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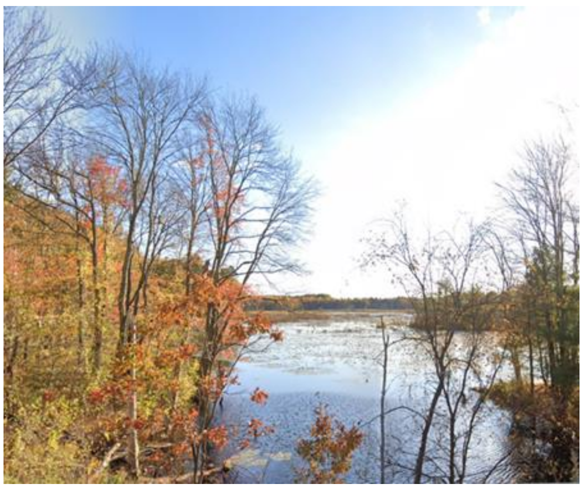
Environmental Impact Report EEA#16736



APRIL 2024

LITTLETON WATER SUPPLY CONNECTION

PREPARED FOR:
LITTLETON ELECTRIC LIGHT AND WATER DEPARTMENT

SUBMITTED TO:
Executive Office of Energy and Environmental Affairs

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A. Background

This Environmental Impact Report (EIR) is submitted by Weston & Sampson (W&S) on behalf of the Littleton Electric Light and Water Department. W&S submitted an Expanded Environmental Notification Form (EENF) to the Massachusetts Environmental Policy Act (MEPA) Office for review and public comment. Notice of the EENF was published in the Environmental Monitor on July 26, 2023. Since the project is within 1 mile of an Environmental Justice (EJ) community, a mandatory Environmental Impact Report (EIR) is required. No other MEPA threshold was triggered that would require a mandatory EIR.

The EENF certificate was issued September 5, 2023, setting forth a Scope primarily limited to Environmental Justice, Public Health, Wetlands and Waterways, Climate Change Adaptation and Resiliency, Mitigation and Section 61 Findings. A copy of the EENF Certificate is provided as part of this submission (Appendix A). The EENF certificate states that upon review of the EENF, the Secretary of EEA, in accordance with Section 11.06(8) of the MEPA regulations, grants the Proponent permission to submit a single EIR in lieu of the traditional two-stage Draft and Final EIR submittal and review process.

Comment Period Extensions & Project Withdrawal

The Single EIR was filed December 22, 2024. Since the filing, the applicant and project team have had multiple meetings with members of the Natural Heritage and Endangered Species (NHESP) program to address concerns related to the Blandings Turtle habitat on the project site of the proposed new groundwater withdrawal (Taylor Street Well). As these conversations have been ongoing, the comment period has been extended three times, until it was brought to the attention of the project team that comment period extensions for Single EIRs are not permitted. The previous Single EIR filing was then withdrawn on March 14, 2024 to allow for additional impact evaluations to take place in consultation with NHESP.

Below is the required information to be included in the Single EIR as noted in the EENF certificate:

Summary
Project Description
Alternatives Analysis
Existing Environment
Assessment of Impacts
Statutory and Regulatory Standards and Requirements
Mitigation Measures and Proposed Section 61 Findings
Response to EIR Scope Criteria and Comments

B. Summary

In July 2023, Weston & Sampson (W&S), on behalf of the Littleton Electric Light and Water Department, submitted the Littleton Water Supply Connection Project Expanded Environmental Notification Form (EENF) to the Massachusetts Environmental Policy Act (MEPA) Office for review (EEA #116736). The proposed project is located on multiple streets in Boxborough, Littleton, and Harvard.

The proposed project includes a new water supply well for the Littleton Electric Light & Water Departments (LELWD), connection of the new water supply well to an existing WTP via a raw water transmission main, and construction of a finished water main from the LELWD system 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 the 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 having the highest maximum sodium concentration for a public water system located within 0.5 miles of a MassDOT roadway.

An EIR is required for this project under 301 CMR 11.06(7)(b) of the MEPA regulations because it is located within one mile of one or more EJ populations. The project requires an Order of Conditions from both the Littleton and Boxborough Conservation Commission (or in the case of an appeal, a Superseding Order of Conditions from MassDEP). A Notice of Intent was filed with Boxborough on September 5, 2023 and the Order of Conditions was issued October 23, 2023 (See Appendix K). A Notice of Intent was filed with Littleton on November 1, 2023, and the process is ongoing. The project also required a submission with the Massachusetts Historic Commission. Their comments were issued August 3, 2023, and have been addressed. A submission was also provided to the Natural Heritage and Endangered Species Program (NHESP). Their review of the water main portion of the work is complete, and conditions have been provided (See Appendix I). The review of the Taylor Street Well portion of the work is ongoing.

As described in the EENF, alternatives for both the raw water main and finished water main were evaluated based on the primary objective of bringing a treated water supply to the Town of Boxborough. The EENF evaluated the following alternatives:

New Source and Raw Water Alternatives:

1. No-Build, (Alternative 1)
2. Drill Individual Replacement Wells for each PWS (Alternative 2)
3. Add Treatment to each PWS (Alternative 3)
4. Municipal Interconnection (Alternative 4)
5. Municipal Interconnection to LELWD - Alternative Routes (Alternative 5a & 5b).

Finished Water Main Alternatives:

1. No Build (Alternative 1)
2. Construct Water Main in Existing Roadway (Alternative 2)

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.

The project site is located within one mile of EJ populations characterized by Minority (3). Within the census tracts containing the above EJ populations within 1 mile of the project site, there were not any other languages identified as those spoken by 5% or more of residents who also identify as not speaking English very well (Limited English Proficiency (LEP) individuals).

This project will not result in any negative environmental or public health impacts to the surrounding EJ Populations. As stated in the EENF, the project will provide more benefits than detriments, as the project will provide a treated water supply to residents and businesses in Boxborough that currently experience contamination in existing water supplies. The new finished water main will also provide fire protection, another improvement for the EJ community over existing conditions. Potential detriments are limited to impacts on air quality during the temporary construction period.

A list of mitigation measures can be found below in the Section 61 findings and Mitigation section. Construction period mitigation measures will be utilized during construction. Please see Table 6 for a summary of mitigation measures.

C. Project Description

As described in the EENF, 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 and once the proposed raw water transmission main leaves the area of the new water supply well.

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. A Zone II is defined by the Commonwealth of Massachusetts as a wellhead protection area that has been determined by hydro-geologic modeling and approved by the Department of Environmental Protection's (DEP) Drinking Water Program (DWP).

Scope of Work

LELWD is proposing developing a new water supply well at 153 Taylor Street which during an 8-hour pump test, saw per- and polyfluoroalkyl substances (PFAS 6) levels of approximately 14 parts per trillion (ppt). The new well is expected to supply approximately 0.5 million gallons per day (mgd). The LELWD has recently completed construction on a new 1.8 MGD water treatment plant (WTP) at 15 Whitcomb Avenue under a separate project to treat for PFAS found in their existing raw water sources. Under this proposed project, water from the proposed new well will be pumped to the WTP and will provide additional water to the existing customers of Littleton and is proposed to provide water to up to 11 public water systems (PWS) customers in Boxborough that are impacted by PFAS, sodium, chloride, and/or perchlorate. Work under this project includes drilling and construction of a new groundwater well source and associated pump station, a new raw water main to convey water from the new well to the new WTP, and a new finished water main extending from the existing Littleton water main in Whitcomb Avenue and continuing south approximately 4.5 miles to the Codman Hill Condominiums (PWS #2037001) in Boxborough.

Construction of a raw water transmission main is required to connect the new well to the Whitcomb Avenue WTP treatment plant. The proposed route includes preliminary design of a raw water main connecting the new source located behind the Amazon Facility to the Littleton Water Treatment Plant as outlined in the Raw Water Main Alternatives Analysis performed by Tata & Howard in December 2021.

The project will also 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.

Since the submission of the Expanded Environmental Notification Form, the project has been updated to include the construction of a 1,200-foot± access road, with approximately 800-feet constructed of gravel and 400-feet of asphalt. Stormwater management infrastructure in the form of an infiltration basin has also been added. Runoff from approximately 40%± of impervious areas subject to vehicular access will be captured in the stormwater management system and treated prior to discharge. More information regarding stormwater BMPS can be found in the Stormwater Report in Appendix C.

With the project changes, the impact numbers have been revised and are outlined in Table 1 below. Revised impact numbers were broken up into existing impervious, existing disturbed, and undisturbed forest area. Important updates to note include that the entirety of the project has been moved out of both Bordering and Isolated Vegetated Wetlands, resulting in zero impact to these areas. Previously, the directional drilling went through the BVW area, resulting in some temporary impacts to the resource area. However, extending the length of the directional drill effectively removed impact from the BVW area. A summary of project changes within the cross-country area that minimized impacts is below:

- Increased the length of directional drilling to reduce impacts within the 100 ft buffer, BVW, BLSF, & riverfront resource areas
- Shifted the water main closer to the highway for the full length running parallel with Route 2 which reduced impact to 100-ft buffer a bit
- Shifted the water main a little east/closer to the Amazon property to reduce area within 100-ft buffer
- Relocated the proposed water main to follow the proposed access road vs cross country (reduced impact to 100-ft buffer)
- Shifted the location of the proposed access road (reduced impact to 100-ft buffer) as less of the roadway is within the buffer zone now

The impacts to Bordering Land Subject to Flooding and Riverfront Area have also decreased. This is because the revised design plans include directional drilling the water main approximately 550 feet rather than 150 feet, so the design no longer impacts approximately 400 feet of which was within the bordering land subject to flooding and riverfront area. The water main was also moved out of the tree line for the Littleton Conservation Commission to minimize impacts (SEE SHEET C103).

The impacts to the 100' Wetland Buffer have increased since the EENF submission. This is due to the inclusion of the access road grading and drainage design.

Impacts to Bank, Land Under Water, and Isolated Land Subject to Flooding were zero in the original EENF submission and remain at zero for the Single EIR submission.

Table 1: Revised Impact Numbers

		Per EENF Submission		Revised	
Resource Area	Impact Area	Temp Impact	Perm Impact	Temp Impact	Perm Impact
Bordering Land Subject to Flooding	Existing Impervious			4,257	0
	Existing Disturbed			0	0
	Undisturbed Forest			0	2,394
	Total:	25,015	9,505	4,257	2,394
Riverfront Area	Existing Impervious			13,779	0
	Existing Disturbed			0	0
	Undisturbed Forest			6,011	0
	Total:	73,299	6,231	19,790	0
100' BVW Buffer	Existing Impervious			39,467	0
	Existing Disturbed			0	0
	Undisturbed Forest			19,032	39,053
	Total:	72,694 *(original value was not split into temp vs perm)*		58,499	39,053

Bordering Vegetated Wetland	Existing Impervious			0	0
	Existing Disturbed			0	0
	Undisturbed Forest			0	0
	Total:	1,420	0	0	0
Isolated Vegetated Wetland	Existing Impervious			0	0
	Existing Disturbed			0	0
	Undisturbed Forest			0	0
	Total:	170	0	0	0
Bank	Total:	0	0	0	0
Land Under Water	Total:	0	0	0	0
Isolated Land Subject to Flooding	Total:	0	0	0	0

Table 1A below identifies changes in the total land alteration for the project. The revised 2.08 acres of Land Alteration includes the updated stormwater management design; specifically, the enhanced infiltration basin and infiltration trench for the proposed access road to the new well station.

Table 1A. Total Land Alteration

Land Category	Area (square feet)	Area (acres)
Impervious Surface Outside Buffer Zone	5,375	
Proposed Paved Roadway	6,552	
Proposed Gravel Roadway	11,451	
Proposed Paved Roadway (outside buffer)	2,909	
Proposed Gravel Roadway (outside buffer)	2,472	

In addition, to address comments from the Littleton Conservation Commission regarding the use of a metal roof, the proposed building will have a metal roof with a powder-coat finish. Special provisions for stormwater BMPs related to metal roofing in the MA Stormwater Handbook are only applicable for galvanized or copper roofing, neither of which are applicable.

