FOR PURPOSES UNRELATED DIRECTLY AND SOLELY TO SAID CONTRACT SHALL BE AT THE USER'S SOLE AND EXCLUSIVE RISK AND LIABILITY, INCLUDING LIABILITY FOR VIOLATION OF COPYRIGHT LAWS, UNLESS WRITTEN CONSENT IS PROVIDED BY FELDMAN LAND SURVEYORS.  
WETLAND FLAGS SHOWN HEREON WERE PLACED BY ECOTEC, INC. ON JULY 1, 2021. THE FOLLOWING FLAGS WERE NOT FOUND AT THE TIME OF SURVEY: A3, C20, A82, A48, A411, AND A416. FLAG A47 APPEARS TO BE OUT OF PLACE.

MATCH LINE - SHEET 2  
SHEET 1

MATCH LINE - SHEET 2  
SHEET 1

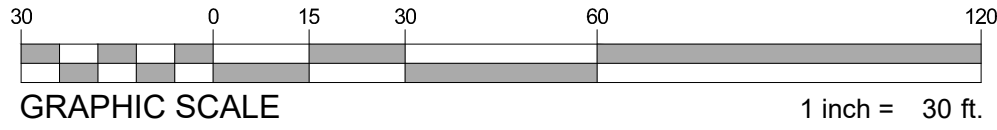




SYMBOL LEGEND	
	DOUBLE ROW OF STAKED HAYBALES EROSION CONTROL BARRIER
	SILTSACK [®] CATCH BASIN INLET PROTECTION
	ANTI-TRACKING PAD / CONSTRUCTION ENTRANCE
	SAWCUT LINE
	LIMIT OF WORK
	MAINTAIN AND PROTECT
	REMOVE AND DISPOSE
	DENOTES OBJECTS TO BE REMOVED
	OBJECT TO BE REMOVED AND DISPOSED
	BITUMINOUS CONCRETE WALK REMOVAL
	LIMIT OF EXISTING TREE REMOVAL
	EXISTING BUILDING/STRUCTURE REMOVAL

DEMOLITION NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING **DIG-SAFE** PRIOR TO THE START OF ANY DEMOLITION OR CONSTRUCTION FOR LOCATION OF BELOW-GRADE UTILITY SYSTEMS BOTH ON AND OFF THE SITE WITHIN CONSTRUCTION LIMITS.
2. THE CONTRACTOR SHALL OBTAIN ALL DEMOLITION PERMITS REQUIRED FROM THE TOWN OF WATERTOWN.
3. DURING THE CONSTRUCTION PHASE, METAL DUMPSTER TYPE WASTE DISPOSAL RECEPTACLES SHALL BE LOCATED ON SITE.
4. THE CONTRACTOR SHALL REGULARLY INSPECT THE PERIMETER OF THE PROPERTY TO CLEAN UP AND REMOVE LOOSE CONSTRUCTION DEBRIS BEFORE IT LEAVES THE SITE.
5. CONSTRUCTION/DEMOLITION DEBRIS SHALL BE RECYCLED TO THE EXTENT POSSIBLE. CONSTRUCTION/DEMOLITION DEBRIS SUITABLE FOR RECYCLING SHALL BE SEPARATED FROM THE WASTE STREAM AND STORED IN METAL DUMPSTER DESIGNATED FOR RECYCLING MATERIAL ONLY. CONSTRUCTION/DEMOLITION WASTE SHALL BE SEPARATED ON SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SEPARATION AND HAULING OF THE RECYCLABLE AND WASTE MATERIAL.
6. REMOVAL OF COMMERCIAL SOLID WASTE SHALL BE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.
7. ANY ITEMS OR MATERIALS ABOVE OR BELOW GRADE INDICATED AS "PROTECT (M&P)" SHALL REMAIN IN PLACE AND PROTECTED FROM DAMAGE THROUGHOUT CONSTRUCTION. DAMAGED ITEMS INDICATED TO BE PROTECTED (M&P) SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.
8. ANY ITEMS OR MATERIALS ABOVE OR BELOW GRADE INDICATED AS "REMOVE AND DISPOSE (R&D)" SHALL BE REMOVED/DEMOLISHED AND LEGALLY DISPOSED OFF SITE. NO ITEMS OR MATERIALS SHALL BE DISPOSED OR BURIED ON-SITE.
9. ANY DAMAGE TO ITEMS OR MATERIALS BEYOND THE INDICATED LIMIT OF WORK SHALL BE REPLACED/REPAIRED TO ORIGINAL CONDITION AT THE CONTRACTORS EXPENSE.
10. CONTRACTOR TO VERIFY ABANDONMENT OF PUBLIC AND PRIVATE UTILITIES PRIOR TO START OF DEMOLITION/CONSTRUCTION AND COORDINATE WITH THE TOWN OF WATERTOWN D.P.W AND UTILITY SERVICE PROVIDERS.
11. ALL EXCESS EARTH EXCAVATIONS SHALL BE DISPOSED OFF-SITE BY CONTRACTOR.
12. REMOVAL / DISPOSAL OF EXISTING BUILDINGS SHALL INCLUDE ALL BELOW GRADE FOUNDATIONS AND SLABS. NO PART OF FOUNDATIONS AND SLABS SHALL BE BURIED.
13. ALL ORGANIC SOILS, TOPSOIL, LOAM AND LAWNS SHALL BE REMOVED AND DISPOSED OF OFF SITE.
14. THE CONTRACTOR SHALL DISCONNECT, CAPIPLUG, ALL EXISTING WATER AND SEWER SERVICES TO ALL EXISTING BUILDINGS ON SITE. CONTRACTOR TO COORDINATE WITH THE TOWN OF WATERTOWN FOR APPROPRIATE DISCONNECT STANDARDS.
15. THE CONTRACTOR SHALL COORDINATE WITH SERVICE PROVIDERS FOR DISCONNECTION (AND CAPPING) OF ALL GAS AND ELECTRICAL SERVICES THAT SERVICE ALL EXISTING BUILDING ON THE SITE.



HIGHPOINT ENGINEERING, INC.  
LAND PLANNING  
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CONSULTING  
280 WASHINGTON ST., SUITE 216  
BENJAMIN EXECUTIVE CENTER  
BENJAMIN, MA 02026  
www.HighpointEng.com

CLIENT:

**GORE PLACE**  
The Historic Governor Gore Estate

CONSULTANT:

**BARN IMPROVEMENT PROJECT**

249 WALTHAM STREET  
WATERTOWN, MA

OWNER/APPLICANT: GORE PLACE SOCIETY

1	2-02-2022	RESPONSE TO COMMENTS
REV	DATE	DESCRIPTION

ISSUE TYPE:  
PERMITTING  
ISSUE DATE:  
10/13/2021  
PROJECT NUMBER:  
20019

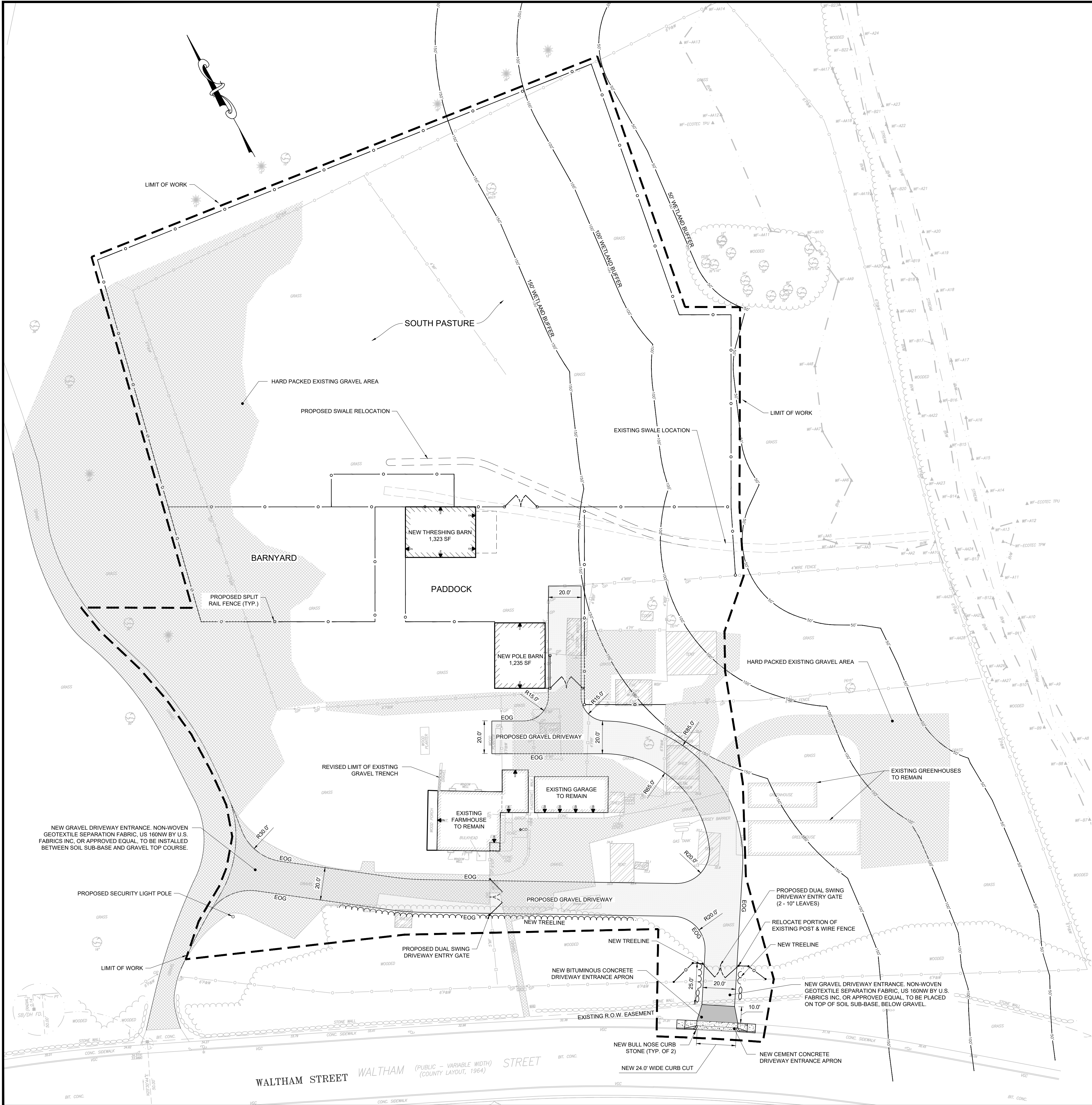
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SHEET TITLE:  
**SITE  
PREPARATION  
& DEMOLITION  
PLAN**

SHEET NUMBER:  
**C100**

ISSUED FOR :



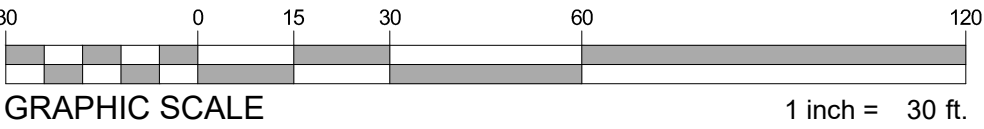


- GENERAL NOTES**
1. THE CONTRACTOR SHALL REPORT TO THE OWNER AND ENGINEER ANY SIGNIFICANT VARIATIONS IN EXISTING SITE CONDITIONS FROM THOSE SHOWN ON THESE PLANS. ANY PROPOSED REVISIONS TO THE WORK, IF REQUIRED BY THESE SITE CONDITIONS, SHALL NOT BE UNDERTAKEN UNTIL REVIEWED AND APPROVED BY THE OWNER AND THE ENGINEER.
  2. IN ORDER TO PROTECT THE PUBLIC SAFETY DURING CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING AND MAINTAINING AT ALL TIMES ALL NECESSARY SAFETY DEVICES AND PERSONNEL, WARNING LIGHTS, BARRICADES, AND POLICE OFFICERS.
  3. UNLESS OTHERWISE SPECIFIED ON THE PLANS AND SPECIFICATIONS ALL SITE CONSTRUCTION MATERIALS AND METHODOLOGIES ARE TO CONFORM TO THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, 1988 EDITION.

