

Background (Littleton)

The proposed project includes the construction of a new water supply well for the Littleton Electric Light & Water Departments (LELWD), connection of the new water supply well to a WTP in Littleton via a raw water transmission main, construction of a finished water main from the LELWD system, and the construction of a new access road to bring a treated water supply to the Town of Boxborough.

This project is the result of careful coordination and planning among the two municipalities of Littleton and Boxborough, the Massachusetts Department of Environmental Protection (MassDEP) and Massachusetts Department of Transportation (MassDOT), and is the direct result of the MassDOT Snow and Ice Control Program identifying the impacts of sodium and chloride contamination to water supplies from the application and storage of road salt. In the 2017 Environmental Status and Planning Report by MassDOT, the Boxborough Executive Center office building was identified as the highest maximum sodium concentration for a public water system located within 0.5 miles of a MassDOT roadway.

While this project description gives an overview of the project in its entirety, this submission is only seeking approval for the portion of work occurring in Littleton, which includes the construction of the water supply well, access road to well and raw water main. The remainder of the finished water main will be permitted with the Town of Boxborough Conservation Commission.

Site Description

Boxborough

Much of the project work is installation of water main which will occur in the existing roadway along the proposed route of the finished water main. Affected roadways include Beaver Brook Road, Swanson Road and Codman Hill Road.

Littleton

The location of the new water supply well is located on a parcel that lies within a valley between higher elevation residential neighborhoods to the northwest and Route 495 to the southeast. Monarch Drive, Taylor Street and MA Route 2 border the parcel along the southeast, east, and north boundaries, respectively. Entrance to the site is located through a commercial access point at 151 Taylor Street.

Within the property boundaries are wetlands and Beaver Brook, a small stream that runs the length of the northwestern portion of the parcel, flowing southwest to northeast. Beaver Brook is approximately 1,014 feet northwest of the proposed well location. The confluence of Beaver Brook with an unnamed tributary from Black Pond is approximately 1,505 feet downstream from the parcel, which continues on as Beaver Brook. Beaver Brook flows northeast which eventually drains into Forge Pond. The proposed Zone II of the new water supply well extends upgradient of the well to the drainage basin divides and to the till/stratified drift boundaries.

The raw water main will be installed through naturally wooded area and below Beaver Brook. A access road will be constructed to the well.

Scope of Work

Boxborough

The project will include a finished water main from the existing Littleton water main at Nancy's Way near the Boxborough Town Line, progressing south along Beaver Brook Road and Swanson Road and

terminating at the existing Codman Hill Condominiums PWS located at 276 Codman Hill Road in Boxborough, Massachusetts.

Trenches in pavement shall have the traveled way surface cut in a straight line. Pipe trenches shall be made as narrow as practicable (about 5' in width). Excavation shall only be between these cuts. The pipe shall be installed with a minimum of 5'-0" of cover, unless specifically indicated otherwise on the plans or required by the Engineer. Prior to backfilling, the Contractor shall compact the exposed natural subgrade. Where specified and required by the Engineer and after placement of the gravel subbase, the Contractor shall place temporary bituminous pavement above the trench, between the edges of the existing pavement. The temporary pavement shall be repaired as necessary to maintain the surface of the pavement until replaced by permanent pavement. All water pumped or drained from the work shall be disposed of in a manner that will not result in undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures, and utilities.

Littleton

The LELWD is proposing to construct and develop a new water supply well at 153 Taylor. The new well is expected to supply approximately 0.5 million gallons per day (mgd). The LELWD is currently constructing a new 3 MGD water treatment plant (WTP) at 15 Whitcomb Avenue under a separate project to treat for per- and polyfluoroalkyl substances (PFAS) found in their existing raw water sources. Under this proposed project, raw water from the proposed new well will be pumped to the WTP and will provide additional water to the existing customers of Littleton. Work under this project includes a new finished water main extending from the proposed WTP along road to the Littleton border, existing Littleton water main in Whitcomb Avenue and continuing south approximately 4.5 miles to the Codman Hill Condominiums (PWS #2037001) in Boxborough.

Work involved with this project will also include the construction of a 1,200-foot± access road, with approximately 800-feet constructed of gravel and 400-feet of asphalt, a well building, a raw water main, and stormwater management infrastructure. Other work will include grading, landscaping, and utilities in support of the well building.

Regulatory Review

Environmental impacts associated with this project are provided below.

Permit specific discussions are provided, below, for the Massachusetts Environmental Policy Act, Massachusetts Endangered Species Act, and Notice of Intent applications under the Massachusetts Wetlands Protection Act.

MA Endangered Species Act (MESA, 321 CMR 10.0)

The portion of the work occurring in Boxborough is considered exempt under 321 CMR 10.14(10): installation of utility lines. However, other portions of the overall project are not exempt, and therefore a MESA filing has been filed separately and can be found using reference number 23-4202.

Massachusetts Environmental Policy Act (MEPA, 301 CMR 11.0)

The purpose of MEPA and 301 CMR 11.00 is to provide meaningful opportunities for public review of the potential environmental impacts of a project for which a permit is required from an agency of the Commonwealth, and to assist agencies of the Commonwealth in using all feasible means to avoid

damage to the environment or, to the extent damage to the environment cannot be avoided, to minimize and mitigate damage to the environment to the maximum extent practicable. MEPA's review is intended to inform the participating agencies of the project, to maximize Consistency between agency actions, and to facilitate coordination of all environmental and development review and permitting processes of the Commonwealth. The MEPA process provides an opportunity for the project proponent to identify required agency actions and to describe and analyze how the project will comply with applicable regulatory standards and requirements. Through review of the MEPA documents, each participating agency can comment on aspects of the project or issues regarding its agency action that require additional description or analysis. There are twelve MEPA review threshold categories contained in the Act covering the following topics of Land, State Listed Species, Wetlands, Waterways and Tidelands, Water, Wastewater, Transportation, Energy, Air, Solid and Hazardous Waste, Historical and Archaeological Resources, Areas of Critical Concern, and Regulations. In addition to triggering a threshold, a state action (i.e., state funding or state permitting) is necessary to trigger MEPA review. The following MEPA threshold is triggered for this project under the Wetlands, Waterways and Tidelands:

11.03 (3)(b)(f) alteration of ½ or more acres of any other wetlands. (floodzone, riverfront area)

In addition, this project triggers a MEPA threshold related to Water:

11.03 (4)(b)(1) New withdrawal or Expansion in withdrawal of 100,000 or more gpd from a water source that requires new construction for the withdrawal.

Construction of more than 5 miles of water main.

Environmental Justice Communities Discussion

Per 301 CMR 11.00, MEPA requires all Environmental Justice (EJ) communities within a mile of the project location be identified and notified. Using the MEPA EJ community mapper, a map was generated to identify all communities within a mile. It is required to notify all local community-based organizations and tribal organizations with an Environmental Justice Screening form via an e-mail list provided by the MEPA-EJ Director; the screening form was sent out on 4/24/2023. Additionally, a notification was posted in the Boston Herald on 4/25/2023. As of 6/22/2023, no comments from the surrounding Environmental Justice Communities have been received.

A public meeting was held on January 19, 2023 to describe the project and provide opportunity for questions and answers from municipal and state officials.

Climate Resiliency Discussion

Per 301 CMR 11.05(5) MEPA updated requirements, an RMA climate resilience design standards tool was used to generate a report on the projects to address climate risk.

The Massachusetts Wetlands Protection Act (310 CMR 10.00)

The Massachusetts Wetlands Protection Act (MGL c.131 § 40) (WPA) and implementing regulations (310 CMR 10.00) is a state statute administered locally. While a Notice of Intent (NOI) submission would be reviewed by the local Conservation Commissions (Littleton, Boxborough, Harvard), this permit is being discussed under this state review discussion because of the state regulations that govern the WPA submissions. Jurisdiction under the WPA would occur for proposed removal, fill, dredge and/or

alteration of a wetland resource protected under the WPA. The WPA requires the preparation of a NOI for work within a wetland resource area, work within 100-feet of certain resource areas and/or within the 100-year flood plain. The general performance standards for work or activities occurring within each wetland resource are identified in the WPA. Resource areas impacted by the proposed work include the following:

- Bordering Land Subject to Flooding (B.L.S.F)
- Riverfront Area

In addition, work will occur within the 100' Wetlands Buffer Zone. It is anticipated that there will be 58,931 sf of work within the buffer zone.

Adherence to the Wetlands Protection Act performance standards for BLSF and Riverfront Area presented below.

Bordering Land Subject to Flooding

Per 310 CMR 10.57 BLSF Performance Standards of as follows:

1. Compensatory storage shall be provided for all flood storage volume that will be lost as the result of a proposed project within Bordering Land Subject to Flooding, when in the judgment of the issuing authority said loss will cause an increase or will contribute incrementally to an increase in the horizontal extent and level of flood waters during peak flows. Compensatory storage shall mean a volume not previously used for flood storage and shall be incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, which would be displaced by the proposed project. Such compensatory volume shall have an unrestricted hydraulic connection to the same waterway or water body. Further, with respect to waterways, such compensatory volume shall be provided within the same reach of the river, stream, or creek.

Approximately 352 cubic yards (CY) of compensatory storage will be provided as part of this project. This will appropriately compensate for the flood storage that will be lost from the permanent impacts to BLSF. See below compensatory storage table.

ELEVATIONS	VOLUME OF FILL (CY)	VOLUME OF CUT PROVIDED (CY)
222-223	0.0	0.0
223-224	1.4	4.3
224-225	1.7	115.4
225-226	8.9	90.6
226-227	1.8	141.7

2. Work within Bordering Land Subject to Flooding, including that work required to provide the above-specified compensatory storage, shall not restrict flows so as to cause an increase in flood stage or velocity.

The work within BLSF will not restrict flows that cause an increase in flood stage or velocity. Compensatory storage will be provided to ensure flood stage and velocity does not increase following project completion.

3. Work in those portions of bordering land subject to flooding found to be significant to the protection of wildlife habitat shall not impair its capacity to provide important wildlife habitat functions. Except for work which would adversely affect vernal pool habitat a project or projects on a single lot, for which Notice(s) of Intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 5,000 square feet (whichever is less) of land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold, or altering vernal pool habitat, may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures contained in 310 CMR 10.60.

Some portions of the work within BLSF also fall within National Heritage and Endangered Species (NHESP) Estimated and Priority Habitat. Communication with MassWildlife regarding compliance with the Massachusetts Endangered Species Act (MESA) is ongoing and will be resolved prior to commencement of work.

Riverfront Area (Redevelopment Standards)

- (a) At a minimum, proposed work shall result in an improvement over existing conditions of the capacity of the riverfront area to protect the interests identified in M.G.L. c. 131 § 40. When a lot is previously developed but no portion of the riverfront area is degraded, the requirements of 310 CMR 10.58(4) shall be met.

While this work will not result in an improvement, the majority of work within the riverfront area is occurring on degraded area (paved road). The portions that are not occurring within degraded area will be temporary in nature, as directional drilling is being utilized for those portions of the work that are within undisturbed riverfront area.

- (b) Stormwater management is provided according to standards established by the Department.

The MA Stormwater Standards are being met. Please see Appendix C for Stormwater Report.

- (c) Within 200 foot riverfront areas, proposed work shall not be located closer to the river than existing conditions or 100 feet, whichever is less, or not closer than existing conditions within 25 foot riverfront areas, except in accordance with 310 CMR 10.58(5)(f) or (g).

Work will occur closer to the river than existing conditions. However, the majority of work is occurring in paved roadway. Portions within undisturbed riverfront area are temporary in nature, and the riverfront will be returned to existing condition following construction.

- (d) Proposed work, including expansion of existing structures, shall be located outside the riverfront area or toward the riverfront area boundary and away from the river, except in accordance with 310 CMR 10.58(5)(f) or (g).

There will be no expansion of existing structures within the riverfront area. Proposed work within the riverfront is occurring in paved roadway. Portions within undisturbed riverfront area are

temporary in nature, and the riverfront will be returned to existing condition following construction.

- (e) The area of proposed work shall not exceed the amount of degraded area, provided that the proposed work may alter up to 10% if the degraded area is less than 10% of the riverfront area, except in accordance with 310 CMR 10.58(5)(f) or (g).

The majority of this work is occurring in previously degraded area (roadway). The areas that are not within degraded area (forest) are temporary in nature. Thus, no new degraded area is anticipated within the riverfront area as part of this project.

- (f) When an applicant proposes restoration on-site of degraded riverfront area, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), and (e) at a ratio in square feet of at least 1:1 of restored area to area of alteration not conforming to the criteria. Areas immediately along the river shall be selected for restoration. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Restoration shall include: 1. removal of all debris, but retaining any trees or other mature vegetation; 2. grading to a topography which reduces runoff and increases infiltration; 3. coverage by topsoil at a depth consistent with natural conditions at the site; and 4. seeding and planting with an erosion control seed mixture, followed by plantings of herbaceous and woody species appropriate to the site;

During construction, the top 12" of soil and vegetation will be set to the side. Following construction, the work area within undisturbed riverfront will be backfilled with that material and debris will be removed.

Alternatives Analysis
Littleton/Boxborough New Well and Finished Water Main
Littleton and Boxborough, MA

Project Goal: Provide a treated water supply to eleven public water systems (PWS) in Boxborough that are currently impacted by PFAS, sodium, chloride, and/or perchlorate; and increase the redundancy for the water system in Littleton.

New Source and Raw Water Main Alternatives

Alternative 1: No Build

Under this alternative, no construction would occur. While there would be no impacts to wetland resources, the impacted PWS would not be provided with an alternative water supply and would continue to suffer serious water quality issues and the residents would not have access to drinking water that meets all MassDEP's Drinking Water Standards and Guidelines. In addition, the Town of Littleton would not gain the redundancy in its drinking water system necessary to provide residents with drinking water at all times.

This alternative does not meet the project goals.

Alternative 2: Drill Individual Replacement Wells for each PWS

Under this alternative, each individual PWS would have a new source of supply drilled and the contaminated wells could be abandoned. This alternative is not feasible due to the extent of the contamination in the local aquifers. Replacement wells would likely need to be drilled in different geological formations, which may require thousands of additional feet of water main to be constructed for each system. In addition, there is no guarantee of water quality in the short or long term at the replacement wells and no redundancy of supply provided.

This alternative does not meet the project goals.

Alternative 3: Add Treatment to each PWS

Under this alternative, each individual PWS would be updated to include treatment for the contaminants of concern and the new well would not be constructed in Littleton. Treatment systems for the contaminants of concern require significant infrastructure, operations and maintenance, and produce individual waste streams that may negatively impact the environment. Reverse Osmosis (RO) would be the only feasible treatment for treatment of sodium and chloride contamination. This treatment process produces a concentrated waste stream that would ultimately be disposed of through underground injection. The discovery of the PFAS contamination in the area groundwater complicates the viability of this treatment alternative, as the concentrations of PFAS within the waste streams of each individual system will limit disposal options. This alternative also does not provide redundancy.

This alternative does not meet the project goals.

Alternative 4: Municipal Interconnection

Under this alternative, the contaminated PWS would be connected to a nearby municipal water system. Systems within 1 mile of the contaminated PWS were considered due to feasibility of design and construction of the project. There is no centralized PWS in Boxborough.

The Town of Harvard operates a small system with approximately 98 service connections that is served by two wells and has a third well for emergency supply. This system has no treatment and does not have capacity to connect the contaminated PWS. This system was not considered further for an interconnection.

The Littleton Electric Light & Water Departments (LELWD) operates a water system serving residents in Littleton, MA. LELWD is currently constructing a Water Treatment Plant (WTP) at Whitcomb Avenue with a capacity of 3 million gallons per day (MGD) to treat water from its groundwater wells for PFAS as well as other contaminants. LELWD has also been conducting hydrogeological testing and investigation over the past 35+ years to locate a new well source to provide additional redundancy within their system. The well site is located at the parcel at 153 Taylor Street in Littleton. With the addition of this well to the system, and the treatment capacity at the Whitcomb Avenue WTP, LELWD will have the additional supply necessary to provide treated water to the PWS in Boxborough.

This alternative supports the project goal and was further refined below.

Alternative 5a & 5b: Municipal Interconnection to LELWD - Alternative Routes

To connect the new well to the Whitcomb Avenue WTP, two alternative routes (Option 1 and Option 2) were explored. These alternatives are documented in the memorandum "Raw Water Main Alternatives Analysis" dated December 21, 2021. Both routes include work in close proximity to the wetland areas

- a. Option 1: Raw water main (approximately 6,250 linear feet) installed from the well to the WTP by directional drilling under Beaver Brook and the surrounding wetlands.
- b. Option 2: Raw water main (approximately 10,800 linear feet) installed from the well along Taylor Street, Porter Road, and Whitcomb Avenue.

Option 1 was further refined to limit the distance required for directional drilling from 1,850 feet to approximately 170 feet and the path of the raw water main was brought as close to the existing right of way and previously disturbed areas as much as possible to reduce environmental impacts.

This alternative supports the project goal and is the preferred alternative.

Finished Water Main Alternatives

For the finished water main connecting from the WTP at 15 Whitcomb Avenue to 330 Codman Hill Road, the following alternatives were considered.

Alternative 1: No Build

Under this alternative, no construction would occur. While there would be no impacts to environmental resources, the impacted PWS would not be provided with an alternative water supply and would continue to suffer serious water quality issues and the residents would not have access to drinking water that meets all MassDEP's Drinking Water Standards and Guidelines.

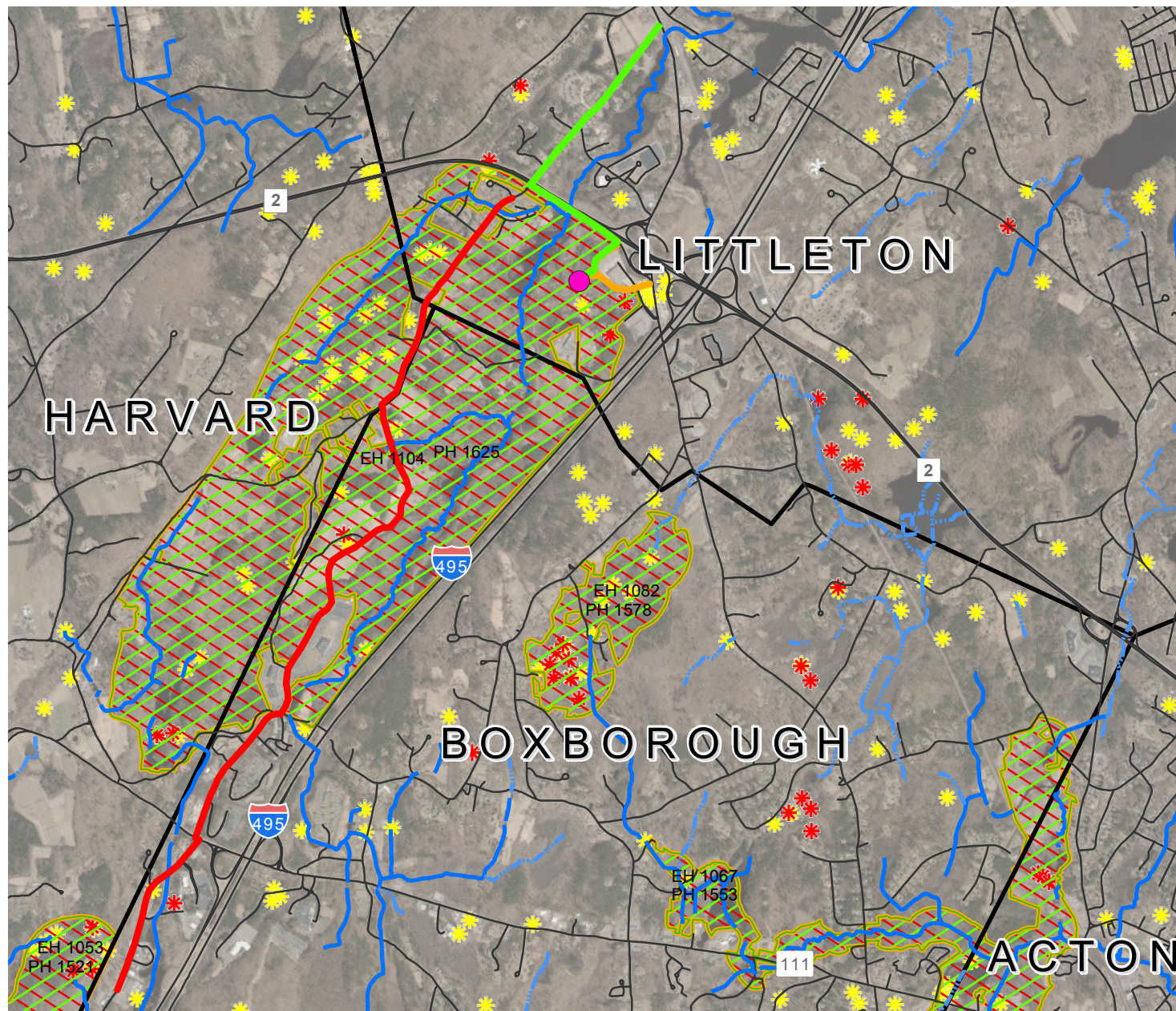
This alternative does not meet the project goals.

Alternative 2: Construct Water Main in Existing Roadway

This alternative includes construction of a finished water main within the existing right of ways for Whitcomb Avenue, Littleton County Road, Beaver Brook Road, Swanson Road, Codman Hill Road, for an approximate length of 23,200 linear feet. This option limits construction to the pre-existing roadway and will have limited environmental impact while achieving the project goal of providing safe drinking water to impacted residents.

Conclusion

The combination of a refined Alternative 5a for the New Source and Raw Water Main and Alternative 2 for the Finished Water Main is recommended as the preferred alternative for implementation. Even though impacts to wetland resources are proposed, an overall improvement of current conditions will be achieved with this proposed project. Residents and businesses will be provided with a safe source of drinking water that meets all MassDEP's Drinking Water Standards and Guidelines, and redundancy in existing water supplies will be improved.



Legend

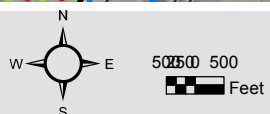
- Well Site
- Finish Extension
- Raw Extension
- Access Road
- Perennial Stream
- Intermittent Stream
- ACECs**
- ACECs
- NHESP Habitats**
- NHESP Estimated Habitats of Rare Wildlife
- NHESP Priority Habitats of Rare Species
- ★ NHESP Certified Vernal Pools
- ★ NHESP Potential Vernal Pools

FIGURE 2

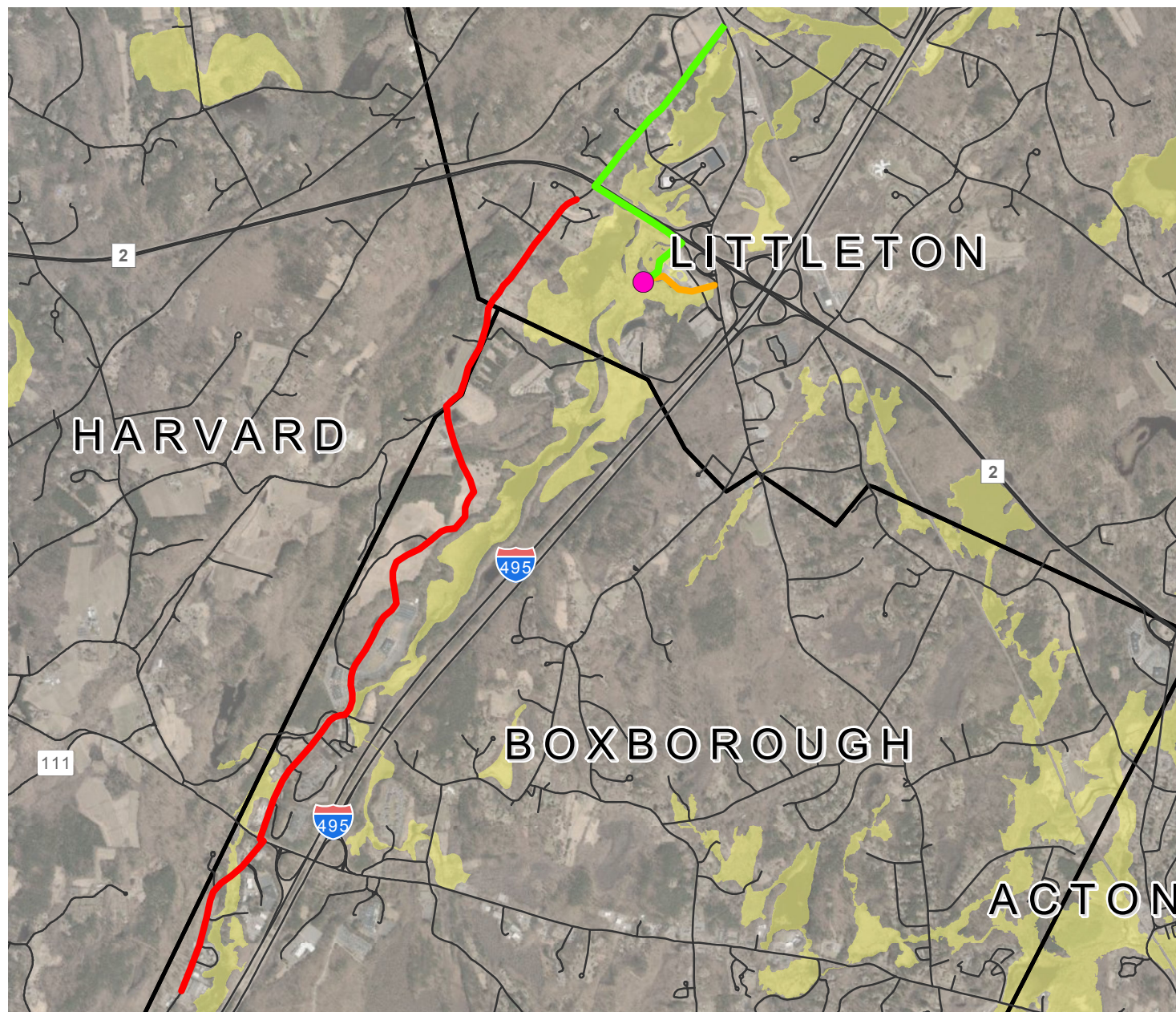
New Source and Raw Water Main
Finished Water Ext.