Project Updates Since Filing of the Single EIR

Since the filing of the Single EIR, there has been ongoing communication with Misty-Anne Marold and the team at the Natural Heritage and Endangered Species Program (NHESP). There are concerns surrounding the presence of the Blanding's Turtle at the project site, and the projects impact to the species habitat. Specifically, NHESP needed additional information to determine if the pumping from the proposed Taylor Street Well will result in impacts to the surrounding ephemeral pools that are utilized by the Blanding's Turtle. Previous efforts and pumping tests to evaluate that impact were hampered by drought conditions and dry ephemeral pools that could not be monitored. To address these concerns, the project team will be conducting an additional 5-day pumping test on the Taylor Street Well during a water surplus time of year with full ephemeral pools. During the pumping test, surface and ground water elevations will be monitored at each of the eight ephemeral pools and one drainage swale identified by Oxbow Associates. The team will collect at least 5 days of antecedent data at each of these locations, followed by 5 days of pumping data and five days of recovery data. These results will then be reviewed by MassDEP and NHESP to help them in making their final determination regarding impact to the habitat areas.

D. Alternatives Analysis

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 has recently completed construction of a Water Treatment Plant (WTP) at Whitcomb Avenue with a capacity of 1.8 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
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.
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 new 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. The work includes replacing an existing finished water main between the WTP and 142 Whitcomb Avenue (just north of Route 2). The existing water from 142 Whitcomb Avenue, running under Route 2, and continuing south to Nancy's Way is relatively new and does not need replacement. The new finished water main will start at Nancy's Way and then continue south through the above-mentioned roadways to 330 Codman Hill Road. 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.

E. Existing Environment

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 and once the proposed raw water transmission main leaves the area of the new water supply well.

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.

Topography and Geology

The existing site is predominantly wooded and surrounded by a large wetland complex. The terrain is complex, with flat upland grassed areas, and undulating rolling hills located within wooded areas. Elevations range from 237-feet to 233-feet on the grassed portion of the Amazon site, and from 244 feet to 223-feet on the wooded portion located on Town owned property. Resource areas include bordering vegetated wetland, the 100-foot wetland buffer, and a Zone II wellhead protection area. NRCS soil mapping shows the site being comprised primarily of Quonset sandy loam and sandy Udorthents. Numerous well borings throughout the area generally confirm the subsurface conditions.

Air Quality, GHG, Emissions, and Noise

In accordance with the MEPA Interim Protocol for Analysis of EJ Impacts, a GHG analysis was not required because the project is anticipated to generate less than 2,000 tons per year (tpy) of GHG emissions. Specifically, the project is not expected to result in the generation of any GHG emissions once construction is complete. No large noise impacts are expected; limited noise will be present during construction.

Plant and Animal Species and Habitat

Portions of the project area fall within mapped habitat of the Blanding's Turtle, Blue-spotted salamander and Eastern Meadowlark, all species protected in accordance with Massachusetts Endangered Species Act (MESA). 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.MESA review is ongoing.

Traffic, Transit, and Pedestrian and Bicycle Transportation

Portions of the work include work within roadway (Beaver Brook Road, Swanson Road, Codman Hill Road, Monarch Drive, Taylor Street, MA Route 2). Impacts to roadway are temporary in nature. Residents will be notified regarding road closures.

Scenic Qualities, Open Space, and Recreational Resources

There are no scenic qualities, Open Space or recreational resources within the project area.

Historic Structures or District, and Archaeological Sites

In a comment letter dated August 3, 2023, the Massachusetts Historic Commission provided information regarding two historical properties recorded within or close to the project area. These markers include the Harvard-Littleton Boundary Marker (MHC #HRV.926) and the Boxborough-Harvard Boundary Marker (BXB.908). These two markers were located and are included on the revised plans provided with this submission. These historic properties will be protected during construction.

Rare or Unique Features

There are no existing rare or unique features within the determined limit of work.

F. Assessment of Impacts

Public Health

As stated in the *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations,* which was put together with parallel efforts to update the MEPA regulations at 301 CMR 11.00 et seq. to determine any "unfair or inequitable environmental burden and related public health consequences," the following criteria have been addressed:

This assessment shall address all identified EJ populations located in whole or in part within the designated geographic area for the project. The assessment should then survey past and current polluting activities that may have contributed to an "existing environmental burden" impacting the EJ population that may be "unfair and inequitable" as compared to the general population. While measuring the individual effects of a multitude of past and current activities is a complex endeavor, publicly available mapping tools exist as resources.

The project team used the MA DPH Tool to identify municipality based and census tract-based health criteria. This identifies EJ populations that exhibit any of the four "vulnerable health EJ criteria". As outlined in the *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations:*

Such criteria are environmentally related health indicators that are measured to be 110% above statewide rates based on a five-year rolling average. Any EJ population that exists within those municipalities or census tracts could then be viewed as exhibiting "vulnerable health EJ criteria," and therefore potentially bearing an "unfair or inequitable" environmental burden and related public health consequences.

The results of this analysis are summarized in table format, below, in Table 1 and Table 2. Both tables show there are no unfair or inequitable environmental burdens or consequences from the project.

Table 2: Municipality Based

Vulnerable Health Criteria	110% Statewide Rate	Rate Per 10,000	Does it meet the Statewide Rate?	Community
Heart Attack Hospitalization	29.065	19.9	No	Littleton

	29.065	12	No	Boxborough
	29.065	19.4	No	Harvard
Pediatric Asthma	91.4	33.1	No	Littleton

Table 3: Census Based

Vulnerable Health Criteria	110% Statewide Rate	Rate Per 1,000	Does it meet the Statewide Rate?	Census Tract
Blood Lead	16.484	10.7	No	25,017,325,100
Low Birth Weight	238.5	584.8	Yes	25,017,324,102
	238.5	0	No	25,027,761,400

Heart Attack Hospitalizations are not shown to be elevated in EJ communities within one mile of the project site (Littleton) per the DPH Tool. This project will have no impact on heart attack hospitalizations and could potentially improve this aspect by improving water resources.

Pediatric Asthma rates are not shown to be elevated in EJ communities within one mile of the project site (Littleton) per the DPH Tool. This project will have no impact on pediatric asthma and will not better these communities with respect to this aspect. Temporary construction activities could potentially have adverse impacts on air quality.

Blood Lead rates are not shown to be elevated in EJ census tracts within one mile of the project site per the DPH Tool. This project will have no impact on blood lead rates and will not better these communities with respect to this aspect.

Low Birth Weight rates are shown to be elevated in one EJ census tracts within one mile of the project site (25,017,324,102) per the DPH Tool. This project will have no impact on low birth weight rates and will not better these communities with respect to this aspect.

Overall, this project will have more benefits than harm to EJ populations within one mile and beyond. The goal of the project is to provide water meeting the MassDEP standards to public water systems and individual well owners that are impacted by contaminated groundwater in Boxborough.

Potential Sources of Pollution

The project team used the MA DPH EJ Tool to identify the following potential sources of pollution that may have impacted, or may currently impact, EJ populations within the Designated Geographic Area (DGA). Table 3, below, shows potential sources within 1 mile of the project area. None of the additional facilities listed in table 3 titled Assessment of Potential Sources of Pollutions Within 1 Mile DGA are located on the project site itself, and the project will not impact or exacerbate any of the identified Hazards. In addition, it is anticipated that consolidation of the PWSs will decrease the risk of these potential pollution sources form impacting the EJ populations' drinking water supply.

Table 4: Assessment of Potential Sources of Pollutions Within 1 Mile DGA

RMAT Climate Resilience Design Standards Tool (the “RMAT Tool”) Assessment

Potential Sources of Pollution	Identified in DGA Project Area
MassDEP major air and waste facilities (See below)	
Air Operating permits	0 total
Large Quantity Generators	2 total - CDK REALTY VENTURE ONE LLC, NATIONAL TECHNICAL SYSTEM
Large Quantity Toxic User	1 total - SYNQOR INC
M.G.L. c. 21E sites	2 total - SWANSON RD AND BEAVER BROOK RD AREA PFAS, ROUTE 2 EB ON-RAMP FROM I-495 NB
“Tier II” toxics use reporting facilities	7 total - Cisco Systems, Inc (Site II), Cisco Systems, Inc (Site II), Interactive Data Corporation, Cisco Systems, Inc (Site II), Medtronic, DXC Technology Services LLC. - Littleton MA, LITTLETON PORTER ROAD - USID54639
MassDEP sites with AULs	1 total - MATTBOB CORP
MassDEP groundwater discharge permits	4 total - CISCO SYSTEMS - SITE II, BROOK VILLAGE CONDO, HARVARD RIDGE CONDO. TRUST, JEFFERSON AT BEAVER BROOK
Wastewater treatment plants	0 total
MassDEP public water suppliers	2 total - Codman Hill Condominium, Littleton Water Department, Harvard Water Department *Note: the MA DPH EJ Tool identifies 3 MassDEP Public Water Suppliers in the DGA Project Area. There are 18 total Public Water Systems along the route of the finished water main.*
Underground storage tanks	2 total - VERC BOXBOROUGH EXXON, MA HIGHWAY DEPARTMENT

The project team used the RMAT Tool output (Table 4, below) to identify the indications of risk.

Table 5: Climate RMAT Tool Assessment

RMAT Tool Category	Rating
Sea Level Rise/ Storm	No Risk
Extreme Precipitation- Urban Flooding	High Risk
Extreme Precipitation- Riverine Flooding	High Risk
Extreme Heat	High Risk

Using the RMAT tool, findings show that this project site ranks High Exposure in Extreme Precipitation – Urban Flooding, Extreme Precipitation – Riverine Flooding, and Extreme Heat. Additionally, it ranks No Exposure in Sea Level Rise/Storm Surge. Due to these high risks and close proximity to EJ communities, the proposed design includes a few climate resilience measures to protect these communities and decrease risk (See Appendix H for RMAT Report).

Risks associated with Extreme Precipitation - Urban Flooding and Extreme Precipitation – Riverine Flooding are addressed in this project through the consolidation of smaller water supply wells into one larger municipal water system. This reduces the risk of individual sources and treatment systems being adversely impacted by flooding, precipitation, and extreme weather events. The new well for the municipal water system improves the redundancy of the system and will allow the system to be more resilient during times when one or more other water sources may be offline, potentially due to extreme weather events. Risks associated with Extreme Heat are not addressed in this project.

Overall, this project will decrease the risks of Climate Change to residents and businesses, including EJ populations, in the immediate area through increased water supply capacity and redundancy and reduced risk of individual water supply sources being affected by climate change.

This project will not be generating GHG emissions past the construction period and will not include indoor occupied spaces, therefore it does not require further GHG emission analysis.

G. Statutory and Regulatory Standards and Requirements

Please see below for a summary of required statutory and regulatory review processes:

Massachusetts Historic Commission Project Notification Form

Due to the state funding and required state permitting, a Project Notification Form was submitted to the Massachusetts Historic Commission (MHC). Project notification forms are required per the MHC website for:

Any projects that require funding, licenses, or permits from any state agency must be reviewed by MHC in compliance with Massachusetts General Laws Chapter 9, sections 26-27C. This law creates the MHC, the office of the State Archaeologist, and the State Register of Historic Places among other historic preservation programs. It provides for MHC review of state projects, State Archaeologist's Permits, the protection of archaeological sites on public land from unauthorized digging, and the protection of unmarked burials.

Response from MHC was received on August 3, 2023. The response provided information on two historical boundary markers located near the project area. The markers have been located and identified on plans and will be protected throughout construction.

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 Boxborough and Littleton Conservation Commission, 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.

This project involves work in 3 municipalities: Littleton, Harvard, and Boxborough. Work will be within the jurisdiction of both the Boxborough and Littleton Conservation Commissions.

Resource areas impacted by the proposed work include the following:

- Riverfront Area
- Bordering Land Subject to Flooding

A Notice of Intent was filed with the Town of Boxborough on September 5, 2023 and the Order of Conditions was issued October 23, 2023. A Notice of Intent was filed with the Town of Littleton on November 1, 2023, communication with the Littleton Conservation Commission is ongoing.