SYMBOL LEGEND	
EN	BUILDING ENTRANCE
GD	GARAGE DOOR
EOG	EDGE OF GRAVEL
---	LIMIT OF WORK
- - -	PROPOSED SPLIT RAIL FENCE
~~~~~	NEW TREE LINE
▬	PROPOSED BITUMINOUS CONCRETE APRON
▨	PROPOSED GRAVEL DRIVEWAY
▩	EXISTING BUILDING/STRUCTURE TO BE REMOVED
▧	EXISTING GRAVEL AREA

ZONING CONFORMANCE SUMMARY				
PRIMARY ZONING DISTRICT: OPEN SPACE/CONSERVANCY (OSC)				
BUILDING DIMENSIONAL REQUIREMENTS				
CRITERIA	REQUIRED	EXISTING	PROPOSED	ZONING COMPLIANCE
LOT AREA (MIN.)	-	27.57 AC.*	NO CHANGE	YES
LOT FRONTAGE (MIN.)	50 FT	1821.43 FT	NO CHANGE	YES
FRONT YARD SETBACK (MIN.)	50 FT	>100 FT±	NO CHANGE	YES
SIDE YARD SETBACK (MIN.)	25 FT	>100 FT±	NO CHANGE	YES
REAR YARD SETBACK (MIN.)	50 FT	>100 FT±	NO CHANGE	YES
BUILDING COVERAGE (MAX.)	15%	0.54%	0.49%	YES
IMPERVIOUS COVER (MAX.)	25%	0.56%**	0.51%**	YES
BUILDING HEIGHT (MAX.)	35 FT / 2.5 STORIES	1 STORY	1 STORY	YES

* LOT SIZE OF GORE PLACE WITHIN TOWN OF WATERTOWN = 27.57 ACRES
** EXISTING IMPERVIOUS AREA = 6,671 S.F. (ROOF AREAS & CONCRETE WALK)
PROPOSED IMPERVIOUS AREA = 6,148 S.F. (REVISED ROOF AREAS AND CONCRETE WALK)



HIGHPOINT ENGINEERING, INC.
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CONSULTING
280 WASHINGTON ST., SUITE 216
DORCHESTER, MA 02122
www.HighpointEng.com

CLIENT:

GORE PLACE
The Historic Governor Gore Estate

CONSULTANT:

DOUGLAS J. HARTNETT
CIVIL
NO. 37786
REGISTERED PROFESSIONAL ENGINEER
02-02-2022

BARN IMPROVEMENT PROJECT

249 WALTHAM STREET
WATERTOWN, MA

OWNER/APPLICANT: GORE PLACE SOCIETY

1	2-02-2022	RESPONSE TO COMMENTS
REV	DATE	DESCRIPTION

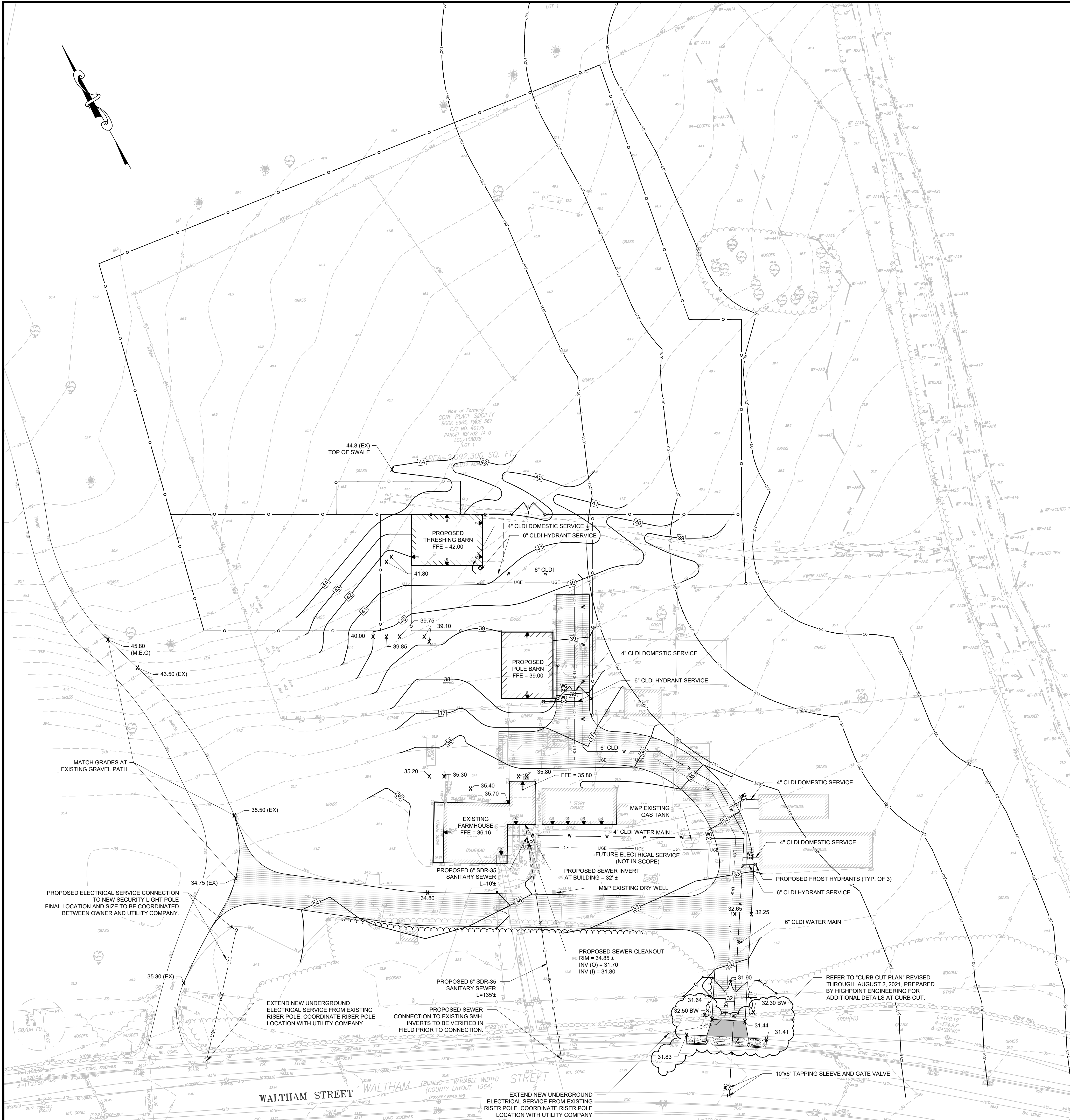
ISSUE TYPE:
PERMITTING
ISSUE DATE:
10/13/2021
PROJECT NUMBER:
20019

DRAWN BY: CA
CHECKED BY: ND
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SHEET TITLE:
LAYOUT & MATERIALS PLAN

SHEET NUMBER:
C200

ISSUED FOR :



SYMBOL LEGEND	
	PROPOSED ELEVATION CONTOUR
	PROPOSED SPOT ELEVATION
	PROPOSED WATER SERVICE
	PROPOSED SEWER LINE
	PROPOSED UNDERGROUND ELECTRICAL SERVICE
	PROPOSED GATE VALVE
	PROPOSED FROST HYDRANT
	PROPOSED SEWER CLEANOUT

GRADING & DRAINAGE NOTES

- AT THE END OF CONSTRUCTION, AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, THE CONTRACTOR SHALL CLEAN THE SUMPS OF ALL CATCH BASINS.
- THE LOCATION OF UNDERGROUND UTILITIES AS REPRESENTED ON THESE PLANS IS BASED UPON PLANS AND INFORMATION PROVIDED BY FELDMAN LAND SURVEYORS. NO WARRANTY IS MADE AS TO THE ACCURACY OF THESE LOCATIONS OR THAT ALL UNDERGROUND UTILITIES ARE SHOWN. THE CONTRACTOR SHALL CONTACT DIG SAFE AT LEAST 72 HOURS PRIOR TO THE START OF CONSTRUCTION. DIG SAFE TELEPHONE NUMBER IS 1-888-DIG-SAVE.
- THE CONTRACTOR SHALL VERIFY THE LOCATION, SIZE AND DEPTH OF EXISTING UTILITIES PRIOR TO TAPPING INTO, CROSSING OR EXTENDING THEM. IF THE NEW WORK POSES A CONFLICT WITH EXISTING UTILITIES, THE ENGINEER IS TO BE NOTIFIED PRIOR TO THE CONTRACTOR CONTINUING.
- THE CONTRACTOR SHALL NOTIFY THE TOWN OF WATERTOWN DEPARTMENT OF PUBLIC WORKS AT LEAST 48 HOURS IN ADVANCE OF ANY REQUIRED INSPECTIONS.
- FILL MATERIAL SHALL BE AS SPECIFIED BY THE ARCHITECT/ENGINEER AND SELECTED FROM ON-SITE EXCAVATION MATERIAL WHERE POSSIBLE.
- MATERIAL FOR BACKFILL SHALL NOT INCLUDE UNSUITABLE MATERIAL SUCH AS PEAT, TRASH, STUMPS, DEBRIS OR HAZARDOUS WASTE.
- ALL STUMPS, PEAT, CONSTRUCTION DEBRIS AND OTHER DELETERIOUS MATERIALS ON THE SITE AT THE TIME OF CONSTRUCTION ARE TO BE REMOVED FROM THE SITE TO AN APPROVED LANDFILL. NO SUCH MATERIALS ARE TO BE BURIED OR OTHERWISE DISPOSED OF ON THE SITE.

BARN IMPROVEMENT PROJECT

249 WALTHAM STREET
WATERTOWN, MA

OWNER/APPLICANT: GORE PLACE SOCIETY

REV	DATE	DESCRIPTION
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ISSUE TYPE:
PERMITTING
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DRAWN BY: CA
CHECKED BY: ND

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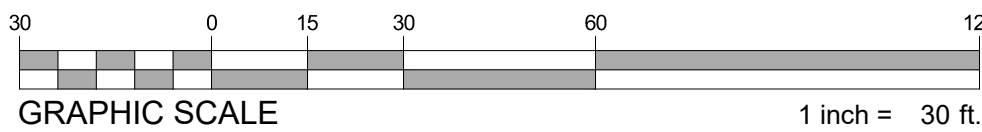
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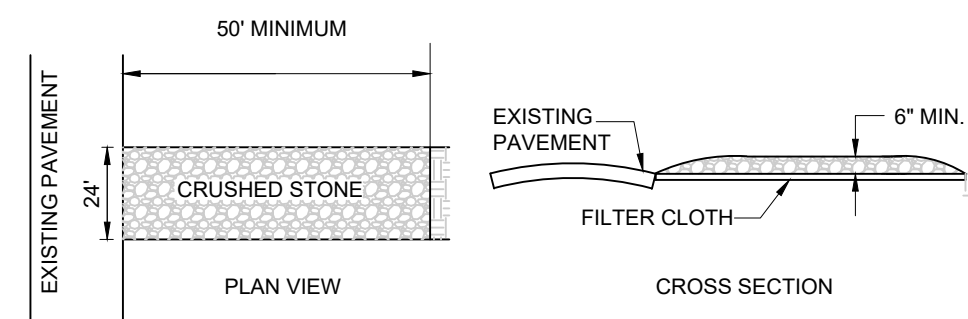
GRADING,
DRAINAGE &
UTILITY PLAN

SHEET NUMBER:

C300

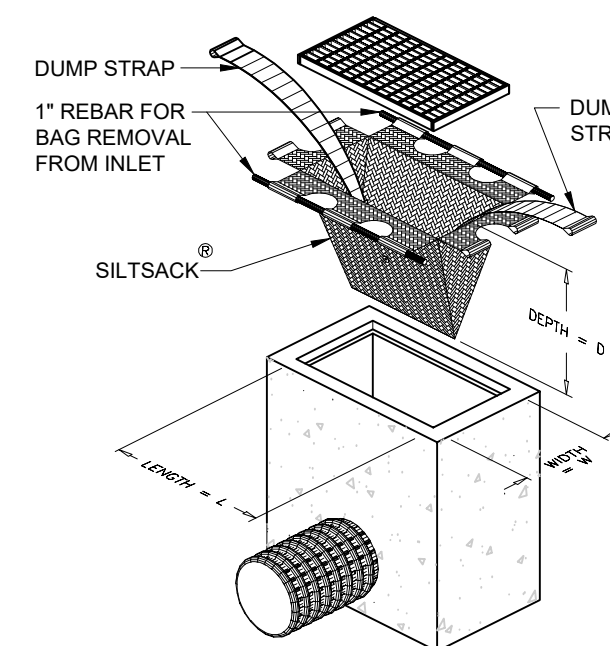
ISSUED FOR :





- TRACKING PAD NOTES

1. STONE SIZE - USE 6" ANGULAR CRUSHED STONE
2. FILTER CLOTH - SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
3. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHOULD BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM SHOULD BE PERMITTED.
4. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH PREVENTS TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANING OF ANY MEASURES USED TO PREVENT SEDIMENT FROM ENTERING THE ENTRANCE OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.



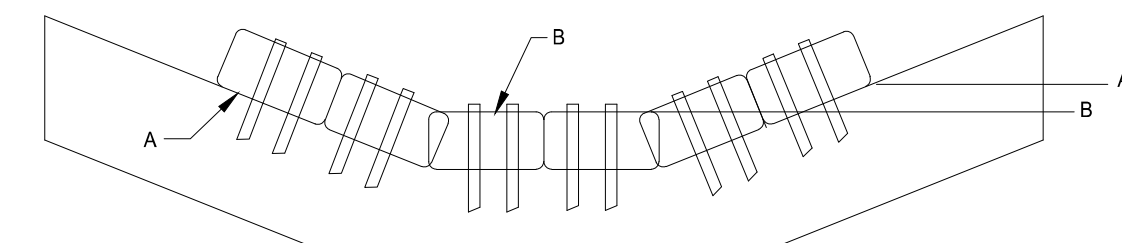
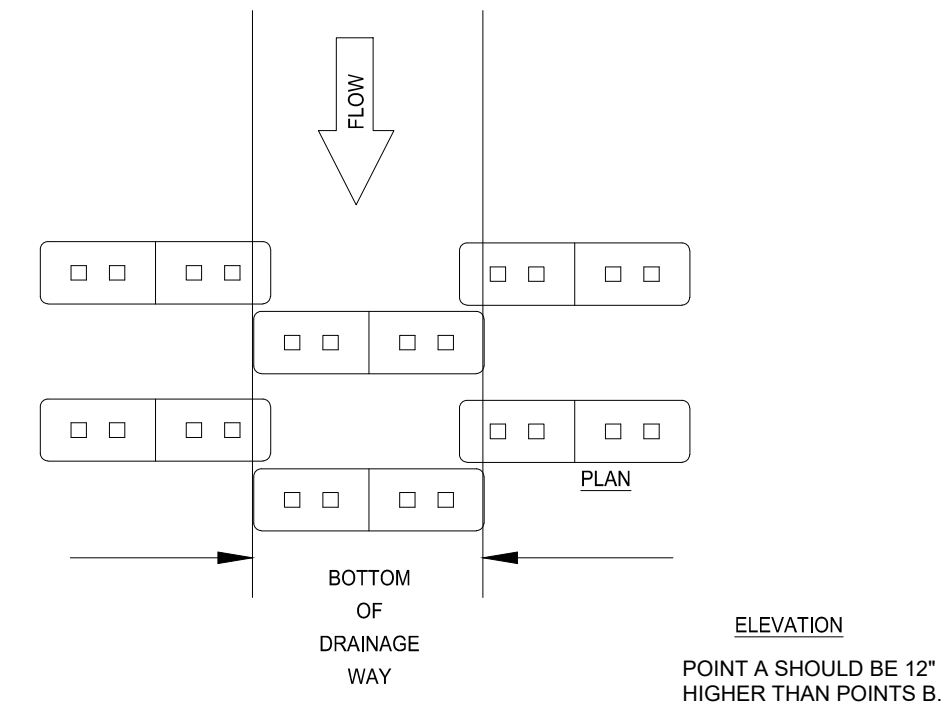
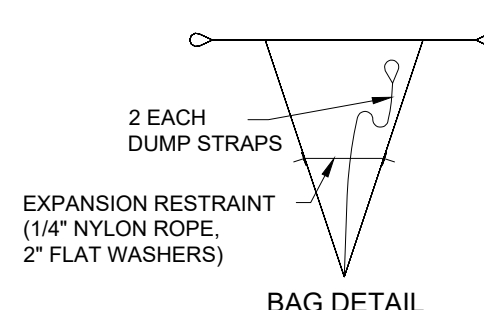
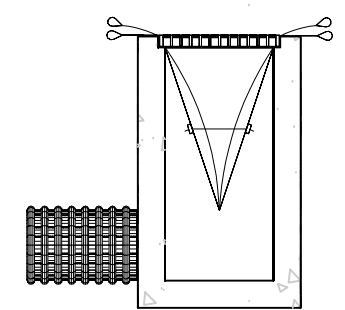
SILTSACK®
SPECIFICATIONS

NOTE: THE SILTSACK WILL BE MANUFACTURED FROM A WOVEN POLYPROPYLENE FABRIC THAT MEETS OR EXCEEDS THE SPECIFICATIONS PROVIDED.

REGULAR FLOW SILTSACK®

(FOR AREAS OF LOW TO MODE
PRECIPITATION AND RUN-OFF)

PROPERTIES	TEST METHOD	UNITS
GRAB TENSILE STRENGTH	ASTM D-4632	300 LBS
GRAB TENSILE ELONGATION	ASTM D-4632	20 %
PUNCTURE	ASTM D-4833	120 LBS
MULLEN BURST	ASTM D-3786	800 PSI
TRAPEZOID TEAR	ASTM D-4533	120 LBS
UV RESISTANCE	ASTM D-4355	80 %
APPARENT OPENING SIZE	ASTM D-4751	40 US SIEVE
FLOW RATE	ASTM D-4491	40 GAL/MIN/SQ FT
PERMITTIVITY	ASTM D-4491	0.55 SEC -1



CRUSHED STONE ANTI-TRACKING PAD

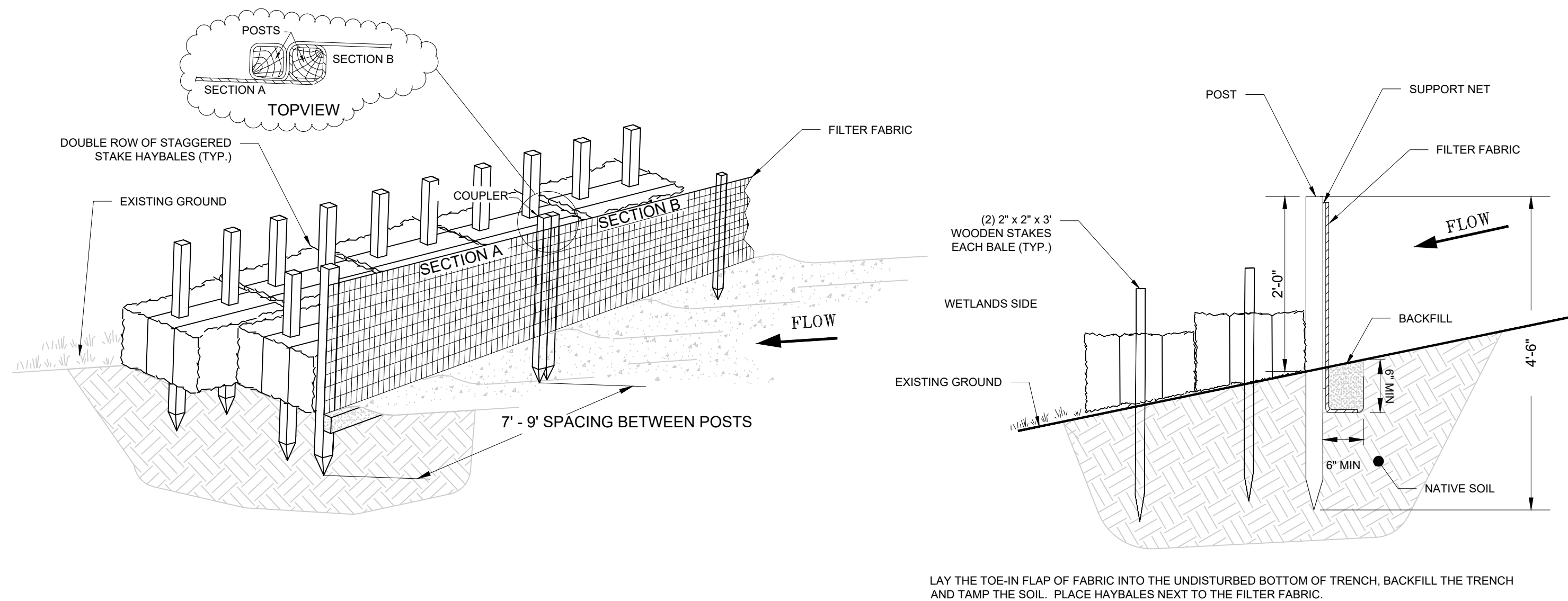
C3



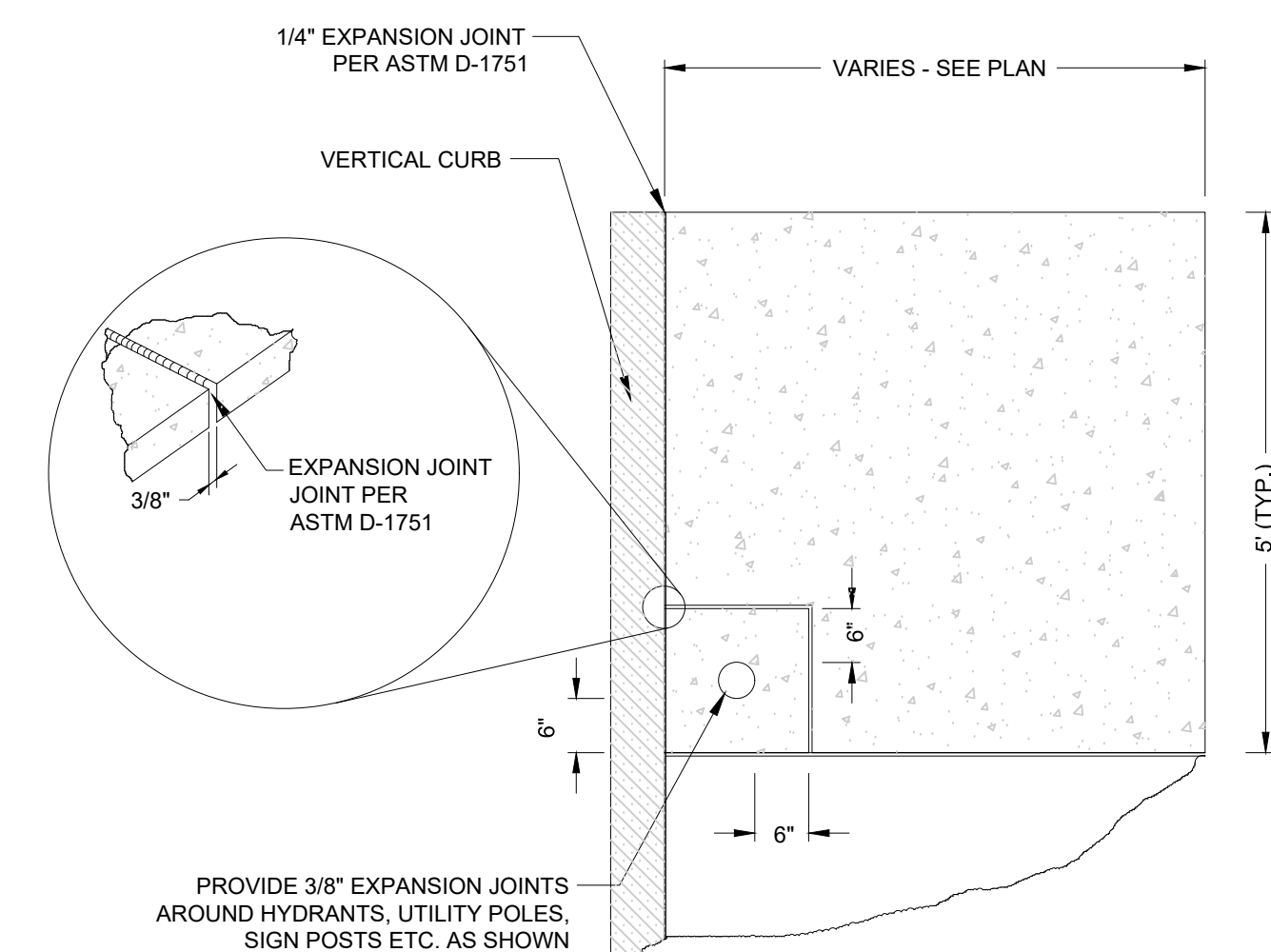
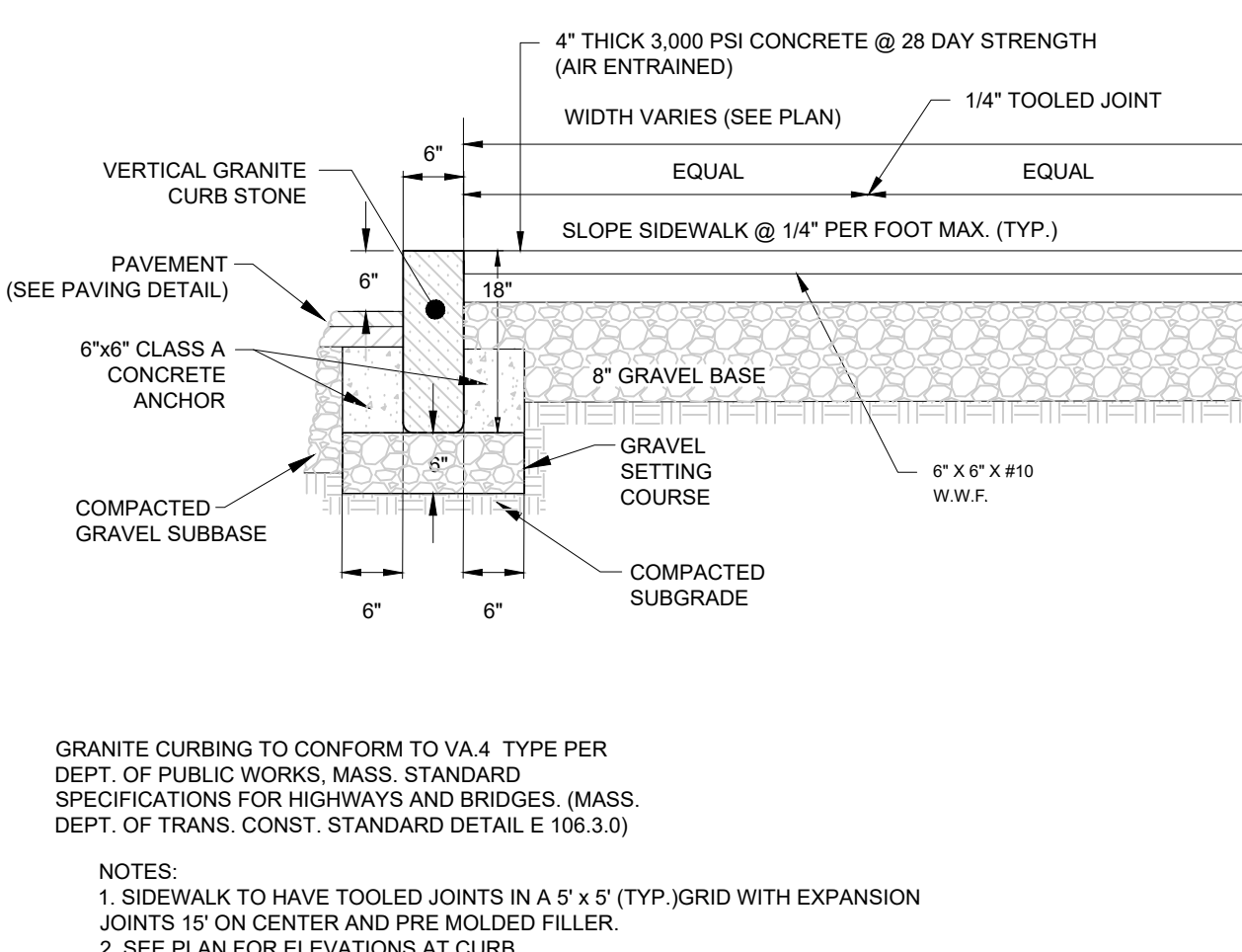
C2



C1



TOE-IN METHODS



HAYBALE / SILT FENCE EROSION CONTROL BARRIER
NOT TO SCALE

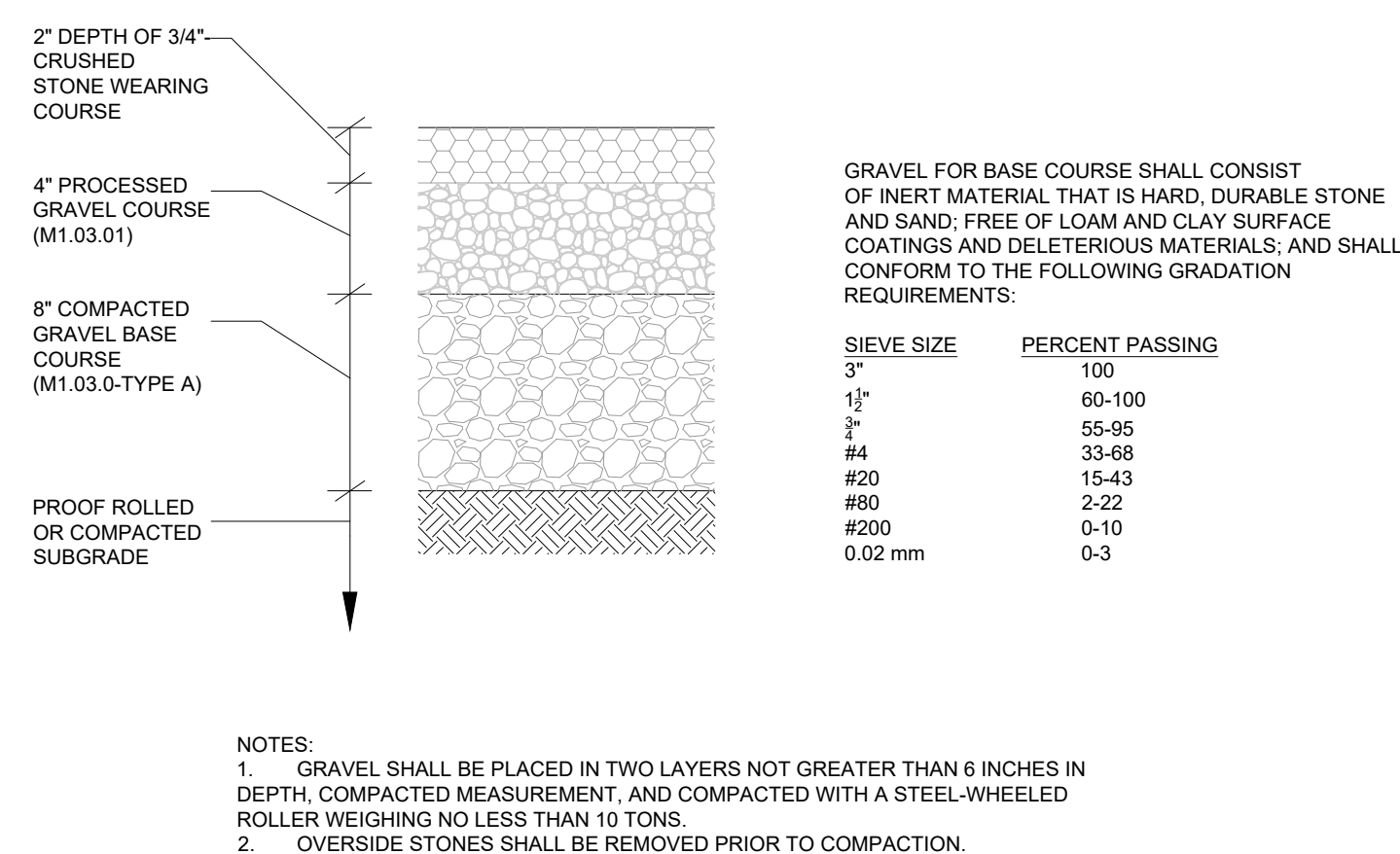
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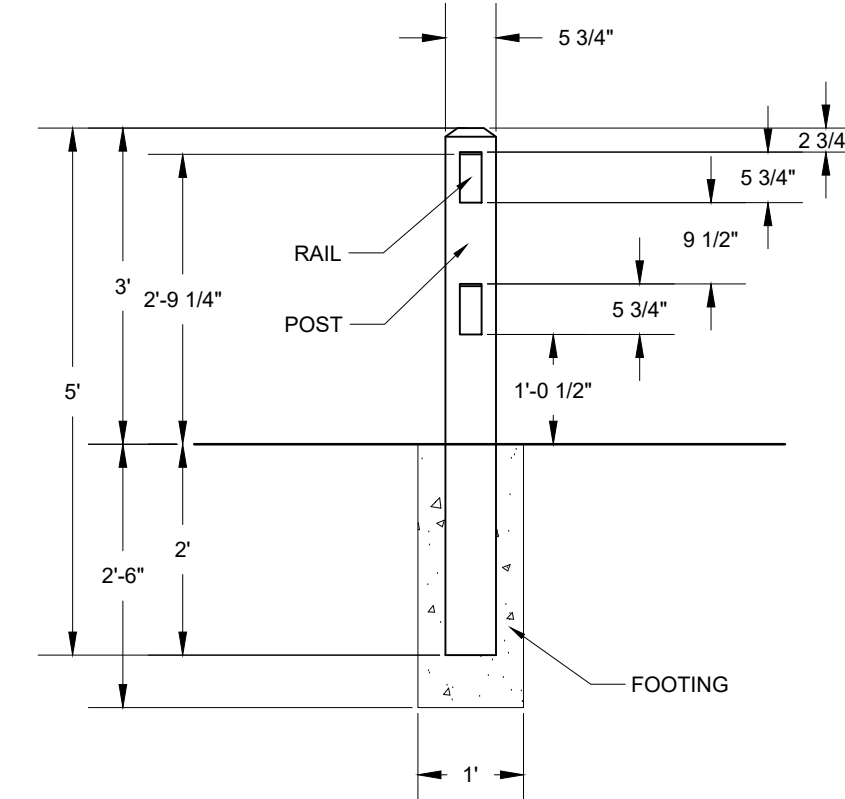


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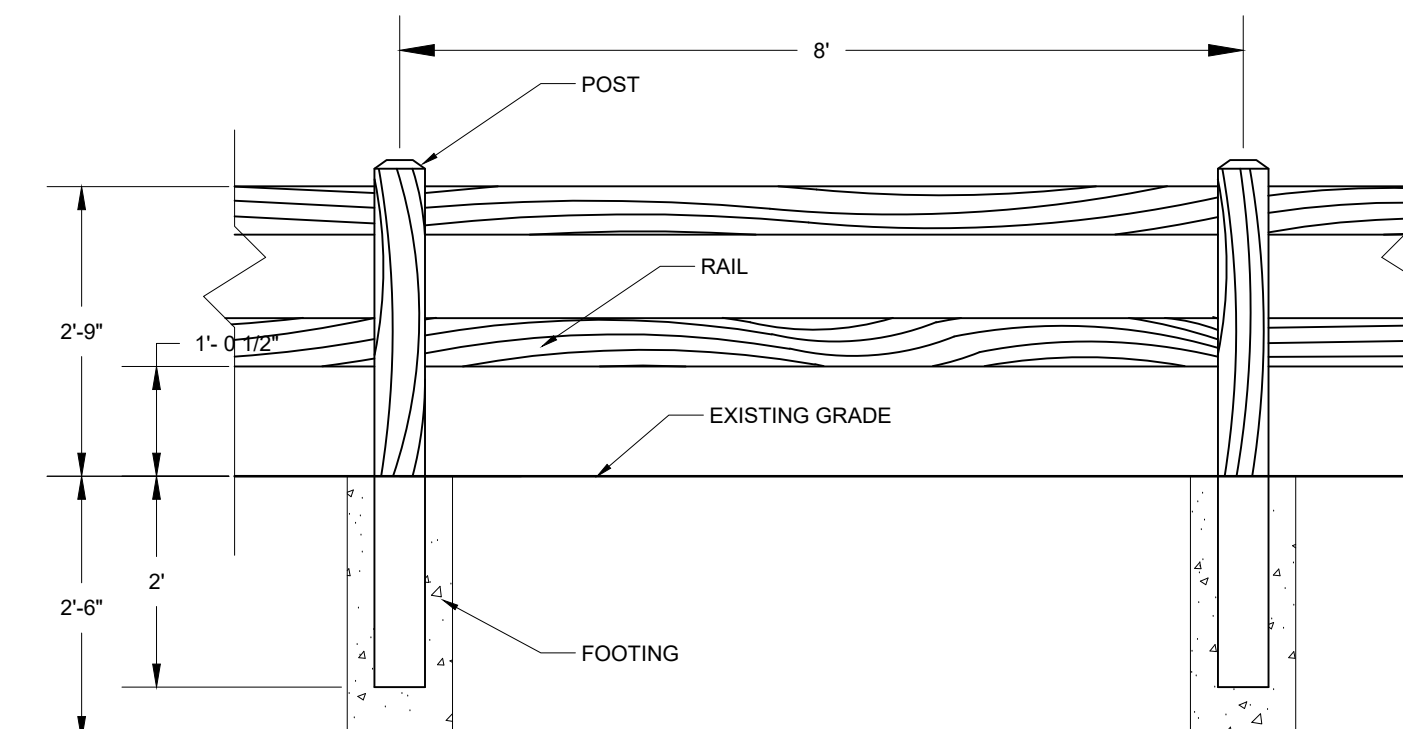


TYPICAL GRAVEL DRIVEWAY DETAIL
NOT TO SCALE

A2



2 RAIL FENCE SECTION



2 RAIL 8 FT. SPACING FENCE ELEVATION

NOTES:
1. ALL CONCRETE TO BE MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS

SPLIT RAIL FENCE (TYP.)
NOT TO SCALE

A1

CONSTRUCTION PHASE STORMWATER OPERATION AND MAINTENANCE PLAN

Gore Place – Barn Improvement Project
249 Waltham Street
Watertown, Massachusetts

Dated: February 2, 2022

I. OWNER:

Gore Place Society
249 Waltham Street
Watertown, MA 02472

II. RESPONSIBLE PARTY:

Gore Place Society
249 Waltham Street
Watertown, MA 02472

III. PROJECT OVERVIEW:

Gore Place is a 50-acre historic country estate located at 52 Gore Street, Waltham. The southwest portion of the property is a 27-acre farmstead located at 249 Waltham St in Watertown. The farmstead portion of the site qualifies as a “Land in Agricultural use” operation including the cultivation of land and production of agricultural goods for consumption. Bordering Vegetated Wetlands are present to the west/ southwest of the property. The Applicant proposes improvements to the existing farmstead by constructing a new pole barn and threshing barn with associated fenced barnyards, gravel driveways, utility service upgrades and relocation of an existing grassed drainage swale. The improvements project also proposes utility service upgrades to the new and existing structures and a relocation of an existing swale to maintain current runoff conditions.

The BMPs used in this design were chosen for their effectiveness and ease of maintenance with respect to developed site conditions. Providing for maintenance requirements that are practical is essential to achieve the desired result of improved water quality of on-site stormwater runoff. This plan will be provided to the resident farmer to educate them on the recommendations of this plan and the DEP Stormwater Management Guidelines.

IV. CONSTRUCTION PERIOD – BEST MANAGEMENT PRACTICES:**a) MONITORING**

During construction operations, the limit of work will be inspected at least once every seven (7) calendar days, or once every fourteen (14) calendar days and within twenty-four (24) hours after

a storm event of one quarter inch (0.25") or greater. Sediment accumulation shall be removed once a depth of one-third the height of the erosion control device is achieved unless otherwise stated. Damaged erosion controls shall be replaced immediately.

b) WASTE DISPOSAL

Metal dumpster type waste disposal receptacles will be located on-site. The project site will be policed daily by a person appointed by the general contractor to be kept the project site free of construction debris.

c) DUST MONITORING PLAN

A dust monitoring plan will be established prior to the start of construction to be kept on site at all times. This will reduce the amount of particulates in the air and reduce impacts to the surrounding areas. Recommended methods for controlling dust include:

- Provide a vegetative cover to disturbed areas at the end of earth disturbing activities as soon as practical, but no longer than 14 days.
- Apply a mulch layer to disturbed areas at the end of earth disturbing activities as soon as practical, but no longer than 14 days.
- Cover stockpiles unused for a maximum of 7 days with poly sheeting or tarps.
- Water surface materials and soil stockpiles.
- Use covered trucks.
- Minimize spoils stockpiled on site.
- Monitor construction practices to minimize unnecessary disturbance and transfer of soil materials.
- Conduct periodic street cleaning along the site frontage during excavation and hauling of materials.
- Pave driveways and parking surfaces (where applicable and feasible).
- Assign a person to remove windblown debris daily.
- Limit the idling of engines or stopped vehicles (with the exception of asphalt and cement concrete mixing trucks and equipment) to five minutes.

d) SPILL PREVENTION AND RESPONSE

Construction activities for this project will necessitate the use of equipment fuels, engine fluids, paints, and adhesives on the construction site and must be considered in the spill prevention and response practices for the project.

The general contractor will ensure areas where potential pollutants can occur are well protected with erosion control barriers and clean up equipment to prevent discharge of waste water, fuels, and oil from vehicles and any other toxic or hazardous spills from the project site.

Should a spill occur, equipment necessary to attend to spills or leaks shall be stored on site in an equipment trailer and shall consist of the following:

- Safety goggles;
- Chemically resistant gloves and overshoe boots;
- Water and chemical fire extinguishers;
- Shovels;
- Absorbent materials;
- Containers suitable for storage of site specific materials; and
- First aid kits.

Spills and leaks shall be treated according to the type, volume, and location of the released material. Generally, mitigation shall consist of the following:

- Prevention of additional material storage;
- Containment of spilled material;
- Safe, thorough, and environmentally sound removal of spilled material; and
- Remediation of environmental damage.

The following describes specific preventative methods to be employed for materials to be used on site.

Fuels, Antifreeze, and Coolant for Construction Equipment and Generators:

In the case of a fuel spill on a pervious surface, the spill shall be contained and treated with absorbent polymer material immediately and the affected soil shall be excavated and stored in an impervious, bermed area for removal by a professional hazardous material removal company. In the case of a fuel spill on an impervious surface, the spill shall be contained to prevent runoff and treated with absorbent material.

Adhesive and Paints:

Adhesive and paint materials shall be transferred to the site on an as needed basis. Any containers to be stored on site shall be clearly labeled and stored in non-flammable lockers. Wash water from paints shall be containerized; washing of paints into the storm drainage system shall be prohibited. Water-based and latex paints shall either be recycled or dried up and thrown out with the regular household trash, and oil-based paints and thinners shall be removed from the site by a local professional hazardous material removal company.

Town of Watertown Emergency Contacts are as Follows:

- Emergency Management: (888) 304-1133 (MassDEP 24-Hour Spill Reporting)
- Police Department: 911
- Fire Department: (617) 972-6510 (Watertown Fire Department)

For spills of less than five (5) gallons of material, mitigation shall consist of source control, containment, and clean-up with absorbent materials, unless an imminent hazard necessitates that a local professional hazardous material removal company become involved to mitigate the spill.

For spills greater than five (5) gallons of material, the incident shall be reported immediately to the MassDEP Hazardous Waste Incident Response Group at (617)-792-7653 and a professional emergency response contractor. Information that shall be provided to the said contractor is as follows:

- Type of material spilled;
- Quantity of material spilled;
- Location of the spill; and
- Time of the spill.

The contractor shall then employ measures to prevent further spillage, contain and/or clean up the spill.

If a Reportable Quantity (RQ) of material is spilled during construction, the National Response Center (NRC) shall be notified immediately at (800) 424-8802. Reportable Quantities of hazardous material are available in 310 CMR 40: Massachusetts Contingency Plan Subpart P: Massachusetts Oil and Hazardous Material List. Within 14 days a report shall be submitted to the EPA New England Regional Office describing the following:

- Type of material released;
- Date and circumstances of the release; and
- Measures taken to prevent future releases.

The report shall be submitted to the EPA New England Regional Office at the following address:

EPA New England, Region 1
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Frequent inspections of areas where potential spill could occur is key to prevention. Inspection shall take place, at a minimum of once every calendar days or once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches or greater or the occurrence of runoff from snowmelt sufficient to cause a discharge.

An inspection report must be completed within 24 hours of completing any site inspection. Each inspection report must include the following:

- The inspection date;
- Names and titles of personnel making the inspection;
- A summary of your inspection findings, covering at a minimum the observations you made in accordance with Part 4.6 of the 2017 Construction General Permit, including any necessary maintenance or corrective actions;
- If inspecting because of rainfall measuring 0.25 inches or greater, include the applicable rain gauge or weather station readings that triggered the inspection; and
- If determined that it is unsafe to inspect a portion of the site, describe the reason found to be unsafe and specify the locations to which the conditions apply.

e) STATE & LOCAL SANITARY LAWS

Portable sanitary units will be placed on-site during construction and will be serviced weekly.

V. CONSTRUCTION PERIOD - STRUCTURAL BEST MANAGEMENT PRACTICES