Littleton & Boxborough, MA

Weston & SampsonSM



Data Source: Office of Geographic and Environmental Information (MassGIS),
Commonwealth of Massachusetts Executive Office of Environmental Affairs



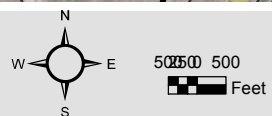
Legend

- Well Site
- Finish Extension
- Raw Extension
- Access Road
- 100-Year Flood Zone**
- 100-Year Flood Zone

FIGURE 3

New Source and Raw Water Main
Finished Water Ext.

Littleton & Boxborough, MA



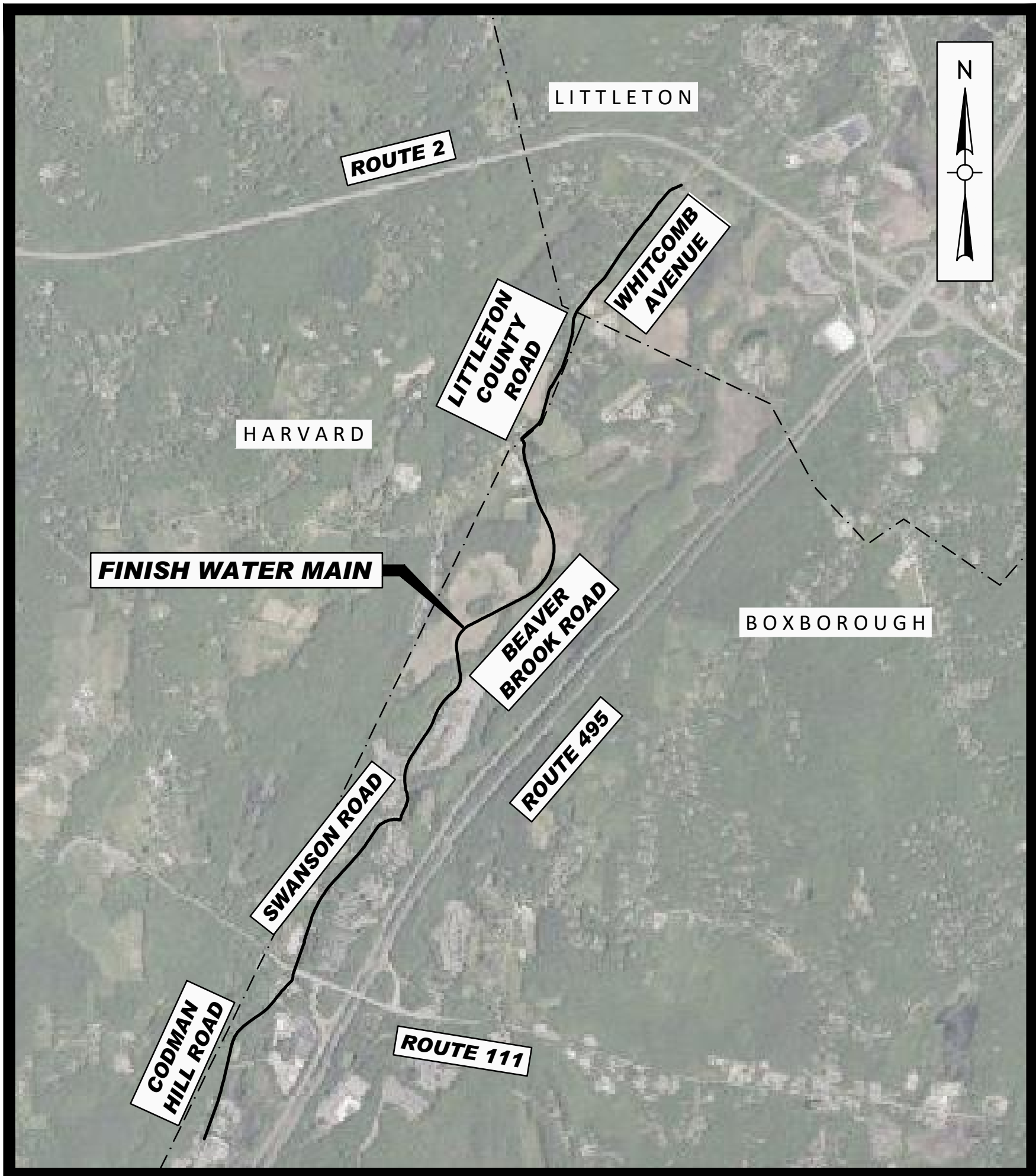
Data Source: Office of Geographic and Environmental Information (MassGIS),
Commonwealth of Massachusetts Executive Office of Environmental Affairs

Weston & SampsonSM

LITTLETON WATER DEPARTMENT



WATER SUPPLY FROM LITTLETON TO BOXBOROUGH TOWN CONTRACT NO. IFB-2024 DWSRF NO. 12397 - CONTRACT NO.2 NICK LAWLER - GENERAL MANAGER DAVE KETCHEN - ASSISTANT GENERAL MANAGER COREY GODFREY - WATER SUPERINTENDENT



LOCUS MAP
SCALE : 1"=2000'

DRAWING INDEX	
SHEET	TITLE
G000	COVER AND SHEET LIST
G001	ABBREVIATIONS, NOTES, AND LEGEND
C101	FINISH WATER PLAN WHITCOMB AVENUE
C102	FINISH WATER PLAN WHITCOMB AVENUE AND LITTLETON COUNTY ROAD
C501	DETAILS
C502	DETAILS

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Issued Date:

OCTOBER 2023



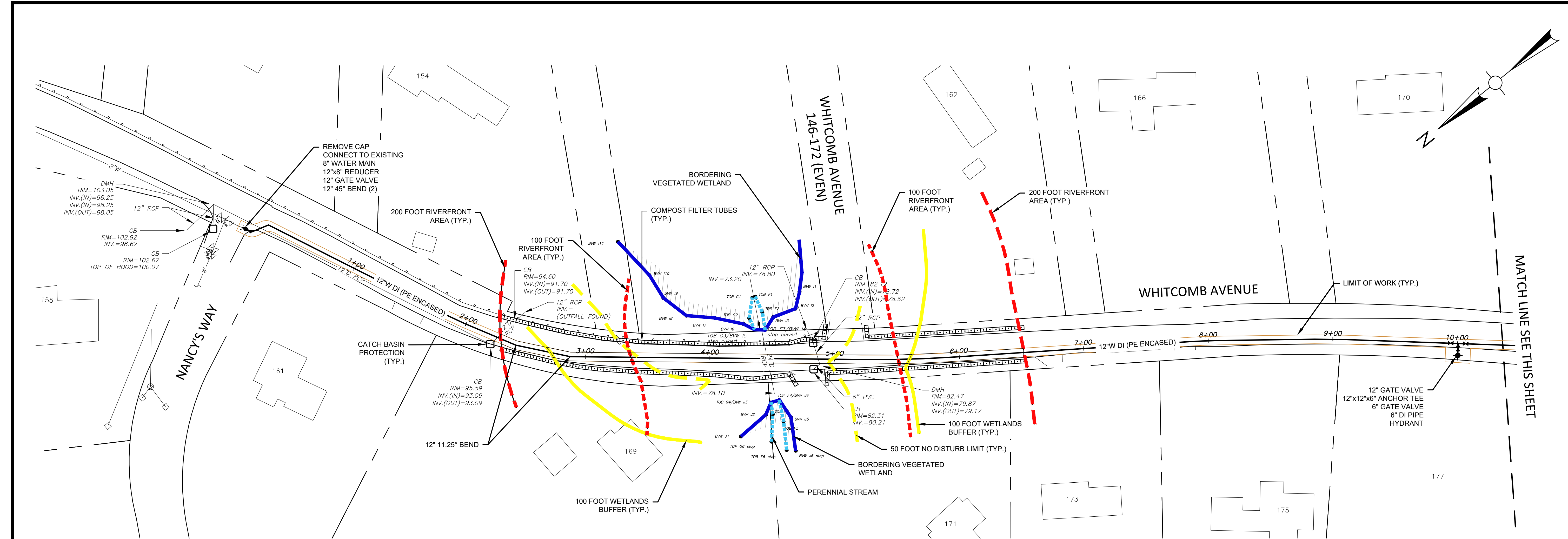
Know what's below.
Call before you dig.

Issued For:



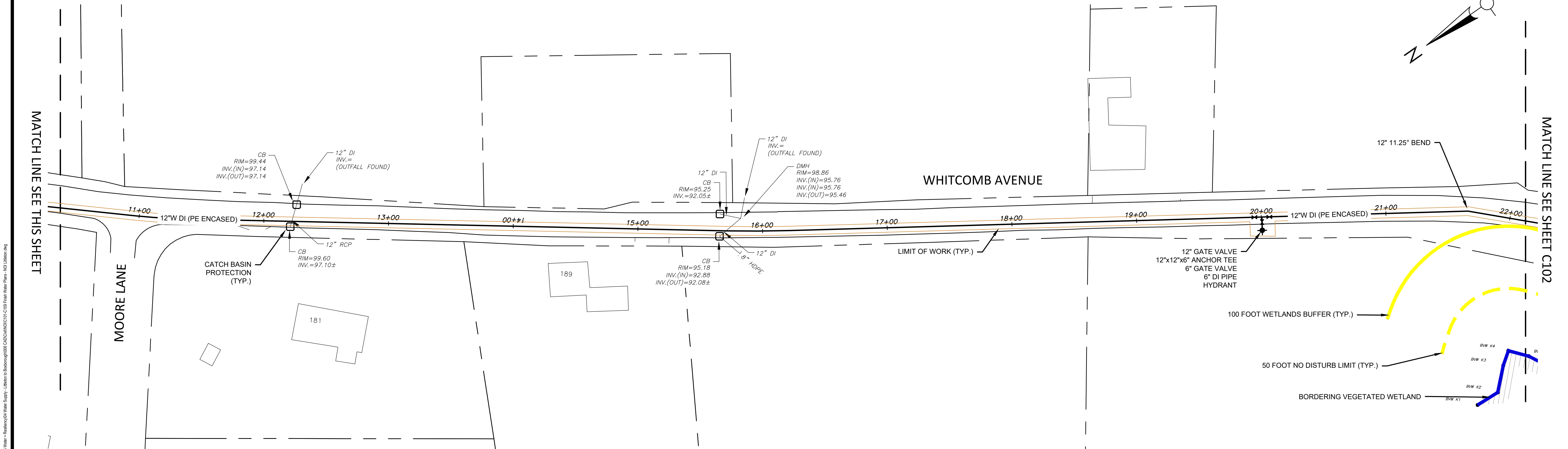
FOR PERMIT REVIEW

FILE NO.

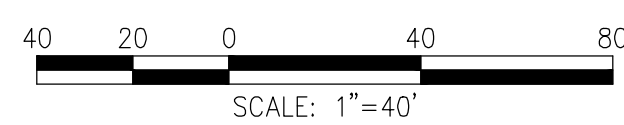


- NOTES:
- WETLAND DELINEATION CONDUCTED ON DECEMBER 5, 6, AND 21, JANUARY 5 AND 18, 2023, AND AUGUST 17, 2023 BY DEVIN HERRICK, CWS.
 - ENTIRE PLAN VIEW IS WITHIN LITTLETON GIS AQUIFER ZONING OVERLAY DISTRICT.

PLAN
SCALE: 1" = 40'



PLAN
SCALE: 1" = 40'



Project:

LITTLETON WATER DEPARTMENT

LITTLETON
LELWD
LITTLETON ELECTRIC, LIQUID & WATER DEPARTMENT

WATER SUPPLY FROM
LITTLETON TO BOXBOROUGH
TOWN CONTRACT NO. IFB-2024
DWSRF NO. 12397
CONTRACT NO. 2

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Consultants:

Revisions:

No.	Date	Description

COA:

Seal:

Issued For:

FOR PERMIT REVIEW ONLY

Scale: AS NOTED

Date: OCTOBER 2023

Drawn By: GJK/RWS

Reviewed By: SBR

Approved By: TEM

W&S Project No.: ENG23-0679

W&S File No.:

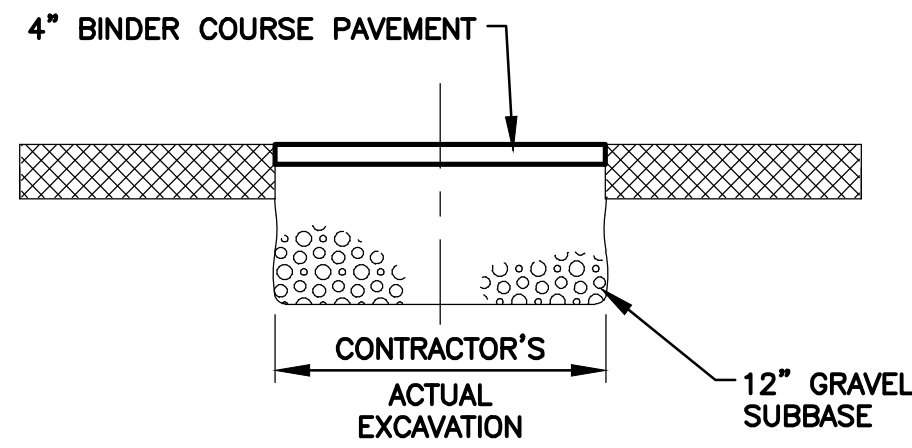
Drawing Title:

**FINISH WATER PLAN
WHITCOMB AVENUE**

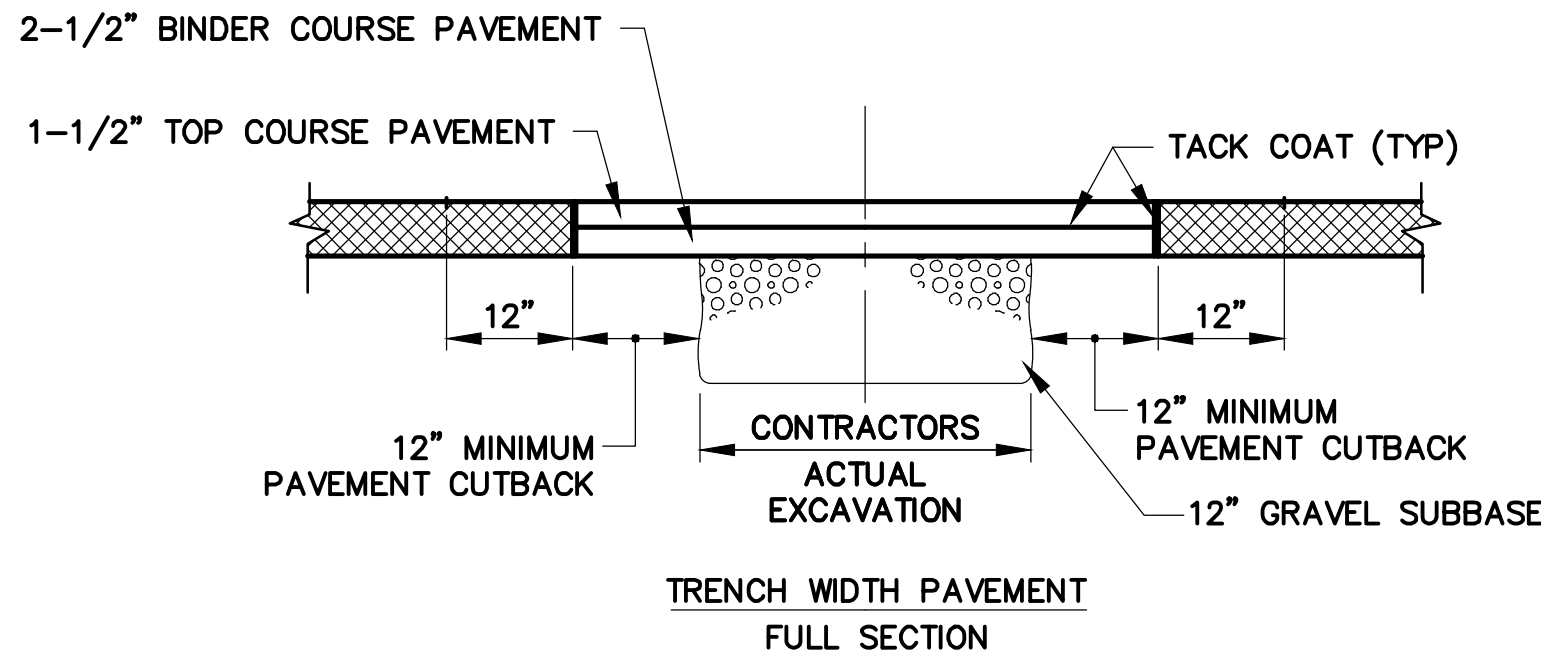
Sheet Number:

C101

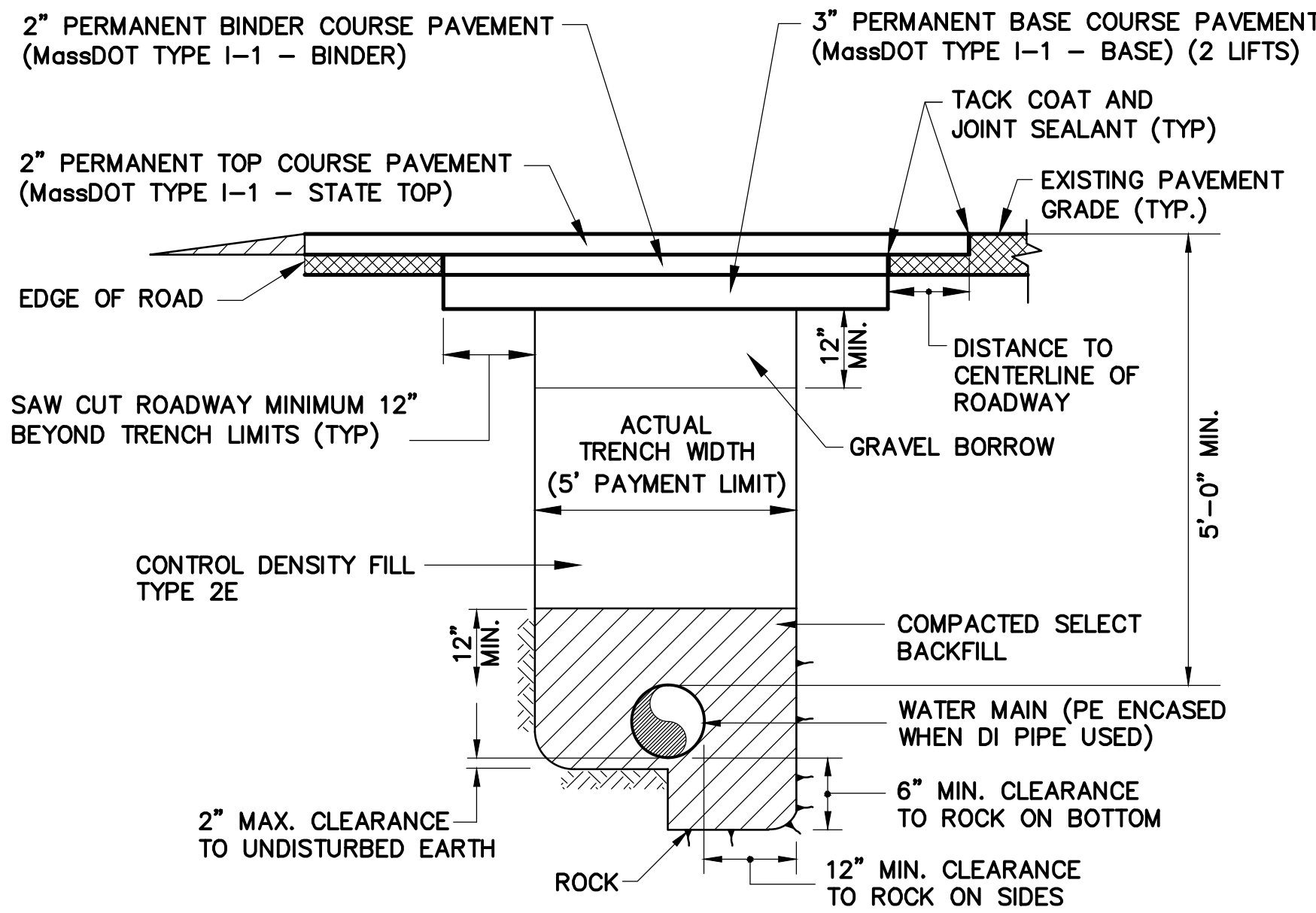
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TEMPORARY TRENCH PAVEMENT
N.T.S.



PERMANENT PAVEMENT REPLACEMENT DETAIL
N.T.S.

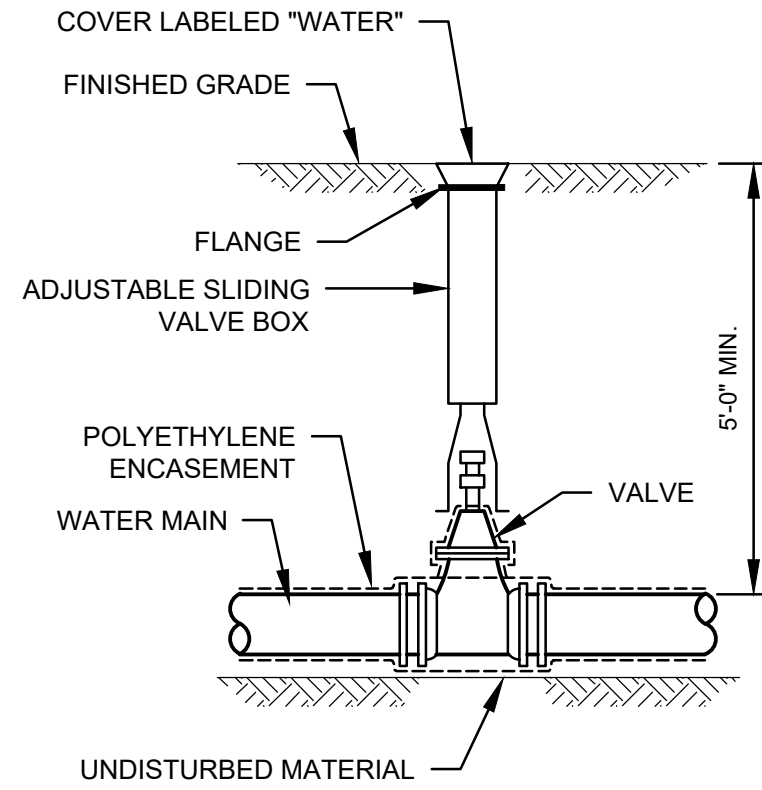


TYPE 3 AND TYPE 4
MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MassDOT)
PERMANENT TRENCH PAVEMENT AND WATER MAIN TRENCH
N.T.S.

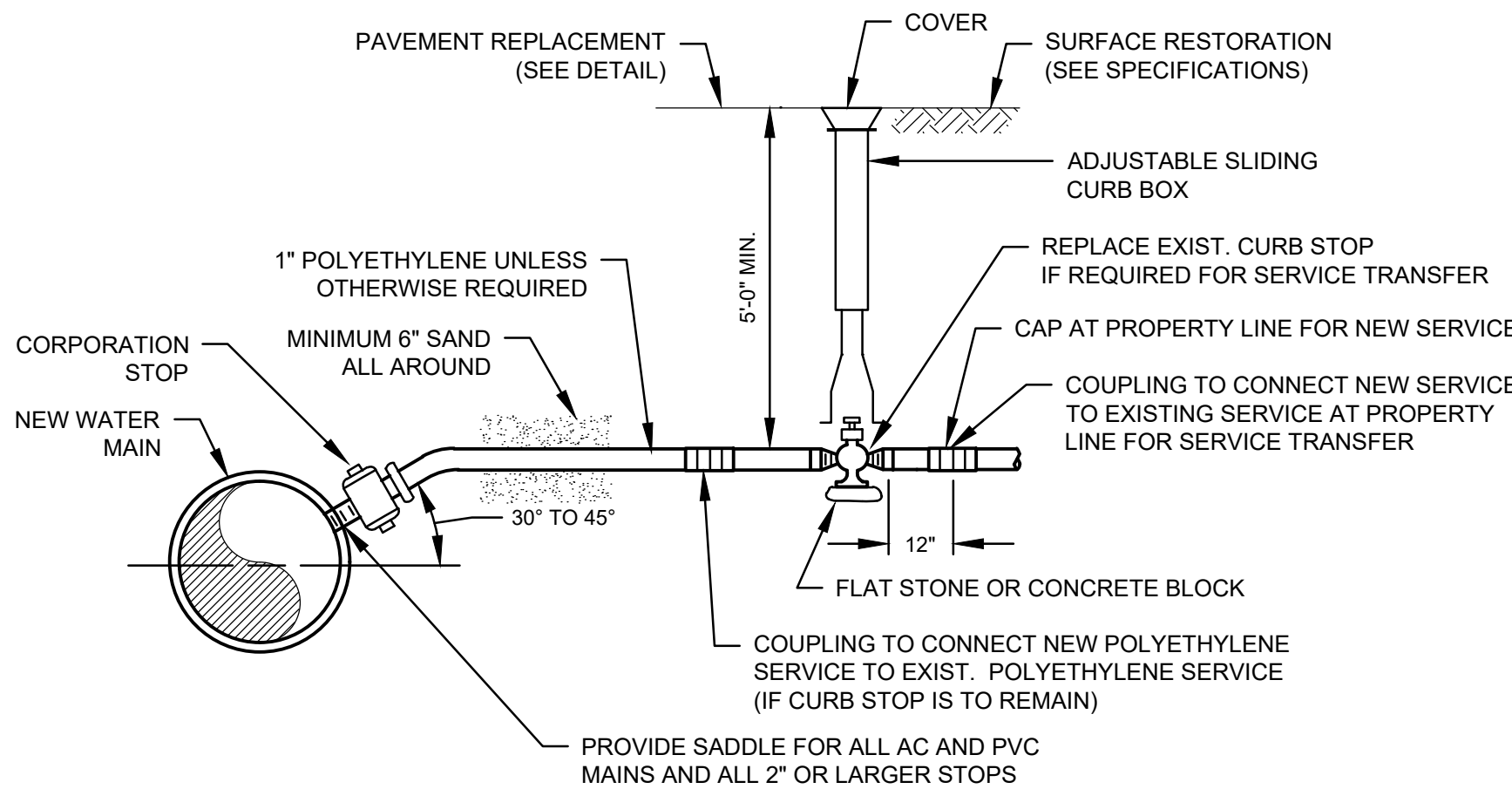
NOTES:

- SEE SECTION 32 11 00, PAVING FOR PAVEMENT SCHEDULE.
- FOR ALL TRENCH PAVEMENTS, CONTRACTOR SHALL INSTALL ASPHALT EMULSION TACK COAT TO ALL SUBSURFACES AND VERTICAL SAW CUTS PRIOR TO INSTALLATION OF PERMANENT PAVEMENT.
- PAVEMENT SHALL BE INSTALLED FLUSH WITH EXISTING GRADE BEFORE WINTER SHUTDOWN.
- TOP LAYER OF PAVEMENT SHALL BE INSTALLED BY MECHANICAL MEANS.