Massachusetts Endangered Species Act

As indicated in the Massachusetts Natural Heritage Atlas (15th Edition), portions of the project site are mapped as Priority and Estimated Habitat for state-listed species as habitat for the Eastern Meadowlark (*Sturnella magna*), a "Special Concern" species as well as Blanding's Turtle (*Emydoidea blandingii*), species state listed as "Threatened", and Blue-spotted Salamander (*Ambystoma laterale pop. 1*), species state listed as "Special Concern". These species and their habitats are protected pursuant to the Massachusetts Endangered Species Act (M.G.L c. 131A) and its implementing regulations (MESA, 321 CMR 10.00) and rare wetland wildlife habitat is protected in accordance with the Massachusetts Wetlands Protection Act and its implementing regulations (WPA, 310 CMR 10.58(4)(b) and 10.59).

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.MESA review is ongoing. To date, NHESP has provided a decision letter on the water main portion of the project. The review of the Taylor Street Well portion of the project remains ongoing. Conditions have been provided, one of which is a Turtle Protection Plan.

Additional permits required for the project include the below:

- *Stormwater Permit with the Littleton Planning Board (approved 1/19/2024)*
- *Interbasin Transfer Act (ITA) as it causes a transfer of water across both a municipal boundary and a major river basin boundary*
- *Access Permit from the Massachusetts Department of Transportation (MassDOT)*
- *Approval to site a source and conduct a pumping test for a source greater than 70 gallons per minute - BRP WS17 (approved by MassDEP August 15, 2022)*

- *Approval of Pumping Test Report for Source of 70 gallons per minute or greater - BRP WS19 (submitted January, 2023);*
- *Approval to Construct a Source of 70 gallons per minute or greater - BRP WS20;*
- *Distribution Modifications for Systems that serve more than 3,300 people – BRP WS32;*
- *Water Management Act Permit Amendment – BRP WM02 (submitted February 2023).*
- *trench and road opening permits*
- *NPDES Construction General Permit*
- *building/electrical permit*

H. Mitigation Measures and Proposed Section 61 Findings

This section provides a summary of the proposed Section 61 findings and associated mitigation measures for the Littleton Water Supply Connection Project.

Introduction

M.G.L. c. 30, s. 61 requires that "[a]ll authorities of the Commonwealth … review, evaluate, and determine the impact on the natural environment of all works, projects or activities conducted by them and use all practicable means and measures to minimize [their] damage to the environment. Any determination made by an agency of the Commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been taken to avoid or minimize said impact." Each state agency that issues a permit for the Project shall issue a Section 61 Finding in connection with permit issuance, identifying mitigation that is relied upon to satisfy the Section 61 requirement. A summary of associated mitigation measures is provided in Table 5, below. The contractor will be responsible for ensuring implementation of the mitigation measures.

Anticipated Permits and Approvals

Table 5 identifies the anticipated permits required to complete the project. The four permits that are required for the project will include, Massachusetts Historic Commission submittal, Massachusetts Endangered Species Act submittal and an Order of Conditions from the Littleton and Boxborough Conservation Commissions.

Table 6: Permits Required for the Project

Agency Name	State Action / Permit
Massachusetts Historic Commission	Project Notification Form
Littleton Conservation Commission	Notice of Intent – Order of Conditions

Boxborough Conservation Commission	Notice of Intent – Order of Conditions
Massachusetts Endangered Species Act	Project Review Checklist
Littleton Planning Board	Stormwater Permit
Department of Conservation & Recreation	Interbasin Transfer Act (ITA)
MassDOT	Access Permit
MassDEP	BRP WS17 - Approval to site a source and conduct a pumping test for a source greater than 70 gallons per minute
MassDEP	BRPWS19 - Approval of Pumping Test Report for Source of 70 gallons per minute or greater
MassDEP	BRPWS20 - Approval to Construct a Source of 70 gallons per minute or greater
MassDEP	BRPWS32 - Distribution Modifications for Systems that serve more than 3,300 people
MassDEP	BRPWM02 - Water Management Act Permit Amendment
Town of Littleton & Boxborough	Trench and road opening permits
EPA	NPDES Construction General Permit
Town of Littleton & Boxborough	Building/electrical permit

Proposed Section 61 Findings
Project Name: Littleton Water Supply Connection
Project Location: Various – Littleton, Boxborough, Harvard
Proponent: Littleton Electric Light & Water Department

Agent: Weston & Sampson – Alexandra Gaspar
Number: EEA#16736

Potential environmental impacts associated with the project have been described, characterized and quantified in the EENF dated January 2023 and the EIR, and are incorporated by reference into this Section 61 Finding. The project Proponent and consulting team have designed, developed and incorporated measures to mitigate significant impacts throughout the duration of the planning, environmental review and construction process.

The Proponent understands and accepts that they are solely responsible for implementation of the proposed mitigation measures throughout the life of the Project under the Massachusetts Environmental Policy Act (MEPA). These mitigation measures are summarized in Table 6, below.

Following review of the MEPA filings, inclusive of the mitigation measures identified in Table 6 it is concluded pursuant to M.G.L. c. 30, s. 61, that all practicable and feasible mitigation measures will have been taken to avoid or minimize potential environmental impacts associated with the project.

Table 7: Summary of Mitigation Measures

Mitigation	Schedule
Littleton Water Supply Connection – Littleton, Boxborough, Harvard	
Environmental Justice	
The Project is not expected to result in disproportionate adverse effects, or increase the risk of climate change, on EJ populations by materially exacerbating any such existing burdens.	During construction
Public Health	
This project is not expected to result in any large public health impacts to the surrounding populations. There will be minimal impact to GHG emissions during construction (less than 2,000 tons per year of GHG emissions). Specifically, the project is not expected to result in the generation of any GHG emissions once construction is complete.	During construction
Every reasonable effort will be made to minimize noise impacts of machinery as required by US EPA and conform to local Littleton/Boxborough noise restrictions.	During Construction

Mitigation	Schedule
Potential harms are limited to impacts on air quality during the temporary construction period. Any emissions on site will be consistent with local, state, and federal standards. No vehicle idling will be permitted during construction.	During Construction
Climate Change	
Risks associated with Extreme Heat are addressed in this project through the replanting of existing vegetation. This will help to mitigate urban heat island impacts by maintaining air temperatures and providing shade.	Post Construction
Building/structure to be elevated to 100-year flood +3 feet per Executive Orders 14030 and 13690 that apply to SRF funded projects	Post Construction
The proposed stormwater BMP is designed to collect suspended sediment, dissipate energy to reduce erosion, scour potential, and provide water quality treatment.	Post Construction
Land Alteration and Wetland Impacts	
The Project will utilize sediment control measures including compost filter tubes/silt fence, Stormwater BMP, staging areas, construction access points, and dewatering areas.	During Construction
The project will utilize stabilized construction mats in undisturbed forested areas. Native seed mix will be spread along all impacted areas upon removal of mats.	During Construction and Post Construction (monitoring- and re-vegetation as needed upon monitoring results)

I. Response to Specific Components of the EIR Scope

The following information is presented to respond to each of the items in the comment letters received and included with the EENF Certificate. This information follows the requirements of 301 CMR 11.07 and provides the information and analyses required in the Scope. Each item mentioned in the certificate is presented in bold, with responses following.

Project Description & Permitting

Comment 1: Updated description of the project and identify any changes to the project since the filing of the EENF. The Single EIR should identify, describe, and assess the environmental impacts of any changes in the project that have occurred between the preparation of the EENF and the Single EIR. It should clearly identify and describe State, federal, and local permitting and review requirements associated with the project and provide an update on the status of each of these pending actions. The Single EIR should include a description and analysis of applicable statutory and regulatory standards and requirements, and a discussion of the project's consistency with those standards.

Response 1: A status update on the project scope can be found in the Project Description section of the Single EIR. The status of permitting can be found in Section F. *Statutory and Regulatory Standards and Requirements.* Below find the performance standards for Bordering Land Subject to Flooding and Riverfront Area and how this project is consistent.

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.

Comment 2: Detailed site plans for existing and post-development conditions at a legible scale. The plan should clearly identify existing and proposed water mains, impervious areas, and stormwater and utility infrastructure. Updated site plans should include information as requested in the MassDEP comment letter including the existing and proposed treelines and the limits of BLSF based on surveyed elevations.

Response 2: Revised site plans have been attached to this submission. These plans have been updated to include the existing and proposed treelines and the limits of BLSF based on surveyed elevations.

Environmental Justice

Comment 3: Description of measures the Proponent intends to undertake to promote public involvement by the identified EJ Populations within the DGA during the remainder of the MEPA review process or a summary thereof, should be distributed to the EJ Reference List, and an updated list should be obtained from the MEPA Office prior to filing the DEIR so as to ensure that organizational contacts are up to date.

Response 3: Notification of the Single EIR submittal shall be sent to the EJ Reference List. The notification is attached to this submission in Appendix B. In addition, project information and status will continue to be updated on the project website located here: https://www.lelwd.com/boxborough-water-main/

Comment 4: The Single EIR should include a separate section on "Environmental Justice," and should discuss whether the project will bring environmental benefits specifically to the identified EJ Populations. The Single EIR should also discuss whether other wells within the Town of Boxborough's Aquifer Protection District, which are not being supplied by the new source, may be affected by the Proponent's new withdrawal. As identified in comments from a Boxborough resident, the new water supply source in Littleton is also within the Boxborough Aquifer Protection District which supplies these additional wells which are within EJ Populations. The Single EIR should discuss the extent of construction period impacts on EJ Populations, including noise, construction time frames, and disruptions to surrounding roadways or other infrastructure.

Response 4: Regarding impacts to other wells and how EJ populations will be impacted, please see page 26 for responses to questions posed by Cindy Markowitz. In terms of environmental benefits to EJ Populations, this project will decrease the risks of Climate Change to residents and businesses, including EJ populations, in the immediate area through increased water supply capacity and redundancy and reduced risk of individual water supply sources being affected by climate change.

Public Health

Comment 5: In accordance with St. 2021, c. 8, s. 57, the Single EIR should include a separate section on "Public Health," and discuss any known or reasonably foreseeable public health consequences that may result from the environmental impacts of the project. Particular focus should be given to any impacts that may materially exacerbate "vulnerable health EJ criteria," in accordance with the MEPA Interim Protocol for Analysis of EJ Impacts. To the extent any required Permits intended to protect public health, the Single EIR should contain specific discussion of such standards and how the project intends to meet or exceed them. The Single EIR should describe the PFAS treatment process, applicable public health standards, and the mechanisms by which the Proponent will continue to monitor water quality and take additional remedial actions to the extent continued contamination is found.

Response 5: The Town of Littleton recently completed its new Whitcomb Avenue Water Treatment Plant (WTP). The total capacity of the WTP is 1.8 million gallons per day. The WTP treats groundwater from Whitcomb Avenue Well 1, Whitcomb Avenue Wellfield 3, and Spectacle Pond Well 5. It will also treat water from the Taylor Street Well (Well #6) once the raw water main portion of this project is completed.

The PFAS treatment process includes four 12-foot diameter, 40,000-lb. granular activated carbon (GAC) pressure filters installed in parallel series for PFAS removal. Raw water enters the PFAS pressure filter system following pre-treatment for pH adjustment, and iron and manganese removal, and ultraviolet disinfections. Following PFAS filtration, treatment for corrosion control and disinfection is provided prior to being pumped into the distribution system. Sampling ports are provided between each filter vessel in series to allow for "breakthrough sampling" to be conducted to detect PFAS breakthrough in the lead vessel necessitating media replacement. The filtration system is designed to comply with all extant state regulations governing PFAS as well as the potential PFAS Rule proposed by the United States Environmental Protection Agency anticipated to be promulgated in late 2023 or early 2024.

The Littleton Water Department will continue to sample for PFAS in its raw water and in its WTP effluent per its Compliance Monitoring Schedule with MassDEP as well as performing additional breakthrough sampling per its WTP consultant's recommendations. With regard to the potential need for additional remedial actions, the Water Department tracks trends in its water quality. Should PFAS levels rise over time, the Water Department would engage consultants to assist with identifying point source locations of the pollution and next steps to reduce PFAS levels in its treated finished water supplied to customers.

Wetlands & Waterways

Comment 6: Distinguish between impacts to existing impervious areas, existing disturbed areas such as roadway shoulders, and undisturbed forested areas, when quantifying impacts to wetland resource areas and Buffer Zone associated with the project.