Structural BMPs are those physical facilities that are designed to manage both stormwater quantity and quality. Proper maintenance of the proposed structural BMPs will ensure design performance, promote longevity, and decrease operator maintenance costs. The structural BMPs selected for the proposed site development include double row staked haybales and silt fence erosion control barrier, existing swale and silt sack catch basin inserts.

a) HAYBALES AND SILT FENCE

Double row of staked haybales and silt fence shall be installed as specified on the "Site Preparation and Demolition Plan", Sheet C100, revised through February 2, 2022, prior to commencing construction activities. The haybales and silt fence shall be inspected daily and maintained throughout construction. Sediment shall be removed before it has accumulated to one-half of the above ground height of the haybales. Any breach in the barrier shall be repaired within 24 hours. Haybales to remain in place for the duration of construction.

b) **SILTSACK® CATCH BASIN INSERTS**

SiltSack® catch basin inserts shall be placed under the grate of the existing dry well located across the existing garage as specified on the “Site Preparation and Demolition Plan”, Sheet C100, revised through February 2, 2022. Silt Sacks® shall remain in place until construction is complete and the site is stabilized. During construction the dry well and SiltSacks® shall be inspected every fourteen (14) calendar days and after a storm of a quarter inch (0.25”) or greater. Sediment accumulation shall be removed once a depth of six-inches (6”) is accumulated in the sack. Damaged SiltSacks® shall be repaired/replaced immediately. Disposal of accumulated sediment and trash is to be in accordance with applicable local, state and federal guidelines and regulations.

c) **CONSTRUCTION ENTRANCE ANTI-TRACKING PAD**

Construction entrance anti-tracking pads shall be installed as specified on the “Site Preparation and Demolition Plan”, Sheet C100, revised through February 2, 2022. The pad will be installed at the proposed curb cut location on Waltham Street to minimize the track-out of sediment onto streets and sidewalks from vehicles leaving the construction site. The pads will extend 50-feet into the development area and be 20-feet wide. The sub-base for the pads will be compacted and covered with a filter cloth. Two-inch crushed stone will be placed on top of the filter cloth at a minimum thickness of 6-inches. The relocated anti-tracking pad will remain in place and maintained until the parking lot receives an asphalt binder course.

The first anti-tracking pad to be installed once the existing pavement is removed from the parking lot. Maintenance requirements include:

- Construction vehicles will be restricted to using only the designated entrance/exit armored with the tracking pad until the site has been stabilized with an asphalt binder course. The removed stone and sediment from the pad will be hauled off site and disposed in accordance with local, state and federal regulations.
- The exit will be maintained in a condition that will prevent tracking or flowing of sediment off-site. This could require additional crushed stone to be placed within the exits. Sediment shall be swept from the anti-tracking pads at least weekly, or more often if necessary. If excess sediment has clogged the pads, the exit will be top dressed with new crushed stone. Replacement of entire pad may be necessary when it becomes completely filled with sediment. The pad will be reshaped as needed for drainage and runoff control.
- Where sediment has been tracked-out from the site, the deposited sediment shall be removed by the end of the same work day. Sediment must be removed by sweeping, shoveling, or vacuuming of these surfaces. Hosing or sweeping tracked-out sediment into a public or private stormwater system is prohibited.

- The exit will be inspected once every seven (7) calendar days and within 24-hours of storm events of 0.25 inches or greater, or the occurrence of runoff from snowmelt sufficient to cause a discharge.

END

LONG-TERM STORMWATER OPERATION AND MAINTENANCE PLAN

Gore Place – Barn Improvement Project
249 Waltham Street
Watertown, Massachusetts

Dated: February 2, 2022

I. OWNER:

Gore Place Society
249 Waltham Street
Watertown, MA 02472

II. RESPONSIBLE PARTY:

Gore Place Society
249 Waltham Street
Watertown, MA 02472

III. PROJECT OVERVIEW:

Gore Place is a 50-acre historic country estate located at 52 Gore Street, Waltham. The southwest portion of the property is a 27-acre farmstead located at 249 Waltham St in Watertown. The farmstead portion of the site qualifies as a “Land in Agricultural use” operation including the cultivation of land and production of agricultural goods for consumption. Bordering Vegetated Wetlands are present to the west/ southwest of the property. The Applicant proposes improvements to the existing farmstead by constructing a new pole barn and threshing barn with associated fenced barnyards, gravel driveways, utility service upgrades and relocation of an existing grassed drainage swale. The improvements project also proposes utility service upgrades to the new and existing structures and a relocation of an existing swale to maintain current runoff conditions.

The BMPs used in this design were chosen for their effectiveness and ease of maintenance with respect to developed site conditions. Providing for maintenance requirements that are practical is essential to achieve the desired result of improved water quality of on-site stormwater runoff. This plan will be provided to the resident farmer to educate them on the recommendations of this plan and the DEP Stormwater Management Guidelines.

IV. POST CONSTRUCTION - BEST MANAGEMENT PRACTICES:**a) NON-STRUCTURAL BEST MANAGEMENT PRACTICES**

Implementing source controls can aid in reducing the types and concentrations of contaminants in stormwater runoff. This principle for pollution prevention and non-structural controls, or BMPs, is to minimize the volume of runoff and to minimize contact of stormwater with potential pollutants. Measures such as, managing snow removal, and educating the owner of good maintenance practices are examples of non-structural BMPs.

i. PUBLIC AWARENESS

The responsible party shall avoid dumping or releasing pollutants into the storm drains and onto the ground.

ii. SNOW AND SNOWMELT MANAGEMENT

The property owner shall avoid stockpiling within the 150-foot buffer. It is suggested that during snowfall events, the snow be stockpiled in the lawn areas to the west of the existing farmhouse and east of the existing driveway entrance.

It is suggested that no de-icing compounds such as calcium chloride (CaCl_2), calcium magnesium acetate (CMA) or the like be used on the site.

iv. PUBLIC SAFETY FEATURES

The project has been designed with consideration for public safety and does not require any specific features as part of the stormwater management system.

b) STRUCTURAL BEST MANAGEMENT PRACTICES:

Structural BMPs are those physical facilities that are designed to manage both stormwater quantity and quality. Proper maintenance of the proposed structural BMPs will ensure design performance and promote longevity of the structure and may decrease operator maintenance costs.

i. GRASSED CHANNEL

The project proposes the relocation of the upstream portion of the existing grassed channel. The proposed grassed channel will be used to intercept runoff generated from the South Pasture of the property and direct it to the remaining portion of the existing swale. There will be no direct discharge of runoff to the on-site intermittent stream.

Inspection should be conducted twice annually the first year, and at least once a year thereafter, for debris and signs of erosion and formations of rills, gullies and grass growth. Plant alternate grass species if the original grass cover is not successfully established. If grass growth is impaired in the winter months, re-establish in the spring.

Mowing of the swale shall be conducted on an as needed basis during the growth season to maintain a minimum grass height of three inches and maximum height of six inches.

End.













Memorandum

To: Laurel Schwab, Senior Environmental Planner
Conservation Office, Third Floor
149 Main Street
Watertown, MA 02472

Date: Jan. 7, 2022

Project #: 14844.00

From: Jessica Coolbaugh
Conor Nagle, PE

Re: 99 Coolidge Avenue
Stormwater Management Design Revisions
due to Discovery of Existing Site Contamination

Due to the discovery of leachable lead on the east side of the 99 Coolidge Avenue redevelopment project in Watertown, MA (the Project), the Project's stormwater design has been modified to convert the infiltration system on the east side of the site to a detention system. An outlet control structure will minimize peak flows discharging from this detention system and a proprietary stormwater filtration system will treat the runoff before it discharges to the neighboring intermittent stream via an existing outfall. The paragraphs below further detail the revisions to the proposed stormwater management strategy and the resulting net stormwater improvements provided by the Project.

Stormwater Management System Modifications

As shown in the revised Site Plans in Appendix A, the stormwater runoff from the surface parking lot, rear courtyard, and building roof that was previously collected via Infiltration System #2 will now be collected in the Detention System. As before, the stormwater runoff from ground surfaces will be collected by a series of deep sump catch basins and piped to Contech CDS hydrodynamic separators to remove TSS. The detention system is made up of StormTech SC-7200 chambers surrounded by stone and wrapped with an impermeable liner. The liner is intended to prevent the collected stormwater from percolating into the ground where the leachable lead was discovered. The detention system provides 44,758 CF of storage.

Flow out of the detention system will be controlled by 2-inch diameter opening in an outlet control structure which will send the 1-inch water quality volume to a media filter (Contech StormFilter). The outlet control structure will also have a weir with a larger opening placed above the water quality volume to discharge the overflow at a controlled rate that minimizes peak rates while maximizing the volume contained within the detention system.

Massachusetts Department of Environmental Protection (DEP) – Stormwater Management Standards

As demonstrated below, the proposed Project fully complies with the DEP Stormwater Management Standards.

Standard 1: No New Untreated Discharges or Erosion to Wetlands

As before, all BMPs have been designed in accordance with the Massachusetts Stormwater Handbook to ensure that all runoff is treated before it is discharged to wetland. All proposed Project stormwater outlets and conveyances have been designed to not cause erosion or scour to wetlands or receiving waters. Outlets from closed drainage systems have been designed with flared end sections and stone protection to dissipate discharge velocities. Overflows from BMP's that impound stormwater have been designed with stone to protect downgradient areas from erosion.

Standard 2: Peak Rate Attenuation

As shown in Table 1 below, the Project reduces runoff peak discharge rates to the wetlands by over 75%. Proposed peak discharge rates to Design Point 2 (Municipal Drainage System) remain the same as provided in the Project stormwater report, dated July 2021. Hydrologic modeling computations for DP-1 are provided in Appendix B.

Table 1 Peak Discharge Rates (cfs) for Design Point 1 - Wetlands

	2-year	10-year	25-year	100-year
Existing	11.9	22.0	30.0	46.4
Proposed	0.8	3.6	6.1	11.0
<i>Runoff Reduction</i>	<i>94%</i>	<i>84%</i>	<i>80%</i>	<i>76%</i>

Standard 3: Stormwater Recharge

Since the Project is reducing total impervious area onsite, there is no Required Recharge Volume for the Project. 15,903 CF of recharge will still be provided via StormTrap infiltration units for the parking garage on the west side of the site. 567 CF of recharge will also be provided via stone infiltration trenches under permeable pavers on Coolidge Avenue. In total, the project will provide a recharge volume of 16,470 CF. Supporting calculations are included in Appendix C.

Standard 4: Water Quality

The proposed stormwater management system implements treatment trains of BMPs that have been designed to provide 80% TSS removal of stormwater runoff from all proposed impervious surfaces. Downstream of the detention system, a media filter (Contech StormFilter) will provide additional treatment. The provided water quality volume of 26,562 cf exceeds the required water quality volume of 13,984 cf. Treatment train worksheets and water quality volume calculations are provided in Appendix D.

The stormwater approach to all remaining Massachusetts Stormwater Standards remains unchanged.

Local Municipal Rules & Regulations and Waiver Request

Town of Watertown Stormwater Rules Management and Erosion Control Regulations

The Project proposes to retain the 100-year, 24-hour storm where feasible and meet Watertown's Retention Standard to the maximum extent practicable. Shallow depth to seasonal high groundwater, prior site contamination, limited infiltration capacity due to historical fill, and surrounding wetland boundaries limit potential areas of infiltration on the site. In addition to the proposed stormwater infiltration, detention, and treatment measures, the Project will reduce stormwater runoff through better site design practices, such as removing extraneous parking, reconfiguring required parking, minimizing use of impervious materials, and providing enhanced vegetation. The proposed improvements will reduce the site's peak runoff rates and runoff volumes.

Charles River Watershed Total Maximum Daily Loads (TMDLs)

The Lower Charles River Nutrient TMDL identifies a 65% target reduction in phosphorus loading for commercial sites. The Project site exports an existing phosphorus load of 8.47 lb/yr. Without treatment, the site's proposed conditions are expected to export a phosphorus load of 6.67 lb/yr. Table 2 identifies each of the proposed drainage watersheds,

the phosphorus loading based on cover type, the receiving BMP and associated phosphorus removal rate, and finally the post-treatment phosphorus loading rate.

In the revised stormwater management design, the runoff from the surface parking lot, rear courtyard, and building roof that was previously infiltrated will be treated using a media filter, specifically a Contech Stormfilter with PhosphoSorb® media. The StormFilter unit typically removes 73% of total phosphorus. Since an upstream overflow conduit will divert peak storm events, the precise amount of treatment that this unit will provide on an annual basis is difficult to calculate. At a minimum, the manufacturer certifies that it will remove 62% of phosphorus from runoff over the total tributary area such that the overall site meets the 65% reduction target.