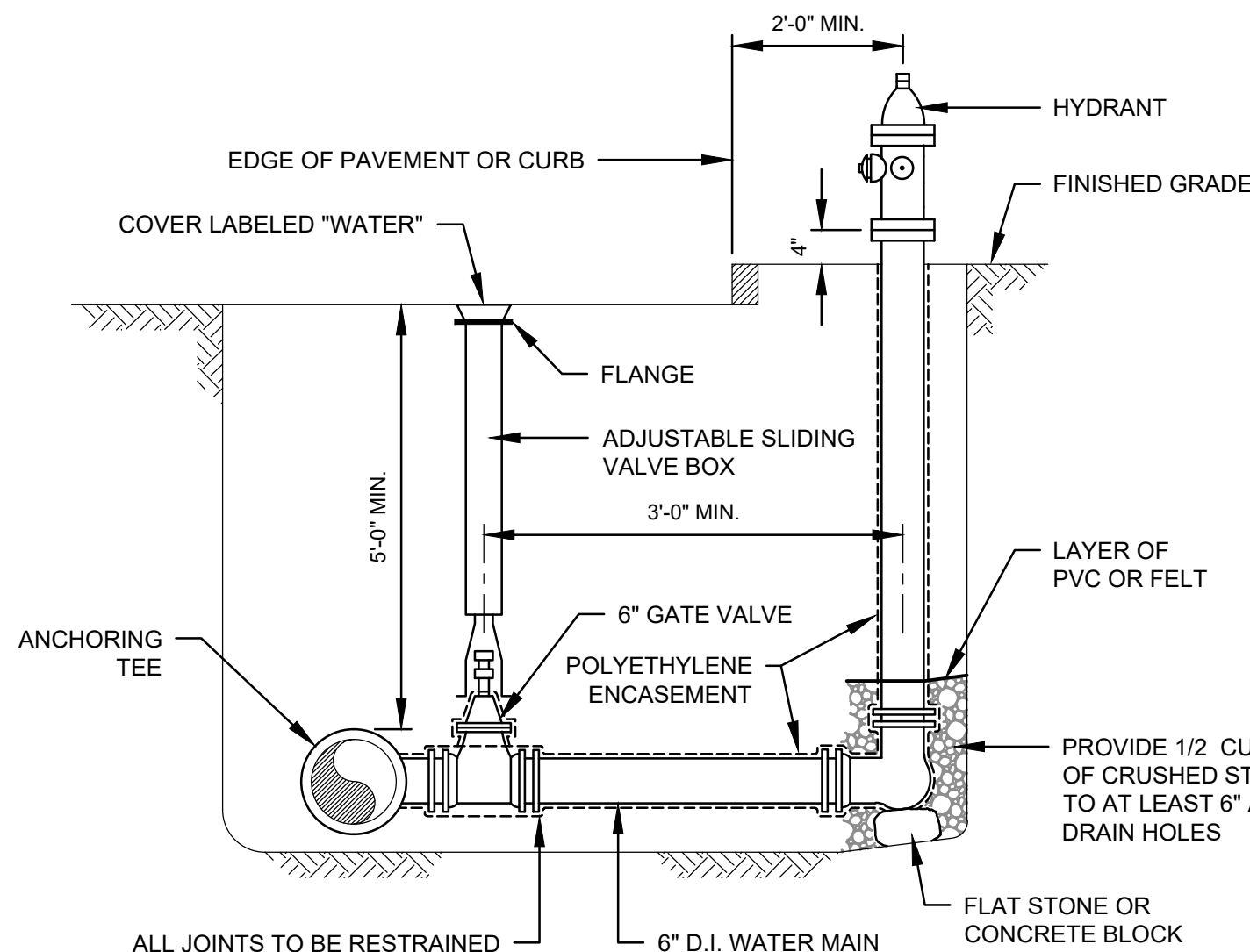
PAVEMENT REPLACEMENT DETAILS
N.T.S.



VALVE AND BOX DETAIL
N.T.S.



WATER SERVICE DETAIL
N.T.S.



NOTE:
USE TWO 6" BENDS OR OFFSET ON LATERAL TO ACHIEVE REQUIRED HYDRANT ELEVATION IF NECESSARY.

HYDRANT AND VALVE DETAIL
N.T.S.

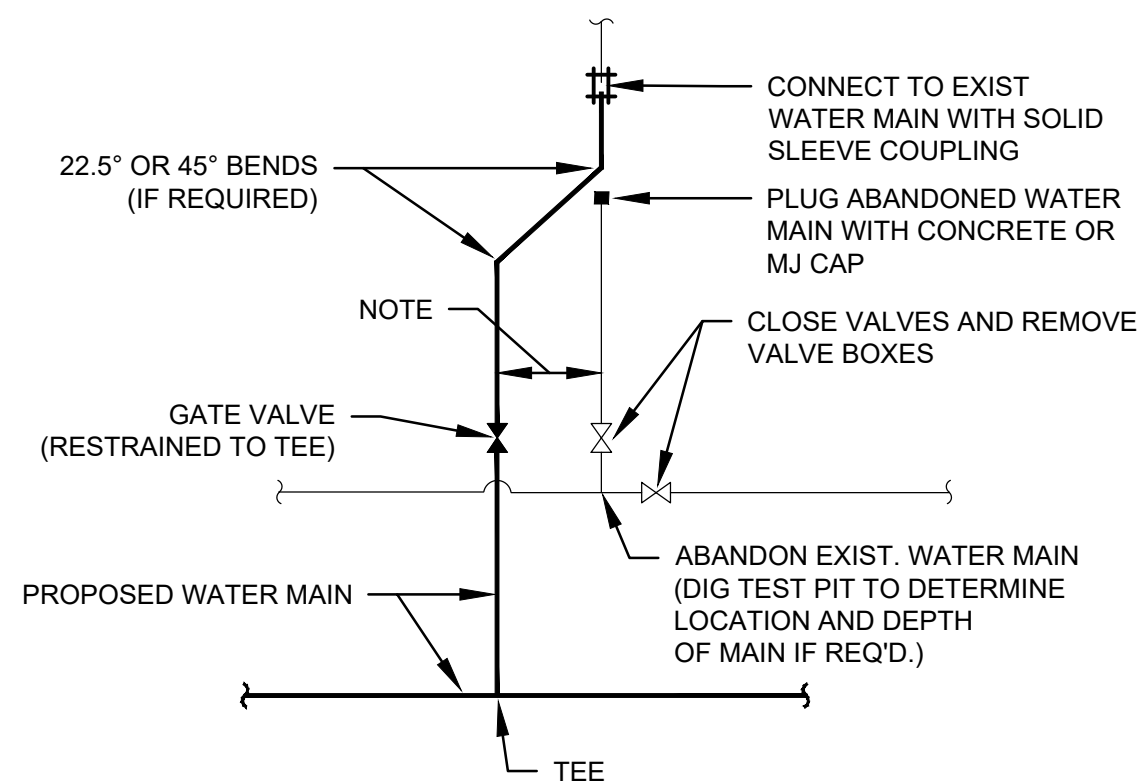
REQUIRED LENGTH OF RESTRAINED JOINTS FROM FITTINGS (FEET)

PIPE SIZE	90° BEND	45° BEND OR WYE BRANCH	22 1/2° BEND	11 1/4° BEND	PLUG, CAP OR IN-LINE VALVE	TEE (BRANCH)
6"	25 (30.5)	10.5 (12.5)	5 (6)	2.5 (3)	43 (64)	34 (51)
8"	33 (40)	13.5 (16.5)	6.5 (8)	3 (4)	55 (82)	47 (70)
10"	40 (48.5)	16.5 (20)	8 (9.5)	4 (5)	67 (100)	58 (87)
12"	47 (56.5)	19.5 (23.5)	9.5 (11.5)	4.5 (5.5)	79 (118)	70 (105)
16"	59.5 (72)	24.5 (30)	12 (14.5)	6 (7)	101 (152)	92 (139)
20"	72 (86.5)	30 (36)	14.5 (17)	7 (8.5)	123 (184)	114 (171)
24"	84 (100)	35 (41)	16.5 (20)	8 (10)	144 (216)	134 (202)
30"	100 (120)	41 (50)	20 (24)	10 (12)	174 (261)	165 (247)

NOTES:

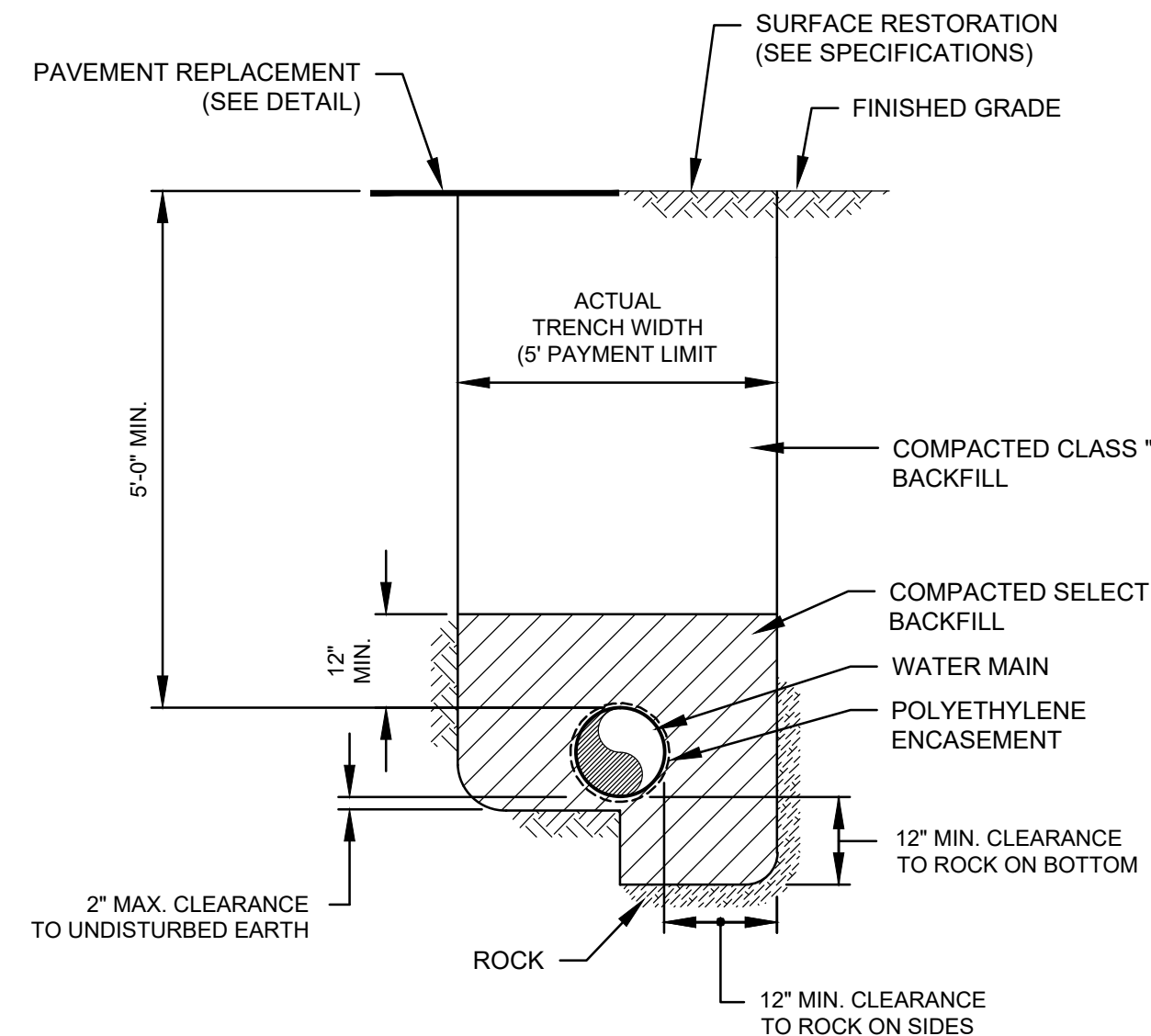
- RESTRAINED LENGTHS LISTED IN PARENTHESES ARE FOR PIPE WRAPPED IN POLYETHYLENE. THE OTHER ASSOCIATED LENGTHS ARE FOR PLAIN UNWRAPPED DUCTILE IRON PIPE.
- THE CONTRACTOR SHALL USE THIS TABLE IN CONJUNCTION WITH THE APPROPRIATE PIPE SPECIFICATION SECTION.

RESTRAINED JOINT TABLE



NOTE:
MINIMUM PRACTICAL DISTANCE - GENERALLY NO MORE THAN 2 FT.

WATER MAIN LATERAL CONNECTION
N.T.S.



WATER MAIN TRENCH DETAIL
N.T.S.

Revisions:		
No.	Date	Description



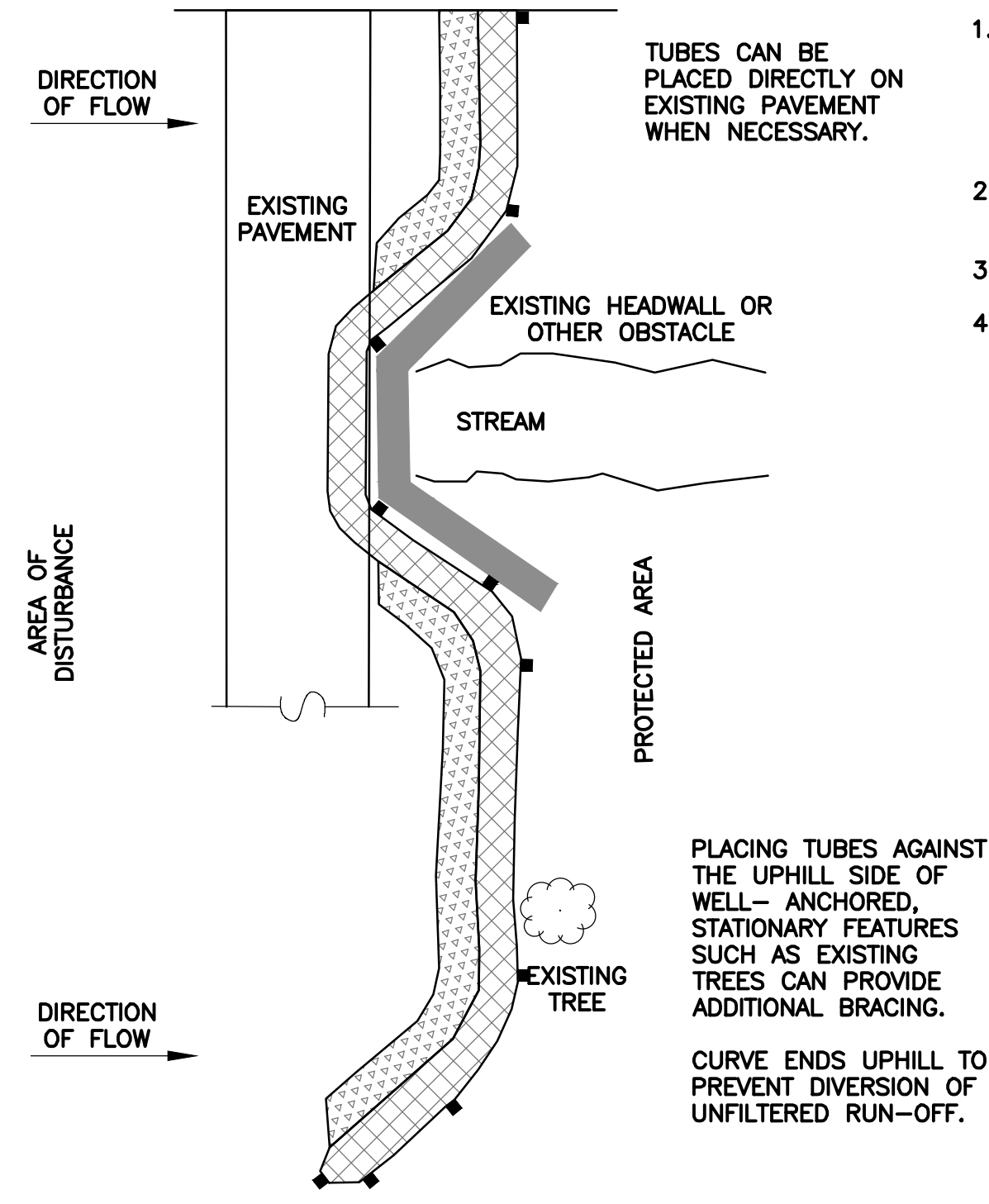
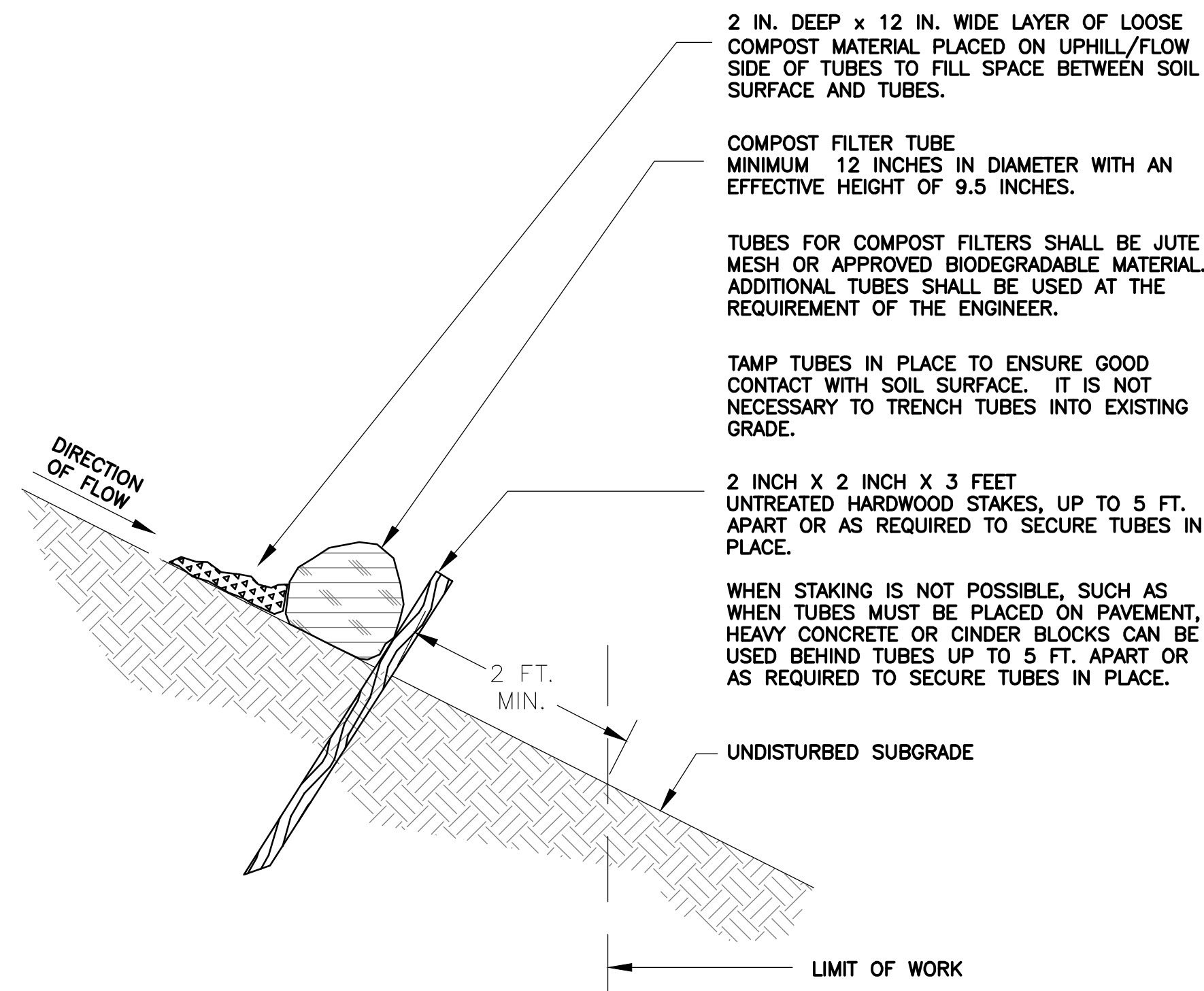
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Reviewed By: SBR
Approved By: TEM
W&S Project No.: ENG23-0679
W&S File No.:

DETAILS I

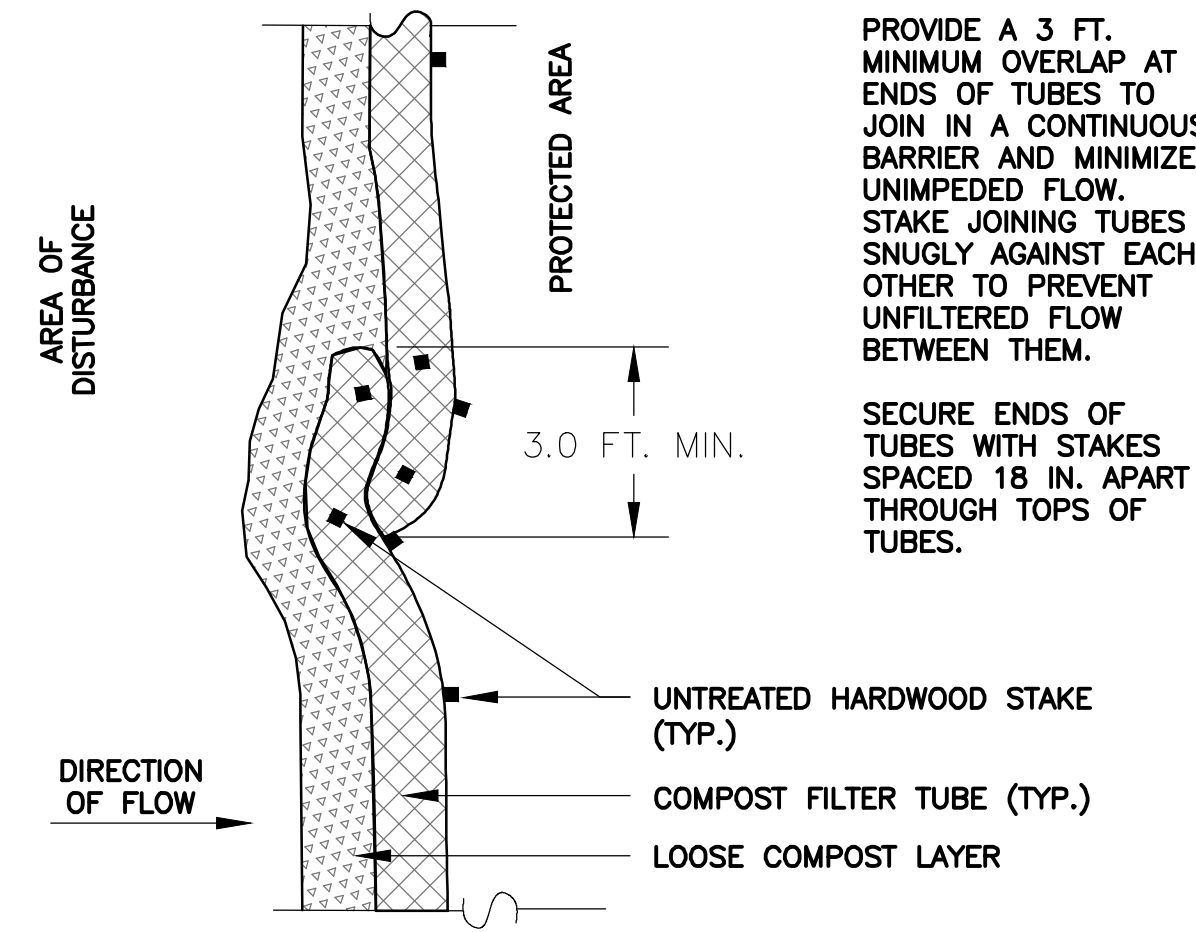
C501



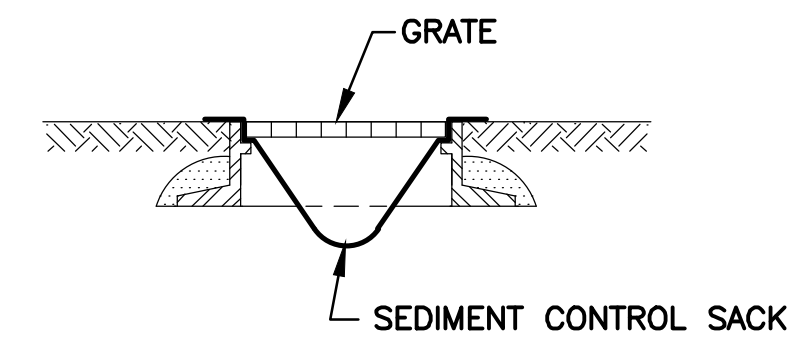
PLAN VIEW
SINGLE COMPOST FILTER TUBE DETAIL
NOT TO SCALE

GENERAL NOTES:

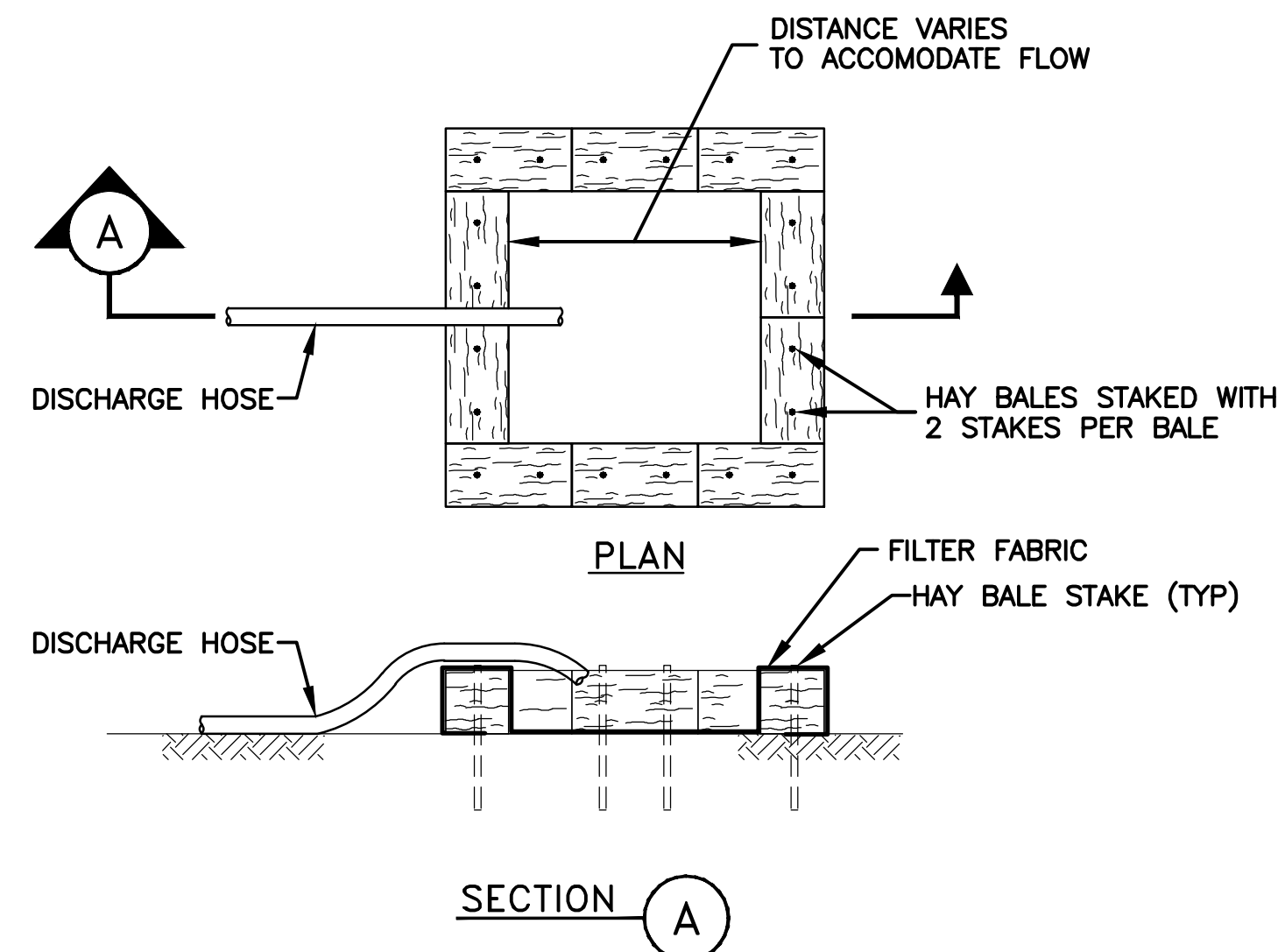
1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSEING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
2. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
3. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
4. CONFIGURE TUBES AROUND EXISTING SITE FEATURES TO MINIMIZE SITE DISTURBANCE AND MAXIMIZE CAPTURE AREA OF STORMWATER RUN-OFF.