Response 6: Please Section C and Table 1 of this document that breaks down resource area impacts into impact area type to distinguish if impacts are occurring in impervious areas, disturbed area, or undistributed forested areas.

Comment 7: Include existing and proposed treelines on the site plans.

Response 7: Existing and proposed treelines have been included on the site plans attached to this submission.

Comment 8: Depict the location of BLSF based on surveyed elevations not GIS overlays.

Response 8: BLSF based on LiDAR data has been included on the site plans attached to this submission.

Comment 9: Confirm whether the project qualifies as a Limited Project under 310 CMR 10.53(3)(d) (underground and overhead public utilities).

Response 9: Yes. Portions of this project qualify under 310 CMR 10.53(3)(d) as much of the work is occurring within paved roadway.

Comment 10: Describe how wetland resource areas within off-road portions of the project will be restored, the anticipated long-term vegetated characteristics of the resource areas, maintenance requirements, and proposed invasive species control measures.

Response 10: During construction, the work area will be lined with compost filter tubes to prevent impact to surrounding wetland areas. Areas that are disturbed during construction will be restored with a native seed mix approved by the Littleton Conservation Commission.

Areas of temporary alteration will be restored with loam and seed or a native seed mix, as appropriate.

Personnel, trained in the U.S. Army Corps of Engineers Wetland Delineation Manual, will identify any invasive species in restoration areas, with monitoring occurring for two growing seasons following construction. During each monitoring effort, the wetland scientist will look for the presence of non-native species at the restored wetland resource area and buffer zone within the limit of work. The more common invasive species include:

- Purple loosestrife (Lythrum salicaria)
- Japanese knotweed (Fallopia japonica)
- Common reed (Phragmites communis)

The wetland scientist will document any and all invasive species found, as well as the overall health of the re-seeded area. At any time during the monitoring period, if 10% of invasive species or more are found within any monitoring area, work will be conducted to remove all invasive species from the entire restored area, in the manner as described below.

If invasive species are found at the restored site, all plant material including root mass, stolons, and rhizomes will be removed to prevent re-sprouting from occurring. This will occur using hand tools. The vegetation will be placed inside plastic bags, so seeds do not spread to any non-impacted areas. Removal operations will be overseen by a trained Wetlands Scientist.

Comment 11: Submit a Monitoring and Clean-up Plan to MassDEP and the Littleton Conservation Commission as part of the Notice of Intent for the project.

Response 11: Please see Appendix E for Frac-Out plan and Appendix D Cleaning Up Spec.

Comment 12: Submit a 401 Water Quality Certification if the volume of material dredged by the drilling equals or exceeds 100 cubic yards.

Response 12: Dredging is not anticipated but if needed, the volume of dredging will not be over 100 CY.

Comment 13: Address MassDEP comments related to the potential for wetland impacts associated with inadvertent returns from drilling lubricant used in horizontal directional drilling (HDD).

Response 13: A Frac-Out plan has been attached as part of this submission and can be found in Appendix E.

Comment 14: The project will result in the creation of 0.35 acres of new impervious surfaces and the Single EIR should document the project's compliance with the MassDEP SMS.

Response 14: A Stormwater Report has been compiled as part of this Single EIR submission. It is included in Appendix C.

Comment 15: If the proposed project will involve dredging or other activities within any c.91 jurisdictional area, c.91 authorization will be required. The Single EIR should discuss the potential need for dredging if bedrock is hit and directional drilling is determined to be not possible, including possible volumes and the need for c. 91 authorization.

Response 15: At this time, horizontal directional drilling (HDD) is preferred for the crossing of Beaver Brook because it will ensure that the raw water main is located at an appropriate distance below grade to prevent concerns regarding freezing conditions in the winter. During the winter, shallow or exposed water mains may freeze the water within the pipe if it is not moving, which could occur when the Taylor Street well was offline. It is anticipated that test borings will be performed by the HDD contractor to confirm depth to bedrock prior to beginning work on HDD. In the event that the depth to bedrock is too shallow to support drilling, the Town of Littleton has several options which would be pursued in order:

1. Reroute the water main slightly north for installation above the culvert conveying Beaver Brook beneath Route 2. This option was not selected due to the desire of MassDOT to not have the raw water main infringe on the existing highway layout and concerns regarding whether adequate separation above and below the pipe above the culvert could be provided to prevent freezing of the water in the pipe.
2. Attach the water main to the top of the culvert headwall with insulation. This option is often pursued for distribution mains where water is constantly flowing, but for a raw water transmission main it is not preferred because the water in the pipe is not continuously moving for sufficient time to prevent freezing in winter when the well is not operating. Additional design and/or operational alterations would be needed to ensure that the water in the exposed portion of the main would not freeze in the winter.
3. Install the water main beneath Beaver Brook via dredging or trenching. This option was not pursued due to the higher potential for environmental impacts compared to HDD. Additional design and specifications, as well as permitting, governing the in-water work would be necessary to install the pipe below Beaver Brook. Work would likely be completed via barge and would likely affect a 10- to 20-foot-wide water area consistent with the proposed HDD route, including approximately 65 linear feet of brook crossing, as well as potential wetland impacts associated with moving equipment into the brook.
4. Pursuing an alternate route. Tata & Howard identified an alternative routing for the raw water main from the well site to Taylor Street, north along Taylor Street to Porter Road, northwest along Porter Road to Whitcomb Avenue, and northeast along Whitcomb Avenue to the WTP. This option was significantly more expensive than directional drilling beneath Beaver Brook as it included more road work. Pursuing this option would require additional funding from the State Revolving Fund and reconsideration of permitting needs, adding significant delay to the project.

Comment 16: The proposed site of the well, pumping station, and associated generator is in the 100-year floodplain (AE Zone) and must comply with federal, state and local measures related to floodplain development.

Response 16: The proposed site of the well, pumping station and associated generator have been elevated to 100-year flood +3 feet per Executive Orders 14030 and 13690 that apply to SRF funded projects.

Comment 17: The pumping station and associated generator are structures that would pose significant disruption in day-to-day life if their operations were disrupted by a flood, and should be either elevated to standards of ASCE 24, Ch. 2 or dry-floodproofed to ASCE 24, Ch 6. The Single EIR should document compliance with these standards.

Response 17: Yes, it will meet ASCE 24, Ch. 2. Building/structure to be elevated to 100-year flood +3 feet per Executive Orders 14030 and 13690 that apply to SRF funded projects. ASCE 24, Ch2 standard is BFE + 2 feet.

Water Supply

Comment 18: Need authorization from MassDEP to amend its existing Water Management Act Permit to add the new well source.

Response 18: The WMA Permit Amendment Application was submitted to the DEP on February 2, 2023. The Order to Complete (OTC) was received Thursday 11/30/2023. Responses to the OTC questions are being prepared. Following the completion of MassDEP's review of Littleton's responses, MassDEP will issue a draft renewed and amended permit to Littleton for review and then release the draft permit for a 30-day public review comment period.

Comment 19: Project may require an ITA Permit as the basin and community where the proposed water supply source is located is different from the basin and community where the wastewater from the source will be discharged.

Response 19: The project proponent submitted a Request for Determination of Insignificance (RDI) for the Interbasin Transfer Act (ITA) on August 15, 2023. Comments on the RDI were received by Weston & Sampson on October 2, 2023. A Response to Comment letter was submitted by Weston & Sampson on November 29, 2023. Our response letter is attached to this submission in Appendix J.

Comment 20: Need additional information including the maximum capacity of the water supply connection, limiting factor of the transfer, and whether any water supply is being provided to Harvard.

Response 20: Yes, the IMA is for 65,000 gpd. See response to RDI comment letter referenced above for more detail. No supply is being provided to Harvard.

Comment 21: The SEIR certificate can be issued once the RDI decision is made by the WRC, so that scoping may be adjusted as needed to reflect any new permitting requirements for the project. The Proponent is directed to consult with the MEPA Office to determine the procedure for upcoming filings, should the RDI be denied.

Response 21: Noted.

Rare Species

Comment 22: No plan cross-sections are provided nor any details about the depth of drilling. The Single EIR should provide this information.

Response 22: A cross-section that includes depth of drilling has been attached to this submission and can be found in Appendix F.

Comment 23: Provide a contingency plan in the event that a slurry blowout occurs or in which bedrock is hit and directional drilling is determined to be not possible.

Response 23: A Frac-Out plan has been attached to this submission and can be found in Appendix E.

Comment 24: Consult with NHESP to ensure that there are no impacts to surface waters associated with the pumping that may affect Blandings turtle habitat.

Response 24: Consult with NHESP is ongoing. The project team is committed to any recommendations that may come from this consult to prevent habitat impacts. To date, NHESP has provided a decision letter on the water main portion of the project. The review of the Taylor Street Well portion of the project remains ongoing. Conditions have been provided, one of which is a Turtle Protection Plan.

Per the MESA Decision letter located in Appendix I, *"Should the project result in direct Resource Area impacts beyond those already described in the Notice of Intent, the Division retains the right to require full restoration of impacted areas and, at the Division's sole discretion, an 'after-the-fact' Conservation & Management Permit pursuant to 321 CMR 10.23 (CMP). In such a circumstance, the Applicant will be required to meet the performance standard to achieve a long-term Net Benefit. Projects resulting in a Take of state-listed species may only be permitted if they meet the performance standards for a CMP. The proponent must demonstrate that the project has avoided, minimized and mitigated impacts to state-listed species consistent with the following performance standards: (a) the applicant has adequately assessed alternatives to both temporary and permanent impacts to state-listed species; (b) an insignificant portion of the local population would be impacted by the project; and (c) the applicant agrees to carry out a conservation and management plan that provides a long-term Net Benefit to the conservation of the state-listed species impacted."*

Comment 25: Work with NHESP to finalize its plans to avoid, minimize and mitigate impacts to state-listed species sufficient to avoid the necessity of a MESA Conservation and Management Permit (CMP).

Response 25: Coordination with Tim McGuire at NHESP is ongoing to minimize and mitigate impact to avoid the need for a CMP. Please see Response 24.

Massachusetts Historic Commission

Comment 26: A surveyor should locate any historical boundary markers in the project area and the locations of the markers should be indicated on the project plans. If historical boundary markers are located in areas that could be affected by the project, then an avoidance and protection plan should be developed and implemented by the project planners to avoid and protect the markers.

Response 26: Per MHC's comment letter, there are two boundary markers located within the project area; The Harvard-Littleton Boundary Marker (MHC #HRV926) and the Boxborough-Harvard

Boundary Marker (BXB.908). Both of these markers were identified in the field and are included on the revised plans included with this submission. It is not expected that this project will result in impacts to these markers, and thus an avoidance and protection plan has not been developed.

Hazardous Waste

Comment 27: The Single EIR should provide information related to all measures that will be taken to protect the public, including EJ Populations, and the environment from impacts related to contaminated soil or groundwater.

Response 27: A Long-Term Pollution Prevention Plan has been included as part of the Stormwater Report enclosed in this submission. The plan outlines the proper procedures of practices for source control and pollution prevention. The report can be found in Appendix C.

Climate Change

Comment 28: Discuss the resiliency of the well, pump station and associated water mains and other infrastructure to future climate conditions and should address the recommendations from the MA Resilience Design Tool. Specifically, the Single EIR should assess the resiliency of the pump station to future flood conditions and should use the numeric values and methodologies provided by the Tool (e.g., “riverine peak elevation”) as a reference point.

Response 28: Flood resiliency is an important component of the project as construction is proposed within the 100-year flood elevation and the infrastructure is critical to drinking water supply. It is not feasible to locate the infrastructure outside of the 100-year flood elevation due to the location of the proposed well site. The proposed project is funded by the Massachusetts State Revolving Fund (SRF) loan program through MassDEP, which includes the requirement to comply with the Federal Flood Risk Management Standard (FFRMS) Executive Order (EO) 14030, *Climate-Related Financial Risk*, reinstating EO 13690, *Establishing a Federal Flood Risk Management Standard and Process for Further Soliciting and Considering Stakeholder Input*. To comply with this, the finished floor elevation of the well building and the top of foundations for the proposed above ground infrastructure are designed to be at an elevation 3 feet above the 100-year and above the 500-year flood elevations.