Table 3 summarizes the existing and proposed phosphorus loading from the Site. The proposed BMPs are expected to reduce phosphorus loads by at least 74% from existing conditions and 67% from proposed conditions. Supporting calculations are included in Appendix E.

Table 2 Proposed Conditions Phosphorus Loading

Subcatchment	Impervious (ac)	Pervious to (ac)	P to BMP (lb/year)	BMP	Removal Rate*	Phosphorus after treatment (lb/year)
PR-1A	1.3	0.0	2.34	StormFilter	62%**	1.07 lb/year
PR-1B	1.2	0.5	2.19	StormFilter	62%**	0.55 lb/year
PR-1C	0.1	1.0	0.18	-	0%	0.18 lb/year
PR-1D	0.7	0.0	1.27	Infiltration	100%	0.00 lb/year
PR-1E	0.3	0.3	0.48	Bioretention	53%	0.22 lb/year
PR-1F	0.1	0.4	0.16	-	0%	0.17 lb/year
PR-1G	0.1	0.1	0.23	Infiltration	100%	0.00 lb/year
Total						2.20 lb/year

* Per MA MS4 General Permit, Appendix F, Table 3-1 - Average annual distinct phosphorus load (P Load) export rates for use in estimating phosphorus load reduction credits in the MA MS4 Permit.

** StormFilter total phosphorus removal efficiency of 73% reduced by a factor of 0.15 to be more conservative considering peak events bypassing the StormFilter.

Table 3 Phosphorus Reduction Summary Table

Existing Phosphorus Loading Rate	8.47 lb/year
Proposed Phosphorus Loading Rate (Pre-Treatment)	6.67 lb/year
Proposed Phosphorus Loading Rate (Post-Treatment)	2.20 lb/year
Percent Reduction from Existing	74.1%
Percent Reduction from Proposed	67.1%

Massachusetts MS4 Compliance

Section 2.3.6.a.ii.4 states that redevelopment sites shall be designed to remove 80% of the average annual load of Total Suspended Solids (TSS) and 50% of the average annual load of Total Phosphorus related to the total post-construction impervious surface area on the site. As demonstrated previously, the Project will exceed both of these reduction targets.

Appendix A: Revised Site Plans

- › Grading and Drainage Plan
- › Utility Plan
- › Site Details #5

PROJECT NUMBER: 20014

DATE: OCTOBER 13, 2021

REVISIONS:

1 BULLETIN #4 11/29/2021
LOCAL APPROVAL 01/09/2022

2 LOCAL APPROVALS 01/07/2022

$$\frac{\Delta}{\Delta} = \frac{\Delta}{\Delta} = \frac{\Delta}{\Delta}$$





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SEE PREVIOUS ISSUES FOR REVISIONS
NOT LISTED HERE

SCALE: 1"=20'

DRAWING NAME:GRADING AND

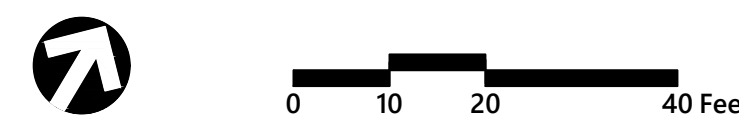
DRAINAGE PLAN

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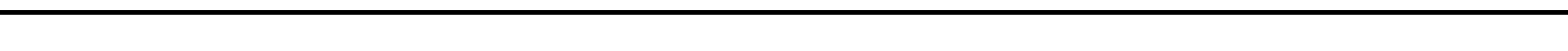
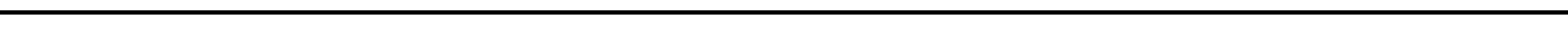
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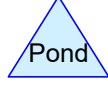
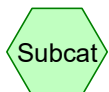
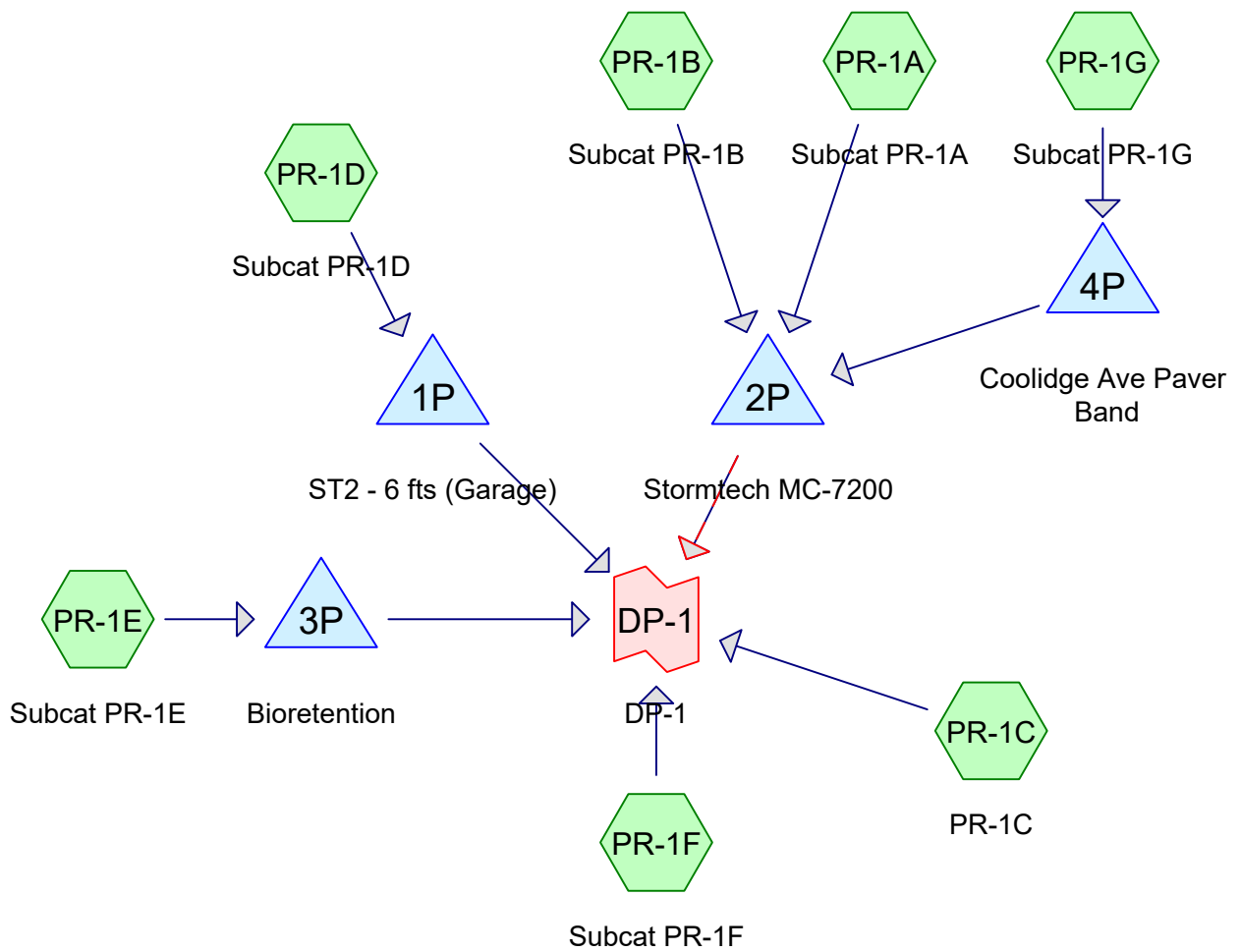
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Appendix B: Standard 2 Computations and Supporting Information

HydroCAD Analysis: Proposed Conditions

The rainfall-runoff response of the Site under existing and proposed conditions was evaluated for storm events with recurrence intervals of 2, 10, 25 and 100-years. Rainfall volumes used for this analysis were based on the Natural Resources Conservation Service (NRCS) Type III, 24-hour storm and precipitation depths for the site: 3.2, 4.9, 6.2, and 8.9 inches, respectively, based on Watertown Stormwater Regulations. Runoff coefficients for the pre- and post-development conditions were determined using NRCS Technical Release 55 (TR-55) methodology as provided in HydroCAD. The HydroCAD model is based on the NRCS Technical Release 20 (TR-20) Model for Project Formulation Hydrology.



Routing Diagram for 14844.00 - PR-Drainage_Overdig(1.02)_Detention
 Prepared by VHB, Printed 1/7/2022
 HydroCAD® 10.10-5a s/n 01038 © 2020 HydroCAD Software Solutions LLC

14844.00 - PR-Drainage_Overdig(1.02)_Detention

Type III 24-hr 2-Years Rainfall=3.20"

Prepared by VHB

Printed 1/7/2022

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Page 2

Summary for Subcatchment PR-1A: Subcat PR-1A

Runoff = 5.20 cfs @ 12.07 hrs, Volume= 0.359 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Years Rainfall=3.20"

Area (ac)	CN	Description
* 0.000	0	, HSG A
0.307	39	>75% Grass cover, Good, HSG A
0.421	98	Paved parking, HSG A
1.316	98	Roofs, HSG A
0.026	98	Unconnected pavement, HSG A
2.070	89	Weighted Average
0.307		14.81% Pervious Area
1.764		85.19% Impervious Area
0.026		1.48% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0600	1.86		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
3.1	229	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	15	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.6	294	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1B: Subcat PR-1B

Runoff = 2.30 cfs @ 12.11 hrs, Volume= 0.174 af, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Years Rainfall=3.20"

Area (sf)	CN	Description
* 0	0	, HSG A
7,525	39	>75% Grass cover, Good, HSG A
2,727	96	Gravel surface, HSG A
30,963	98	Paved parking, HSG A
81	98	Roofs, HSG A
4,201	98	Unconnected pavement, HSG A
45,496	88	Weighted Average
10,252		22.53% Pervious Area
35,244		77.47% Impervious Area
4,201		11.92% Unconnected

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Type III 24-hr 2-Years Rainfall=3.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.2	63	0.0170	0.91		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.6	80	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.7	193	Total			

Summary for Subcatchment PR-1C: PR-1C

Runoff = 0.01 cfs @ 15.05 hrs, Volume= 0.005 af, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Years Rainfall=3.20"

Area (ac)	CN	Description
0.950	39	>75% Grass cover, Good, HSG A
0.071	96	Gravel surface, HSG A
0.000	98	Paved parking, HSG A
0.010	98	Roofs, HSG A
0.042	98	roofs, HSG A
1.073	46	Weighted Average
1.021		95.15% Pervious Area
0.052		4.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	44	0.0450	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
3.7	44	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1D: Subcat PR-1D

Runoff = 2.29 cfs @ 12.07 hrs, Volume= 0.176 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Years Rainfall=3.20"

Area (ac)	CN	Description
0.713	98	Roofs, HSG A
0.713		100.00% Impervious Area

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Type III 24-hr 2-Years Rainfall=3.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0320	1.45		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.1	25	0.2380	7.85		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	75	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1E: Subcat PR-1E

Runoff = 0.79 cfs @ 12.08 hrs, Volume= 0.055 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Years Rainfall=3.20"

Area (ac)	CN	Description
0.170	39	>75% Grass cover, Good, HSG A
0.088	96	Gravel surface, HSG A
0.205	98	Paved parking, HSG A
* 0.005	98	pavement, HSG A
0.050	98	Water Surface, HSG A
0.518	78	Weighted Average
0.258		49.81% Pervious Area
0.260		50.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	50	0.0400	0.47		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.5	260	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	74	0.0360	2.85		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.7	384	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1F: Subcat PR-1F

Runoff = 0.03 cfs @ 12.39 hrs, Volume= 0.007 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Years Rainfall=3.20"

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Type III 24-hr 2-Years Rainfall=3.20"

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Area (ac)	CN	Description
0.373	39	>75% Grass cover, Good, HSG A
0.028	96	Gravel surface, HSG A
0.002	98	Paved parking, HSG A
0.005	98	Roofs, HSG A
* 0.033	98	pavement, HSG A
0.041	98	roofs, HSG A
0.482	52	Weighted Average
0.401		83.20% Pervious Area
0.081		16.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	34	0.3190	0.42		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.4	34	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1G: Subcat PR-1G

Runoff = 0.56 cfs @ 12.07 hrs, Volume= 0.039 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Years Rainfall=3.20"

Area (ac)	CN	Description
0.035	39	>75% Grass cover, Good, HSG A
0.018	98	Paved parking, HSG A
* 0.170	98	pavement, HSG A
0.223	89	Weighted Average
0.035		15.70% Pervious Area
0.188		84.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	20	0.0250	1.09		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.9	9	0.0580	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.2	29	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond 1P: ST2 - 6 fts (Garage)

Inflow Area = 0.713 ac, 100.00% Impervious, Inflow Depth = 2.97" for 2-Years event
 Inflow = 2.29 cfs @ 12.07 hrs, Volume= 0.176 af
 Outflow = 0.08 cfs @ 9.44 hrs, Volume= 0.176 af, Atten= 97%, Lag= 0.0 min
 Discarded = 0.08 cfs @ 9.44 hrs, Volume= 0.176 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

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Type III 24-hr 2-Years Rainfall=3.20"

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Peak Elev= 10.22' @ 15.37 hrs Surf.Area= 3,310 sf Storage= 4,135 cf

Plug-Flow detention time= 462.2 min calculated for 0.176 af (100% of inflow)

Center-of-Mass det. time= 462.2 min (1,217.6 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	8.50'	662 cf	21.79'W x 151.88'L x 7.00'H Field A 23,167 cf Overall - 21,512 cf Embedded = 1,655 cf x 40.0% Voids
#2A	9.00'	17,039 cf	StormTrap ST2 SingleTrap 6-0 x 9 Inside #1 Inside= 101.7"W x 72.0"H => 45.09 sf x 15.40'L = 694.1 cf Outside= 101.7"W x 78.0"H => 55.11 sf x 15.40'L = 848.5 cf 8.48' x 138.56' Core + 6.66' Border = 21.79' x 151.88' System
		17,701 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	8.50'	1.020 in/hr Exfiltration over Surface area
#2	Device 3	14.60'	5.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	9.00'	12.0" Round Culvert L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.00' / 8.90' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.08 cfs @ 9.44 hrs HW=8.57' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.08 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=8.50' (Free Discharge)↑**3=Culvert** (Controls 0.00 cfs)↑**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)**Summary for Pond 2P: Stormtech MC-7200**

Inflow Area = 3.338 ac, 82.71% Impervious, Inflow Depth = 2.01" for 2-Years event
Inflow = 7.87 cfs @ 12.08 hrs, Volume= 0.558 af
Outflow = 0.65 cfs @ 13.18 hrs, Volume= 0.558 af, Atten= 92%, Lag= 66.0 min
Primary = 0.13 cfs @ 13.18 hrs, Volume= 0.374 af
Secondary = 0.52 cfs @ 13.18 hrs, Volume= 0.183 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

Peak Elev= 12.51' @ 13.18 hrs Surf.Area= 11,250 sf Storage= 14,149 cf

Plug-Flow detention time= 961.2 min calculated for 0.558 af (100% of inflow)

Center-of-Mass det. time= 961.2 min (1,771.5 - 810.3)

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Volume	Invert	Avail.Storage	Storage Description
#1A	11.00'	4,403 cf	18.17'W x 192.03'L x 6.00'H Field A 20,932 cf Overall - 9,924 cf Embedded = 11,007 cf x 40.0% Voids
#2A	11.00'	9,924 cf	ADS_StormTech MC-7200 b +Cap x 56 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 56 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#3B	11.00'	3,527 cf	10.33'W x 244.77'L x 6.00'H Field B 15,176 cf Overall - 6,357 cf Embedded = 8,818 cf x 40.0% Voids
#4B	11.00'	6,357 cf	ADS_StormTech MC-7200 b +Cap x 36 Inside #3 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#5C	11.00'	427 cf	9.08'W x 33.83'L x 6.00'H Field C 1,844 cf Overall - 777 cf Embedded = 1,067 cf x 40.0% Voids
#6C	11.00'	777 cf	ADS_StormTech MC-7200 b +Cap x 4 Inside #5 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#7D	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field D 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#8D	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #7 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#9E	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field E 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#10E	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #9 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#11F	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field F 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#12F	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #11 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#13G	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field G 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#14G	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #13 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#15H	11.00'	501 cf	9.08'W x 40.42'L x 6.00'H Field H 2,203 cf Overall - 951 cf Embedded = 1,252 cf x 40.0% Voids
#16H	11.00'	951 cf	ADS_StormTech MC-7200 b +Cap x 5 Inside #15 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#17I	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field I 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids

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#18I	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #17 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#19J	11.00'	1,445 cf	18.17'W x 60.20'L x 6.00'H Field J 6,562 cf Overall - 2,948 cf Embedded = 3,613 cf x 40.0% Voids
#20J	11.00'	2,948 cf	ADS_StormTech MC-7200 b +Cap x 16 Inside #19 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 16 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#21K	11.00'	1,961 cf	19.42'W x 73.38'L x 6.00'H Field K 8,549 cf Overall - 3,646 cf Embedded = 4,903 cf x 40.0% Voids
#22K	11.00'	3,646 cf	ADS_StormTech MC-7200 b +Cap x 20 Inside #21 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 20 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#23O	11.00'	723 cf	9.08'W x 60.20'L x 6.00'H Field O 3,281 cf Overall - 1,474 cf Embedded = 1,807 cf x 40.0% Voids
#24O	11.00'	1,474 cf	ADS_StormTech MC-7200 b +Cap x 8 Inside #23 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#25M	11.00'	501 cf	9.08'W x 40.42'L x 6.00'H Field M 2,203 cf Overall - 951 cf Embedded = 1,252 cf x 40.0% Voids
#26M	11.00'	951 cf	ADS_StormTech MC-7200 b +Cap x 5 Inside #25 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#27N	11.00'	649 cf	9.08'W x 53.61'L x 6.00'H Field N 2,922 cf Overall - 1,300 cf Embedded = 1,622 cf x 40.0% Voids
#28N	11.00'	1,300 cf	ADS_StormTech MC-7200 b +Cap x 7 Inside #27 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
44,758 cf			Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard
Storage Group D created with Chamber Wizard
Storage Group E created with Chamber Wizard
Storage Group F created with Chamber Wizard
Storage Group G created with Chamber Wizard
Storage Group H created with Chamber Wizard
Storage Group I created with Chamber Wizard
Storage Group J created with Chamber Wizard
Storage Group K created with Chamber Wizard
Storage Group O created with Chamber Wizard
Storage Group M created with Chamber Wizard
Storage Group N created with Chamber Wizard

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Device	Routing	Invert	Outlet Devices
#1	Primary	11.00'	12.0" Round 12" Culvert L= 22.9' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 11.00' / 10.90' S= 0.0044 '/ Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	11.00'	15.0" Round 15" Culvert L= 14.2' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 11.00' / 10.70' S= 0.0211 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#3	Device 1	11.00'	2.0" Vert. 2" Orifice C= 0.600 Limited to weir flow at low heads