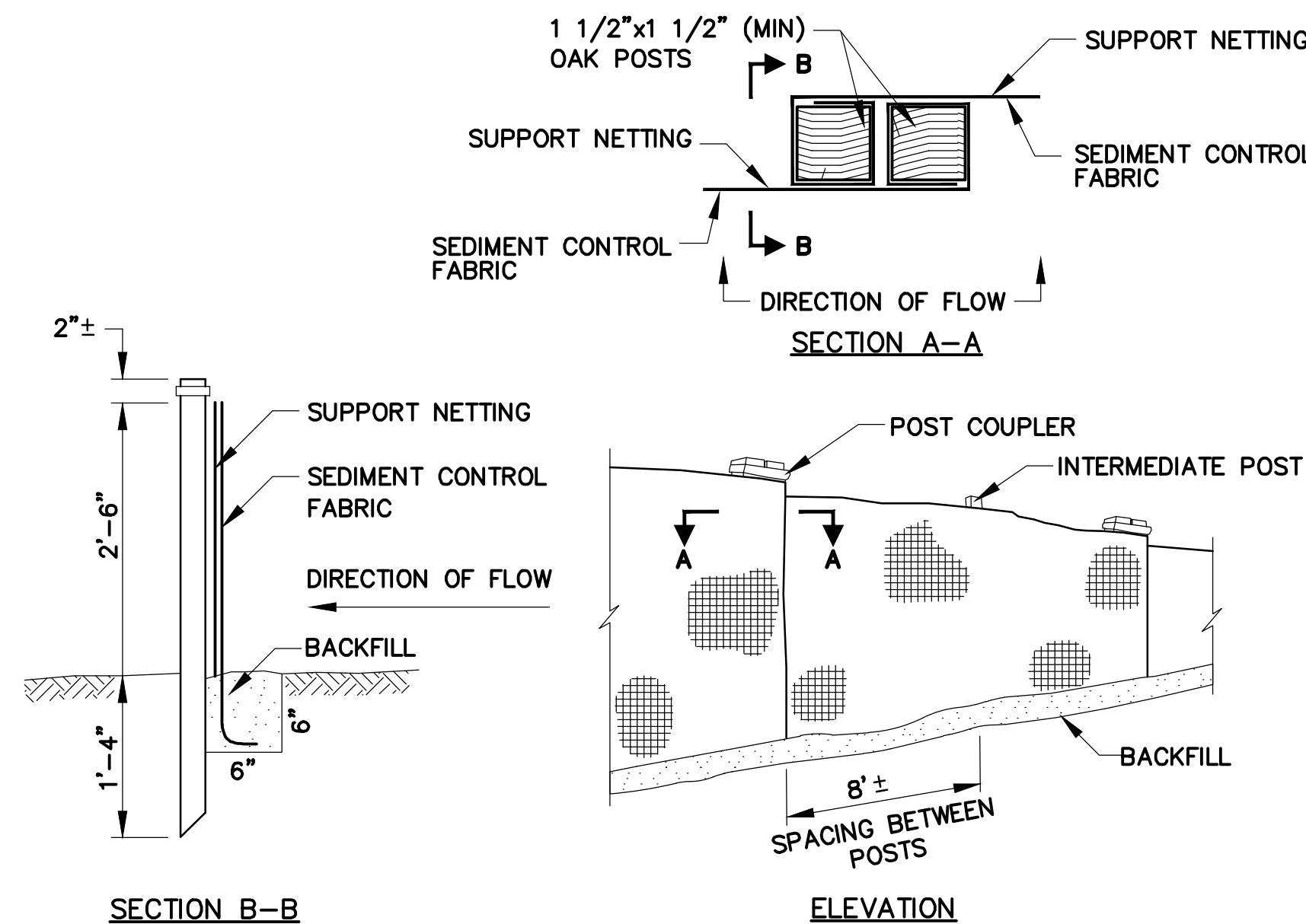
PLAN VIEW - JOIN DETAIL



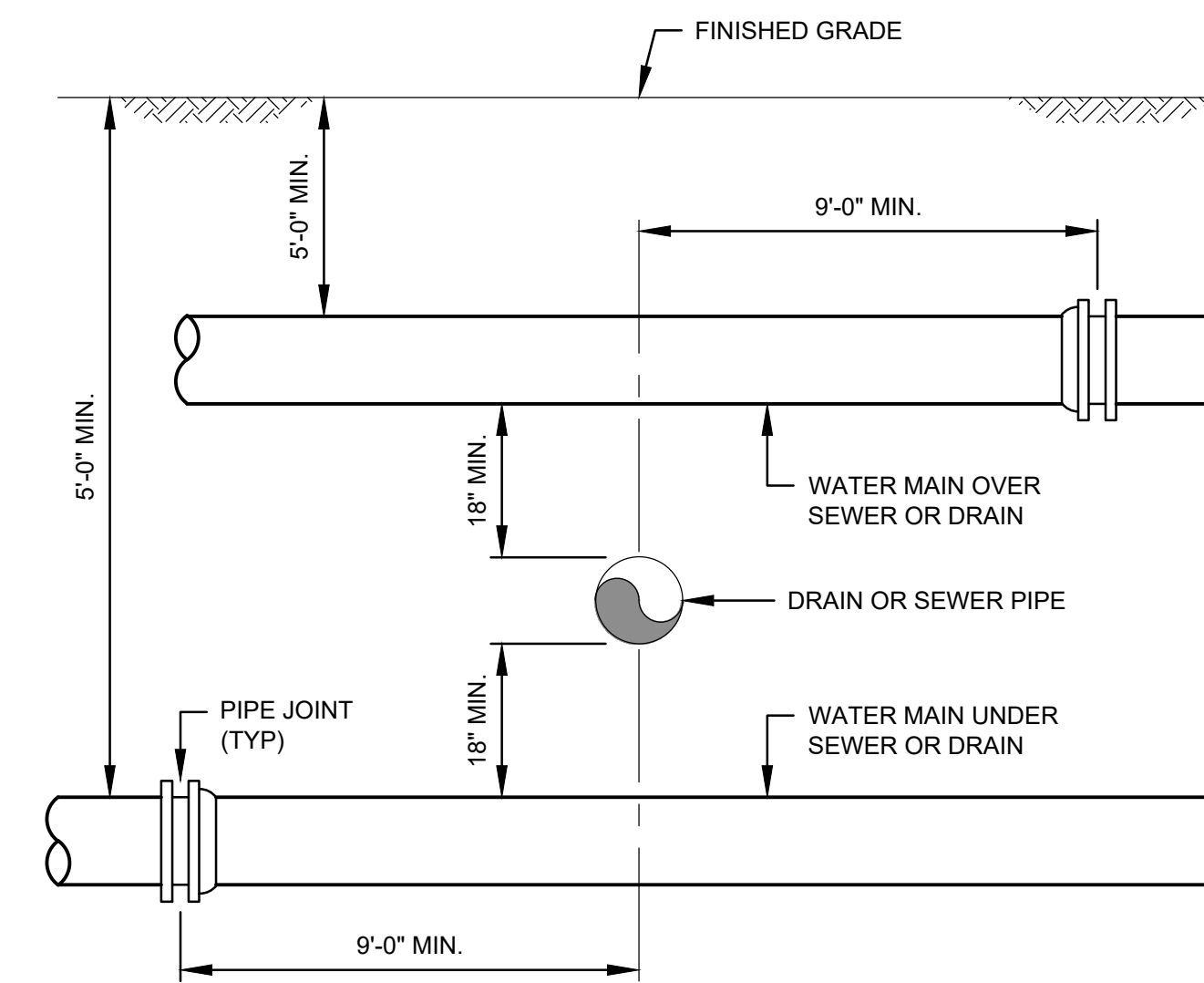
CATCH BASIN PROTECTION DETAIL
N.T.S.



DEWATERING DISCHARGE DISPOSAL DETAIL
N.T.S.



SILT FENCE DETAIL
N.T.S.



SEWER OR DRAIN CROSSING DETAIL
N.T.S.

No.	Date	Description

COA:



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W&S File No.:

Drawing Title:

DETAILS II

Sheet Number:

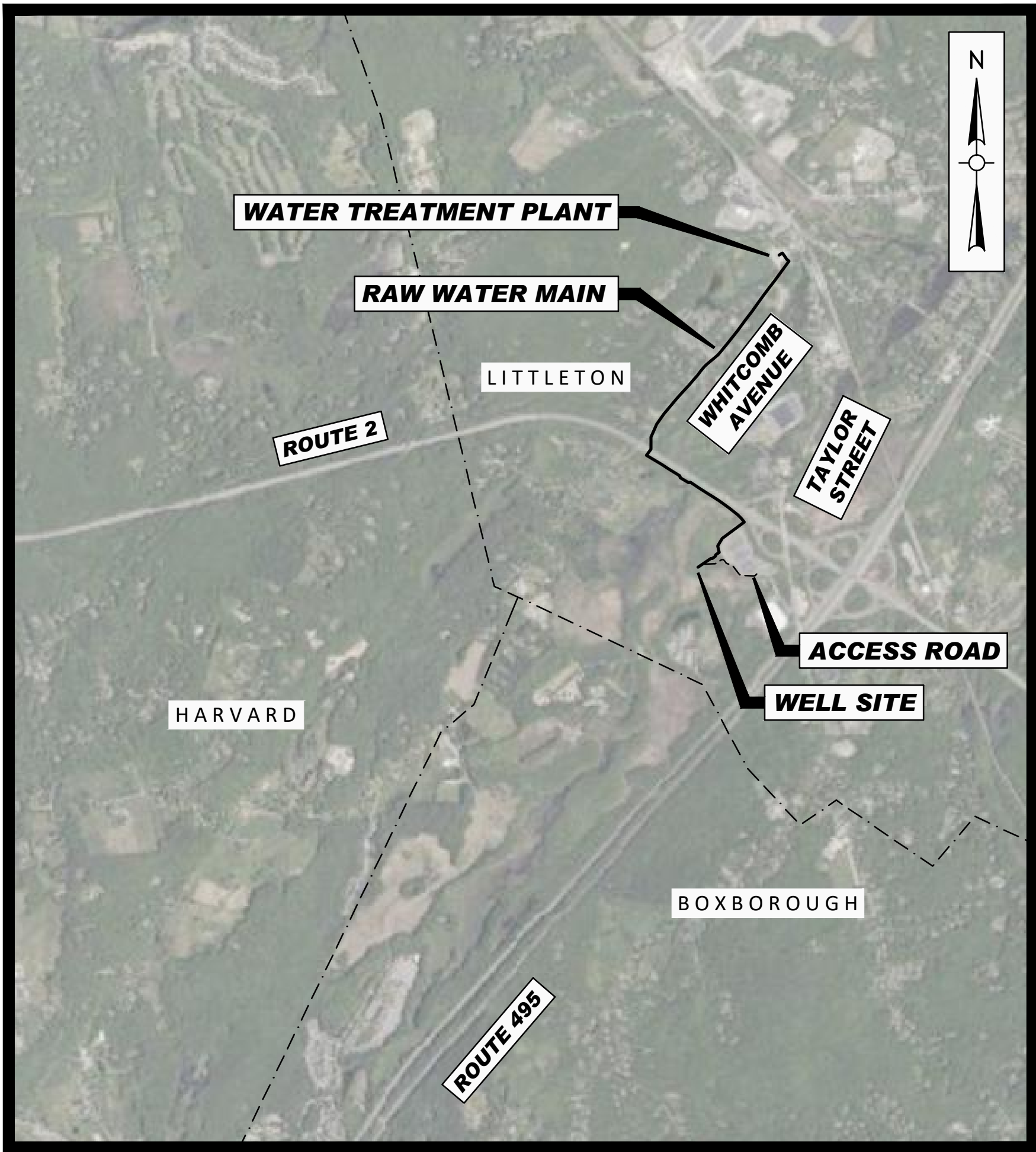
C502

LITTLETON WATER DEPARTMENT



TAYLOR STREET WELL AND RAW WATER MAIN TOWN CONTRACT NO. IFB-2024 DWSRF NO. 12397 - CONTRACT NO.1 NICK LAWLER - GENERAL MANAGER DAVE KETCHEN - ASSISTANT GENERAL MANAGER COREY GODFREY - WATER SUPERINTENDENT

DRAWING INDEX	
SHEET	TITLE
G000	COVER AND SHEET LIST
G001	ABBREVIATIONS, NOTES, AND LEGEND
C101	RAW WATER PLAN WHITCOMB AVENUE
C102	RAW WATER PLAN WHITCOMB AVENUE
C103	RAW WATER PLAN CROSS COUNTRY
C104	ACCESS ROAD GRADING & DRAINAGE PLAN
C105	ACCESS ROAD GRADING & DRAINAGE PLAN
C201	BEAVER BROOK DIRECTIONAL DRILL
C501	DETAILS I
C502	DETAILS II
C503	DETAILS III
C504	DETAILS IV



LOCUS MAP
SCALE : 1"=2000'

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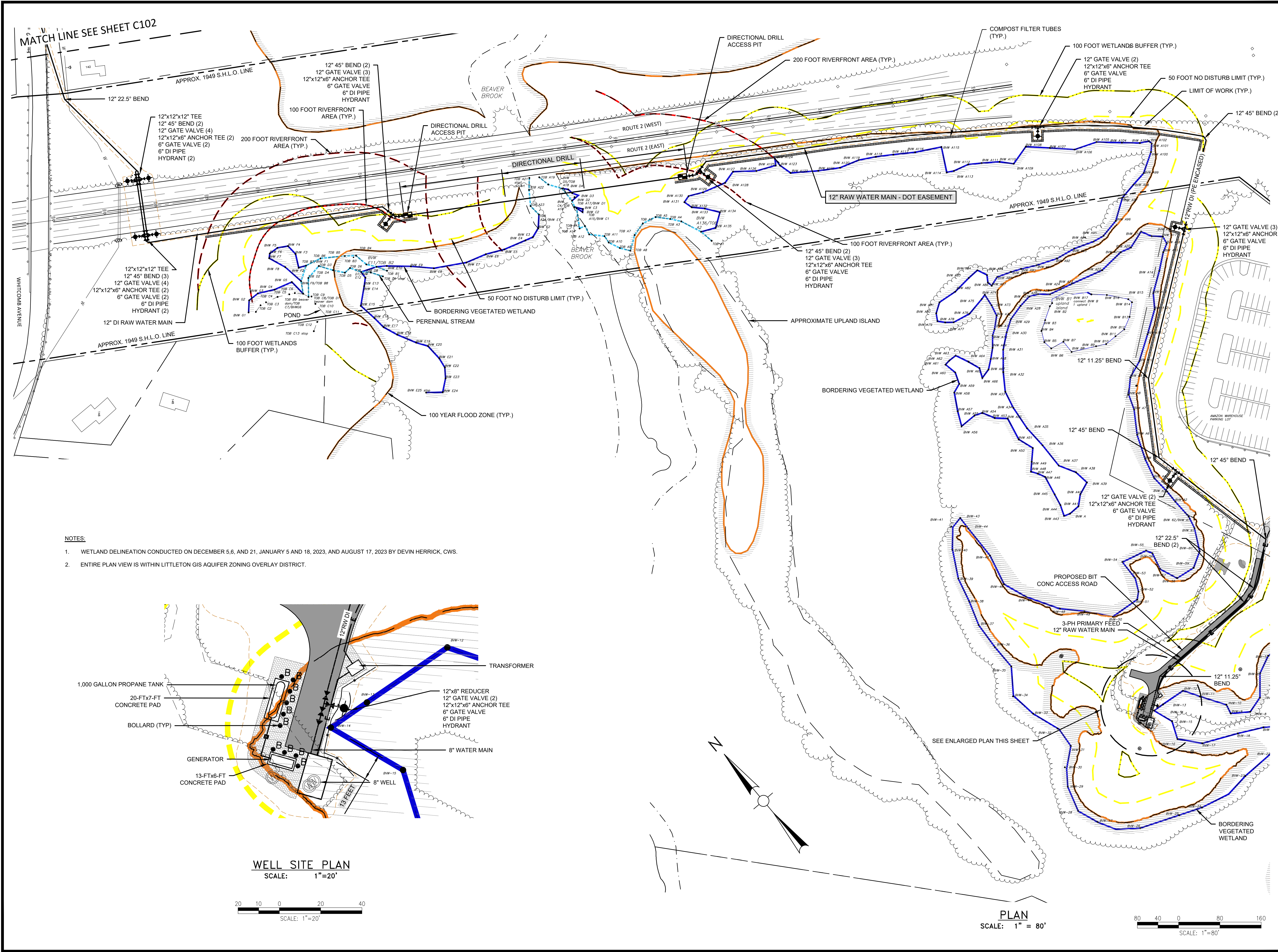
Issued Date: **OCTOBER 2023**

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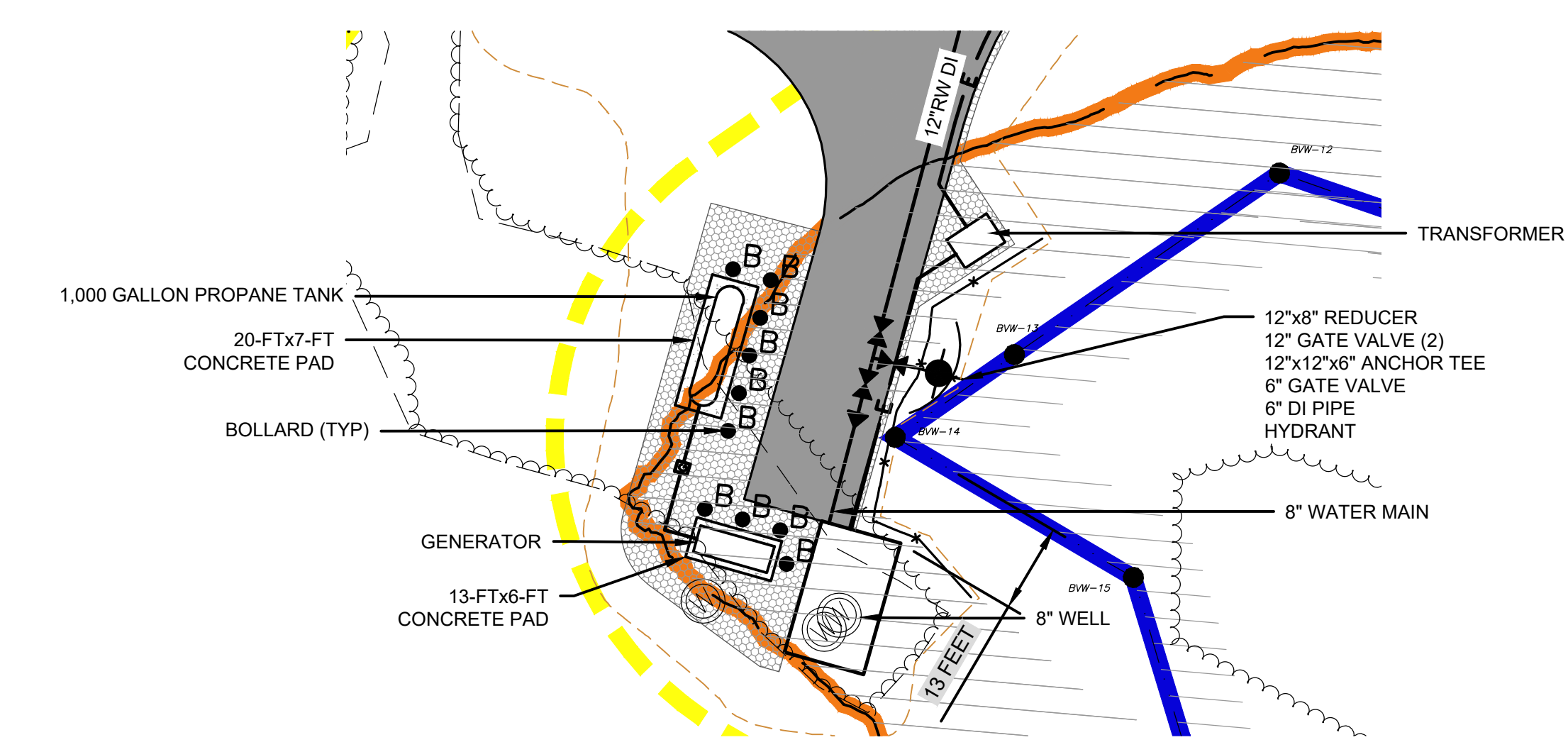
811
Know what's below.
Call before you dig.

Professional Engineer Seal:
TARA E. MCMAHON
No. 57127
REGISTERED PROFESSIONAL ENGINEER
Tara E. McMahon

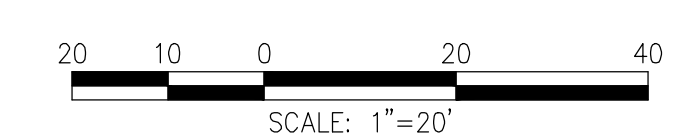
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- NOTES:
1. WETLAND DELINEATION CONDUCTED ON DECEMBER 5,6, AND 21, JANUARY 5 AND 18, 2023, AND AUGUST 17, 2023 BY DEVIN HERRICK, CWS.
 2. ENTIRE PLAN VIEW IS WITHIN LITTLETON GIS AQUIFER ZONING OVERLAY DISTRICT.