The existing ground elevation where the pump station and above ground infrastructure (propane tanks, generator, and transformer) will be installed varies from approximately 226’ to 236’. The 100-year flood elevation is 226.25’ and the 500-year flood elevation is 227.5’ based on Federal Emergency Management Agency (FEMA) mapping in this area for Beaver Brook. The designed finished floor elevation of the pump station is 229.25’. The proposed finished grade around the propane tanks, generator, and transformer is 229.0’ or higher in elevation. The above ground infrastructure will be installed on 6” thick concrete pads set on top of the proposed grade. Therefore, the well building finished floor and the above ground infrastructure will be installed a minimum of 3’ above the 100-year flood elevation and above the 500-year flood elevation in accordance with the FFRMS EOs. If future climate conditions require additional flood resiliency, the critical infrastructure in the well building could be modified to be raised inside the building. The propane tanks, generator, and transformer could be lifted and reset on higher elevated concrete pads. See Response 29 below for water main resiliency.

Comment 29: Discuss the extent to which any underground structures (water mains) will be resilient to future conditions, including whether and how climate change was considered in determining the depth of burial.

Response 29: Polyethylene encasement will protect pipe exterior from potential corrosion due to fluctuating groundwater table. In addition, water mains will be installed with a minimum of 5-feet of cover or insulated where less than 5-feet of cover.

Comment 30: To the extent upgrades to the stormwater management system are proposed, the Single EIR should evaluate the efficacy of the system to future precipitation levels and should use the 24-hour rainfall volumes provided by the Tool as a reference.

Response 30: The efficacy of the stormwater management system was analyzed using the projected 2070 rainfall intensity of 9.2 inches for the 50-year storm event provided by the RMAT tool. The proposed design functions as intended and maintains the required 1-foot of freeboard while still possessing additional capacity. The maximum water surface elevation in the proposed basin reaches 231.87-feet during this event and the top of the basin berm is situated at 233.0-feet.

Comment 31: Discuss the project's compliance with National Flood Insurance Program (NFIP) requirements, including how structures have been designed to meet or exceed established base flood elevations for the site.

Response 31: As noted in Response 17 above, the project will meet ASCE 24, Ch. 2. Building/structure to be elevated to 100-year flood +3 feet per Executive Orders 14030 and 13690 that apply to SRF funded projects. ASCE 24, Ch2 standard is BFE + 2 feet. In addition, as part of the SRF Application, the Town of Littleton agrees to purchase flood insurance.

Comment 32: To the extent the project is not projected to meet recommended climate standards for building elevation or stormwater design, the Single EIR should discuss whether the Proponent has engaged in adaptative flexible strategies and whether the project enables future upgrades or retrofits.

Response 32: The project is projected to meet recommended climate standards for building elevation or stormwater design (See Response 28 above).

Mitigation & Draft Section 61 Findings

Comment 33: The Single EIR should include a separate chapter summarizing all proposed mitigation measures including construction-period measures. This chapter should also include a comprehensive list of all commitments made by the Proponent to avoid, minimize and mitigate the environmental and related public health impacts of the project, and should include a separate section outlining mitigation commitments relative to EJ Populations. The filing should contain clear commitments to implement these mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation. The list of commitments should be provided in a tabular format organized by subject matter (traffic, solid and hazardous waste, stormwater, environmental justice, etc.) and identify the Agency Action or Permit associated with each category of impact. Draft Section 61 Findings should be separately included for each Agency Action to be taken on the project.

Response 33: Please see Table 6 for Section 61 documentation.

Resident Cindy Markowitz

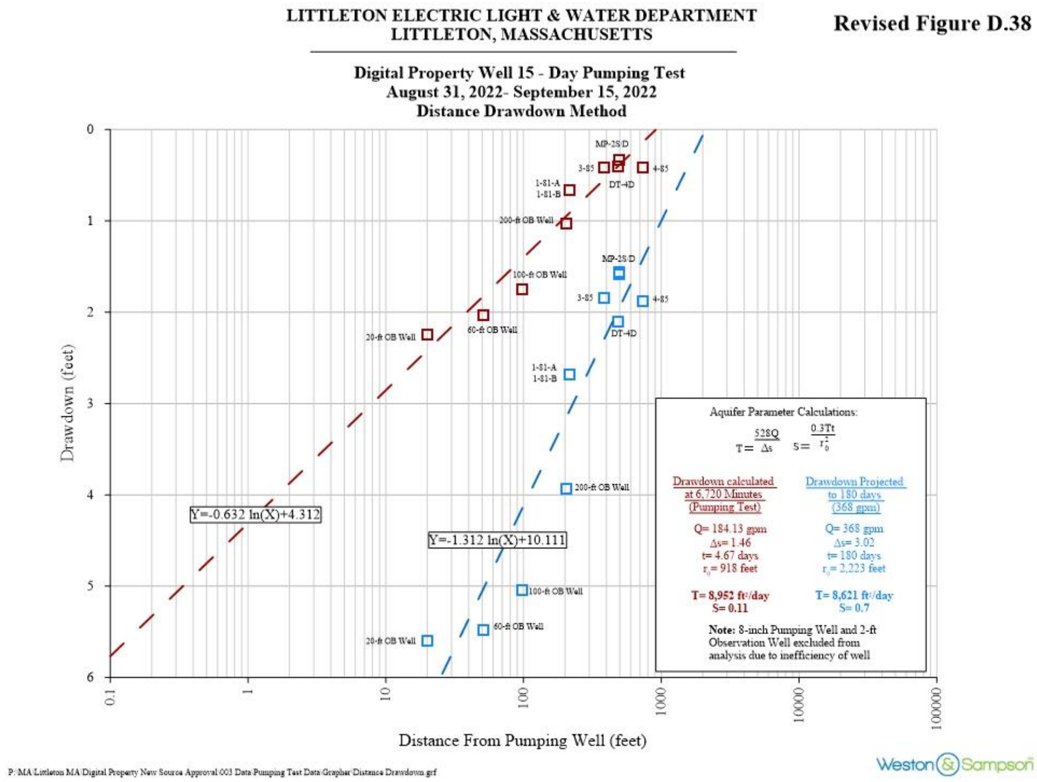
Comment 34: Can the Proponent provide the study(ies) that demonstrated this safe yield and identify what percentage of water is being drawn from aquifer areas located within Boxborough?

Response 34: The study conducted on the proposed Taylor Street Well in Littleton is summarized in the Source Final Report (BRP WS19 Permit Application) submitted to the DEP in January, 2023. Questions regarding that permit application were received by the applicant on May 31, 2023. Those questions were responded to and submitted to the DEP in a Technical Deficiency Response Letter on June 22, 2023.

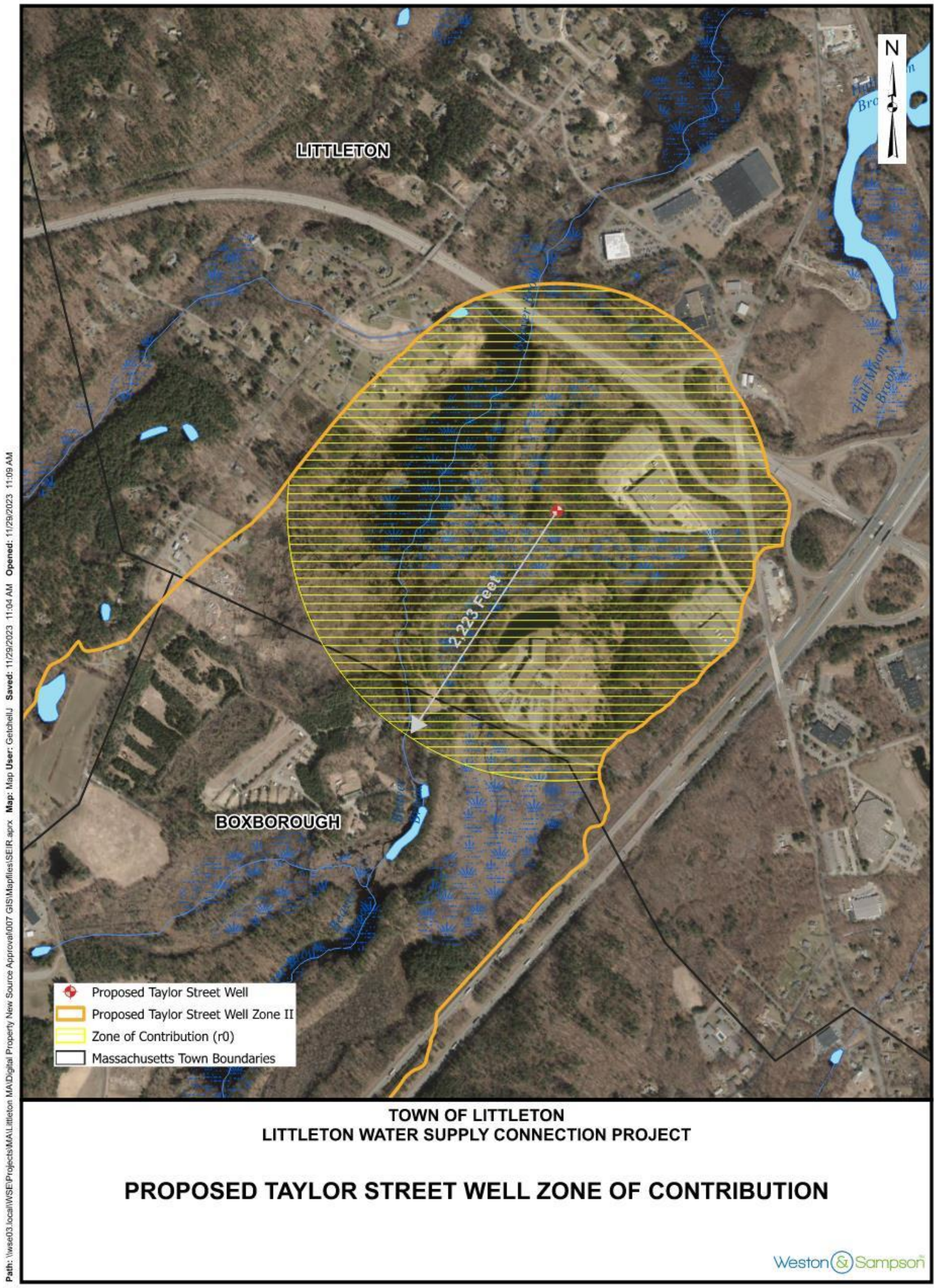
The percentage of water being drawn from aquifer areas located in Boxborough was calculated by:

1) Delineating the Zone of Contribution (ZOC) to the Taylor Street Well at the proposed permitted pumping rate of 368 gallons per minute (gpm) or 529,920 gallons per day (gpd) using a 180-day no recharge condition (same conditions used for the delineation of Zone II Wellhead Protection Area).
2) Calculate the areas within the ZOC that are within Littleton and Boxborough.
3) Use the ZOC areas within each town to determine the % of water coming from Littleton and Boxborough.

Using the data collected from the 15-day pumping test conducted in September 2022, a distance drawdown plot (drawdown vs distance from pumping well) was constructed for the proposed pumping rate of 368 gpm (529,920 gpd). The resultant Zone of Contribution to the Taylor Street Well was defined by using the extrapolated point of zero drawdown (r_0) in the aquifer. The distance drawdown plot constructed is shown below.



That point of zero drawdown (r_0 = 2,223 ft) was used to delineate a zone of contribution to the Taylor Street Well. The figure below shows the ZOC for the Taylor Street Well at a pumping rate of 368 gpd (529,920 gpd) under a 180-day period of no recharge condition (same conditions used for the delineation of Zone II Wellhead Protection Area).



By defining this area, a ratio of aquifer areas within both Littleton and Boxborough can be used to estimate the percentage of the 368 gpm (529,920 gpd) of groundwater that comes from within Littleton and the percentage of groundwater that comes from Boxborough. The total area of the ZOC is 12,172,243 ft^2, with 660,251 ft^2 (5%) in Boxborough and 11,511,922 ft^2 (95%) in Littleton.

The results indicate that 5% of water or 26,496 gpd comes from Boxborough if the well is pumping at its proposed permitted rate of 529,920 gpd.

Comment 35: What is the impact to Boxborough's aquifer as a result of water from the aquifer located in Boxborough being pumped by Littleton Water and only 15% of it being returned to Boxborough?