#4	Device 2	12.15'	9.0" W x 8.0" H Vert. Rectangular Orifice C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.13 cfs @ 13.18 hrs HW=12.51' (Free Discharge)↑ **1=12" Culvert** (Passes 0.13 cfs of 3.31 cfs potential flow)↑ **3=2" Orifice** (Orifice Controls 0.13 cfs @ 5.75 fps)**Secondary OutFlow** Max=0.52 cfs @ 13.18 hrs HW=12.51' (Free Discharge)↑ **2=15" Culvert** (Passes 0.52 cfs of 5.56 cfs potential flow)↑ **4=Rectangular Orifice** (Orifice Controls 0.52 cfs @ 1.93 fps)**Summary for Pond 3P: Bioretention**

Inflow Area = 0.518 ac, 50.19% Impervious, Inflow Depth = 1.27" for 2-Years event
 Inflow = 0.79 cfs @ 12.08 hrs, Volume= 0.055 af
 Outflow = 0.14 cfs @ 12.56 hrs, Volume= 0.032 af, Atten= 82%, Lag= 28.9 min
 Primary = 0.14 cfs @ 12.56 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
 Peak Elev= 9.81' @ 12.56 hrs Surf.Area= 1,575 sf Storage= 1,109 cf

Plug-Flow detention time= 230.3 min calculated for 0.032 af (57% of inflow)
 Center-of-Mass det. time= 111.6 min (959.9 - 848.2)

Volume	Invert	Avail.Storage	Storage Description
#1	9.00'	3,347 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
9.00	1,184	138.0	0	0	1,184
10.00	1,677	159.0	1,423	1,423	1,702
11.00	2,182	178.0	1,924	3,347	2,239

Device	Routing	Invert	Outlet Devices
#1	Device 2	9.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	5.00'	12.0" Round Culvert L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 5.00' / 4.50' S= 0.0050 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

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Primary OutFlow Max=0.14 cfs @ 12.56 hrs HW=9.81' (Free Discharge)↑ **2=Culvert** (Passes 0.14 cfs of 6.40 cfs potential flow)↑ **1=Orifice/Grate** (Weir Controls 0.14 cfs @ 0.78 fps)**Summary for Pond 4P: Coolidge Ave Paver Band**

Inflow Area = 0.223 ac, 84.30% Impervious, Inflow Depth = 2.08" for 2-Years event

Inflow = 0.56 cfs @ 12.07 hrs, Volume= 0.039 af

Outflow = 0.54 cfs @ 12.10 hrs, Volume= 0.039 af, Atten= 4%, Lag= 1.4 min

Discarded = 0.01 cfs @ 12.10 hrs, Volume= 0.014 af

Primary = 0.52 cfs @ 12.10 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

Peak Elev= 19.42' @ 12.10 hrs Surf.Area= 462 sf Storage= 213 cf

Plug-Flow detention time= 80.2 min calculated for 0.039 af (100% of inflow)

Center-of-Mass det. time= 80.3 min (890.4 - 810.2)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	958 cf	Stone Infiltration Trench (Conic) Listed below (Recalc) 2,394 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
17.00	1	0	0	1
18.00	195	70	70	197
19.00	384	284	354	395
20.00	581	479	833	607
21.00	783	679	1,513	829
22.00	983	881	2,394	1,055

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	1.020 in/hr Exfiltration over Wetted area
#2	Primary	19.00'	10.0" Round Culvert L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 19.00' / 18.80' S= 0.0100 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.01 cfs @ 12.10 hrs HW=19.42' (Free Discharge)↑ **1=Exfiltration** (Exfiltration Controls 0.01 cfs)**Primary OutFlow** Max=0.52 cfs @ 12.10 hrs HW=19.42' (Free Discharge)↑ **2=Culvert** (Barrel Controls 0.52 cfs @ 2.78 fps)

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Summary for Link DP-1: DP-1

Inflow Area = 6.123 ac, 63.14% Impervious, Inflow Depth = 1.18" for 2-Years event

Inflow = 0.76 cfs @ 13.00 hrs, Volume= 0.601 af

Primary = 0.76 cfs @ 13.00 hrs, Volume= 0.601 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

Summary for Subcatchment PR-1A: Subcat PR-1A

Runoff = 8.99 cfs @ 12.07 hrs, Volume= 0.634 af, Depth= 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Years Rainfall=4.90"

Area (ac)	CN	Description
*	0.000	0 , HSG A
	0.307	39 >75% Grass cover, Good, HSG A
	0.421	98 Paved parking, HSG A
	1.316	98 Roofs, HSG A
	0.026	98 Unconnected pavement, HSG A
	2.070	89 Weighted Average
	0.307	14.81% Pervious Area
	1.764	85.19% Impervious Area
	0.026	1.48% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0600	1.86		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
3.1	229	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	15	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.6	294	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1B: Subcat PR-1B

Runoff = 4.04 cfs @ 12.11 hrs, Volume= 0.311 af, Depth= 3.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Years Rainfall=4.90"

Area (sf)	CN	Description
*	0	0 , HSG A
	7,525	39 >75% Grass cover, Good, HSG A
	2,727	96 Gravel surface, HSG A
	30,963	98 Paved parking, HSG A
	81	98 Roofs, HSG A
	4,201	98 Unconnected pavement, HSG A
	45,496	88 Weighted Average
	10,252	22.53% Pervious Area
	35,244	77.47% Impervious Area
	4,201	11.92% Unconnected

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.2	63	0.0170	0.91		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.6	80	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.7	193	Total			

Summary for Subcatchment PR-1C: PR-1C

Runoff = 0.23 cfs @ 12.28 hrs, Volume= 0.041 af, Depth= 0.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Years Rainfall=4.90"

Area (ac)	CN	Description
0.950	39	>75% Grass cover, Good, HSG A
0.071	96	Gravel surface, HSG A
0.000	98	Paved parking, HSG A
0.010	98	Roofs, HSG A
0.042	98	roofs, HSG A
1.073	46	Weighted Average
1.021		95.15% Pervious Area
0.052		4.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	44	0.0450	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
3.7	44	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1D: Subcat PR-1D

Runoff = 3.54 cfs @ 12.07 hrs, Volume= 0.277 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Years Rainfall=4.90"

Area (ac)	CN	Description
0.713	98	Roofs, HSG A
0.713		100.00% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0320	1.45		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.1	25	0.2380	7.85		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	75	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1E: Subcat PR-1E

Runoff = 1.65 cfs @ 12.08 hrs, Volume= 0.113 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Years Rainfall=4.90"

Area (ac)	CN	Description
0.170	39	>75% Grass cover, Good, HSG A
0.088	96	Gravel surface, HSG A
0.205	98	Paved parking, HSG A
* 0.005	98	pavement, HSG A
0.050	98	Water Surface, HSG A
0.518	78	Weighted Average
0.258		49.81% Pervious Area
0.260		50.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	50	0.0400	0.47		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.5	260	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	74	0.0360	2.85		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.7	384	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1F: Subcat PR-1F

Runoff = 0.31 cfs @ 12.10 hrs, Volume= 0.030 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Years Rainfall=4.90"

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Area (ac)	CN	Description
0.373	39	>75% Grass cover, Good, HSG A
0.028	96	Gravel surface, HSG A
0.002	98	Paved parking, HSG A
0.005	98	Roofs, HSG A
* 0.033	98	pavement, HSG A
0.041	98	roofs, HSG A
0.482	52	Weighted Average
0.401		83.20% Pervious Area
0.081		16.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	34	0.3190	0.42		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.4	34	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1G: Subcat PR-1G

Runoff = 0.97 cfs @ 12.07 hrs, Volume= 0.068 af, Depth= 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Years Rainfall=4.90"

Area (ac)	CN	Description
0.035	39	>75% Grass cover, Good, HSG A
0.018	98	Paved parking, HSG A
* 0.170	98	pavement, HSG A
0.223	89	Weighted Average
0.035		15.70% Pervious Area
0.188		84.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	20	0.0250	1.09		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.9	9	0.0580	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.2	29	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond 1P: ST2 - 6 fts (Garage)

Inflow Area = 0.713 ac, 100.00% Impervious, Inflow Depth = 4.66" for 10-Years event
 Inflow = 3.54 cfs @ 12.07 hrs, Volume= 0.277 af
 Outflow = 0.08 cfs @ 8.08 hrs, Volume= 0.277 af, Atten= 98%, Lag= 0.0 min
 Discarded = 0.08 cfs @ 8.08 hrs, Volume= 0.277 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

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Peak Elev= 11.42' @ 16.83 hrs Surf.Area= 3,310 sf Storage= 7,521 cf

Plug-Flow detention time= 835.3 min calculated for 0.277 af (100% of inflow)

Center-of-Mass det. time= 835.3 min (1,582.7 - 747.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	8.50'	662 cf	21.79'W x 151.88'L x 7.00'H Field A 23,167 cf Overall - 21,512 cf Embedded = 1,655 cf x 40.0% Voids
#2A	9.00'	17,039 cf	StormTrap ST2 SingleTrap 6-0 x 9 Inside #1 Inside= 101.7"W x 72.0"H => 45.09 sf x 15.40'L = 694.1 cf Outside= 101.7"W x 78.0"H => 55.11 sf x 15.40'L = 848.5 cf 8.48' x 138.56' Core + 6.66' Border = 21.79' x 151.88' System
		17,701 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	8.50'	1.020 in/hr Exfiltration over Surface area
#2	Device 3	14.60'	5.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	9.00'	12.0" Round Culvert L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.00' / 8.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.08 cfs @ 8.08 hrs HW=8.57' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.08 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=8.50' (Free Discharge)↑**3=Culvert** (Controls 0.00 cfs)↑**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)**Summary for Pond 2P: Stormtech MC-7200**

Inflow Area = 3.338 ac, 82.71% Impervious, Inflow Depth = 3.59" for 10-Years event
Inflow = 13.70 cfs @ 12.08 hrs, Volume= 0.998 af
Outflow = 2.51 cfs @ 12.54 hrs, Volume= 0.998 af, Atten= 82%, Lag= 27.5 min
Primary = 0.16 cfs @ 12.54 hrs, Volume= 0.403 af
Secondary = 2.35 cfs @ 12.54 hrs, Volume= 0.595 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

Peak Elev= 13.44' @ 12.54 hrs Surf.Area= 11,250 sf Storage= 22,384 cf

Plug-Flow detention time= 598.3 min calculated for 0.998 af (100% of inflow)

Center-of-Mass det. time= 598.3 min (1,393.4 - 795.1)

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Volume	Invert	Avail.Storage	Storage Description
#1A	11.00'	4,403 cf	18.17'W x 192.03'L x 6.00'H Field A 20,932 cf Overall - 9,924 cf Embedded = 11,007 cf x 40.0% Voids
#2A	11.00'	9,924 cf	ADS_StormTech MC-7200 b +Cap x 56 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 56 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#3B	11.00'	3,527 cf	10.33'W x 244.77'L x 6.00'H Field B 15,176 cf Overall - 6,357 cf Embedded = 8,818 cf x 40.0% Voids
#4B	11.00'	6,357 cf	ADS_StormTech MC-7200 b +Cap x 36 Inside #3 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#5C	11.00'	427 cf	9.08'W x 33.83'L x 6.00'H Field C 1,844 cf Overall - 777 cf Embedded = 1,067 cf x 40.0% Voids
#6C	11.00'	777 cf	ADS_StormTech MC-7200 b +Cap x 4 Inside #5 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#7D	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field D 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#8D	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #7 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#9E	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field E 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#10E	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #9 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#11F	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field F 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#12F	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #11 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#13G	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field G 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#14G	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #13 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#15H	11.00'	501 cf	9.08'W x 40.42'L x 6.00'H Field H 2,203 cf Overall - 951 cf Embedded = 1,252 cf x 40.0% Voids
#16H	11.00'	951 cf	ADS_StormTech MC-7200 b +Cap x 5 Inside #15 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#17I	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field I 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids

#18I	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #17 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#19J	11.00'	1,445 cf	18.17'W x 60.20'L x 6.00'H Field J 6,562 cf Overall - 2,948 cf Embedded = 3,613 cf x 40.0% Voids
#20J	11.00'	2,948 cf	ADS_StormTech MC-7200 b +Cap x 16 Inside #19 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 16 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#21K	11.00'	1,961 cf	19.42'W x 73.38'L x 6.00'H Field K 8,549 cf Overall - 3,646 cf Embedded = 4,903 cf x 40.0% Voids
#22K	11.00'	3,646 cf	ADS_StormTech MC-7200 b +Cap x 20 Inside #21 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 20 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#23O	11.00'	723 cf	9.08'W x 60.20'L x 6.00'H Field O 3,281 cf Overall - 1,474 cf Embedded = 1,807 cf x 40.0% Voids
#24O	11.00'	1,474 cf	ADS_StormTech MC-7200 b +Cap x 8 Inside #23 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#25M	11.00'	501 cf	9.08'W x 40.42'L x 6.00'H Field M 2,203 cf Overall - 951 cf Embedded = 1,252 cf x 40.0% Voids
#26M	11.00'	951 cf	ADS_StormTech MC-7200 b +Cap x 5 Inside #25 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#27N	11.00'	649 cf	9.08'W x 53.61'L x 6.00'H Field N 2,922 cf Overall - 1,300 cf Embedded = 1,622 cf x 40.0% Voids
#28N	11.00'	1,300 cf	ADS_StormTech MC-7200 b +Cap x 7 Inside #27 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
44,758 cf			Total Available Storage

Storage Group A created with Chamber Wizard
 Storage Group B created with Chamber Wizard
 Storage Group C created with Chamber Wizard
 Storage Group D created with Chamber Wizard
 Storage Group E created with Chamber Wizard
 Storage Group F created with Chamber Wizard
 Storage Group G created with Chamber Wizard
 Storage Group H created with Chamber Wizard
 Storage Group I created with Chamber Wizard
 Storage Group J created with Chamber Wizard
 Storage Group K created with Chamber Wizard
 Storage Group O created with Chamber Wizard
 Storage Group M created with Chamber Wizard
 Storage Group N created with Chamber Wizard

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Device	Routing	Invert	Outlet Devices
#1	Primary	11.00'	12.0" Round 12" Culvert L= 22.9' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 11.00' / 10.90' S= 0.0044 '/ Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	11.00'	15.0" Round 15" Culvert L= 14.2' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 11.00' / 10.70' S= 0.0211 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#3	Device 1	11.00'	2.0" Vert. 2" Orifice C= 0.600 Limited to weir flow at low heads
#4	Device 2	12.15'	9.0" W x 8.0" H Vert. Rectangular Orifice C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.16 cfs @ 12.54 hrs HW=13.44' (Free Discharge)↑ **1=12" Culvert** (Passes 0.16 cfs of 5.25 cfs potential flow)↑ **3=2" Orifice** (Orifice Controls 0.16 cfs @ 7.40 fps)**Secondary OutFlow** Max=2.35 cfs @ 12.54 hrs HW=13.44' (Free Discharge)↑ **2=15" Culvert** (Passes 2.35 cfs of 7.97 cfs potential flow)↑ **4=Rectangular Orifice** (Orifice Controls 2.35 cfs @ 4.69 fps)**Summary for Pond 3P: Bioretention**