WELL SITE PLAN
SCALE: 1"=20'



PLAN
SCALE: 1" = 80'



Project:
LITTLETON WATER DEPARTMENT
LITTLETON
LELWD
TOWN OF LITTLETON
TOWN ENGINEER & WATER DEPARTMENT

TAYLOR STREET WELL AND
RAW WATER MAIN
TOWN CONTRACT NO. 1FB-2024
DWSRF NO. 12397
CONTRACT NO. 1

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Professional Engineer

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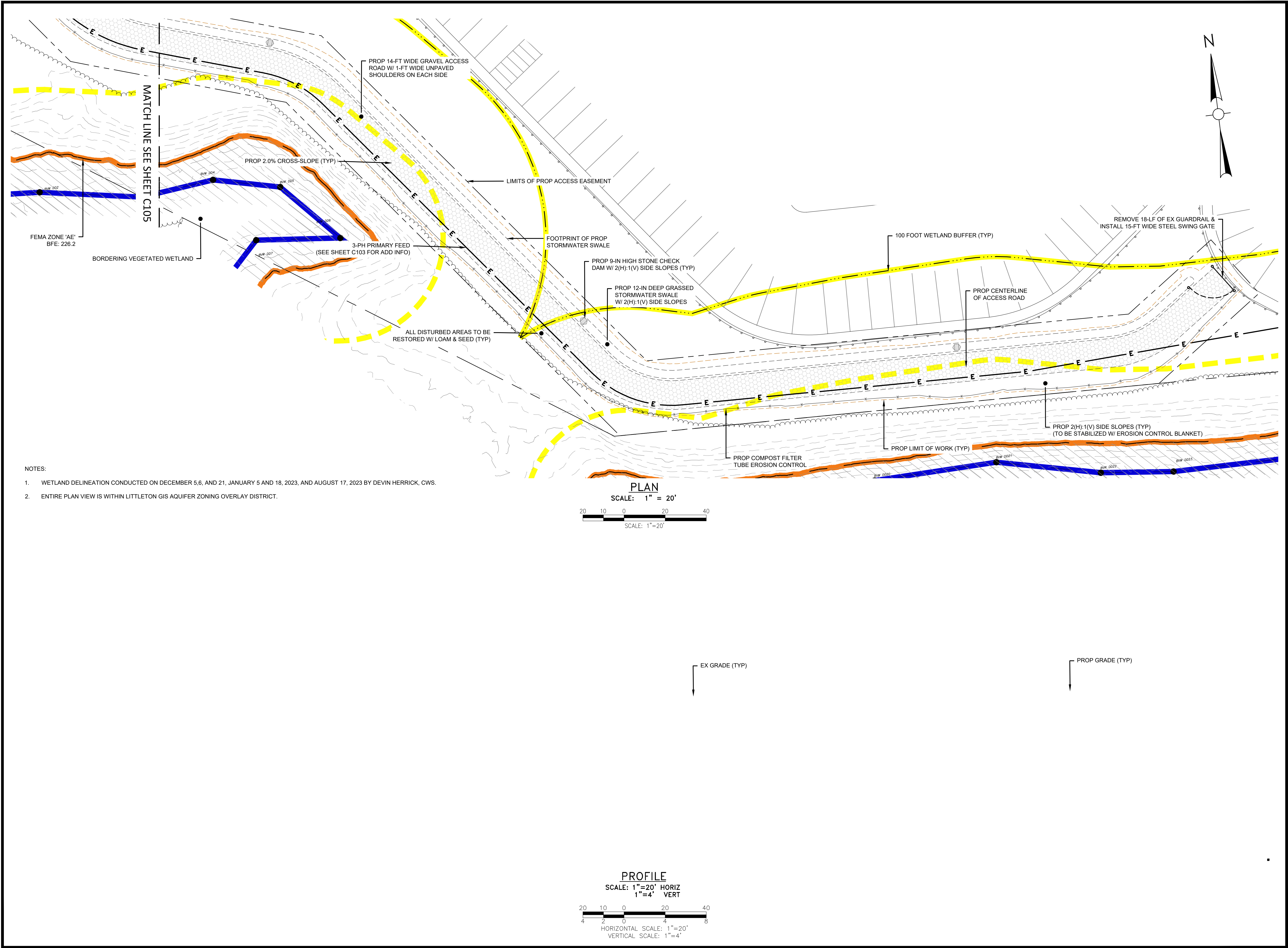
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Approved By: TEM
W&S Project No.: ENG23-0679
W&S File No.:
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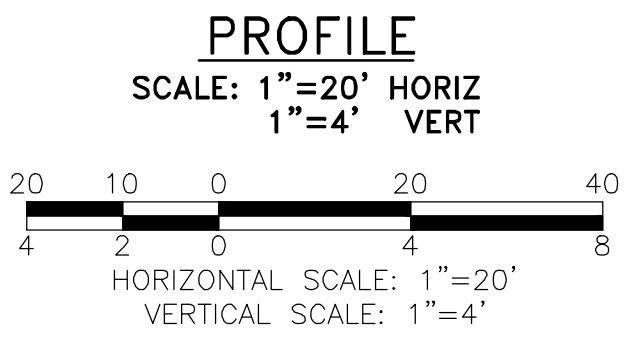
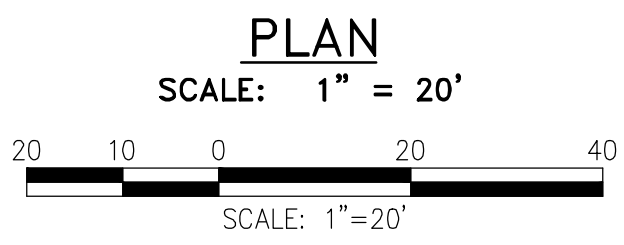
**RAW WATER PLAN
CROSS COUNTRY**

Sheet Number:
C103

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- NOTES:
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 2. ENTIRE PLAN VIEW IS WITHIN LITTLETON GIS AQUIFER ZONING OVERLAY DISTRICT.



Project:

LITTLETON WATER DEPARTMENT

LITTLETON
LELWD
ELECTRIC, LIQUID & WATER DEPARTMENTS

TAYLOR STREET WELL AND RAW WATER MAIN
TOWN CONTRACT NO. IFB-2024
DWSRF NO. 12397
CONTRACT NO. 1

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W&S Project No.: ENG23-0679
W&S File No.:

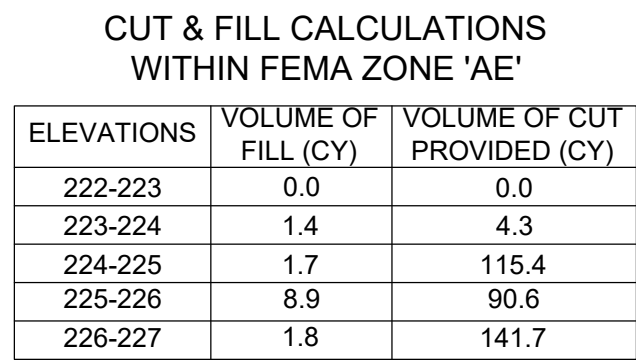
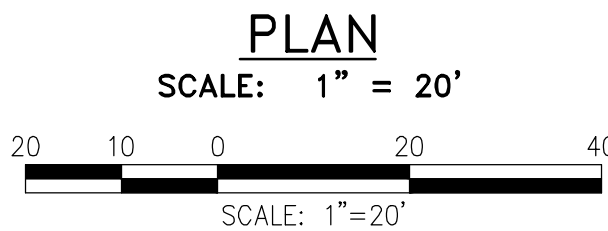
Drawing Title:

ACCESS ROAD GRADING & DRAINAGE PLAN

Sheet Number:

C104

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- NOTES:
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 2. ENTIRE PLAN VIEW IS WITHIN LITTLETON GIS AQUIFER ZONING OVERLAY DISTRICT.

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Seal:



The seal is circular with a double-lined border. The outer ring contains the text "COMMONWEALTH OF MASSACHUSETTS" at the top and "PROFESSIONAL ENGINEER" at the bottom. The center of the seal contains the name "TARA E MCMANUS", the number "No. 57127", and the word "REGISTERED". Below the seal is a handwritten signature in cursive script that reads "Tara E. McManus".

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W&S File No.:	

Drawing Title:

ACCESS ROAD
GRADING &
DRAINAGE PLAN

Sheet Number:

C105

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W&S File No.:	

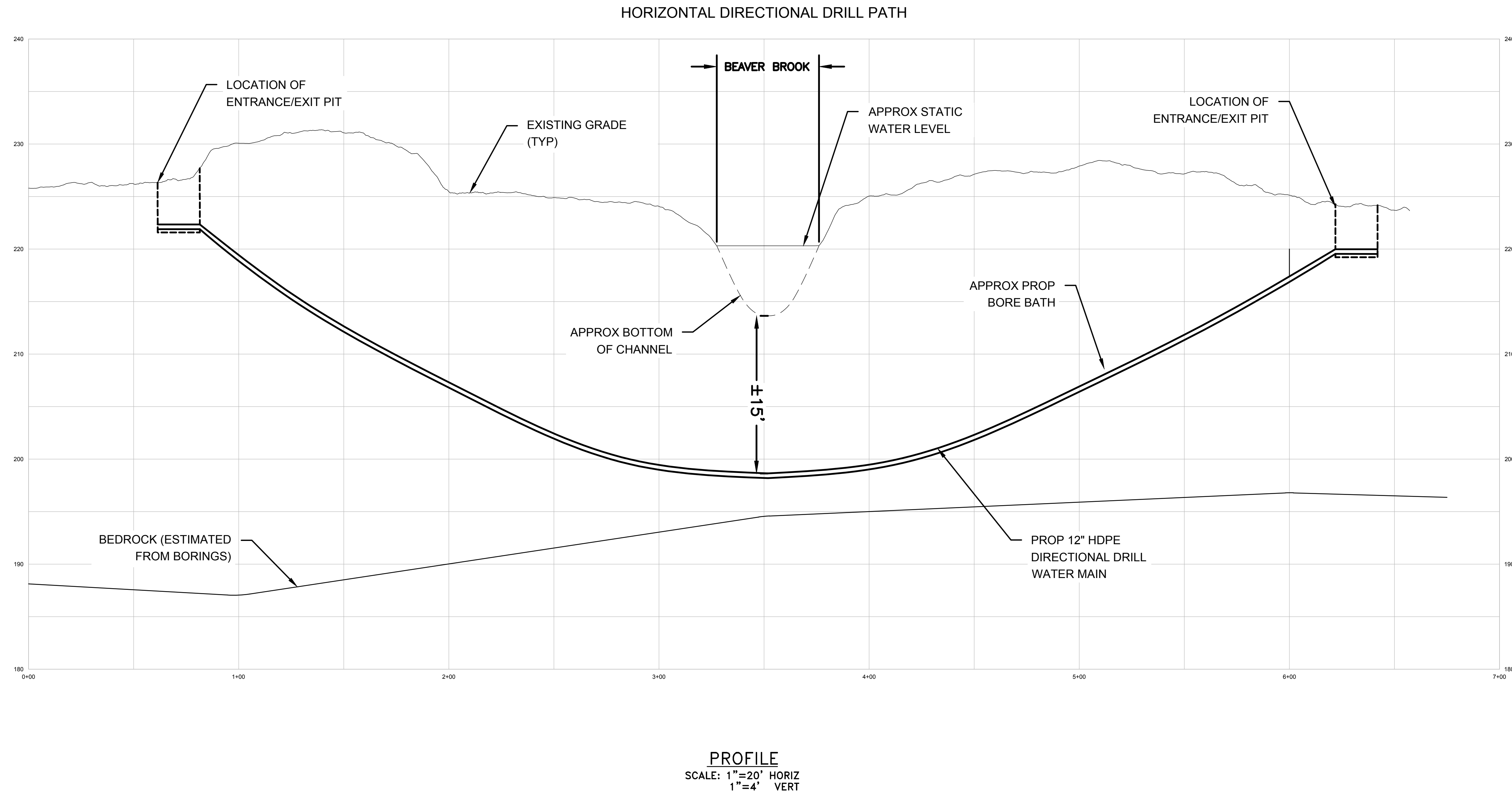
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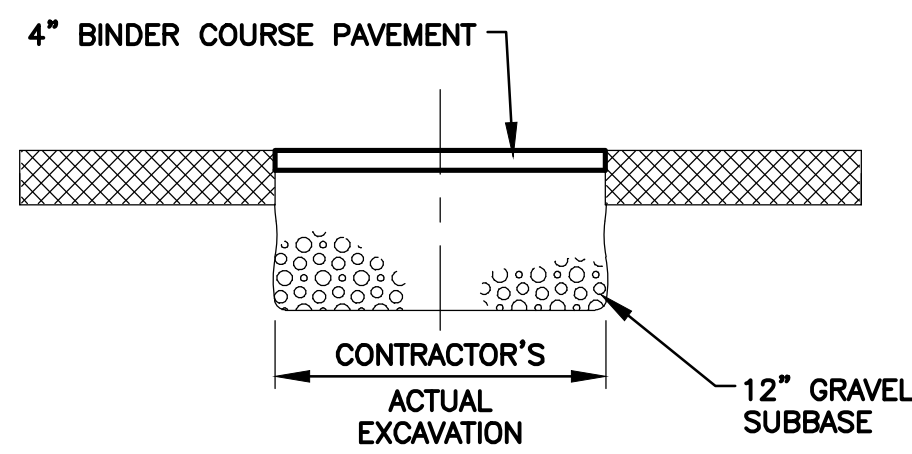
BEAVER BROOK
DIRECTIONAL DRILL

Sheet Number:

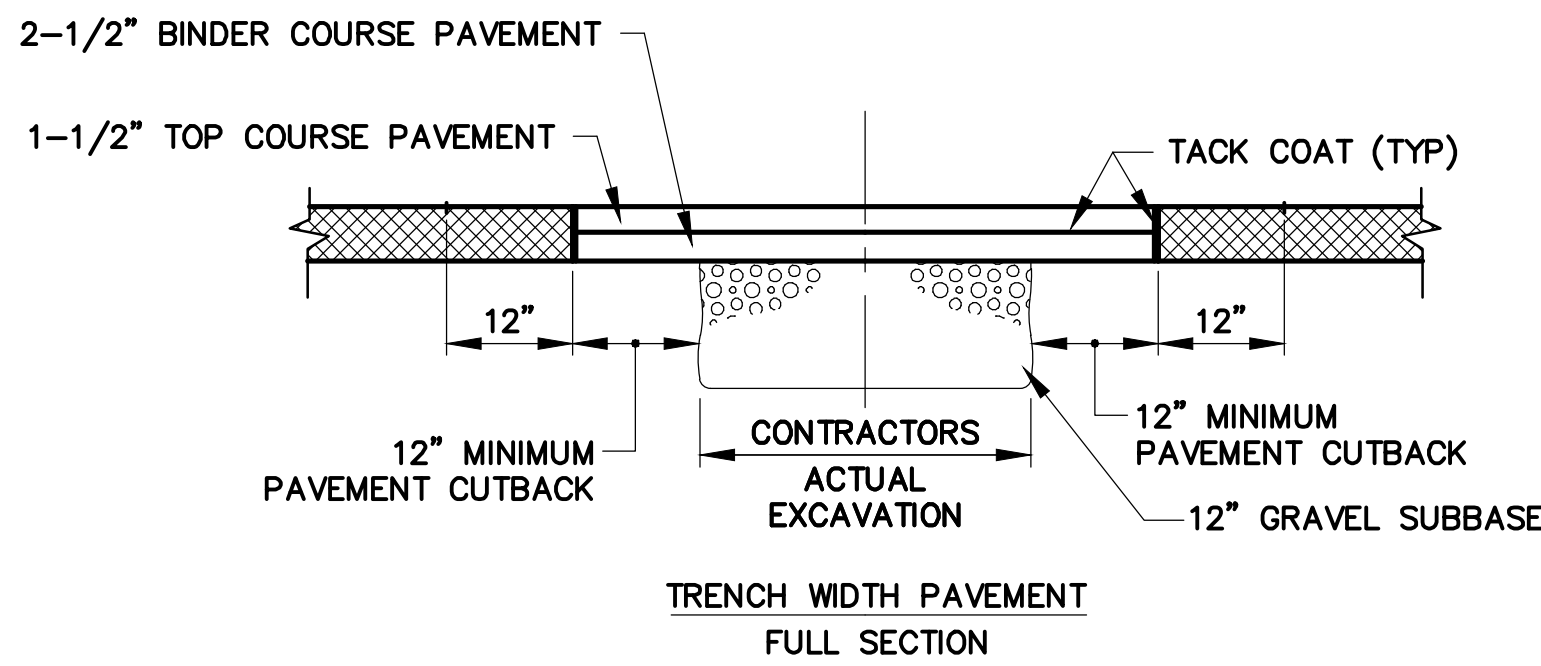
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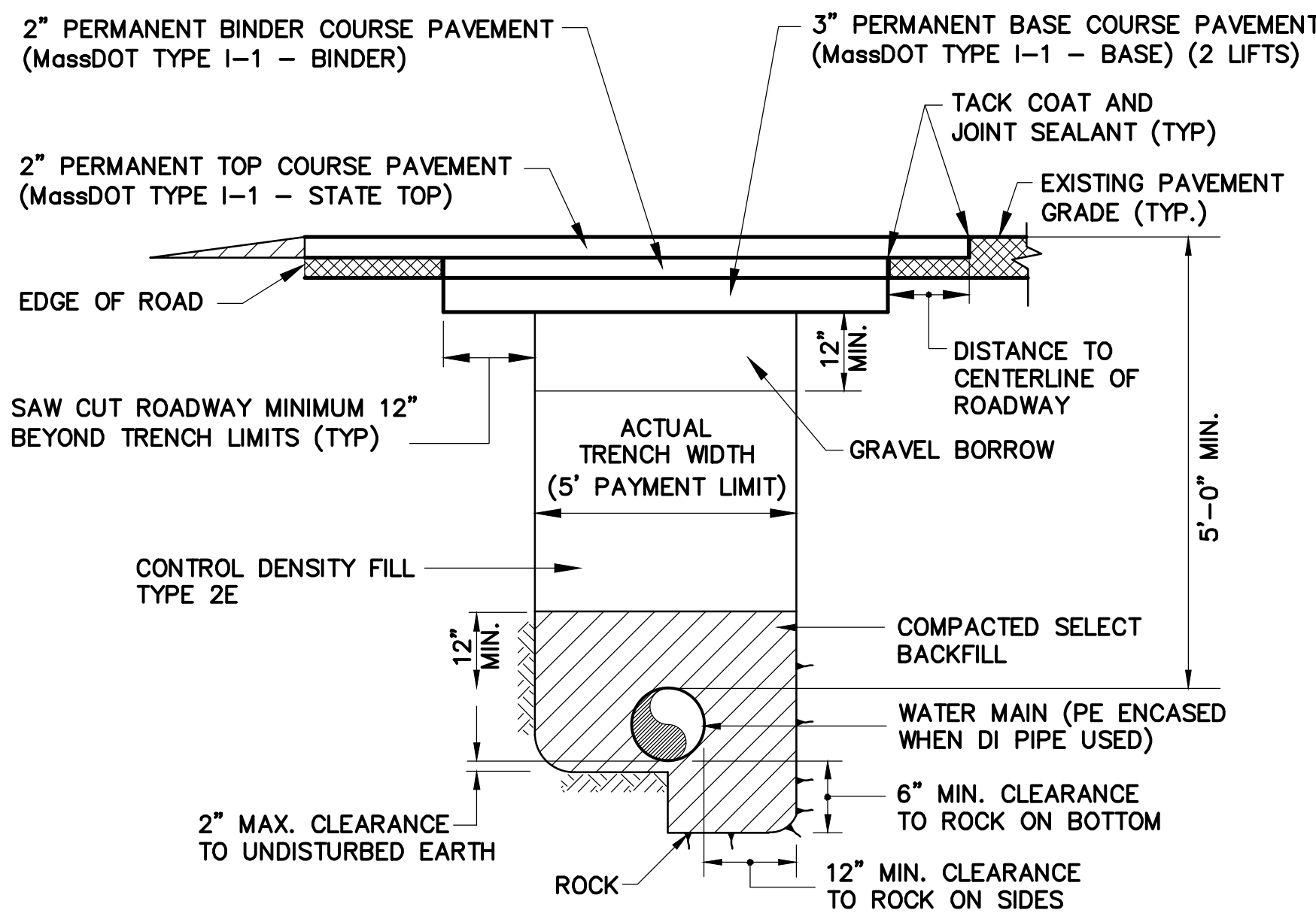




TEMPORARY TRENCH PAVEMENT
N.T.S.



PERMANENT PAVEMENT REPLACEMENT DETAIL
N.T.S.



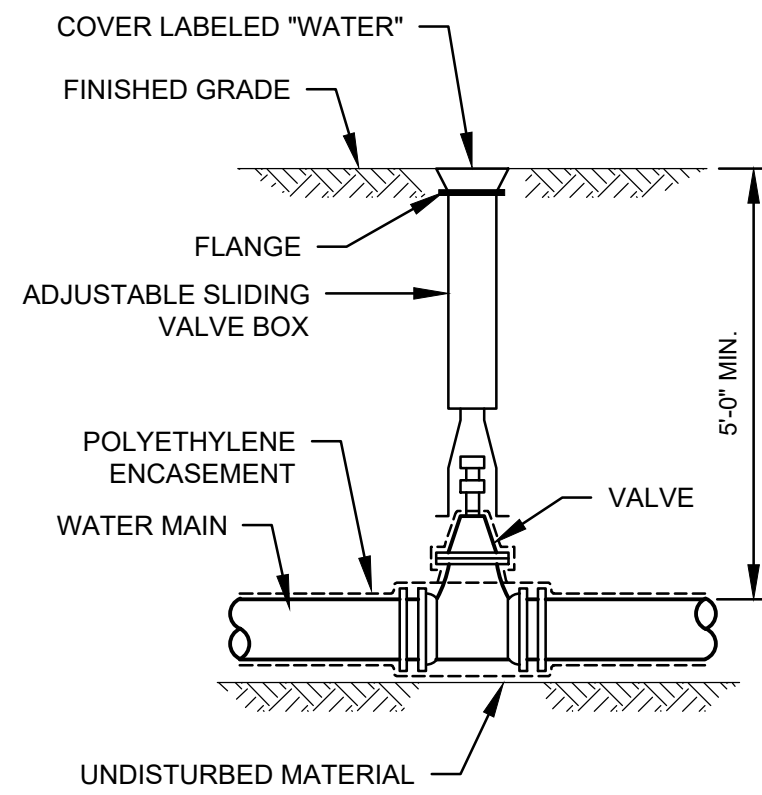
TYPE 3 AND TYPE 4

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MassDOT)
PERMANENT TRENCH PAVEMENT AND WATER MAIN TRENCH
N.T.S.

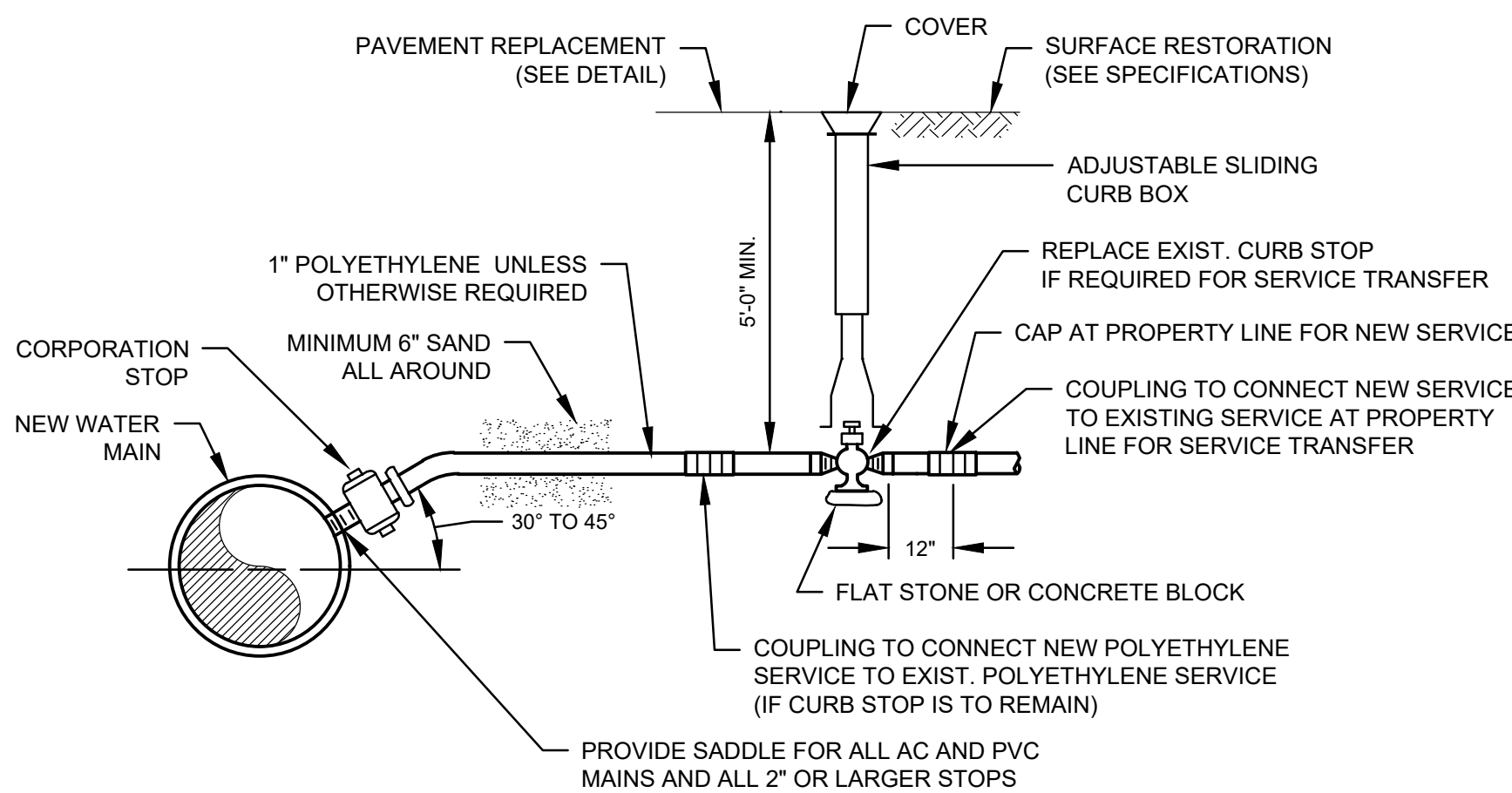
NOTES:

- SEE SECTION 32 11 00, PAVING FOR PAVEMENT SCHEDULE.
- FOR ALL TRENCH PAVEMENTS, CONTRACTOR SHALL INSTALL ASPHALT EMULSION TACK COAT TO ALL SUBSURFACES AND VERTICAL SAW CUTS PRIOR TO INSTALLATION OF PERMANENT PAVEMENT.
- PAVEMENT SHALL BE INSTALLED FLUSH WITH EXISTING GRADE BEFORE WINTER SHUTDOWN.
- TOP LAYER OF PAVEMENT SHALL BE INSTALLED BY MECHANICAL MEANS.