Response 35: All impact evaluations from the proposed withdrawal are available for review in the previously referenced Source Final Report (BRP WS19 Permit Application) submitted to the DEP in January, 2023 and attached herein. Additional impact questions were addressed in a Technical Deficiency Response Letter submitted to the DEP on June 22, 2023 and attached herein.

From a mass balance perspective, however, there are three changes from existing conditions that contribute to the net gain or loss from the aquifer system(s) in Boxborough, including:

1. Net Loss: the response to the previous comment defined that 26,496 gpd is coming from the surficial aquifer in Boxborough to support the Taylor Street Well withdrawal.
2. Net Gain: The Intermunicipal Agreement (IMA) has agreed to provide 65,000 gpd of treated drinking water from Littleton's newly constructed Whitcomb Ave Iron, Manganese, and PFAS treatment plant into the Town of Boxborough.
3. Net Gain: The 11 public water supply wells that have been impacted by either (or both) chloride and PFAS will abandon their drinking water supply wells if they connect to the Littleton system. This represents a net gain of 65,000 gpd to the Boxborough aquifer system(s).

The resultant gain to the Boxborough aquifer system(s) is 105,504 gpd (65,000 gpd + 65,000 gpd – 26,496 gpd).

Comment 36: Will the withdrawal reduce water levels in area wetlands and waterbodies?

Response 36: The estimated streambed leakage from Beaver Brook and its associated wetlands have been calculated to be approximately 5.62 gallons per minute (0.0126 cfs). All impact evaluations from the proposed withdrawal are available for review in the previously referenced Source Final Report (BRP WS19 Permit Application) submitted to the DEP in January 2023 and attached herein. Additional impact questions were addressed in a Technical Deficiency Response Letter submitted to the DEP on June 22, 2023, and attached herein.

Comment 37: Will the withdrawal change the recharge rate to the aquifer?

Response 37: Groundwater recharge or the rate at which aquifers are replenished can be impacted by the amount of precipitation, soil and vegetation types, geology, and topography. None of these variables will be changed as a result of this project.

Comment 38: Will water recharge back into the same area where the water is being withdrawn?

Response 38: See response to Question 2 and 3 above.

Comment 39: The Proponent should be required to provide the Application to DCR and any response from DCR and share such information with the public before moving ahead with the Project.

Response 39: The project proponent submitted a Request for Determination of Insignificance (RDI) for the Interbasin Transfer Act (ITA) on August 15, 2023. Comments on the RDI were received by Weston & Sampson on October 2, 2023. A Response to Comment letter was submitted by the project proponent on December 1, 2023. The RDI and Response letters are attached herein.

Comment 40: The letter from Natural Heritage and Endangered Species should be received, shared with the public and any recommendations addressed prior to any work being done.

Response 40: The letter from NHESP has been attached to this submission and can be found in Appendix I.

Comment 41: The Proponent should provide the documents that discussed the impact of the original 1.4 million gallons per day withdrawal for the Taylor Street Well on the medium and high stressed basins (Merrimack and Concord River basins).

Response 41: The proposed Taylor Street Well is located in the Stony Brook sub basin (13054). Littleton's Whitcomb Ave Wellfield and Beaver Brook Wellfields are also located in the same sub basin for a combined permitted withdrawal of 1.51 MGD.

The Beaver Brook Wells have been a source of supply for Littleton since they were developed in 1977. In 2018, the Littleton Water Department conducted a pumping test on the Beaver Brook Wells to support an increased permitted withdrawal volume of 450 gpm (0.65 MGD) from this source. Beaver Brook and associated wetlands were monitored throughout the 11-day pumping test and found no influence of pumping in a nearby isolated wetland and in wetlands associated with Beaver Brook. The Source Final Report submitted to the DEP in 2018 is attached for review herein.

The Whitcomb Ave Wellfield was initially constructed as a wellfield of nine wells in 1911. In 1973, the wellfield was replaced with a wellfield of six wells. In 2020, the six wells were replaced with four 24 x 18-inch gravel-packed wells spaced 50 feet apart for a total source withdrawal volume of 600 gpm (0.86 MGD). Although permitting is required to replace the wells, no impact evaluation is required and is therefore not available for review. The wells have been operating in some capacity for over 100 years and have reached a steady state with respect to the zone of influence.

According to Mass DEP's Water Management Act Tool, the two sources discussed above represent 2 of 41 withdrawals in this subbasin. The remaining 39 withdrawals consist of 26 in Boxborough, 3 in Harvard, and 7 in Westford.

Comment 42: Are there any Environmental Justice communities who depend on the aquifer but are not part of the project or being served by the project adversely impacted?

Response 42: All Environmental Justice communities that depend on the aquifer are being served by the project.

Water Resources Commission

Comment 43: The currently effective FEMA FIRMs, dated July 7, 2014, show that the proposed site of the well, pumping station, and associated generator is in an AE zone. Because of its location in the 100-year floodplain, compliance with the requirements of several federal, state and local measures related to floodplain development is required.

Response 43: Please see response to Comment 16 & 17 regarding how this project is in compliance with the requirements of several federal, state and local measures related to floodplain development.

Comment 44: The pumping station and associated generator in Littleton are structures that would pose significant disruption in day-to-day life if their operations were disrupted by a flood, and should be either elevated to standards of ASCE 24, Ch. 2 or dry-floodproofed to ASCE 24, Ch 6.

Response 44: Please see response to Comment 16 & 17 regarding how this project is in compliance with the requirements of several federal, state and local measures related to floodplain development.

Comment 45: This project requires review under the Interbasin Transfer Act (313 CMR 4.00) as it causes a transfer of water across both a municipal boundary and a major river basin boundary.

Response 45: The project proponent submitted a Request for Determination of Insignificance (RDI) for the Interbasin Transfer Act (ITA) on August 15, 2023. Comments on the RDI were received by Weston & Sampson on October 2, 2023. A Response to Comment letter was submitted by the project proponent on December 1, 2023. The RDI and Response letters are attached herein.

Comment 46: WRC staff would like to clarify that the Insignificance review process requires the submittal of a Request for Determination of Insignificance (RDI). While this is a more streamlined and shorter process than for a full approval as laid out in 313 CMR 4.09 and does not require compliance with MEPA before consideration of the request, the request does require review by, and approval by a majority vote of, the WRC. Discussion and voting will occur at a future public meeting of the WRC.

Response 46: See Response 45 regarding the RDI submission.

MassDEP Waterways

Comment 47: The ENF does not address Chapter 91 jurisdiction. Based on a review of the plans, the proposed utility lines will be installed via directional drill beneath the waterways and therefore appear to be exempt from licensing in accordance with 310 CMR 9.05(3)(g)3. However, if the proposed project will involve dredging or other activities within any Chapter 91 jurisdictional area, Chapter 91 authorization will be required.

Response 47: This project is exempt from licensing in accordance with 310 CMR 9.05(3)(g)3. No dredging is proposed as part of this project.

MassDEP Central Regional Office

Comment 48: The Proponent will need authorization from MassDEP to amend its existing Water Management Act Permit to add the new source. The Proponent is not seeking an increase in daily withdrawals beyond its current permitted amounts and therefore does not require a new WMA Permit for the Project. In addition, the Project may require an Interbasin Transfer Act Permit if the basin and community where the proposed water supply source is located are different from the basin and community where the wastewater from the source will be discharged. The Proponent will be filing a Determination of Insignificance Application with the Department of Conservation and Recreation for this transfer.

Response 48: Please see Responses 19, 39, and 45 regarding the WMA Permit and ITA permit submissions for this project.

Comment 49: The Proponent will be required to submit Notices of Intent (NOIs) for proposed work within wetland resource areas and BZ to the Littleton and Boxborough Conservation Commissions (the "Commissions"), and MassDEP.

Response 49: Please see Section F regarding ongoing permitting efforts for this project. Notices of Intent have been submitted to both the Littleton and Boxborough Conservation Commissions.

Comment 50: MassDEP requests that the Proponent provide additional information related to wetland resource area impacts, wetland restoration, and stormwater management, in subsequent MEPA filings and NOIs. The Proponent should include existing and proposed treelines on the site plans; depict the location of BLSF based on surveyed elevations not GIS overlays; and confirm whether the Project qualifies as a Limited Project under 310 CMR 10.53(3)(d) (underground and overhead public utilities).

Response 50: Additional information has been provided throughout the Single EIR submission. Existing and proposed treelines and BLSF based on LiDAR data have been added to the plans attached to this submission. Portions of this project do qualify as a Limited Project as the project constitutes work on underground public utilities.

Comment 51: The Proponent should describe how wetland resource areas within off-road portions of the Project will be restored, the anticipated long-term vegetated characteristics of the resource areas, maintenance requirements, and proposed invasive species control measures.

Response 51: Please see Response 10.

Comment 52: The Proponent should verify that the Project will meet the Massachusetts Stormwater Standards (the "Standards") in future filings submitted to MEPA and the Commissions. MassDEP recommends Project-specific selection, placement, and inspection of erosion and sedimentation controls, to achieve compliance with the Standards and avoid additional impacts to wetland resource area. The Proponent must submit a Monitoring and Clean-up Plan to MassDEP and the Littleton Conservation Commission as part of the Notice of Intent for the Project. This document must provide a comprehensive procedure for preventing and remediating inadvertent returns.

Response 52: A Stormwater Report has been compiled as part of this Single EIR submission. It is included in Appendix C. A Frac-Out Plan and Cleaning-Up Specification have been included in Appendices D and E.

Comment 53: A 401Water Quality Certification will be required for the HDD component of this Project if the volume of material dredged by the drilling equals or exceeds 100 cubic yards.

Response 53: Dredging is not proposed as part of this project and therefore a 401 Water Quality Certification is not required. However, if HDD was determined during construction to not be feasible across the BVW and dredging was determined to be required, the volume of dredged material would be less than 100 cubic yards.

Comment 54: The Proponent is advised that excavating, removing and/or disposing of contaminated soil, pumping of contaminated groundwater, or working in contaminated media must be done under the provisions of M.G.L. c.21E (and potentially c.21C) and OSHA and may require the submittal of a Release Abatement Plan or to be conducted as a Phase IV Remedial Action. Excavating contaminated soil or pumping contaminated groundwater could be considered response actions under the MCP. Conducting response actions without MassDEP approval may result in a penalty. If oil and/or hazardous materials are identified during the implementation of this Project, notification to MassDEP may be required pursuant to M.G.L. c. 21E and the MCP. A Licensed Site Professional (LSP) should be retained to determine if submittals to MassDEP are required to conduct the work or if notification is required. The BWSC may be contacted for guidance if questions arise regarding contaminated material. If dewatering activities are to occur at a site with contaminated groundwater, or in proximity to contaminated groundwater where dewatering can draw in the contamination, a plan must be in place to properly manage the groundwater and ensure site conditions are not exacerbated by these activities.

Response 54. Noted. Should the Contractor, while performing work under the Construction Contract, uncover hazardous materials, as defined in Massachusetts Hazardous Waste Regulations 310 CMR 30.00, they shall immediately notify the Engineering Consultant (Weston & Sampson). The Engineering Consultant has several MA LSP's on staff available to work with the Town and BWSC on conducting response actions. In addition, for non-pre-existing site conditions, a Long-Term Pollution Prevention Plan has been included as part of the Stormwater Report enclosed in this submission. The plan outlines the proper procedures of practices for source control and pollution prevention. The report can be found in Appendix C.

Comment 55: Construction activities for new structures or utilities at a disposal site shall not prevent or impede the implementation of likely assessment or remedial response actions at the site. Construction of structures at a contaminated site may be conducted as a Release Abatement Measure if assessment and remedial activities prescribed at 310 CMR 40.0442(3) are completed within and adjacent to the footprint of the proposed structure prior to or concurrent with the construction activities. Excavation of contaminated soils to construct clean utility corridors should be conducted for all new utility installations.

Response 55: No work under this project is planned at a disposal site. MassDEP's BWSC provided a list of Release Tracking Numbers (RTNs) that were located within and near the Project area. These RTN addresses were reviewed, and all seem to abut the Project area; in many cases the release is located significantly away from the Project area and/or was noted by MassDEP as unlikely to impact the Project. While not anticipated, it is possible that hazardous waste may be encountered on any construction project. Should hazardous waste be encountered during construction, an LSP will be retained and the MassDEP BWSC will be contacted. Please see Comment 54 and Response 54 above.