Inflow Area = 0.518 ac, 50.19% Impervious, Inflow Depth = 2.63" for 10-Years event
 Inflow = 1.65 cfs @ 12.08 hrs, Volume= 0.113 af
 Outflow = 1.24 cfs @ 12.14 hrs, Volume= 0.090 af, Atten= 25%, Lag= 4.0 min
 Primary = 1.24 cfs @ 12.14 hrs, Volume= 0.090 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

Peak Elev= 9.99' @ 12.14 hrs Surf.Area= 1,674 sf Storage= 1,413 cf

Plug-Flow detention time= 127.2 min calculated for 0.090 af (79% of inflow)

Center-of-Mass det. time= 47.7 min (874.8 - 827.1)

Volume	Invert	Avail.Storage	Storage Description
#1	9.00'	3,347 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
9.00	1,184	138.0	0	0	1,184
10.00	1,677	159.0	1,423	1,423	1,702
11.00	2,182	178.0	1,924	3,347	2,239

Device	Routing	Invert	Outlet Devices
#1	Device 2	9.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	5.00'	12.0" Round Culvert L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 5.00' / 4.50' S= 0.0050 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.23 cfs @ 12.14 hrs HW=9.99' (Free Discharge)

↑ **2=Culvert** (Passes 1.23 cfs of 6.54 cfs potential flow)
 ↑ **1=Orifice/Grate** (Weir Controls 1.23 cfs @ 1.61 fps)

Summary for Pond 4P: Coolidge Ave Paver Band

Inflow Area = 0.223 ac, 84.30% Impervious, Inflow Depth = 3.68" for 10-Years event
 Inflow = 0.97 cfs @ 12.07 hrs, Volume= 0.068 af
 Outflow = 0.93 cfs @ 12.09 hrs, Volume= 0.068 af, Atten= 4%, Lag= 1.3 min
 Discarded = 0.01 cfs @ 12.09 hrs, Volume= 0.016 af
 Primary = 0.92 cfs @ 12.09 hrs, Volume= 0.052 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
 Peak Elev= 19.59' @ 12.09 hrs Surf.Area= 495 sf Storage= 245 cf

Plug-Flow detention time= 54.8 min calculated for 0.068 af (100% of inflow)
 Center-of-Mass det. time= 54.8 min (849.0 - 794.2)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	958 cf	Stone Infiltration Trench (Conic) Listed below (Recalc) 2,394 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
17.00	1	0	0	1
18.00	195	70	70	197
19.00	384	284	354	395
20.00	581	479	833	607
21.00	783	679	1,513	829
22.00	983	881	2,394	1,055

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	1.020 in/hr Exfiltration over Wetted area
#2	Primary	19.00'	10.0" Round Culvert L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 19.00' / 18.80' S= 0.0100 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.01 cfs @ 12.09 hrs HW=19.59' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.92 cfs @ 12.09 hrs HW=19.59' (Free Discharge)

↑ **2=Culvert** (Barrel Controls 0.92 cfs @ 3.14 fps)

Summary for Link DP-1: DP-1

Inflow Area = 6.123 ac, 63.14% Impervious, Inflow Depth = 2.27" for 10-Years event
Inflow = 3.55 cfs @ 12.22 hrs, Volume= 1.159 af
Primary = 3.55 cfs @ 12.22 hrs, Volume= 1.159 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

Summary for Subcatchment PR-1A: Subcat PR-1A

Runoff = 11.88 cfs @ 12.07 hrs, Volume= 0.850 af, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Years Rainfall=6.20"

Area (ac)	CN	Description
*	0.000	0 , HSG A
	0.307	39 >75% Grass cover, Good, HSG A
	0.421	98 Paved parking, HSG A
	1.316	98 Roofs, HSG A
	0.026	98 Unconnected pavement, HSG A
	2.070	89 Weighted Average
	0.307	14.81% Pervious Area
	1.764	85.19% Impervious Area
	0.026	1.48% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0600	1.86		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
3.1	229	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	15	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.6	294	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1B: Subcat PR-1B

Runoff = 5.37 cfs @ 12.11 hrs, Volume= 0.419 af, Depth= 4.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Years Rainfall=6.20"

Area (sf)	CN	Description
*	0	0 , HSG A
	7,525	39 >75% Grass cover, Good, HSG A
	2,727	96 Gravel surface, HSG A
	30,963	98 Paved parking, HSG A
	81	98 Roofs, HSG A
	4,201	98 Unconnected pavement, HSG A
	45,496	88 Weighted Average
	10,252	22.53% Pervious Area
	35,244	77.47% Impervious Area
	4,201	11.92% Unconnected

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.2	63	0.0170	0.91		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.6	80	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.7	193	Total			

Summary for Subcatchment PR-1C: PR-1C

Runoff = 0.85 cfs @ 12.10 hrs, Volume= 0.085 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Years Rainfall=6.20"

Area (ac)	CN	Description
0.950	39	>75% Grass cover, Good, HSG A
0.071	96	Gravel surface, HSG A
0.000	98	Paved parking, HSG A
0.010	98	Roofs, HSG A
0.042	98	roofs, HSG A
1.073	46	Weighted Average
1.021		95.15% Pervious Area
0.052		4.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	44	0.0450	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
3.7	44	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1D: Subcat PR-1D

Runoff = 4.49 cfs @ 12.07 hrs, Volume= 0.354 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Years Rainfall=6.20"

Area (ac)	CN	Description
0.713	98	Roofs, HSG A
0.713		100.00% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0320	1.45		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.1	25	0.2380	7.85		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	75	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1E: Subcat PR-1E

Runoff = 2.36 cfs @ 12.07 hrs, Volume= 0.162 af, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Years Rainfall=6.20"

Area (ac)	CN	Description
0.170	39	>75% Grass cover, Good, HSG A
0.088	96	Gravel surface, HSG A
0.205	98	Paved parking, HSG A
* 0.005	98	pavement, HSG A
0.050	98	Water Surface, HSG A
0.518	78	Weighted Average
0.258		49.81% Pervious Area
0.260		50.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	50	0.0400	0.47		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.5	260	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	74	0.0360	2.85		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.7	384	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1F: Subcat PR-1F

Runoff = 0.70 cfs @ 12.09 hrs, Volume= 0.056 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Years Rainfall=6.20"

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Area (ac)	CN	Description
0.373	39	>75% Grass cover, Good, HSG A
0.028	96	Gravel surface, HSG A
0.002	98	Paved parking, HSG A
0.005	98	Roofs, HSG A
* 0.033	98	pavement, HSG A
0.041	98	roofs, HSG A
0.482	52	Weighted Average
0.401		83.20% Pervious Area
0.081		16.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	34	0.3190	0.42		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.4	34	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1G: Subcat PR-1G

Runoff = 1.28 cfs @ 12.07 hrs, Volume= 0.092 af, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Years Rainfall=6.20"

Area (ac)	CN	Description
0.035	39	>75% Grass cover, Good, HSG A
0.018	98	Paved parking, HSG A
* 0.170	98	pavement, HSG A
0.223	89	Weighted Average
0.035		15.70% Pervious Area
0.188		84.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	20	0.0250	1.09		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.9	9	0.0580	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.2	29	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond 1P: ST2 - 6 fts (Garage)

Inflow Area = 0.713 ac, 100.00% Impervious, Inflow Depth = 5.96" for 25-Years event
 Inflow = 4.49 cfs @ 12.07 hrs, Volume= 0.354 af
 Outflow = 0.08 cfs @ 7.05 hrs, Volume= 0.354 af, Atten= 98%, Lag= 0.0 min
 Discarded = 0.08 cfs @ 7.05 hrs, Volume= 0.354 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

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Peak Elev= 12.40' @ 17.77 hrs Surf.Area= 3,310 sf Storage= 10,306 cf

Plug-Flow detention time= 1,137.4 min calculated for 0.354 af (100% of inflow)

Center-of-Mass det. time= 1,137.3 min (1,881.1 - 743.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	8.50'	662 cf	21.79'W x 151.88'L x 7.00'H Field A 23,167 cf Overall - 21,512 cf Embedded = 1,655 cf x 40.0% Voids
#2A	9.00'	17,039 cf	StormTrap ST2 SingleTrap 6-0 x 9 Inside #1 Inside= 101.7"W x 72.0"H => 45.09 sf x 15.40'L = 694.1 cf Outside= 101.7"W x 78.0"H => 55.11 sf x 15.40'L = 848.5 cf 8.48' x 138.56' Core + 6.66' Border = 21.79' x 151.88' System
		17,701 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	8.50'	1.020 in/hr Exfiltration over Surface area
#2	Device 3	14.60'	5.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	9.00'	12.0" Round Culvert L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.00' / 8.90' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.08 cfs @ 7.05 hrs HW=8.57' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.08 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=8.50' (Free Discharge)↑**3=Culvert** (Controls 0.00 cfs)↑**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)**Summary for Pond 2P: Stormtech MC-7200**

Inflow Area = 3.338 ac, 82.71% Impervious, Inflow Depth = 4.83" for 25-Years event
 Inflow = 18.13 cfs @ 12.08 hrs, Volume= 1.345 af
 Outflow = 3.46 cfs @ 12.53 hrs, Volume= 1.344 af, Atten= 81%, Lag= 26.8 min
 Primary = 0.19 cfs @ 12.53 hrs, Volume= 0.422 af
 Secondary = 3.27 cfs @ 12.53 hrs, Volume= 0.922 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

Peak Elev= 14.33' @ 12.53 hrs Surf.Area= 11,250 sf Storage= 29,695 cf

Plug-Flow detention time= 480.0 min calculated for 1.344 af (100% of inflow)

Center-of-Mass det. time= 480.0 min (1,267.5 - 787.5)

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Volume	Invert	Avail.Storage	Storage Description
#1A	11.00'	4,403 cf	18.17'W x 192.03'L x 6.00'H Field A 20,932 cf Overall - 9,924 cf Embedded = 11,007 cf x 40.0% Voids
#2A	11.00'	9,924 cf	ADS_StormTech MC-7200 b +Cap x 56 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 56 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#3B	11.00'	3,527 cf	10.33'W x 244.77'L x 6.00'H Field B 15,176 cf Overall - 6,357 cf Embedded = 8,818 cf x 40.0% Voids
#4B	11.00'	6,357 cf	ADS_StormTech MC-7200 b +Cap x 36 Inside #3 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#5C	11.00'	427 cf	9.08'W x 33.83'L x 6.00'H Field C 1,844 cf Overall - 777 cf Embedded = 1,067 cf x 40.0% Voids
#6C	11.00'	777 cf	ADS_StormTech MC-7200 b +Cap x 4 Inside #5 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#7D	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field D 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#8D	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #7 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#9E	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field E 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#10E	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #9 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#11F	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field F 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#12F	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #11 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#13G	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field G 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#14G	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #13 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#15H	11.00'	501 cf	9.08'W x 40.42'L x 6.00'H Field H 2,203 cf Overall - 951 cf Embedded = 1,252 cf x 40.0% Voids
#16H	11.00'	951 cf	ADS_StormTech MC-7200 b +Cap x 5 Inside #15 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#17I	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field I 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids

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#18I	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #17 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#19J	11.00'	1,445 cf	18.17'W x 60.20'L x 6.00'H Field J 6,562 cf Overall - 2,948 cf Embedded = 3,613 cf x 40.0% Voids
#20J	11.00'	2,948 cf	ADS_StormTech MC-7200 b +Cap x 16 Inside #19 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 16 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#21K	11.00'	1,961 cf	19.42'W x 73.38'L x 6.00'H Field K 8,549 cf Overall - 3,646 cf Embedded = 4,903 cf x 40.0% Voids
#22K	11.00'	3,646 cf	ADS_StormTech MC-7200 b +Cap x 20 Inside #21 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 20 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#23O	11.00'	723 cf	9.08'W x 60.20'L x 6.00'H Field O 3,281 cf Overall - 1,474 cf Embedded = 1,807 cf x 40.0% Voids
#24O	11.00'	1,474 cf	ADS_StormTech MC-7200 b +Cap x 8 Inside #23 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#25M	11.00'	501 cf	9.08'W x 40.42'L x 6.00'H Field M 2,203 cf Overall - 951 cf Embedded = 1,252 cf x 40.0% Voids
#26M	11.00'	951 cf	ADS_StormTech MC-7200 b +Cap x 5 Inside #25 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#27N	11.00'	649 cf	9.08'W x 53.61'L x 6.00'H Field N 2,922 cf Overall - 1,300 cf Embedded = 1,622 cf x 40.0% Voids
#28N	11.00'	1,300 cf	ADS_StormTech MC-7200 b +Cap x 7 Inside #27 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
44,758 cf			Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard
Storage Group D created with Chamber Wizard
Storage Group E created with Chamber Wizard
Storage Group F created with Chamber Wizard
Storage Group G created with Chamber Wizard
Storage Group H created with Chamber Wizard
Storage Group I created with Chamber Wizard
Storage Group J created with Chamber Wizard
Storage Group K created with Chamber Wizard
Storage Group O created with Chamber Wizard
Storage Group M created with Chamber Wizard
Storage Group N created with Chamber Wizard

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Device	Routing	Invert	Outlet Devices
#1	Primary	11.00'	12.0" Round 12" Culvert L= 22.9' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 11.00' / 10.90' S= 0.0044 '/ Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	11.00'	15.0" Round 15" Culvert L= 14.2' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 11.00' / 10.70' S= 0.0211 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#3	Device 1	11.00'	2.0" Vert. 2" Orifice C= 0.600 Limited to weir flow at low heads
#4	Device 2	12.15'	9.0" W x 8.0" H Vert. Rectangular Orifice C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.19 cfs @ 12.53 hrs HW=14.33' (Free Discharge)↑ **1=12" Culvert** (Passes 0.19 cfs of 6.37 cfs potential flow)↑ **3=2" Orifice** (Orifice Controls 0.19 cfs @ 8.68 fps)**Secondary OutFlow** Max=3.27 cfs @ 12.53 hrs HW=14.33' (Free Discharge)↑ **2=15" Culvert** (Passes 3.27 cfs of 9.72 cfs potential flow)↑ **4=Rectangular Orifice** (Orifice Controls 3.27 cfs @ 6.54 fps)**Summary for Pond 3P: Bioretention**

Inflow Area = 0.518 ac, 50.19% Impervious, Inflow Depth = 3.76" for 25-Years event
 Inflow = 2.36 cfs @ 12.07 hrs, Volume= 0.162 af
 Outflow = 2.03 cfs @ 12.12 hrs, Volume= 0.139 af, Atten= 14%, Lag= 2.7 min
 Primary = 2.03 cfs @ 12.12 hrs, Volume= 0.139 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
 Peak Elev= 10.09' @ 12.12 hrs Surf.Area= 1,720 sf Storage= 1,575 cf

Plug-Flow detention time= 100.2 min calculated for 0.139 af (86% of inflow)
 Center-of-Mass det. time= 37.1 min (854.0 - 816.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.00'	3,347 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