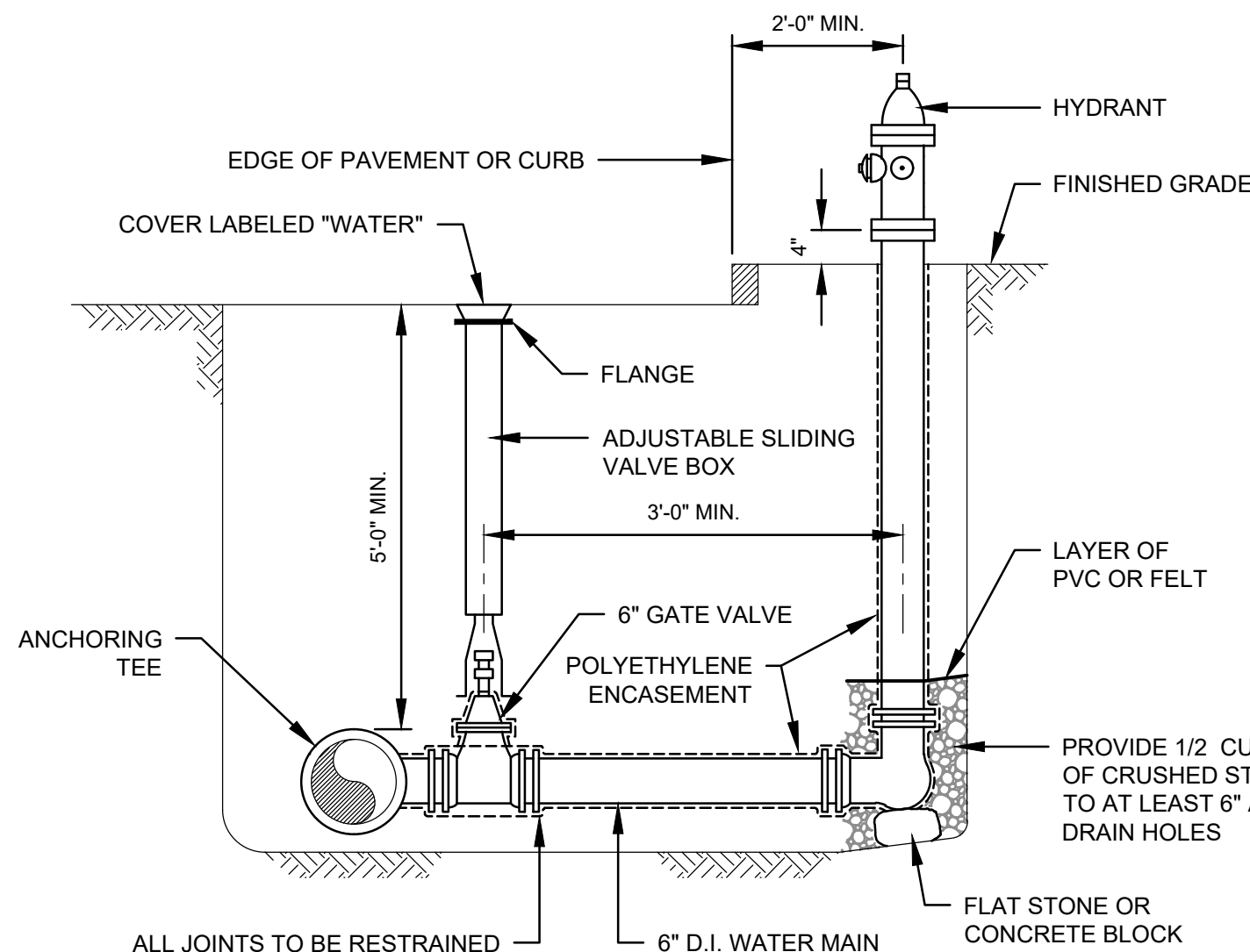
PAVEMENT REPLACEMENT DETAILS
N.T.S.



VALVE AND BOX DETAIL
N.T.S.



WATER SERVICE DETAIL
N.T.S.



NOTE:
USE TWO 6" BENDS OR OFFSET ON LATERAL TO ACHIEVE REQUIRED HYDRANT ELEVATION IF NECESSARY.

HYDRANT AND VALVE DETAIL
N.T.S.

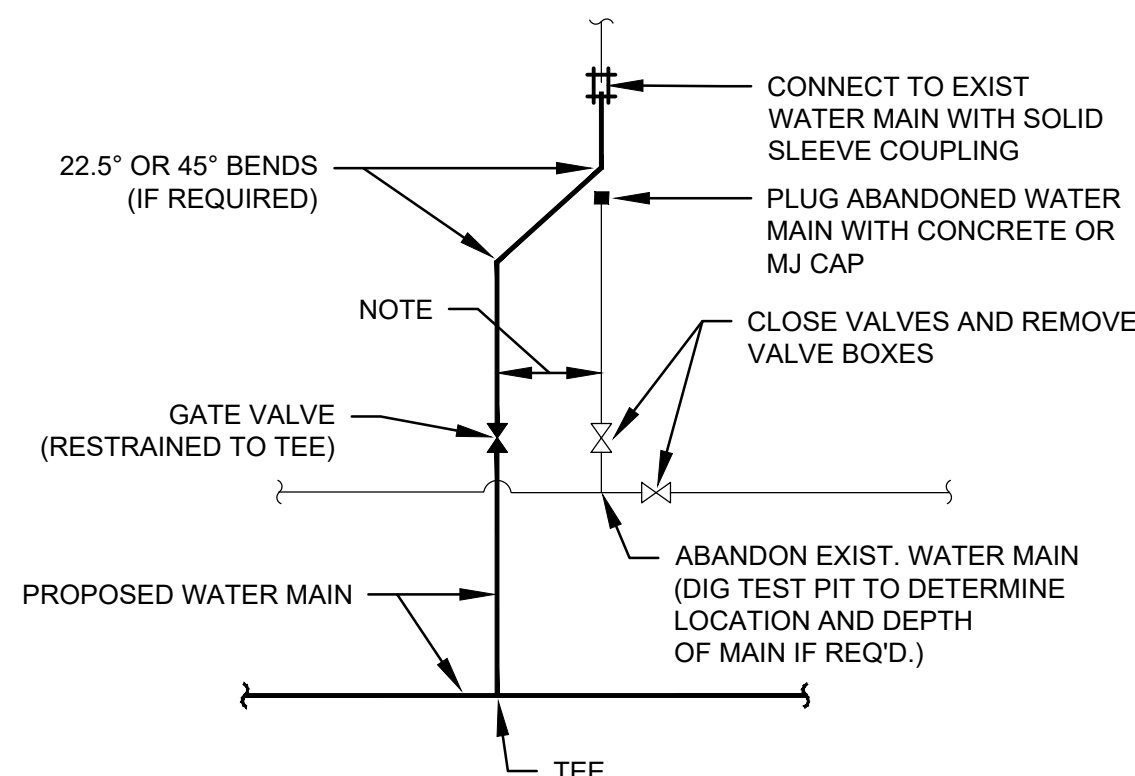
REQUIRED LENGTH OF RESTRAINED JOINTS FROM FITTINGS (FEET)

PIPE SIZE	90° BEND	45° BEND OR WYE BRANCH	22 1/2° BEND	11 1/4° BEND	PLUG, CAP OR IN-LINE VALVE	TEE (BRANCH)
6"	25 (30.5)	10.5 (12.5)	5 (6)	2.5 (3)	43 (64)	34 (51)
8"	33 (40)	13.5 (16.5)	6.5 (8)	3 (4)	55 (82)	47 (70)
10"	40 (48.5)	16.5 (20)	8 (9.5)	4 (5)	67 (100)	58 (87)
12"	47 (56.5)	19.5 (23.5)	9.5 (11.5)	4.5 (5.5)	79 (118)	70 (105)
16"	59.5 (72)	24.5 (30)	12 (14.5)	6 (7)	101 (152)	92 (139)
20"	72 (86.5)	30 (36)	14.5 (17)	7 (8.5)	123 (184)	114 (171)
24"	84 (100)	35 (41)	16.5 (20)	8 (10)	144 (216)	134 (202)
30"	100 (120)	41 (50)	20 (24)	10 (12)	174 (261)	165 (247)

NOTES:

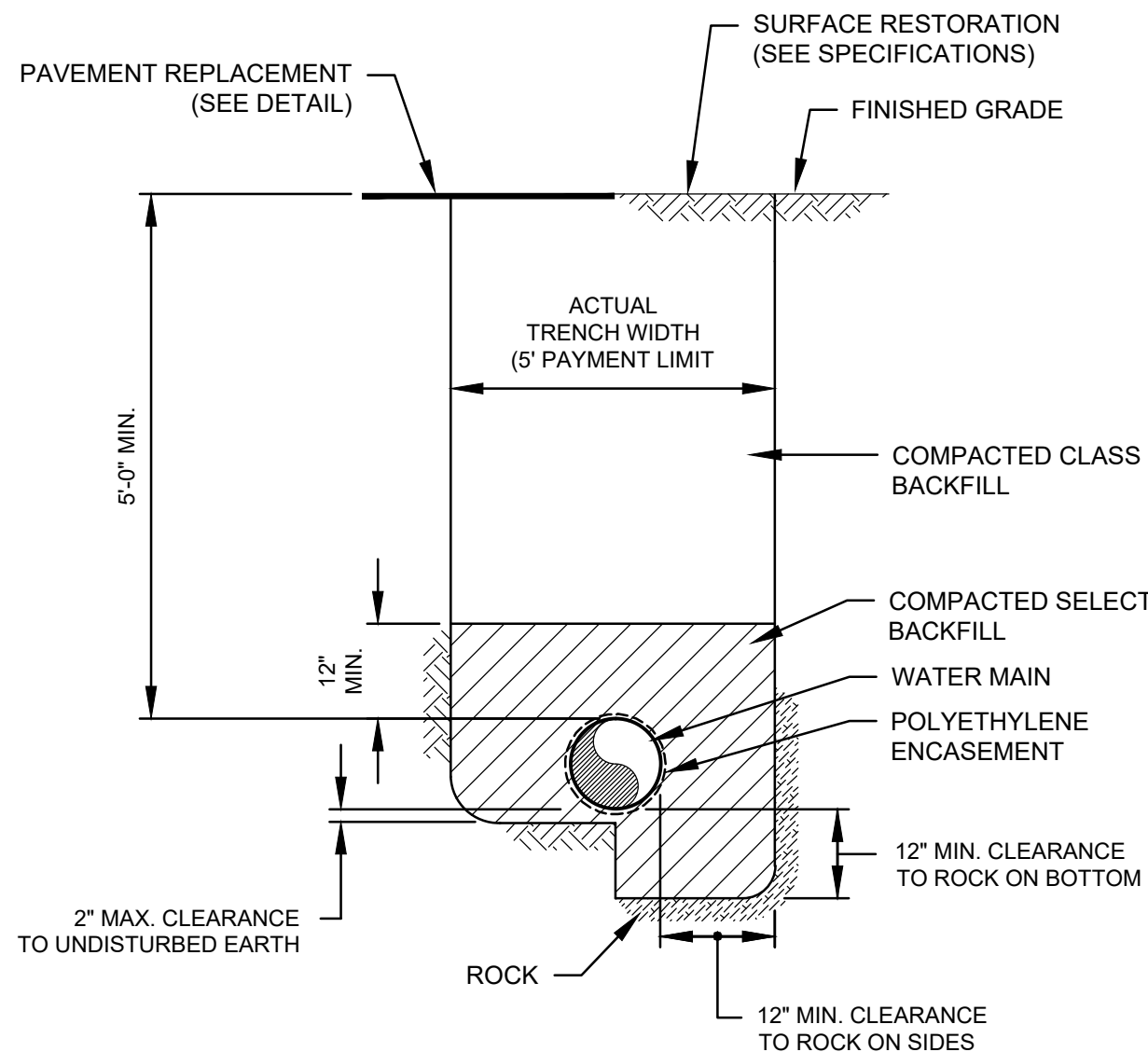
- RESTRAINED LENGTHS LISTED IN PARENTHESES ARE FOR PIPE WRAPPED IN POLYETHYLENE. THE OTHER ASSOCIATED LENGTHS ARE FOR PLAIN UNWRAPPED DUCTILE IRON PIPE.
- THE CONTRACTOR SHALL USE THIS TABLE IN CONJUNCTION WITH THE APPROPRIATE PIPE SPECIFICATION SECTION.

RESTRAINED JOINT TABLE



NOTE:
MINIMUM PRACTICAL DISTANCE - GENERALLY NO MORE THAN 2 FT.

WATER MAIN LATERAL CONNECTION
N.T.S.



WATER MAIN TRENCH DETAIL
N.T.S.

Revisions:		
No.	Date	Description

COA:



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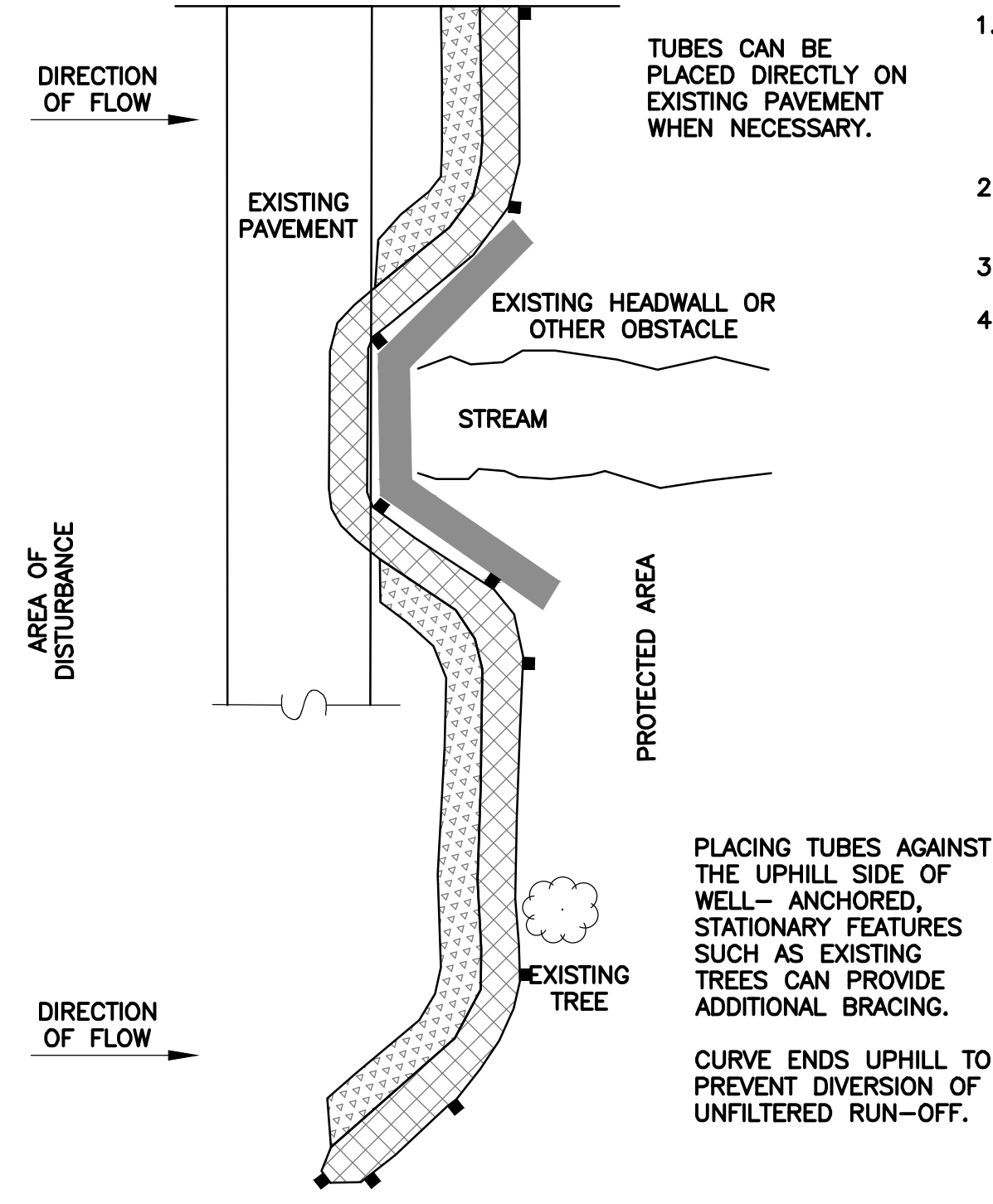
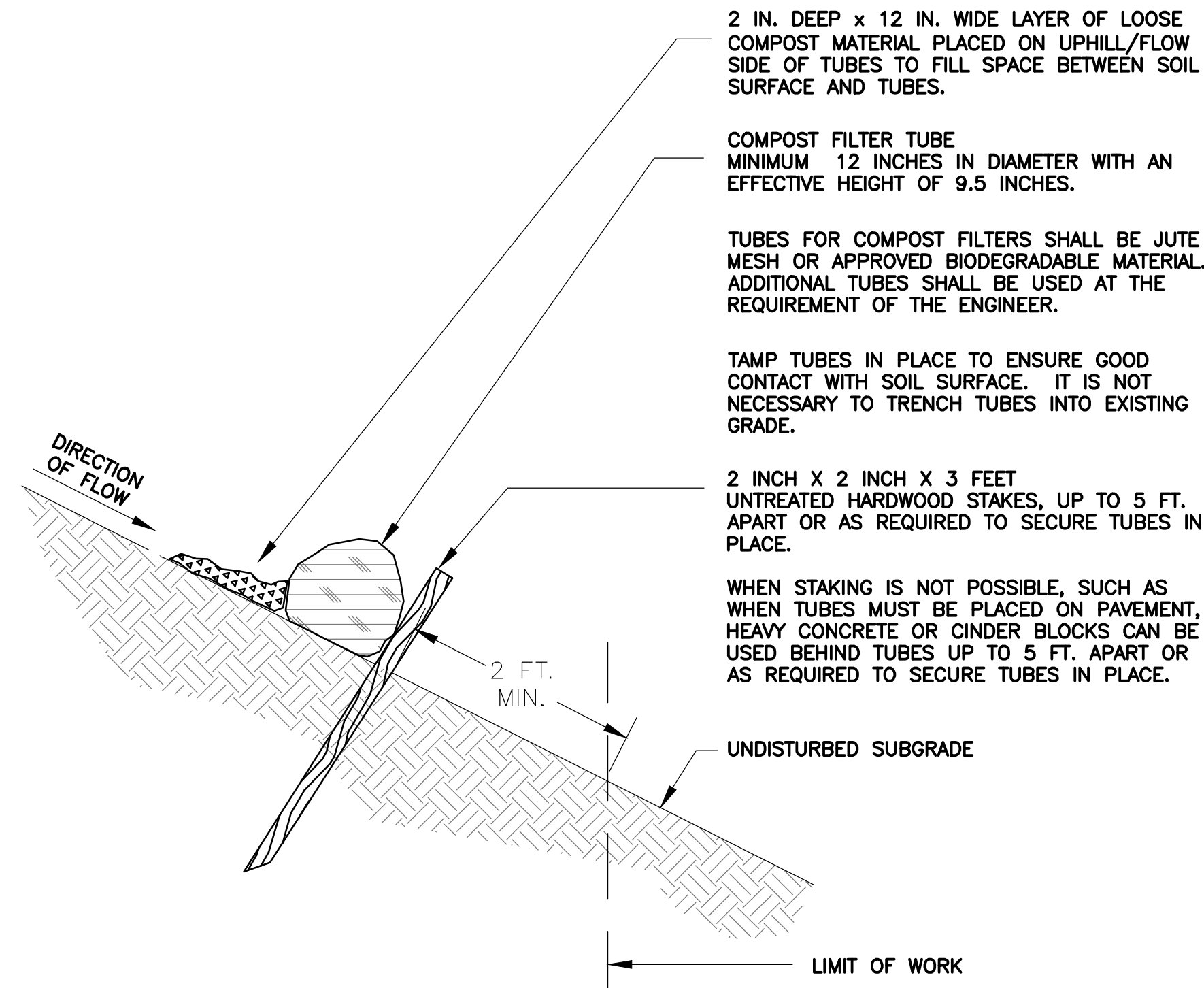
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W&S File No.:

Drawing Title:

DETAILS I

Sheet Number:

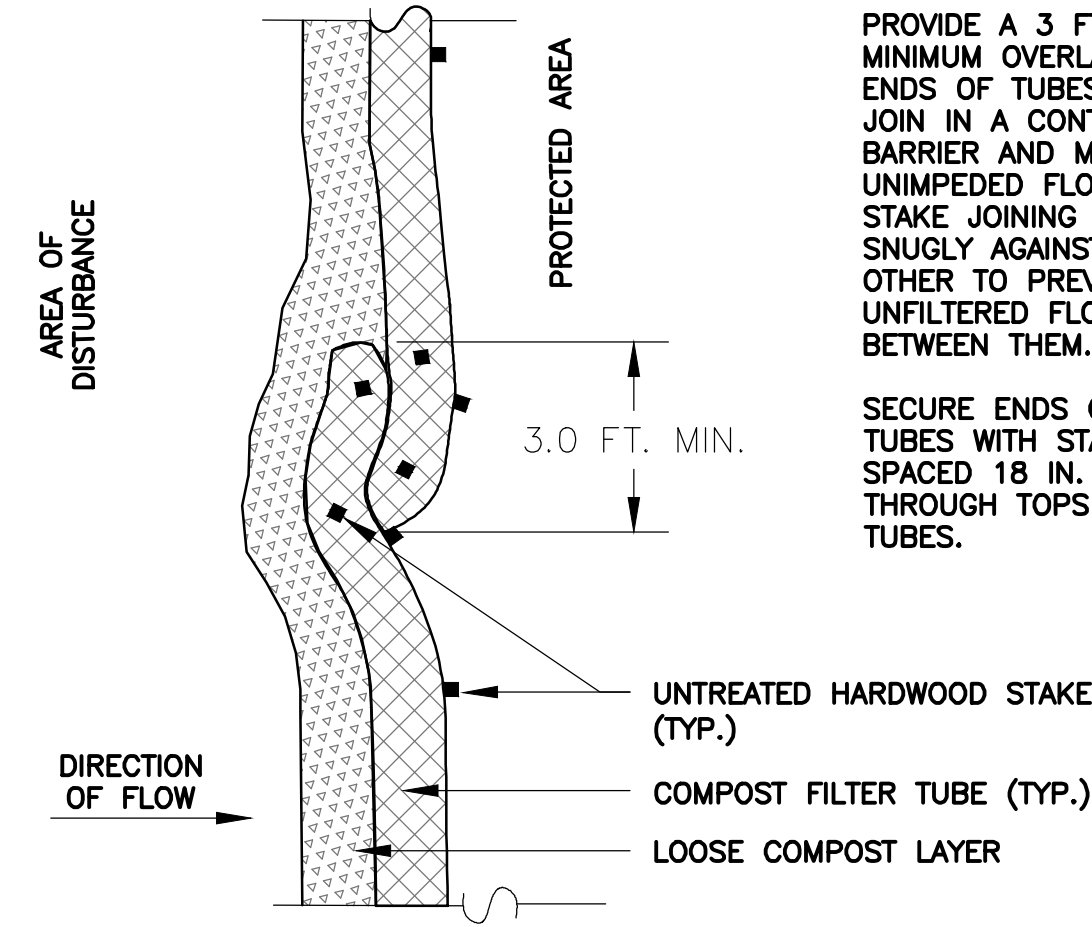
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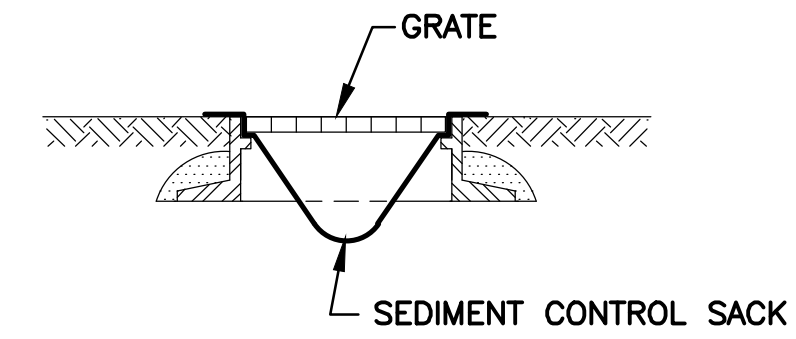
PLAN VIEW
SINGLE COMPOST FILTER TUBE DETAIL
NOT TO SCALE

GENERAL NOTES:

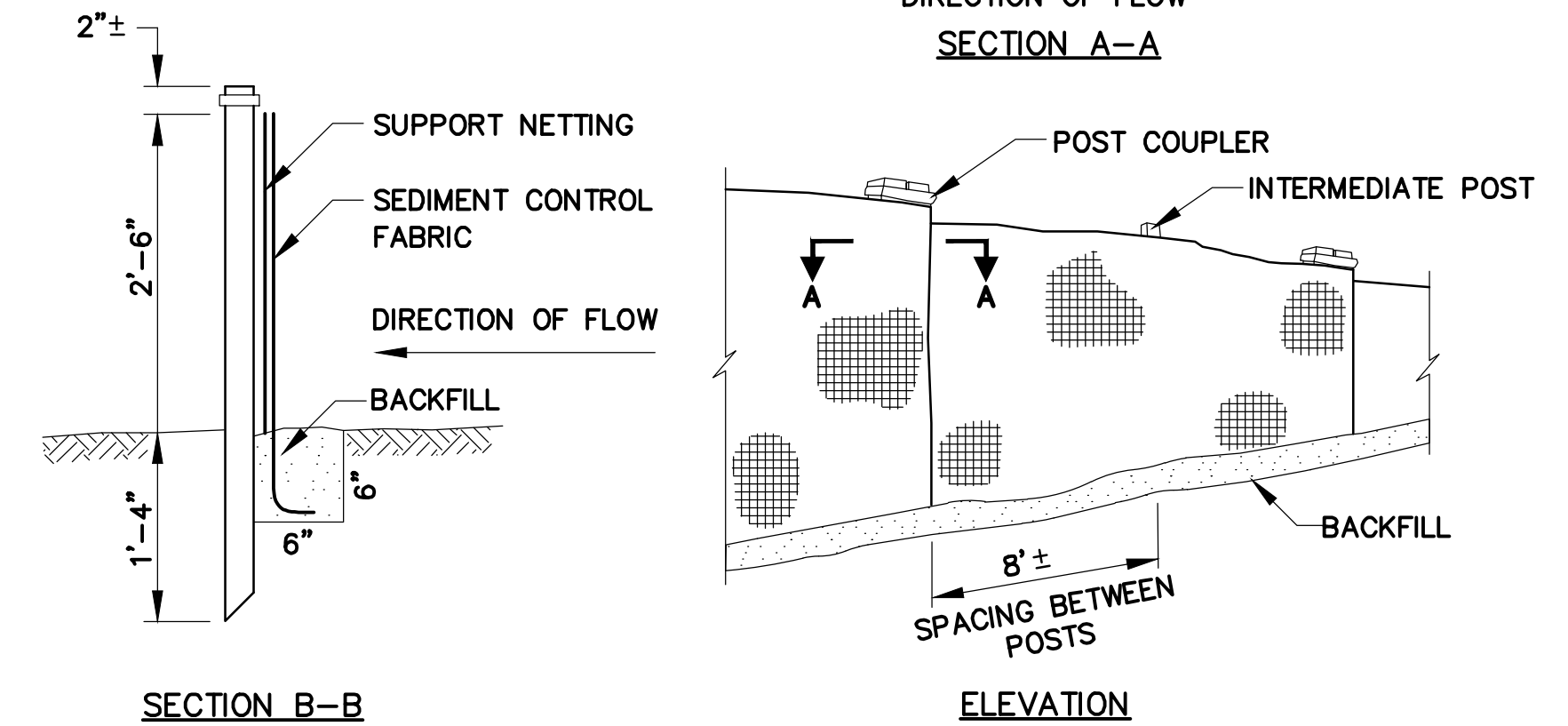
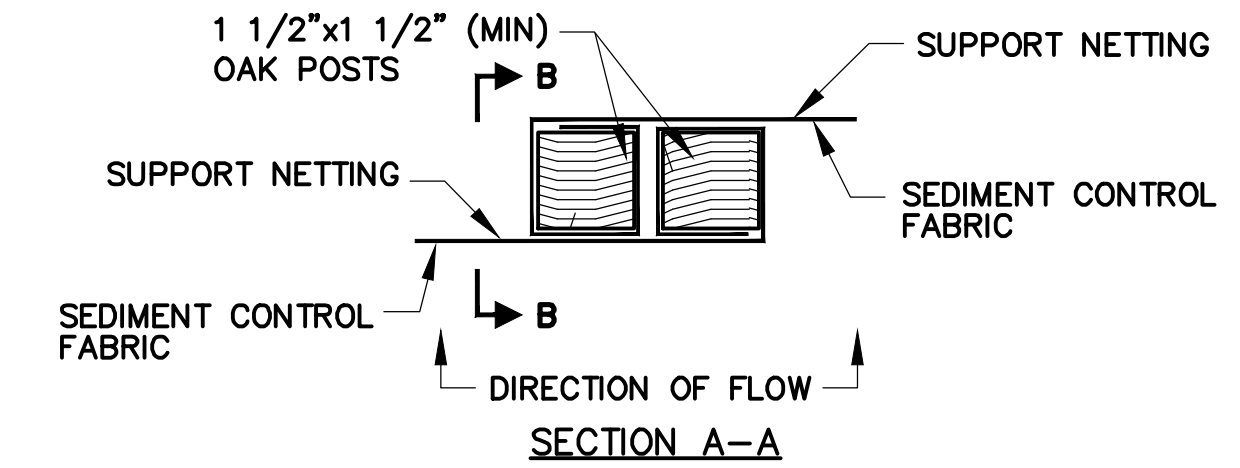
1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSEING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
2. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
3. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
4. CONFIGURE TUBES AROUND EXISTING SITE FEATURES TO MINIMIZE SITE DISTURBANCE AND MAXIMIZE CAPTURE AREA OF STORMWATER RUN-OFF.



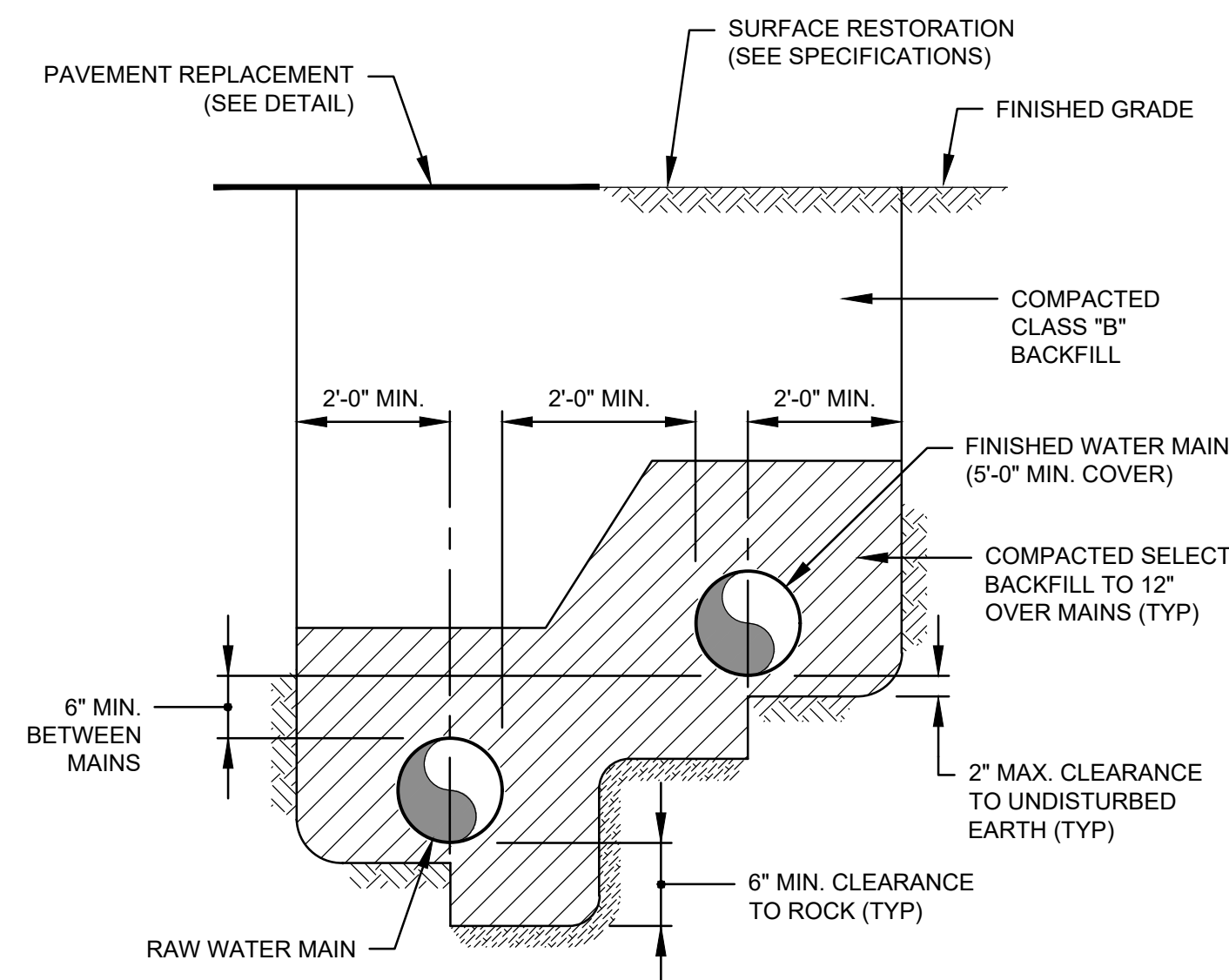
PLAN VIEW - JOIN DETAIL



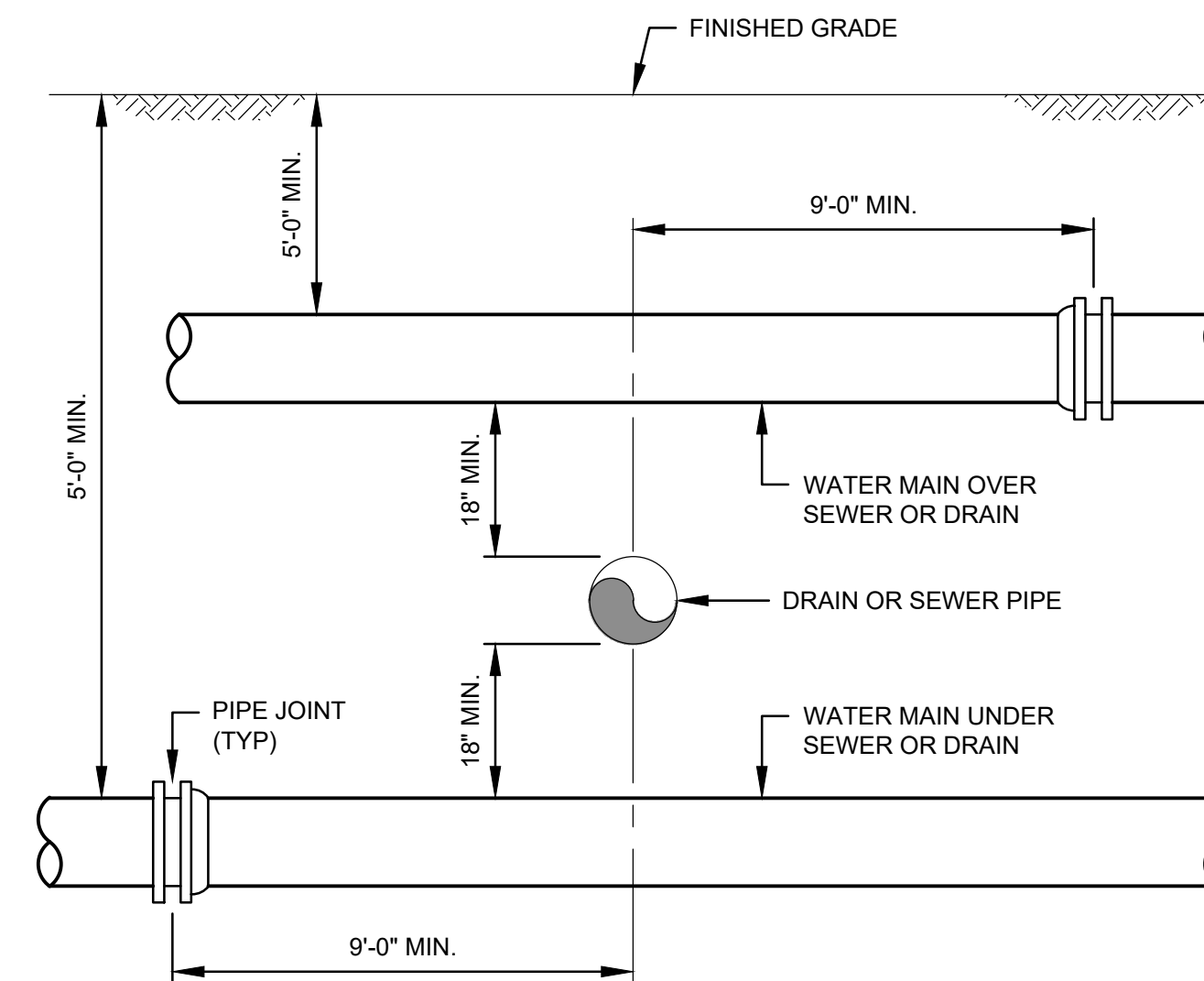
CATCH BASIN PROTECTION DETAIL
N.T.S.



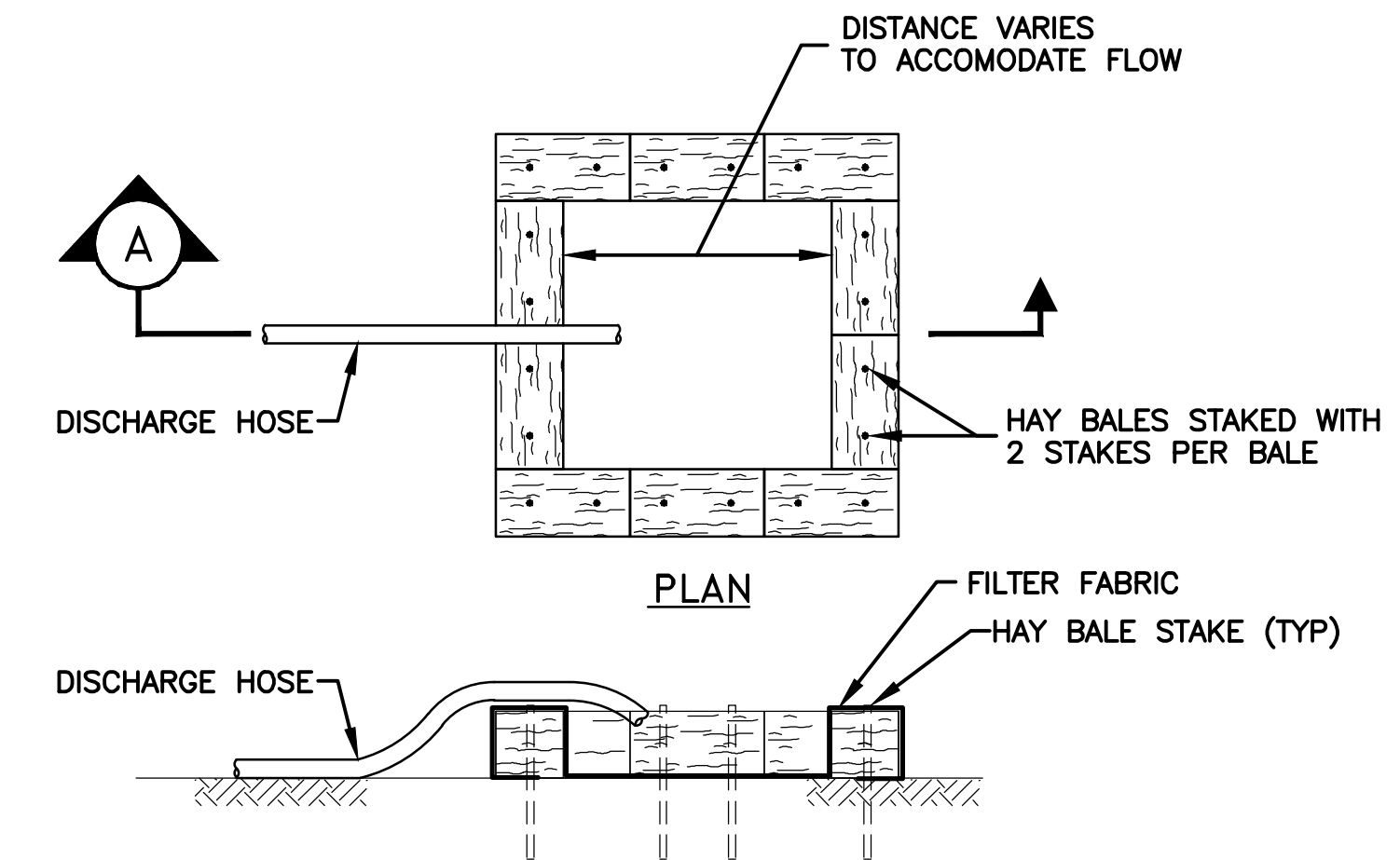
SILT FENCE DETAIL
N.T.S.



DUAL WATER MAIN TRENCH DETAIL
N.T.S.



SEWER OR DRAIN CROSSING DETAIL
N.T.S.

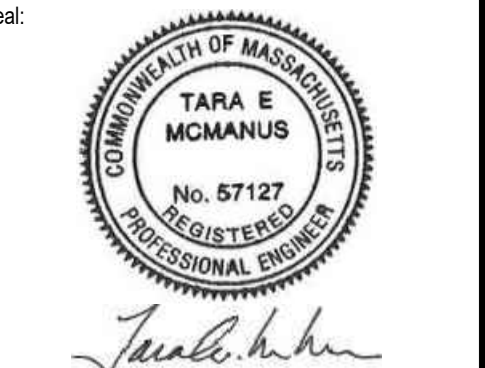


SECTION A

DEWATERING DISCHARGE DISPOSAL DETAIL
N.T.S.

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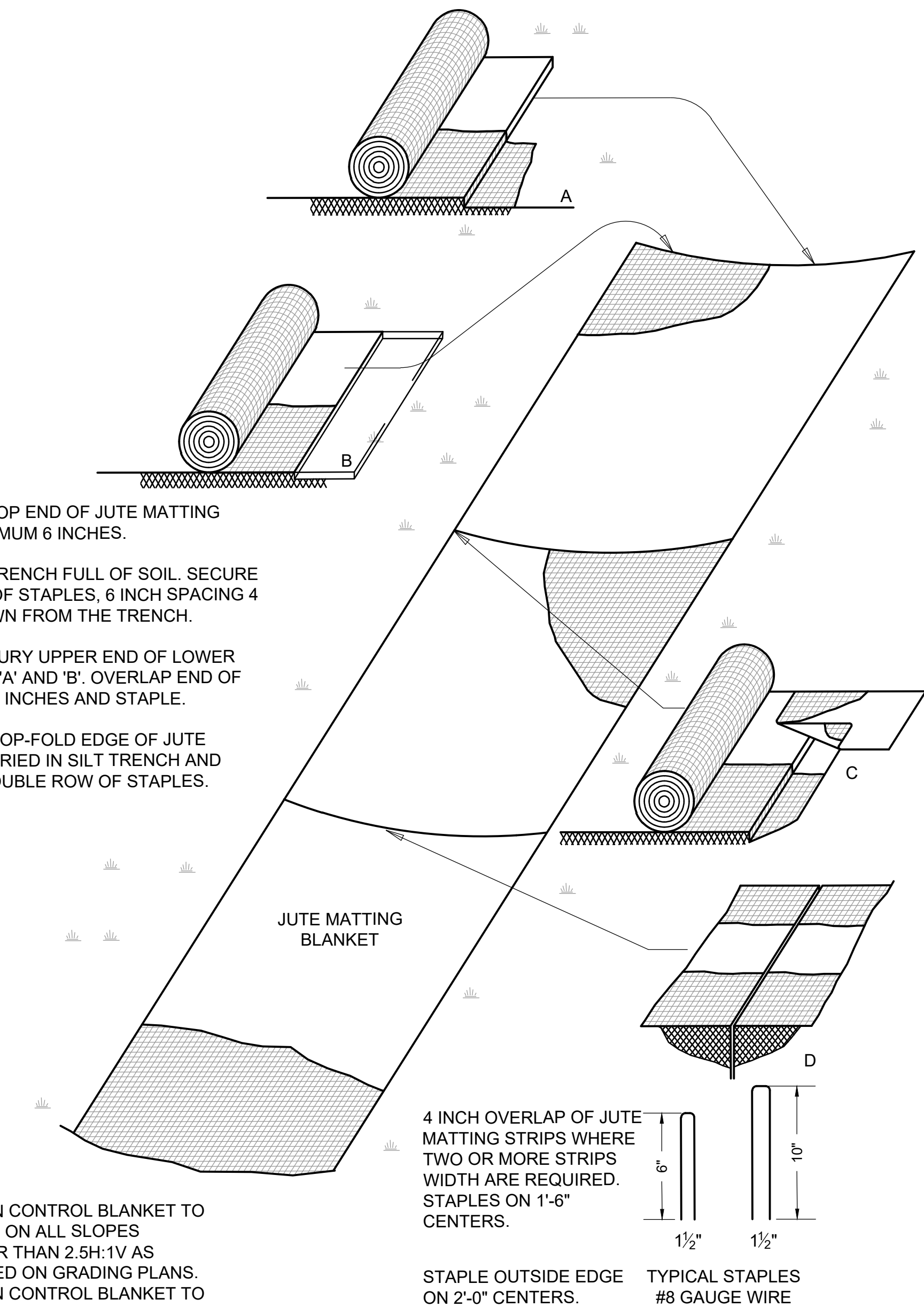
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W&S File No.:

Drawing Title:

DETAILS II

Sheet Number:

C502

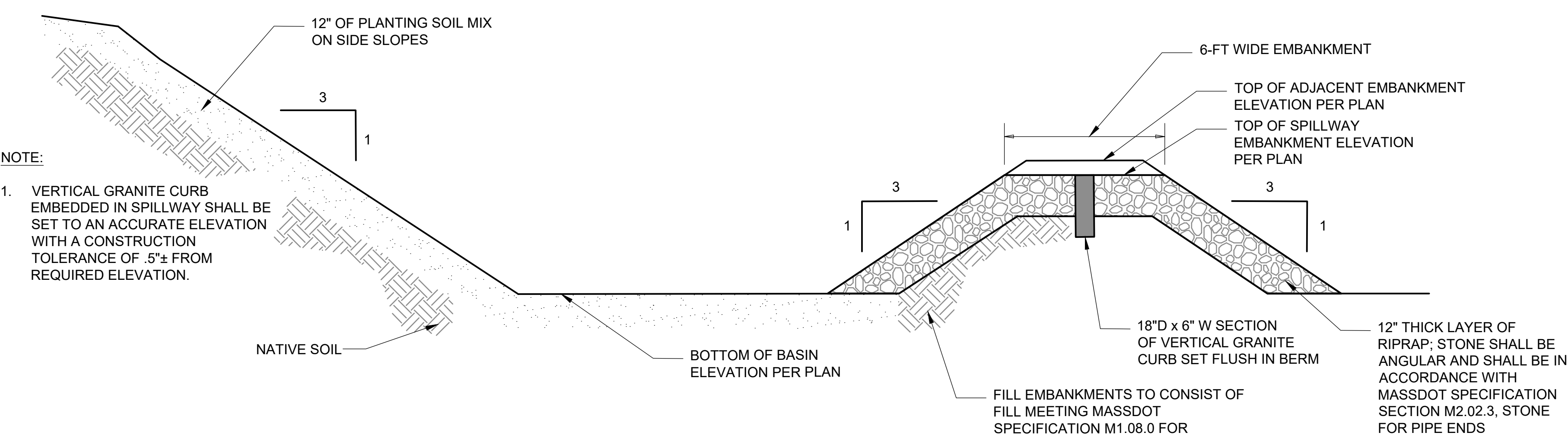


- NOTES:
1. EROSION CONTROL BLANKET TO BE USED ON ALL SLOPES GREATER THAN 2.5H:1V AS INDICATED ON GRADING PLANS. EROSION CONTROL BLANKET TO BE PRODUCED FROM BIODEGRADABLE JUTE OR COIR MATTING AND IS NOT TO CONTAIN PLASTICS.
 2. EROSION CONTROL BLANKET TO BE PRODUCED FROM BIODEGRADABLE JUTE OR COIR MATTING AND IS NOT TO CONTAIN PLASTICS.

STAPLE OUTSIDE EDGE ON 2'-0" CENTERS.

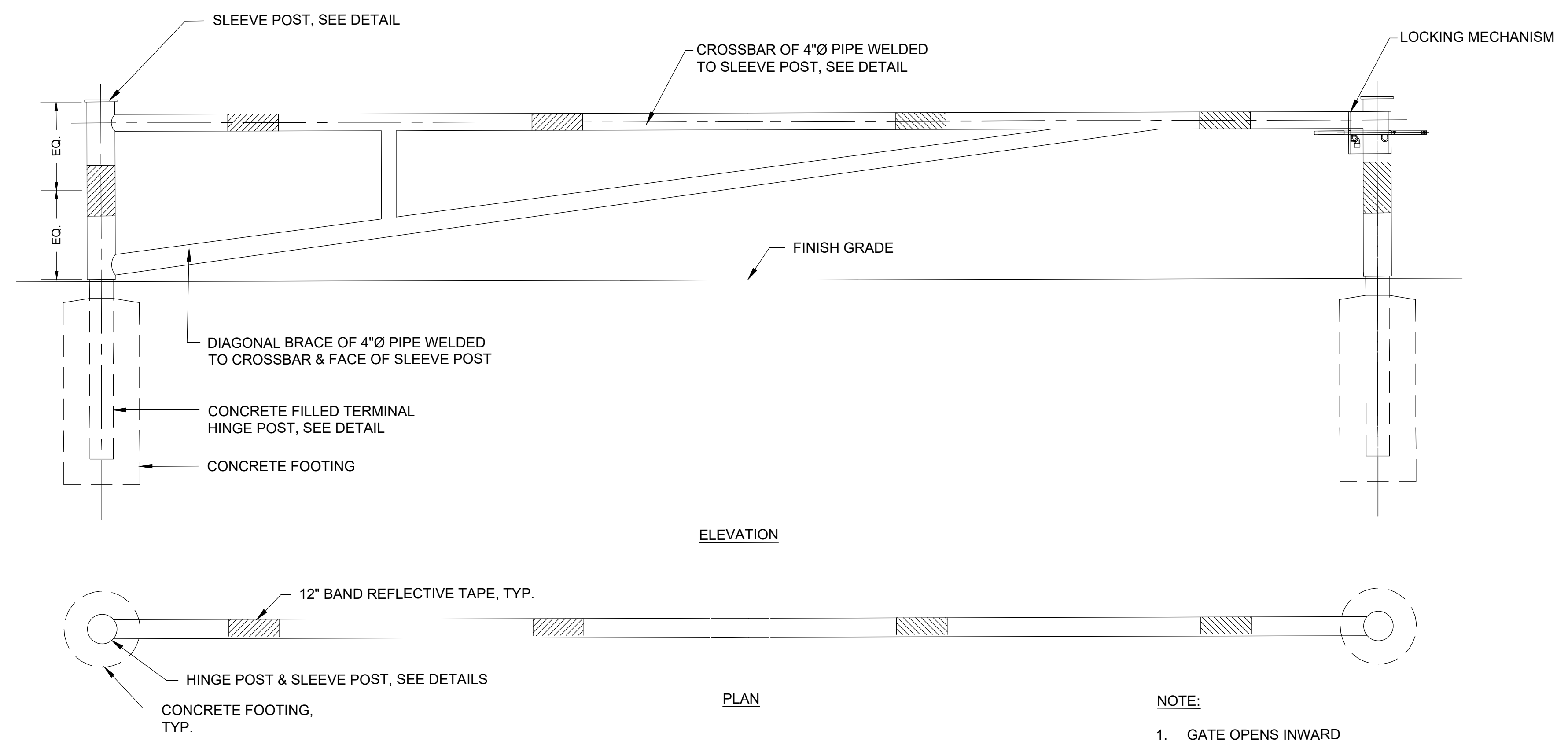
TYPICAL STAPLES #8 GAUGE WIRE

EROSION CONTROL BLANKET DETAIL
N.T.S.