Division of Fisheries

Comment 56: For the majority of the project, we anticipate requiring the development of state-listed protection plans (e.g., include protective sweeps, barriers and time of year restrictions). For the directional drilling under Beaver Brook, we are hopeful that the directional drilling can be conducted as sufficient depth such that impacts to the habitat are avoided. In such a case, we would expect to allow the work to move forward subject to conditions (321 CMR 10.18); therefore, we recommend that the Proponent work with the Division to finalize its plans to avoid, minimize and mitigate impacts to state-listed species sufficient to avoid the necessity of a MESA Conservation and Management Permit (CMP)

Response 56: Coordination with the Division is ongoing. All documents requested by the Division have been provided and are attached to the Single EIR submission.

APPENDIX A

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September 1, 2023

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
EXPANDED ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME	: Littleton Water Supply Connection
PROJECT MUNICIPALITY	: Littleton, Boxborough, Harvard
PROJECT WATERSHED	: Merrimack and Concord
EEA NUMBER	: 16736
PROJECT PROPONENT	: Littleton Electric Light & Water Department (LEWD)
DATE NOTICED IN MONITOR	: July 26, 2023

Pursuant to the Massachusetts Environmental Policy Act (MEPA; M.G.L. c. 30, ss. 61-62L) and Section 11.06 of the MEPA Regulations (301 CMR 11.00), I have reviewed the Expanded Environmental Notification Form (EENF) and hereby determine that this project **requires** the submission of an Environmental Impact Report (EIR). In accordance with Section 11.06(8) of the MEPA regulations, the Proponent requested that I allow a Single EIR to be submitted in lieu of the usual two-stage Draft and Final EIR process. I hereby grant the request to file a Single EIR, which the Proponent should submit in accordance with the Scope included in this Certificate.

Project Description

As described in the Expanded Environmental Notification Form (EENF), the project includes a new water supply well and pumping station in the Town of Littleton, connection of the new water supply well to a new water treatment plant (WTP) (already under construction) via a raw water transmission main, and construction of a finished water main from the WTP through Harvard bringing a treated water supply to the Town of Boxborough. The new well is expected to supply approximately 0.5 million gallons per day (mgd) to Boxborough and Littleton; while the new well is being constructed to provide redundancy in the Littleton drinking water supply, it will have additional supply necessary to provide treated water to Boxborough. This extension of the water distribution system into Boxborough will connect to 11 public water systems in Boxborough that are contaminated with sodium, chloride, and/or per- and polyfluoroalkyl substances (PFAS). As described in the EENF, water from the proposed new well will be pumped to the WTP via a new raw water main (approximately 0.9 miles) and will provide additional water to the existing customers of Littleton; it is also proposed to provide water to 11 public water systems (PWS) in Boxborough that are impacted by PFAS, sodium, chloride, and/or perchlorate contamination. A new finished water main will extend from the existing Littleton water main in Whitcomb Avenue and continue south for approximately 4.5 miles to the water system at the Codman Hill Condominiums (PWS#2037001) in Boxborough.

The EENF notes that the project is the result of coordination and planning among the two Towns, MassDEP and MassDOT, and is the direct result of the MassDOT Snow and Ice Control Program (EEA #11202) identifying the impacts of sodium and chloride contamination to water supplies from the application and storage of road salt.

Project Site

The new water supply well will be located on a parcel behind an existing commercial facility with Monarch Drive, Taylor Street and Route 2 bordering the parcel to the southeast, east and north, respectively. Access to the site is through the commercial facility at 151 Taylor Street. The well site contains wetland resource areas including Bordering Vegetated Wetland (BVW), Inland Bank, and Bordering Land Subject to Flooding (BLSF). Along the routes of the raw and finished water mains, the following wetland resource areas are present: BVW, Isolated Vegetated Wetland (IVW), Inland Bank, BLSF and Riverfront Area (RA). As shown on the Federal Emergency Management Agency (FEMA) National Flood Hazard Layer, the well site is located within the 100-year floodplain associated with Beaver Brook in a Zone AE with a base flood elevation (BFE) of 226 feet.[1] According to the Massachusetts Natural Heritage and Endangered Species Program (NHESP) Atlas (15th Edition), the site is located within Estimated and Priority Habitat of Rare Species.

The finished water main will be installed within one Environmental Justice (EJ) population characterized by Minority and within one mile of two additional EJ Populations also characterized by Minority.[2] The project is located within five miles of eight EJ Populations characterized by Minority (7) and Income (1). As described below, the EENF identified the "Designated Geographic Area" (DGA) for the project as one mile around EJ Populations, included a review of potential impacts and benefits to the EJ Populations within this DGA, and described public involvement efforts undertaken to date.

[1] All elevations referenced in this Certificate are based on North American Vertical Datum of 1988 (NAVD88) unless otherwise specified.
[2] "Environmental Justice Population" is defined in M.G.L. c. 30, § 62 under four categories: Minority, Income, English Isolation, and a combined category of Minority and Income.

Environmental Impacts and Mitigation

Potential environmental impacts associated with the project include the withdrawal of 529,900 gallons per day (gpd) from the new water source. The project will permanently impact 9,905 square feet (sf) of BLSF, and 6,231 sf of RA associated with installation of the new well, pump station, backup generator, and raw and finished water mains. Temporary impacts are anticipated for 1,420 sf of BVW, 25,015 sf of BLSF, and 73,299 sf of RA. In addition, the project will impact 72,694 sf of Buffer Zone (BZ). The project will result in 1.72 acres of land alteration and will create 0.35 acres of impervious area associated with the new well and pump station.

To minimize impacts to wetland resource areas, the Proponent proposes to use directional drilling within BVW and under Beaver Brook. Compensatory flood storage will be provided to mitigate for impacts to BLSF. The Single EIR should describe additional mitigation measures for impacts to state-listed species and wetlands as required by the Scope.

Jurisdiction and Permitting

The project is undergoing MEPA review because it requires Agency Action and exceeds the ENF thresholds at 301 CMR 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, 301 CMR 11.03(3)(b)(f) alteration of ½ or more acres of any other wetlands (BLSF and RA), and 301 CMR 11.03(4)(b)(3) for construction of one or more new water mains five or miles in length. As discussed further below, the project may potentially require review under the Interbasin Transfer Act (ITA) (regulations at 313 CMR 4.00) as it causes a transfer of water across both a municipal boundary and a major river basin boundary. The need for ITA approval would trigger the mandatory EIR threshold at 301 CMR 11.03(4)(a)2. The project is required to prepare an EIR pursuant to 301 CMR 11.06(7)(b) because it is located within a Designated Geographic Area (or DGA, as defined in 301 CMR 11.02) around one or more EJ Populations. The project requires an Access Permit from the Massachusetts Department of Transportation (MassDOT) and the following approvals from the Massachusetts Department of Environmental Protection (MassDEP):

- Approval to site a source and conduct a pumping test for a source greater than 70 gallons per minute - BRP WS17 (already approved by MassDEP);
- Approval of Pumping Test Report for Source of 70 gallons per minute or greater - BRP WS19 (submitted);
- Approval to Construct a Source of 70 gallons per minute or greater - BRP WS20;
- Distribution Modifications for Systems that serve more than 3,300 people – BRP WS32;
- Water Management Act Permit Amendment – BRP WM02 (submitted).

Because the project is seeking Financial Assistance from the Commonwealth (from State Revolving Fund), MEPA jurisdiction is broad in scope and extends to all aspects of the project that are likely, directly or indirectly, to cause Damage to the Environment as defined in MEPA regulations.

Request for Single EIR

The MEPA regulations at 301 CMR 11.06(8) indicate that a Single EIR may be allowed provided I find that the EENF:

a) describes and analyzes all aspects of the project and all feasible alternatives, regardless of any jurisdictional or other limitation that may apply to the Scope;
b) provides a detailed baseline in relation to which potential environmental impacts and mitigation measures can be assessed; and,
c) demonstrates that the planning and design of the project use all feasible means to avoid potential environmental impacts.

For any Project for which an EIR is required in accordance with 301 CMR 11.06(7)(b), I must also find that the EENF:

d) describes and analyzes all aspects of the Project that may affect Environmental Justice Populations located in whole or in part within the Designated Geographic Area around the Project; describes measures taken to provide meaningful opportunities for public involvement by Environmental Justice Populations prior to filing the expanded ENF, including any changes made to the Project to address concerns raised by or on behalf of Environmental Justice Populations; and provides a detailed baseline in relation to any existing unfair or inequitable Environmental Burden and related public health consequences impacting Environmental Justice Populations in accordance with 301 CMR 11.07(6)(n)1.

Consistent with this request, the EENF was subject to an extended comment period under 301 CMR 11.05(8).

Review of the EENF

The EENF provided a description of existing and proposed conditions, preliminary project plans, a wetland delineation report, and an identification of measures to avoid, minimize and mitigate environmental impacts. Consistent with the MEPA Interim Protocol on Climate Change Adaptation and Resiliency, the EENF contained an output report from the Climate Resilience Design Standards Tool prepared by the Resilient Massachusetts Action Team (RMAT) (the "MA Resilience Design Tool"),[3] together with information on climate resilience strategies to be undertaken by the project.

On August 23, 2023, the Proponent provided supplemental information including response to questions posed by reviewing agencies at the MEPA remote consultation session and an updated ENF form which identified an additional MEPA Threshold (301 CMR 11.03(4)(b)(3): Construction of one or more new water mains five or miles in length) and the need for an MassDOT Access Permit.

[3] https://resilientma.org/rmat_home/designstandards/

Alternatives Analysis

As described in the EENF, the new groundwater source and pumping station are proposed to extend the Proponent's distribution system south into Boxborough to connect 11 public water systems that are contaminated with sodium, chloride, and/or PFAS, and to increase the redundancy for the water system in Littleton. The EENF evaluated the following alternatives to the new source and raw water main: No-Build (Alternative 1), Drill Individual Replacement Wells for each PWS (Alternative 2), Add Treatment to each PWS (Alternative 3), Municipal Interconnection (Alternative 4), and Municipal Interconnections to Littleton Electric and Water Department (LEWD) – Alternative Routes (Alternative 5a (the Preferred Alternative) & 5b).

The EENF indicated that the No-Build Alternative was dismissed as the impacted PWS's would not be provided with an alternative water supply for Boxborough which would leave residents without access to drinking water that meets MassDEP Drinking Water Standards and Guidelines. A redundant water supply for Littleton would also not be available.

Under Alternative 2, 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 would be provided. Alternative 2 does not meet the project goals and was dismissed.

Alternative 3 would consist of updating each PWS to include treatment for the contaminants of concern. This would require significant infrastructure, operations and maintenance, and would produce individual waste streams that may negatively impact the environment. According to the EENF, Reverse Osmosis (RO) would be the only feasible option 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 and for these reasons was dismissed.

Alternative 4 (Preferred Alternative) would connect each PWS 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. As noted above, the Proponent is currently constructing a WTP in Littleton (EEA#16151) with a capacity of 3 mgd to treat water from its groundwater wells for PFAS as well as other contaminants. This project was developed to meet both the needs of Littleton for a redundant water supply source, as well as the needs of Boxborough to supply the contaminated PWSs with a new source. The WTP was designed to treat all of Littleton's wells for PFAS and the new source was anticipated in the design capacity. As stated in the EENF, the Proponent has also been conducting hydrogeological testing and investigation over the past 35 years to locate a new well source to provide additional redundancy within its system. The well site is located at 153 Taylor Street in Littleton. With the addition of this well to the system and the treatment capacity at the new Littleton WTP (EEA#16151) the Proponent will have the additional supply necessary to provide treated water to the PWS in Boxborough, as well as to provide a redundant water supply for Littleton. Therefore, this is the Preferred Alternative.

To connect to the new WTP, two alternative routes, Alternatives 5a and 5b were evaluated. Alternative 5a consists of a 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. Alternative 5b consists of a raw water main (approximately 10,800 linear feet) installed from the well along Taylor Street, Porter Road, and Whitcomb Avenue. The EENF indicates that Alternative 5a 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. Alternative 5a supports the project goal of providing a new water source while minimizing impacts, and is therefore the Preferred Alternative.