9.00	1,184	138.0	0	0	1,184
10.00	1,677	159.0	1,423	1,423	1,702
11.00	2,182	178.0	1,924	3,347	2,239

Device	Routing	Invert	Outlet Devices
#1	Device 2	9.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	5.00'	12.0" Round Culvert L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 5.00' / 4.50' S= 0.0050 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.03 cfs @ 12.12 hrs HW=10.09' (Free Discharge)

↑ **2=Culvert** (Passes 2.03 cfs of 6.61 cfs potential flow)
 ↑ **1=Orifice/Grate** (Weir Controls 2.03 cfs @ 1.91 fps)

Summary for Pond 4P: Coolidge Ave Paver Band

Inflow Area = 0.223 ac, 84.30% Impervious, Inflow Depth = 4.93" for 25-Years event
 Inflow = 1.28 cfs @ 12.07 hrs, Volume= 0.092 af
 Outflow = 1.23 cfs @ 12.09 hrs, Volume= 0.092 af, Atten= 4%, Lag= 1.3 min
 Discarded = 0.01 cfs @ 12.09 hrs, Volume= 0.017 af
 Primary = 1.22 cfs @ 12.09 hrs, Volume= 0.075 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
 Peak Elev= 19.71' @ 12.09 hrs Surf.Area= 519 sf Storage= 269 cf

Plug-Flow detention time= 43.9 min calculated for 0.092 af (100% of inflow)
 Center-of-Mass det. time= 43.9 min (830.1 - 786.2)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	958 cf	Stone Infiltration Trench (Conic) Listed below (Recalc) 2,394 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
17.00	1	0	0	1
18.00	195	70	70	197
19.00	384	284	354	395
20.00	581	479	833	607
21.00	783	679	1,513	829
22.00	983	881	2,394	1,055

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	1.020 in/hr Exfiltration over Wetted area
#2	Primary	19.00'	10.0" Round Culvert L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 19.00' / 18.80' S= 0.0100 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.01 cfs @ 12.09 hrs HW=19.70' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.22 cfs @ 12.09 hrs HW=19.70' (Free Discharge)

↑ **2=Culvert** (Barrel Controls 1.22 cfs @ 3.34 fps)

Summary for Link DP-1: DP-1

Inflow Area = 6.123 ac, 63.14% Impervious, Inflow Depth = 3.18" for 25-Years event
Inflow = 6.13 cfs @ 12.12 hrs, Volume= 1.624 af
Primary = 6.13 cfs @ 12.12 hrs, Volume= 1.624 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

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Summary for Subcatchment PR-1A: Subcat PR-1A

Runoff = 17.80 cfs @ 12.07 hrs, Volume= 1.306 af, Depth= 7.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Years Rainfall=8.90"

Area (ac)	CN	Description
* 0.000	0	, HSG A
0.307	39	>75% Grass cover, Good, HSG A
0.421	98	Paved parking, HSG A
1.316	98	Roofs, HSG A
0.026	98	Unconnected pavement, HSG A
2.070	89	Weighted Average
0.307		14.81% Pervious Area
1.764		85.19% Impervious Area
0.026		1.48% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0600	1.86		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
3.1	229	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	15	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.6	294	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1B: Subcat PR-1B

Runoff = 8.10 cfs @ 12.11 hrs, Volume= 0.648 af, Depth= 7.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Years Rainfall=8.90"

Area (sf)	CN	Description
* 0	0	, HSG A
7,525	39	>75% Grass cover, Good, HSG A
2,727	96	Gravel surface, HSG A
30,963	98	Paved parking, HSG A
81	98	Roofs, HSG A
4,201	98	Unconnected pavement, HSG A
45,496	88	Weighted Average
10,252		22.53% Pervious Area
35,244		77.47% Impervious Area
4,201		11.92% Unconnected

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.2	63	0.0170	0.91		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.6	80	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.7	193	Total			

Summary for Subcatchment PR-1C: PR-1C

Runoff = 2.76 cfs @ 12.09 hrs, Volume= 0.210 af, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Years Rainfall=8.90"

Area (ac)	CN	Description
0.950	39	>75% Grass cover, Good, HSG A
0.071	96	Gravel surface, HSG A
0.000	98	Paved parking, HSG A
0.010	98	Roofs, HSG A
0.042	98	roofs, HSG A
1.073	46	Weighted Average
1.021		95.15% Pervious Area
0.052		4.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	44	0.0450	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
3.7	44	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1D: Subcat PR-1D

Runoff = 6.45 cfs @ 12.07 hrs, Volume= 0.514 af, Depth= 8.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Years Rainfall=8.90"

Area (ac)	CN	Description
0.713	98	Roofs, HSG A
0.713		100.00% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0320	1.45		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.1	25	0.2380	7.85		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	75	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1E: Subcat PR-1E

Runoff = 3.86 cfs @ 12.07 hrs, Volume= 0.269 af, Depth= 6.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Years Rainfall=8.90"

Area (ac)	CN	Description
0.170	39	>75% Grass cover, Good, HSG A
0.088	96	Gravel surface, HSG A
0.205	98	Paved parking, HSG A
* 0.005	98	pavement, HSG A
0.050	98	Water Surface, HSG A
0.518	78	Weighted Average
0.258		49.81% Pervious Area
0.260		50.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	50	0.0400	0.47		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.5	260	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	74	0.0360	2.85		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.7	384	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1F: Subcat PR-1F

Runoff = 1.72 cfs @ 12.08 hrs, Volume= 0.123 af, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Years Rainfall=8.90"

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Area (ac)	CN	Description
0.373	39	>75% Grass cover, Good, HSG A
0.028	96	Gravel surface, HSG A
0.002	98	Paved parking, HSG A
0.005	98	Roofs, HSG A
* 0.033	98	pavement, HSG A
0.041	98	roofs, HSG A
0.482	52	Weighted Average
0.401		83.20% Pervious Area
0.081		16.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	34	0.3190	0.42		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.4	34	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-1G: Subcat PR-1G

Runoff = 1.92 cfs @ 12.07 hrs, Volume= 0.141 af, Depth= 7.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Years Rainfall=8.90"

Area (ac)	CN	Description
0.035	39	>75% Grass cover, Good, HSG A
0.018	98	Paved parking, HSG A
* 0.170	98	pavement, HSG A
0.223	89	Weighted Average
0.035		15.70% Pervious Area
0.188		84.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	20	0.0250	1.09		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.9	9	0.0580	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.2	29	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond 1P: ST2 - 6 fts (Garage)

Inflow Area = 0.713 ac, 100.00% Impervious, Inflow Depth = 8.66" for 100-Years event
 Inflow = 6.45 cfs @ 12.07 hrs, Volume= 0.514 af
 Outflow = 0.08 cfs @ 4.93 hrs, Volume= 0.514 af, Atten= 99%, Lag= 0.0 min
 Discarded = 0.08 cfs @ 4.93 hrs, Volume= 0.514 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

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Peak Elev= 14.56' @ 20.77 hrs Surf.Area= 3,310 sf Storage= 16,461 cf

Plug-Flow detention time= 1,796.6 min calculated for 0.514 af (100% of inflow)

Center-of-Mass det. time= 1,796.6 min (2,535.6 - 739.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	8.50'	662 cf	21.79'W x 151.88'L x 7.00'H Field A 23,167 cf Overall - 21,512 cf Embedded = 1,655 cf x 40.0% Voids
#2A	9.00'	17,039 cf	StormTrap ST2 SingleTrap 6-0 x 9 Inside #1 Inside= 101.7"W x 72.0"H => 45.09 sf x 15.40'L = 694.1 cf Outside= 101.7"W x 78.0"H => 55.11 sf x 15.40'L = 848.5 cf 8.48' x 138.56' Core + 6.66' Border = 21.79' x 151.88' System
		17,701 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	8.50'	1.020 in/hr Exfiltration over Surface area
#2	Device 3	14.60'	5.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	9.00'	12.0" Round Culvert L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.00' / 8.90' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.08 cfs @ 4.93 hrs HW=8.57' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.08 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=8.50' (Free Discharge)↑**3=Culvert** (Controls 0.00 cfs)↑**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)**Summary for Pond 2P: Stormtech MC-7200**

Inflow Area = 3.338 ac, 82.71% Impervious, Inflow Depth = 7.47" for 100-Years event
 Inflow = 27.21 cfs @ 12.08 hrs, Volume= 2.077 af
 Outflow = 5.29 cfs @ 12.52 hrs, Volume= 2.077 af, Atten= 81%, Lag= 26.4 min
 Primary = 0.25 cfs @ 12.52 hrs, Volume= 0.460 af
 Secondary = 5.04 cfs @ 12.52 hrs, Volume= 1.617 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

Peak Elev= 16.87' @ 12.52 hrs Surf.Area= 11,250 sf Storage= 44,157 cf

Plug-Flow detention time= 360.8 min calculated for 2.077 af (100% of inflow)

Center-of-Mass det. time= 360.7 min (1,137.4 - 776.7)

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Volume	Invert	Avail.Storage	Storage Description
#1A	11.00'	4,403 cf	18.17'W x 192.03'L x 6.00'H Field A 20,932 cf Overall - 9,924 cf Embedded = 11,007 cf x 40.0% Voids
#2A	11.00'	9,924 cf	ADS_StormTech MC-7200 b +Cap x 56 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 56 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#3B	11.00'	3,527 cf	10.33'W x 244.77'L x 6.00'H Field B 15,176 cf Overall - 6,357 cf Embedded = 8,818 cf x 40.0% Voids
#4B	11.00'	6,357 cf	ADS_StormTech MC-7200 b +Cap x 36 Inside #3 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#5C	11.00'	427 cf	9.08'W x 33.83'L x 6.00'H Field C 1,844 cf Overall - 777 cf Embedded = 1,067 cf x 40.0% Voids
#6C	11.00'	777 cf	ADS_StormTech MC-7200 b +Cap x 4 Inside #5 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#7D	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field D 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#8D	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #7 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#9E	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field E 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#10E	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #9 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#11F	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field F 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#12F	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #11 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#13G	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field G 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids
#14G	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #13 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#15H	11.00'	501 cf	9.08'W x 40.42'L x 6.00'H Field H 2,203 cf Overall - 951 cf Embedded = 1,252 cf x 40.0% Voids
#16H	11.00'	951 cf	ADS_StormTech MC-7200 b +Cap x 5 Inside #15 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#17I	11.00'	205 cf	9.08'W x 14.06'L x 6.00'H Field I 766 cf Overall - 253 cf Embedded = 513 cf x 40.0% Voids

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#18I	11.00'	253 cf	ADS_StormTech MC-7200 b +Cap Inside #17 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#19J	11.00'	1,445 cf	18.17'W x 60.20'L x 6.00'H Field J 6,562 cf Overall - 2,948 cf Embedded = 3,613 cf x 40.0% Voids
#20J	11.00'	2,948 cf	ADS_StormTech MC-7200 b +Cap x 16 Inside #19 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 16 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#21K	11.00'	1,961 cf	19.42'W x 73.38'L x 6.00'H Field K 8,549 cf Overall - 3,646 cf Embedded = 4,903 cf x 40.0% Voids
#22K	11.00'	3,646 cf	ADS_StormTech MC-7200 b +Cap x 20 Inside #21 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L 20 Chambers in 2 Rows Cap Storage= +39.5 cf x 2 x 2 rows = 158.0 cf
#23O	11.00'	723 cf	9.08'W x 60.20'L x 6.00'H Field O 3,281 cf Overall - 1,474 cf Embedded = 1,807 cf x 40.0% Voids
#24O	11.00'	1,474 cf	ADS_StormTech MC-7200 b +Cap x 8 Inside #23 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#25M	11.00'	501 cf	9.08'W x 40.42'L x 6.00'H Field M 2,203 cf Overall - 951 cf Embedded = 1,252 cf x 40.0% Voids
#26M	11.00'	951 cf	ADS_StormTech MC-7200 b +Cap x 5 Inside #25 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#27N	11.00'	649 cf	9.08'W x 53.61'L x 6.00'H Field N 2,922 cf Overall - 1,300 cf Embedded = 1,622 cf x 40.0% Voids
#28N	11.00'	1,300 cf	ADS_StormTech MC-7200 b +Cap x 7 Inside #27 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 6.59'L = 174.4 cf Overall Size= 100.0"W x 60.0"H x 6.59'L Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
44,758 cf			Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard
Storage Group D created with Chamber Wizard
Storage Group E created with Chamber Wizard
Storage Group F created with Chamber Wizard
Storage Group G created with Chamber Wizard
Storage Group H created with Chamber Wizard
Storage Group I created with Chamber Wizard
Storage Group J created with Chamber Wizard
Storage Group K created with Chamber Wizard
Storage Group O created with Chamber Wizard
Storage Group M created with Chamber Wizard
Storage Group N created with Chamber Wizard

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Device	Routing	Invert	Outlet Devices
#1	Primary	11.00'	12.0" Round 12" Culvert L= 22.9' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 11.00' / 10.90' S= 0.0044 '/ Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	11.00'	15.0" Round 15" Culvert L= 14.2' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 11.00' / 10.70' S= 0.0211 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#3	Device 1	11.00'	2.0" Vert. 2" Orifice C= 0.600 Limited to weir flow at low heads
#4	Device 2	12.15'	9.0" W x 8.0" H Vert. Rectangular Orifice C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.25 cfs @ 12.52 hrs HW=16.87' (Free Discharge)↑ **1=12" Culvert** (Passes 0.25 cfs of 8.76 cfs potential flow)↑ **3=2" Orifice** (Orifice Controls 0.25 cfs @ 11.58 fps)**Secondary OutFlow** Max=5.04 cfs @ 12.52 hrs HW=16.87' (Free Discharge)↑ **2=15" Culvert** (Passes 5.04 cfs of 13.53 cfs potential flow)↑ **4=Rectangular Orifice** (Orifice Controls 5.04 cfs @ 10.08 fps)**Summary for Pond 3P: Bioretention**

Inflow Area = 0.518 ac, 50.19% Impervious, Inflow Depth = 6.23" for 100-Years event
 Inflow = 3.86 cfs @ 12.07 hrs, Volume= 0.269 af
 Outflow = 2.85 cfs @ 12.14 hrs, Volume= 0.245 af, Atten= 26%, Lag= 4.0 min
 Primary = 2.85 cfs @ 12.14 hrs, Volume= 0.245 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
 Peak Elev= 10.32' @ 12.14 hrs Surf.Area= 1,830 sf Storage= 1,978 cf

Plug-Flow detention time= 73.5 min calculated for 0.245 af (91% of inflow)
 Center-of-Mass det. time= 29.7 min (832.2 - 802.5)

Volume	Invert	Avail.Storage	Storage Description
#1	9.00'	3,347 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
9.00	1,184	138.0	0	0	1,184
10.00	1,677	159.0	1,423	1,423	1,702
11.00	2,182	178.0	1,924	3,347	2,239

Device	Routing	Invert	Outlet Devices
#1	Device 2	9.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	5.00'	12.0" Round Culvert L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 5.00' / 4.50' S= 0.0050 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