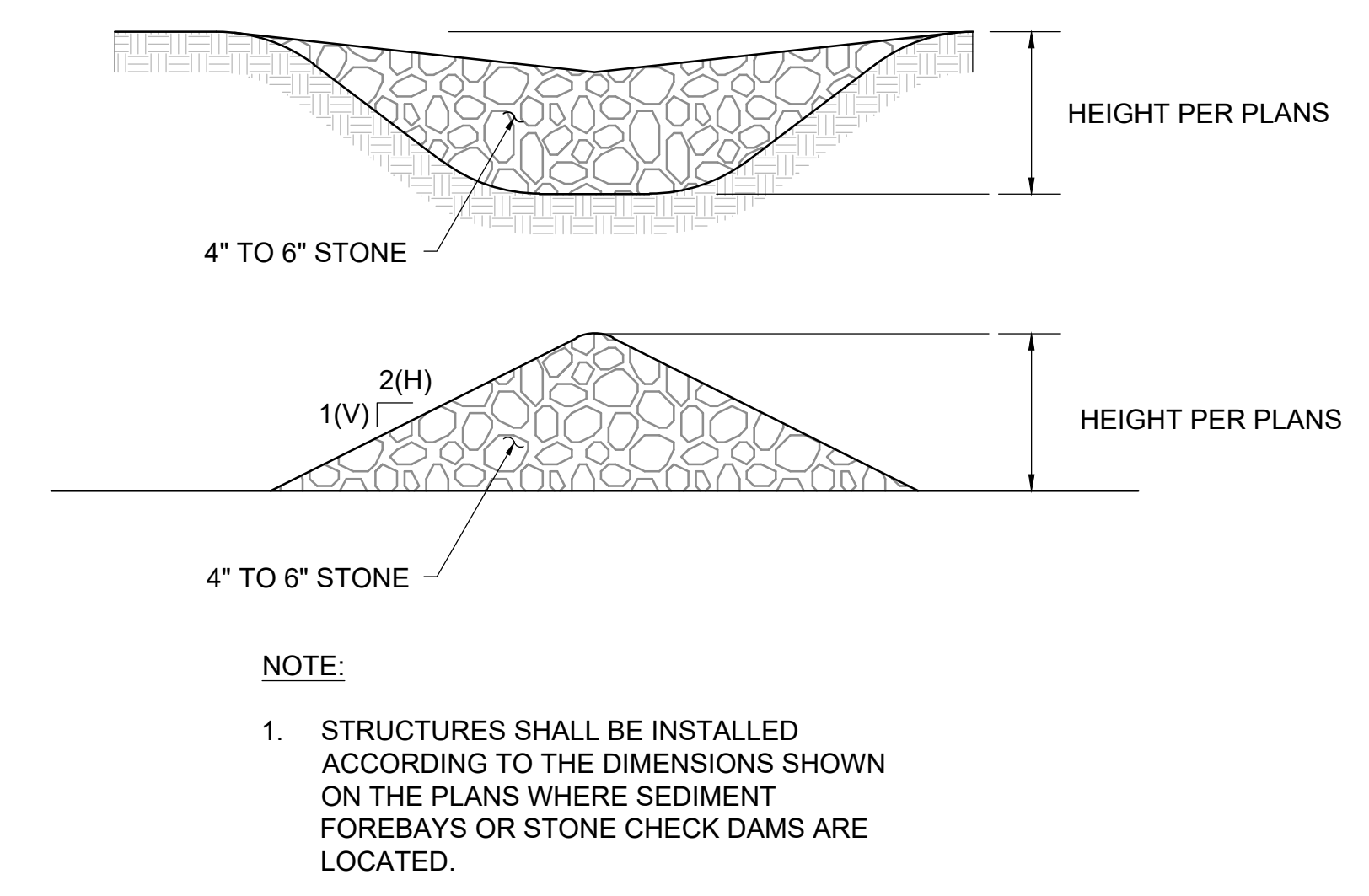
- NOTE:
1. VERTICAL GRANITE CURB EMBEDDED IN SPILLWAY SHALL BE SET TO AN ACCURATE ELEVATION WITH A CONSTRUCTION TOLERANCE OF .5"± FROM REQUIRED ELEVATION.

INFILTRATION BASIN DETAIL
N.T.S.



- NOTE:
1. GATE OPENS INWARD UNLESS OTHERWISE NOTED

STEEL SWING ARM GATE
N.T.S.



SEDIMENT FOREBAY / STONE CHECKDAM DETAIL
N.T.S.

Project:
LITTLETON WATER DEPARTMENT
LITTLETON
LELWD
LITTLETON ELECTRIC & WATER DEPARTMENTS
TAYLOR STREET WELL AND RAW WATER MAIN
TOWN CONTRACT NO. IFB-2024
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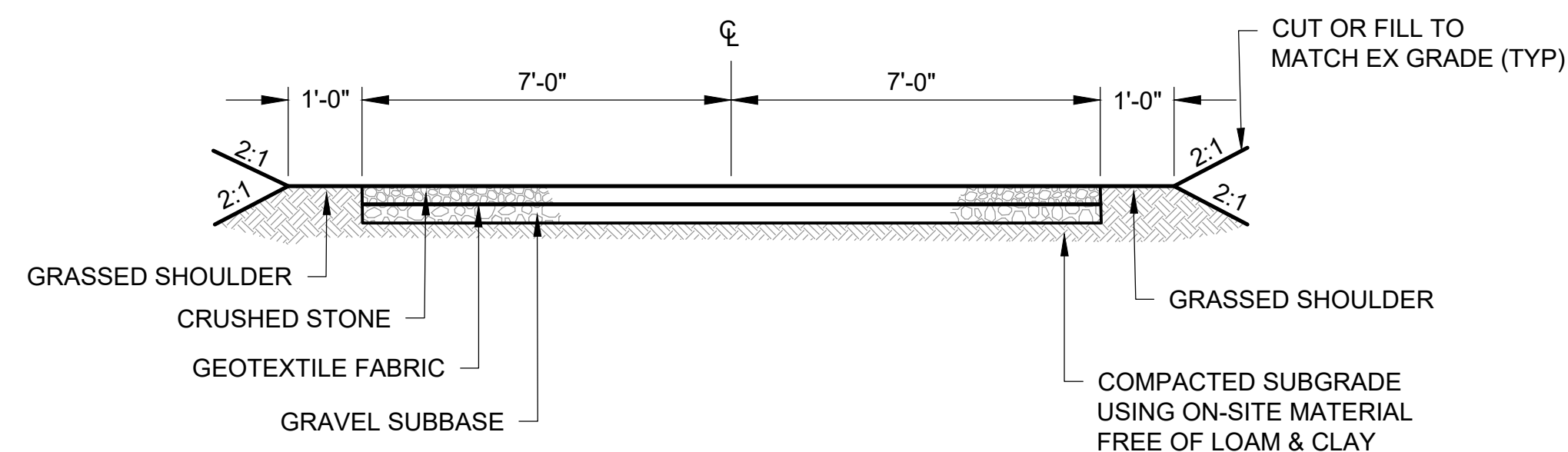
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DETAILS III

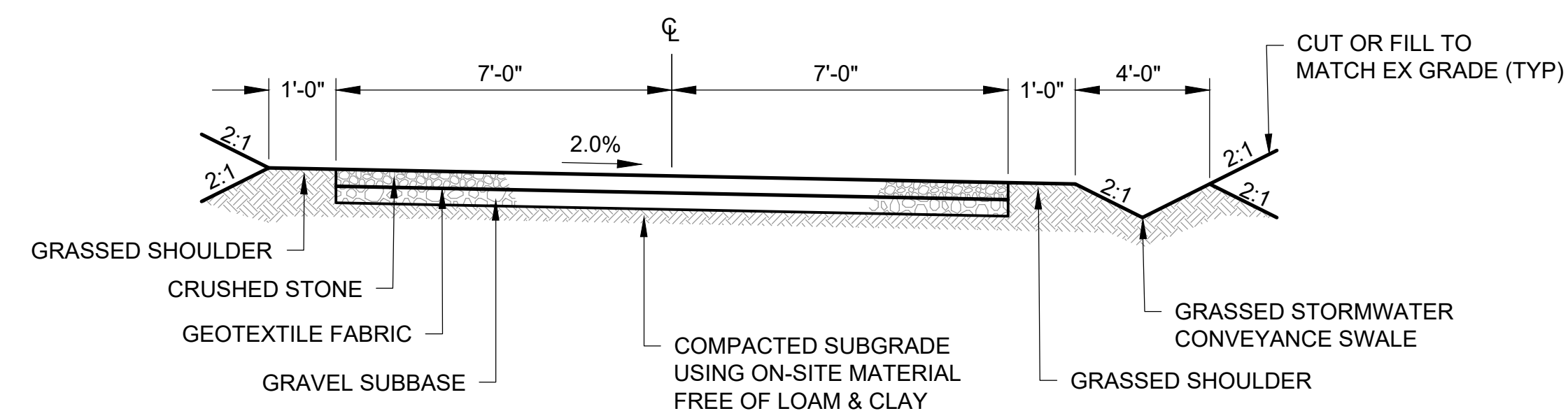
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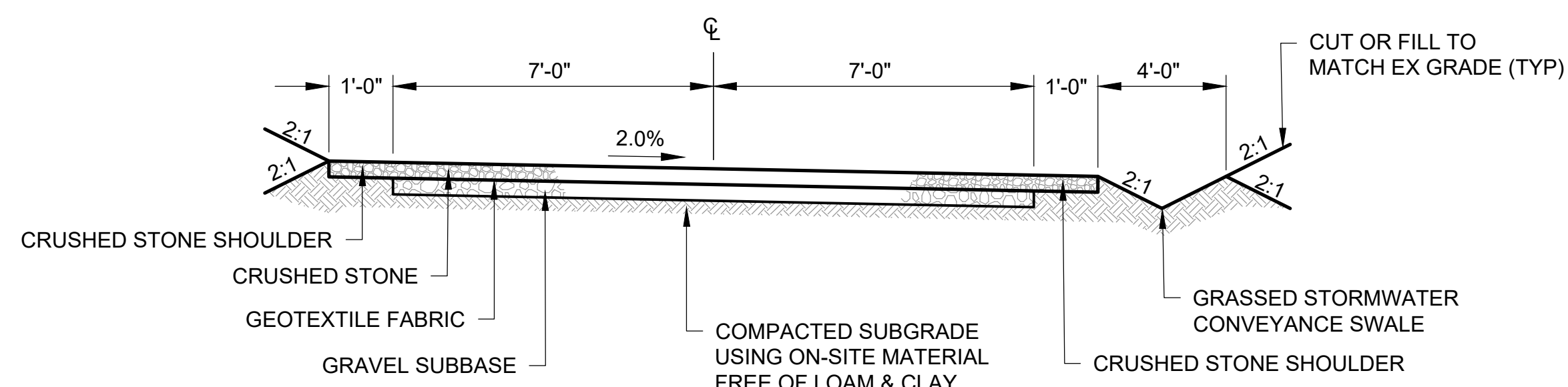
GRAVEL ROAD - TYPICAL SECTION 'A'

STA 0+00.00 - 0+05.00



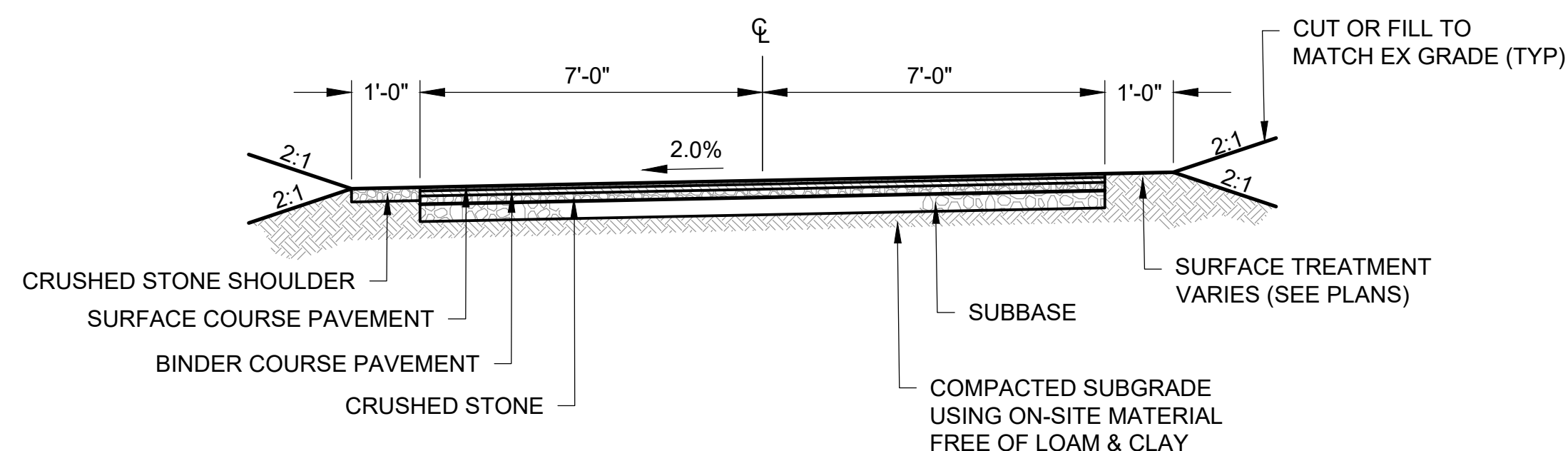
GRAVEL ROAD - TYPICAL SECTION 'B'

STA 0+05.00 - 6+90.36
STA 7+73.14 - 8+07.71



GRAVEL ROAD - TYPICAL SECTION 'C'

STA 6+90.36 - 7+73.14



PAVED ROAD - TYPICAL SECTION 'E'

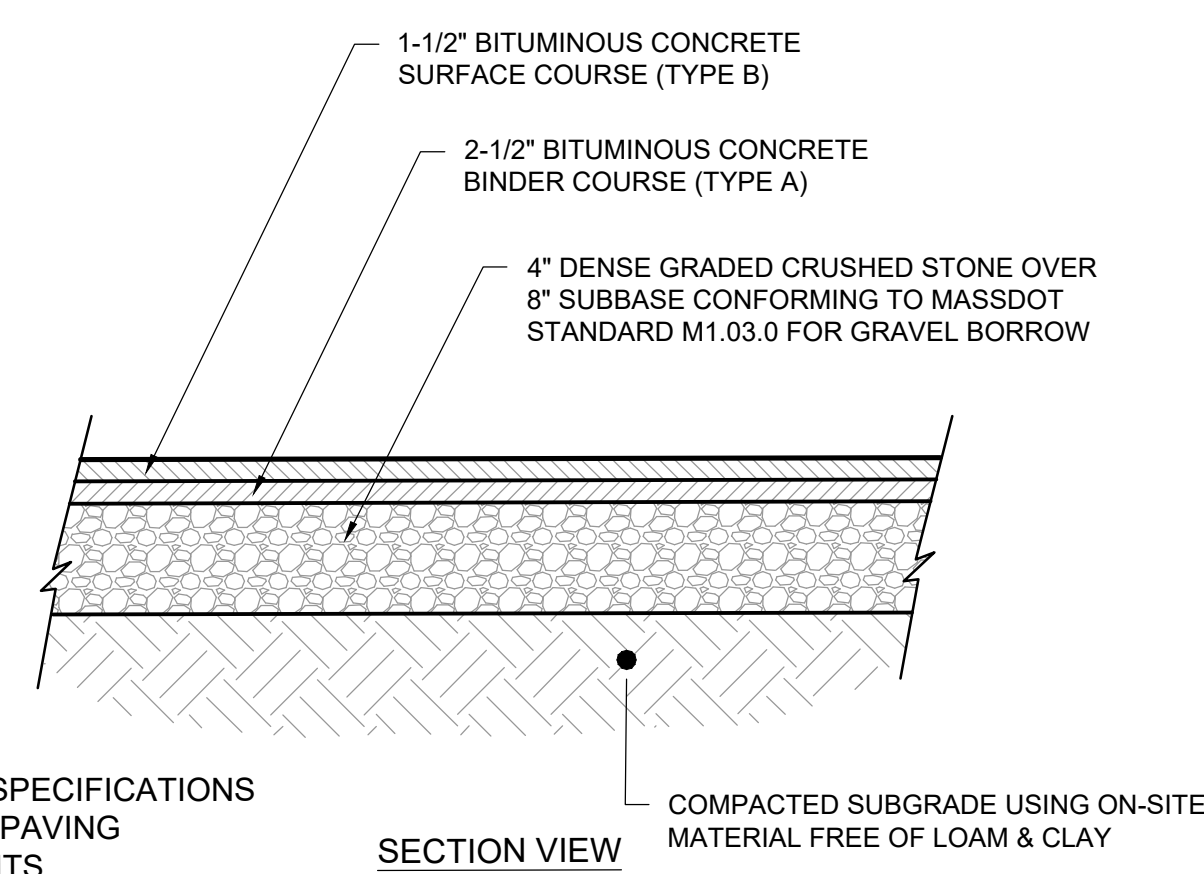
STA 9+97.25 - 11+96.61

NOTE:

1. SEE BITUMINOUS CONCRETE AND GRAVEL ACCESS ROADWAY CROSS-SECTIONS FOR INFORMATION ON MATERIAL DEPTHS AND ADDITIONAL REQUIREMENTS

ACCESS ROADWAY CROSS-SECTIONS

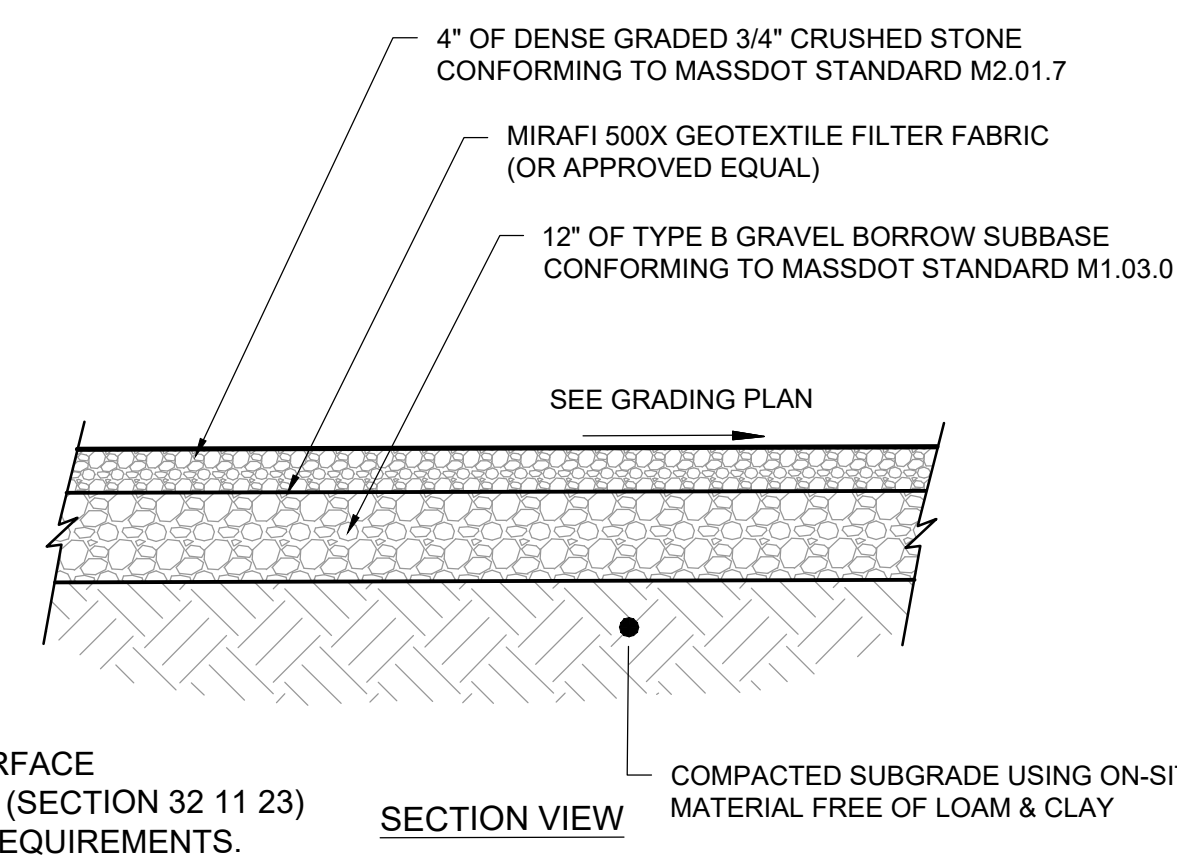
N.T.S.



NOTE:
1. SEE HOT MIX ASPHALT SPECIFICATIONS
(SECTION 32 12 00) FOR PAVING
MATERIAL REQUIREMENTS.

BITUMINOUS CONCRETE ACCESS ROADWAY CROSS-SECTION

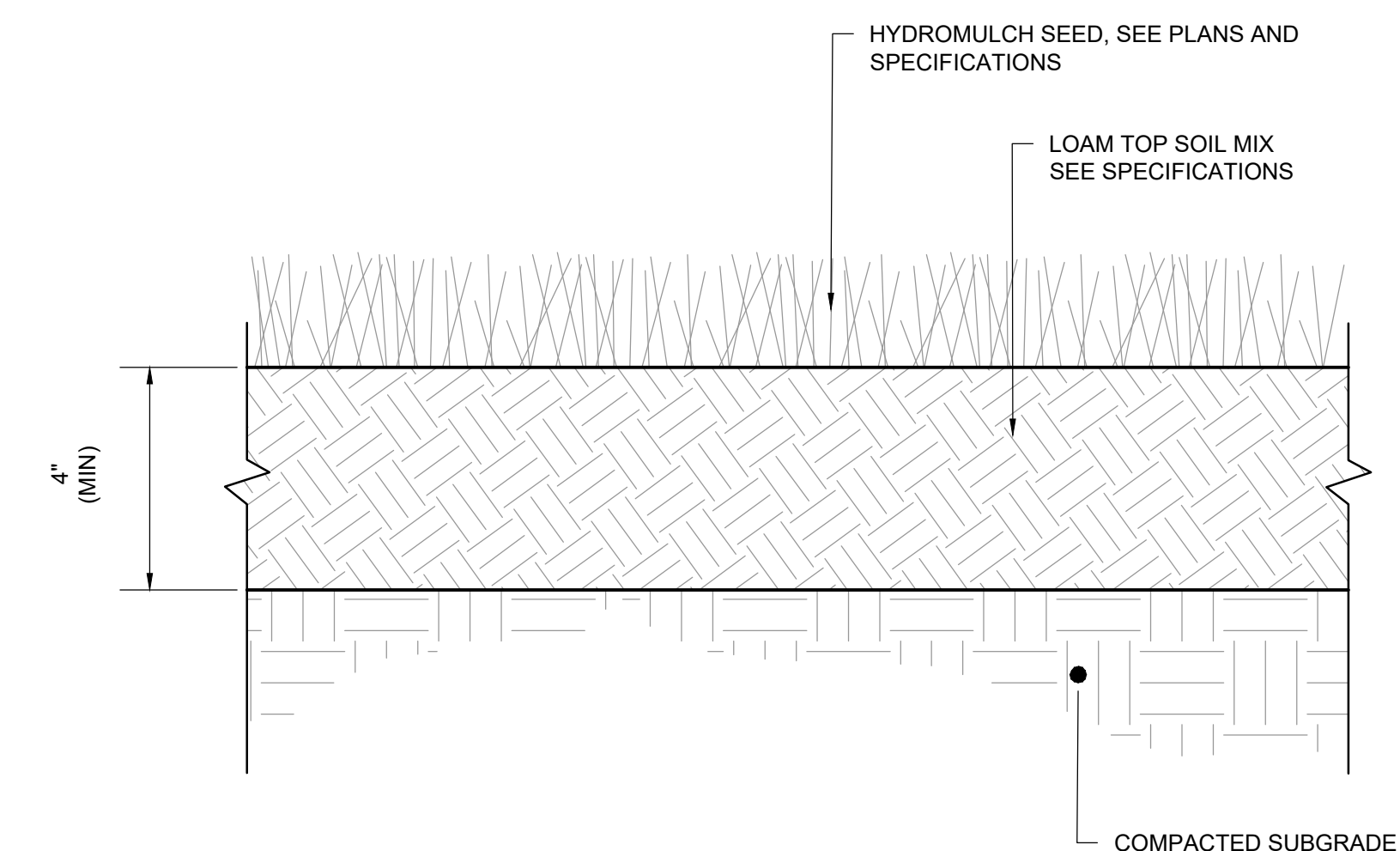
N.T.S.



NOTE:
1. SEE GRAVEL SURFACE SPECIFICATIONS (SECTION 32 11 23) FOR MATERIAL REQUIREMENTS.

GRAVEL ACCESS ROADWAY CROSS-SECTION

N.T.S.



LOAM & SEED DETAIL

N.T.S.

Project:

LITTLETON WATER



TAYLOR STREET WELL AND
RAW WATER MAIN
TOWN CONTRACT NO. IFB-2024
DWSRF NO. 12397
CONTRACT NO.1

Weston & SampsonSM

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Consultants:

[illegible]

COA:

Seal:



Issued For:

FOR PERMIT
REVIEW ONLY

Scale: AS NOTED

Date:	OCTOBER 2023
Drawn By:	GJK/RWS
Reviewed By:	SBR
Approved By:	TEM

W&S Project No.: ENG23-0679

W&S File No.:

Drawing Title:

DETAILS IV

Sheet Number:

C504

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