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Primary OutFlow Max=2.85 cfs @ 12.14 hrs HW=10.32' (Free Discharge)↑ **2=Culvert** (Passes 2.85 cfs of 6.77 cfs potential flow)↑ **1=Orifice/Grate** (Orifice Controls 2.85 cfs @ 3.62 fps)**Summary for Pond 4P: Coolidge Ave Paver Band**

Inflow Area = 0.223 ac, 84.30% Impervious, Inflow Depth = 7.57" for 100-Years event

Inflow = 1.92 cfs @ 12.07 hrs, Volume= 0.141 af

Outflow = 1.83 cfs @ 12.09 hrs, Volume= 0.141 af, Atten= 5%, Lag= 1.4 min

Discarded = 0.01 cfs @ 12.09 hrs, Volume= 0.018 af

Primary = 1.81 cfs @ 12.09 hrs, Volume= 0.122 af

Routing by Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

Peak Elev= 19.95' @ 12.09 hrs Surf.Area= 570 sf Storage= 322 cf

Plug-Flow detention time= 31.9 min calculated for 0.141 af (100% of inflow)

Center-of-Mass det. time= 31.9 min (806.9 - 775.0)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	958 cf	Stone Infiltration Trench (Conic) Listed below (Recalc) 2,394 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
17.00	1	0	0	1
18.00	195	70	70	197
19.00	384	284	354	395
20.00	581	479	833	607
21.00	783	679	1,513	829
22.00	983	881	2,394	1,055

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	1.020 in/hr Exfiltration over Wetted area
#2	Primary	19.00'	10.0" Round Culvert L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 19.00' / 18.80' S= 0.0100 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.01 cfs @ 12.09 hrs HW=19.95' (Free Discharge)↑ **1=Exfiltration** (Exfiltration Controls 0.01 cfs)**Primary OutFlow** Max=1.81 cfs @ 12.09 hrs HW=19.95' (Free Discharge)↑ **2=Culvert** (Barrel Controls 1.81 cfs @ 3.65 fps)

Summary for Link DP-1: DP-1

Inflow Area = 6.123 ac, 63.14% Impervious, Inflow Depth = 5.20" for 100-Years event
Inflow = 10.97 cfs @ 12.10 hrs, Volume= 2.655 af
Primary = 10.97 cfs @ 12.10 hrs, Volume= 2.655 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs

Appendix C: Standard 3 Computations and Supporting Documentation

- › Required/Provided Recharge Volume Calculations
- › 72-hour drawdown analysis



Recharge and Drawdown Calculations

Project Name: 99 Coolidge Avenue

Proj. No.: 14844.00

Date: 1/7/2022

Project Location: Watertown, MA

Calculated by: JRB/JHC

Required Recharge Volume

The project results in an overall decrease in impervious area on site. Therefore, there is no required recharge volume under Standard 3 of the Massachusetts Stormwater Standards

Provided Recharge Volume (Cubic Feet) and Drawdown Times

Infiltration System (Below Garage)

Infiltration Volumes beneath weir at elevation 14.6

Basin Volume Below Weir

Elevation	Bottom Area (s.f.)	Volume (c.f.)	Description
14.60	3,311	15,903	Within Stormtrap units

***See Sanborn Head mounding analysis for drawdown analysis**

Total Recharge Volume: **15,903 c.f.**

Permeable Paver Band

Infiltration Volumes beneath outlet pipes of paver band

Volume Below Outlet Pipe

Height	Bottom Area (s.f.)	Volume (c.f.)	Description
0.50	1,133	567	Below outlet pipe elevation

Assumptions:

Recharge Rate: 1.02 in/hr

Total Drawdown Time: **5.9 hours**

Total Recharge Volume: **567 c.f.**

Recharge Volume Summary

Basin	Volume
Infiltration Basin Recharge Provided:	15,903 c.f.
Permeable Paver Band Recharge Provided:	567 c.f.
Total Recharge Volume Provided:	<u>16,470 c.f.</u>

Appendix D: Standard 4 Computations and Supporting Information

- › Water Quality Volume Calculations
- › TSS Removal Worksheets



Water Quality Volume Calculations

Project Name: Proposed Facility

Proj. No.: 14844.00

99 Coolidge Ave

Date: 1/7/2021

Project Location: Watertown, MA

Calculated by: JRB/JHC

PR-1A + PR-1B

Water Quality Unit

Rooftop Area= 1.3 Acres

Pavement Area= 1.3 Acres

Required:

Runoff Depth to be Treated (in.) Required Volume (c.f.)
Water Quality Volume: 1.0 9,333

Provided:

Treatment 9,496 cf Above outlet at elevation 11.14
Below overflow at elevation 12.15
Pretreatment: Provided by structural water quality unit

PR-1D

Below Garage Infiltration

Rooftop Area= 0.7 Acres

Required:

Runoff Depth to be Treated (in.) Required Volume (c.f.)
Water Quality Volume: 1.0 2,588
Pretreatment 0.1 259

Provided:

Treatment 15,903 cf Below weir at elevation 14.6
Pretreatment: Provided by structural water quality unit

PR-1E

Bioretention Behind Garage

Pavement Area= 0.2 Acres

Required:

Runoff Depth to be Treated (in.) Required Volume (c.f.)
Water Quality Volume: 1.0 773
Pretreatment 0.1 77

Provided:

Treatment 1,021 cf Below inlet at elevation 9.75
Pretreatment: 160 cf Forebay, below elevation 9.6



Water Quality Volume Calculations

Project Name: Proposed Facility

Proj. No.: 14844.00

99 Coolidge Ave

Date: 1/7/2021

Project Location: Watertown, MA

Calculated by: JRB/JHC

PR-1G

Permeable Paver Band (Coolidge Frontage)

Pavement Area= 0.4 Acres

Required:

	Runoff Depth to be Treated (in.)	Required Volume (c.f.)
Water Quality Volume:	1.0	1,290
Pretreatment	0.1	129

Provided:

Treatment 142 cf Provided below outlet pipe at elevation 19.0

Required Total Water Quality Volume 13,984 cf

Provided Total Water Quality Volume 26,562 cf



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TSS Removal Calculation Worksheet

Project Name: **99 Coolidge Avenue**
Project Number: **14844.00**
Location: **Watertown MA**
Discharge Point: **DP-1, via Paver Band**
Drainage Area(s): **PR-1G**

Sheet: **1 of 4**
Date: **4-Jan-2022**
Computed by: **JHC**
Checked by: **KSS**

A	B	C	D	E
BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Porous Pavement	80%	1.00	0.80	0.20
	0%	0.20	0.00	0.20
	0%	0.20	0.00	0.20
	0%	0.20	0.00	0.20
	0%	0.20	0.00	0.20

* BMP and TSS Removal Rate Values from the MassDEP Stormwater Handbook Vol. 1.

** Equals remaining load from previous BMP (E)

**Treatment Train
TSS Removal =**

80%



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TSS Removal Calculation Worksheet

Project Name: **99 Coolidge Avenue**
Project Number: **14844.00**
Location: **Watertown MA**
Discharge Point: **DP-1, via Infil System**
Drainage Area(s): **PR-1D**

Sheet: **2 of 4**
Date: **4-Jan-2022**
Computed by: **JRB/JHC**
Checked by: **KSS**

1. Pre-Treatment prior to Infiltration

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Contech CDS	81%	100%	81%	19%
	0%	19%	0%	19%
	0%	19%	0%	19%
Pre-Treatment TSS Removal =				81%

2. Total TSS Removal including Pretreatment 1.

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Contech CDS	81%	100%	81%	19%
Subsurface Infiltration Structure	80%	19%	15%	4%
	0%	4%	0%	4%
	0%	4%	0%	4%
Treatment Train TSS Removal =				96%

* BMP and TSS Removal Rate Values from the MassDEP Stormwater Handbook Vol. 1. Removal rates for proprietary devices are from manufacturer data (see attached).

** Equals remaining load from previous BMP (E)



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TSS Removal Calculation Worksheet

Project Name: **99 Coolidge Avenue**
Project Number: **14844.00**
Location: **Watertown MA**
Discharge Point: **DP-1, via Infil System**
Drainage Area(s): **PR-1D**

Sheet: **3 of 4**
Date: **7-Jan-2022**
Computed by: **JHC**
Checked by: **KSS**

A	B	C	D	E
BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	25%	1.00	0.25	0.75
Contech CDS	84%	0.75	0.63	0.12
	0%	0.12	0.00	0.12
	0%	0.12	0.00	0.12
	0%	0.12	0.00	0.12

* Removal rates for proprietary devices are from manufacturer data (see attached).

** Equals remaining load from previous BMP (E)

**Treatment Train
TSS Removal =**

88%



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TSS Removal Calculation Worksheet

Project Name: **99 Coolidge Avenue**
Project Number: **14844.00**
Location: **Watertown MA**
Discharge Point: **DP-1, via Infil System**
Drainage Area(s): **PR-1D**

Sheet: **2 of 4**
Date: **7-Jan-2022**
Computed by: **JRB/JHC**
Checked by: **KSS**

1. Pre-Treatment prior to Infiltration

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Contech CDS	81%	100%	81%	19%
	0%	19%	0%	19%
	0%	19%	0%	19%
Pre-Treatment TSS Removal =				81%

2. Total TSS Removal including Pretreatment 1.

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Contech CDS	81%	100%	81%	19%
Subsurface Infiltration Structure	80%	19%	15%	4%
	0%	4%	0%	4%
	0%	4%	0%	4%

* BMP and TSS Removal Rate Values from the MassDEP Stormwater Handbook Vol. 1. Removal rates for proprietary devices are from manufacturer data (see attached).

** Equals remaining load from previous BMP (E)

**Treatment Train
TSS Removal =**

96%



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TSS Removal Calculation Worksheet

Project Name: **99 Coolidge Avenue**
Project Number: **14844.00**
Location: **Watertown MA**
Discharge Point: **DP-1, via Infil System**
Drainage Area(s): **PR-1D**

Sheet: **3 of 4**
Date: **7-Jan-2022**
Computed by: **JHC**
Checked by: **KSS**

A	B	C	D	E
BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	25%	1.00	0.25	0.75
Contech CDS	84%	0.75	0.63	0.12
	0%	0.12	0.00	0.12
	0%	0.12	0.00	0.12
	0%	0.12	0.00	0.12

* Removal rates for proprietary devices are from manufacturer data (see attached).

** Equals remaining load from previous BMP (E)

**Treatment Train
TSS Removal =**

88%



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TSS Removal Calculation Worksheet

Project Name: **99 Coolidge Avenue**
Project Number: **14844.00**
Location: **Watertown MA**
Discharge Point: **DP-1, via Bioretention**
Drainage Area(s): **PR-1E**

Sheet: **4 of 4**
Date: **11-Jan-2021**
Computed by: **JRB**
Checked by: _____

1. Pre-Treatment prior to Infiltration

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	25%	100%	25%	75%
	0%	75%	0%	75%
	0%	75%	0%	75%
Pre-Treatment TSS Removal =				25%

2. Total TSS Removal including Pretreatment 1.

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	25%	100%	25%	75%
Sediment Forebay	25%	75%	19%	56%
Bioretention Area	90%	56%	51%	6%
	0%	6%	0%	6%
Treatment Train TSS Removal =				94%

* BMP and TSS Removal Rate Values from the MassDEP Stormwater Handbook Vol. 1.

** Equals remaining load from previous BMP (E)

Appendix E: TMDL Compliance

- › MS4 Phosphorus Removal Rate Calculations
- › Contech Filtration Practice Phosphorus Reduction Estimate

Project: 99 Coolidge Avenue
 Location: Watertown, MA
 Calculated by: JRB/JHC
 Checked by: CPN/KSS
 Title: Phosphorous Removal

Project # 14844.00
 Sheet 1 of 1
 Date: 1/7/2022
 Date: 1/7/2022

Phosphorus Removal Rates		
BMP	Removal Rate*	Notes
Stormfilter	62%	By Contech (see attached)
Infiltration Trench	100%	Commercial Land Use, 1.02 in/hr, 2 inches of runoff treated
Bioretention Basin	53%	Commercial Land Use, 1 inches of runoff treated

*Removal Rates from Appendix F, Attachment 3 of Massachusetts MS4

Phosphorous Load Reduction Target: 65%

Existing Conditions Phosphorus Loading				
Land Use	Cover Type	PLER (lb/ac/yr)	Area (ac)	Existing Phosphorus Load (lb/year)
Commercial	Impervious	1.78	4.7	8.43 lb/year
	Pervious (HSG A)	0.03	1.4	0.04 lb/year
		Total	6.1	8.47 lb/year

Proposed Conditions Phosphorus Loading (excluding treatment)				
Land Use	Cover Type	PLER (lb/ac/yr)	Area (ac)	Proposed Phosphorus Load (lb/year)
Commercial	Impervious	1.78	3.7	6.60 lb/year
	Pervious (HSG A)	0.03	2.3	0.07 lb/year
		Total	6.0	6.67 lb/year

Proposed Conditions Phosphorus Loading						
Subcatchment	Impervious (ac)	Pervious to BMP (ac)	P to BMP (lb/year)	BMP	Removal Rate	Phosphorus after treatment (lb/year)
PR-1A	1.6	0.3	2.83	StormFilter	62%	1.07 lb/year
PR-1B	0.8	0.2	1.45	StormFilter	62%	0.55 lb/year
PR-1C	0.1	1.0	0.18	-	0%	0.18 lb/year
PR-1D	0.7	0.0	1.27	Infiltration	100%	0.00 lb/year
PR-1E	0.3	0.3	0.48	Bioretention	53%	0.22 lb/year
PR-1F	0.1	0.4	0.17	-	0%	0.17 lb/year
PR-1G	0.2	0.1	0.30	Infiltration	100%	0.00 lb/year
					Total	2.20 lb/year

Summary Table	
Existing Phosphorus Loading Rate	8.47 lb/year
Proposed Phosphorus Loading Rate (pre-BMP)	6.67 lb/year
Proposed Phosphorus Loading Rate (post-BMP)	2.20 lb/year
Percent Reduction from Existing	74.1%
Percent Reduction from Proposed	67.1%



Estimated Filtration Practice Phosphorus Reduction

Date Prepared: 1/6/2022

Site Information

Project Name	99 Coolidge Ave
Project City	Watertown
Project State	MA
System Designation	StormFilter

Total Drainage Area, Ad	3.34 ac
Post Development Impervious Area, Ai	2.77 ac
Pervious Area, Ap	0.57 ac
% Impervious	83%
Runoff Coefficient, Rc	0.80
Calculated Phosphorus Load*	4.95 lb/yr

*Per Table 1-2 Attachment 1 to Appendix F	1.78 lb/ac/yr
	(Commercial, directly connected impervious

*Per Table 1-2 Attachment 1 to Appendix F	0.03 lb/ac/yr
	(Developed Land Pervious, HSG A)

Results

Contech Treatment Practice	StormFilter
Filtration Practice Efficiency**	62 %
Calculated Phosphorus Reduction	3.07 lb/yr

**StormFilter total phosphorus removal efficiency of 73% reduced by a factor of 0.15 to be more conservative considering peak events bypassing the StormFilter.



February 2, 2022

Ref: 14844.01

Laurel Schwab
Senior Environmental Planner & Conservation Agent
Watertown Community Development & Planning
149 Main St Watertown, MA 02474

Re: 57 Coolidge Ave – DEP 321-0175 WWO-2021-02 (the "Project")
Minor Stormwater Revision

Dear Laurel:

On behalf of the Applicant, ARE-MA Region No. 77, LLC, I am submitting the following for your review and approval.:

- LSP Letter, Patricia Pinto, LSP/ Sanborn Head, dated January 5, 2022
- Updated Site Plans, dated January 26, 2022.
- Stormwater Memorandum, dated January 7, 2022

Since the issuance of the Order of Conditions in June 2021, the Project Team has conducted additional geotechnical and environmental explorations following the demolition of existing structures on-site. The analyses uncovered contaminants in the soils on the eastern portion of the site. As a result, the Project's Licensed Site Professional, Tricia Pinto with Sanborn Head & Associates, Inc., is recommending the infiltration system not be pursued on the eastern side of the site.

Thus, we are recommending a stormwater retention system on the eastern side of the site to eliminate the infiltration component on the eastern side of the site. To maintain the water treatment quality of the approved system, the infiltration has been replaced with a Storm Filter system, designed to exceed the 65% phosphorous removal requirement. The proposed design complies with the treatment requirements of the local, state and federal requirements for removal of pollutants. Please refer to the attached Stormwater Memorandum which provides greater details and calculations for this modified system. Please note, the western side of the stream (i.e. the garage side), remains unchanged and will continue to be infiltrated, as previously approved.

We understand these details will be reviewed by the Conservation Commission on February 9, 2022.

Engineers | Scientists | Planners | Designers

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Senior Environmental Planner & Conservation Agent
Ref: 14844.01
February 2, 2022
Page 2



Please don't hesitate to contact me at cnagle@vhb.com or (617) 999-0845 if you have any questions on this minor revision.

Sincerely,

VHB

A handwritten signature in black ink that reads "Conor Nagle". The signature is fluid and cursive, with the first name "Conor" and last name "Nagle" clearly distinguishable.

Conor Nagle
Project Manager

cc: Leo Martin, Chair – Watertown Conservation Commission
Katie Snyder, National Development