The EENF did not evaluate alternative routing options for the finished water main connection to Boxborough. The (Preferred) Construct Water Main in Existing Roadway Alternative would consist 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 (approximately 4.4 miles). The Proponent states that this option limits construction to the pre-existing roadway in order to minimize environmental impacts while achieving the project goal of providing safe drinking water to impacted residents. As discussed further below, comments from MassDEP note that the Proponent does not distinguish between existing impervious areas, existing disturbed areas such as roadway shoulders, and undisturbed forested areas, when quantifying impacts to wetland resource areas and BZ. These comments should be addressed in the Single EIR.

Environmental Justice

As noted above, the project site is located within one EJ population characterized by Minority and within one mile of two additional EJ Populations also characterized by Minority. The project is located within five miles of eight EJ Populations characterized by Minority (7) and Income (1). There are no languages identified as those spoken by 5% of more Limited English Proficiency (LEP) residents within the 1-mile DGA.

Effective January 1, 2022, all new projects in a "DGA" (as defined in 301 CMR 11.02) around EJ Populations are subject to new requirements imposed by the Chapter 8 of the Acts of 2021: *An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy* (the "Climate Roadmap Map") and amended MEPA regulations at 301 CMR 11.00.[1] Two related MEPA protocols—the MEPA Public Involvement Protocol for Environmental Justice Populations (the "MEPA EJ Public Involvement Protocol") and MEPA Interim Protocol for

Analysis of project Impacts on Environmental Justice Populations (the "MEPA Interim Protocol for Analysis of EJ Impacts")—are also in effect for new projects filed on or after January 1, 2022.[4] Under the new regulations and protocols, all projects located in a DGA around one or more EJ Populations must take steps to enhance public involvement opportunities for EJ Populations, and must submit analysis of impacts to such EJ Populations in the form of an EIR.

The EENF described public involvement activities prior to filing. Specifically, the Proponent submitted an EJ Screening Form to a list of Community Based Organizations (CBOs) and tribes/indigenous organizations provided by the MEPA Office (the "EJ Reference List") in May 2023. Notice of the MEPA remote consultation session was also distributed to the EJ Reference List, and a remote meeting was held at 5:30 PM August 10, 2023. In January 2023, the Proponent held a virtual public meeting that included approximately 114 attendees. Notification of the meeting was provided on the Town of Boxborough website, as well as direct contact via an email to property owners along the route of the finished water main and via hard copy mail to residents along the proposed route. Telephone calls were also made to the PWS owners for condominiums and commercial businesses along the proposed water main route. The EENF also indicated that a second public meeting was planned for July 26, 2023. The Single EIR should provide an update on the outcome of this meeting and the number of attendees.

The EENF contained a baseline assessment of any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ Populations in accordance with 301 CMR 11.07(6)(n)1. and the MEPA Interim Protocol for Analysis of EJ Impacts. The baseline assessment included a review of the data provided by the Department of Public Health (DPH) EJ Tool applicable to the DGA regarding "vulnerable health EJ criteria"; this term is defined in the DPH EJ Tool to include any one of four environmentally related health indicators that are measured to be 110% above statewide rates based on a five-year rolling average.[5] According to the EENF, the data surveyed indicate that none of the communities within the project DGA exceeds the criteria for Heart Attack or Childhood Asthma. One census tract within the DGA exceeds the criteria for Low Birth Rate (Census Tract #25017324102[6]). Based on the DPH data, EJ Populations in the DGA show some indication of an existing "unfair or inequitable" burden.

In addition, the EENF indicates that the following sources of potential pollution exist within the identified EJ Populations, based on the mapping layers available in the DPH EJ Tool:

- Major air and waste facilities: 3
- M.G.L. c. 21E sites: 2
- "Tier II" toxics use reporting facilities: 7
- MassDEP sites with AULs: 1

[4] Available at https://www.mass.gov/service-details/eea-policies-and-guidance.
[5] See https://matracking.ehs.state.ma.us/Environmental-Data/ej-vulnerable-health/environmental-justice.html. Four vulnerable health EJ criteria are tracked in the DPH EJ Viewer, of which two (heart attack hospitalization and childhood asthma) are tracked on a municipal level, and two (childhood blood lead, and low birth weight) are tracked on a census tract level.
[6] Census Tract 25017324102 is within one mile of the site in Littleton but does not include an EJ Population.

- MassDEP groundwater discharge permits: 4
- MassDEP public water suppliers:2
- Underground storage tanks: 2

According to the output report from the Climate Resilience Design Standards Tool prepared by the Resilient Massachusetts Action Team (RMAT) (the "MA Resilience Design Tool") included in the EENF, the project site has a high exposure to urban/riverine flooding due to extreme precipitation and extreme heat. EJ Populations within the DGA are likely also exposed to these climate risks. The EENF notes that the project will be a benefit to EJ Populations by consolidating smaller water supply wells into one municipal system, resulting in a water supply that will be more resilient during times when one or more other water sources may be offline potentially due to extreme weather events.

Wetlands and Waterways

As noted above, the project will permanently impact 9,905 sf of BLSF, and 6,231 sf of RA. Temporary alterations will impact 1,420 sf of BVW, 25,015 sf of BLSF, and 73,299 sf of RA. In addition, the project will impact 72,694 sf of BZ. The Littleton and Boxborough Conservation Commissions will review the project's compliance with the Massachusetts Wetlands Protection Act (WPA) and associated regulations.[7] The Proponent states that the majority of the work will occur within existing paved roadways. Comments from MassDEP note that some of the areas where temporary impacts to BLSF, RA, and Buffer Zone will occur are currently comprised of paved roadway; however, as noted above, the EENF does not distinguish between existing impervious areas, existing disturbed areas such as roadway shoulders, and undisturbed forested areas when quantifying impacts to wetland resource areas. This information should be provided in the Single EIR.

As described above, the project will result in the creation of 0.35 acres of new impervious; however, the EENF does not describe the project elements associated with the imperious surfaces. The single EIR should include this information. The EENF states that the project will comply with the MassDEP Stormwater Management Standards (SMS) and that there will be no new stormwater discharges. During construction, construction, related impacts will be mitigated with erosion and sedimentation control measures.

The EENF indicates that direction drilling will be used for pipeline installation in sensitive wetland and riverine environments to minimize construction impacts. This includes drilling under Beaver Brook. As stated in comments from MassDEP Waterways, portions of the project site are within geographic areas that appear to be subject to jurisdiction pursuant to 310 CMR 9.04(1)(e), *"any non-tidal river or stream on which public funds have been expended for stream clearance, channel improvement, or any form of flood control or prevention work, either upstream or downstream within the river basin, except for any portion of any such river or stream which is not normally navigable during any season, by any vessel including canoe, kayak, raft, or rowboat."* Comments further state that the proposed water lines appear to be exempt

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[7] All work in Harvard is proposed outside of wetland resource areas.

from licensing in accordance with 310 CMR 9.05(3)(g)3.; however, if the proposed project will involve dredging or other activities within any Chapter 91 (c.91) jurisdictional area, c.91 authorization will be required. Chapter 91 jurisdiction should be addressed in the Single EIR.

The location of the water supply well requires the construction of a building and concrete pads associated with a generator, propane tank, and electrical transformer within the 100 year floodplain/BLSF. The EENF states that approximately 5.7 cy of compensatory storage will be provided as mitigation for approximately the same amount of fill within BLSF. The Single EIR should address comments from MassDEP and the Water Resources Commission (WRC) regarding additional requirements for work within this wetland resource as outlined in the Scope.

Water Supply

As described in the EENF, the project seeks to add approximately 0.5 mgd (529,900 gpd) of water to the Proponent's system from the new well source. The additional water will provide redundancy to the Town of Littleton system and will also serve a small area in the Town of Boxborough. As noted in comments from MassDEP, of the 529,900 gpd for the project, 65,000 gpd will be directed to an area in Boxborough that includes 11 small PWSs. Ten of the 11 PWSs have exceedances of the drinking water standards for PFAS. Several of these PWSs are also above the drinking water guideline for sodium, chloride, and manganese and must treat for these and other contaminates.

Three of the PWSs in Boxborough are "Community Systems" that serve about 1,000 residents, which is about 20% of the Town of Boxborough. The project requires an amendment to the existing Water Management Act (WMA) Permit from MassDEP in order to add the new water supply source. MassDEP will review the project for its consistency with the WMA regulations (310 CMR 36.00). Comments from MassDEP state that the Proponent is not seeking an increase in daily withdrawals beyond its current permitted amounts and therefore does not require a new WMA Permit for the project.

Comments from the WRC state that the project may potentially require review under the ITA (regulations at 313 CMR 4.00) as it causes a transfer of water across both a municipal boundary and a major river basin boundary. Littleton's sources are in the Merrimack River Basin. Boxborough has land area in the Merrimack and Concord River Basins. The EENF notes that preliminary discussions with agencies indicate the transfer of water from the Merrimack to the Concord River basins will be insignificant and may not require an Interbasin Transfer Act application. Comments from the WRC state that the insignificance review process requires the submittal of a Request for Determination of Insignificance (RDI) and further indicates that a RDI application was submitted by the Proponent on August 15, 2023. Comments from the WRC indicate that compliance with MEPA is not required before consideration of the request can be made. It is my expectation that the RDI request will be decided prior to filing the Single EIR, so that scoping may be adjusted as needed to reflect any new permitting requirements for the project. The Proponent is directed to consult with the MEPA Office to determine the procedure for upcoming filings, should the RDI be denied. I note that the need for ITA approval would trigger the mandatory EIR threshold at 301 CMR 11.03(4)(a)2. and will require further scoping.

Rare Species

As shown in the Massachusetts Natural Heritage Atlas (15th Edition), portions of the project site are mapped as Priority and Estimated Habitat for state-listed species as habitat for the Eastern Meadowlark (*Sturnella magna*), a "Special Concern" species as well as Blanding's Turtle (*Emydoidea blandingii*), species state listed as "Threatened", and Blue-spotted Salamander (*Ambystoma laterale pop. 1*), species state listed as "Special Concern". Comments from NHESP indicate that for the majority of the project, it is anticipated that the Proponent will be required to develop a state listed species protection plan (e.g., including protective sweeps, barriers and time of year restrictions). For the directional drilling under Beaver Brook, comments indicate that NHESP is hopeful that directional drilling can be conducted as sufficient depth such that impacts to habitat are avoided. In such a case, comments from NHESP indicate that the work would be allowed to move forward subject to conditions (321 CMR 10.18). The Proponent should work with NHESP to finalize its plans to avoid, minimize and mitigate impacts to state-listed species sufficient to avoid the necessity of a MESA Conservation and Management Permit (CMP) as detailed in the Scope.

Historical and Archaeological Resources

The EENF stated that the proposed project would not include alteration of any historic structures or archaeological sites as noted as a in 301 CMR 11.03 (10)(b). As such, there are no MEPA triggers concerning Historical and Archaeological Resources. Comments from the Massachusetts Historical Commission (MHC) indicated that review of the Inventory of Historic and Archaeological Assets of the Commonwealth identified two recorded historical properties (the Harvard-Littleton Boundary Marker and the Boxborough-Harvard Boundary Marker) within or close to the project impact area. The Proponent provided supplemental information which noted that the Proponent would capture accurate GPS coordinates in the field for the locations of these markers and that updated plans would be provided in the Single EIR. An avoidance and protection plan will be developed and incorporated into the project specifications if these markers are found to be located within the limit of work.

Hazardous Waste

As noted in comments from MassDEP, the project is located within or near four disposal sites/release notifications that have the potential to impact the project. These sites are identified by the following Release Tracking Numbers (RTNs)[8]:

- RTN 2-0019844 – 151 Taylor Street, Littleton
- RTN 2-0000352 - 59 Porter Road, Littleton
- RTN 2-0000928– Whitcomb Avenue, Boxborough
- RTN 2-0016466 - Harvard Road, Boxborough

Comments further advise the Proponent that excavating, removing and/or disposing of contaminated soil, pumping of contaminated groundwater, or working in contaminated media

[8] Comments from MassDEP identify six additional RTNs that abut or within the project area but are unlikely to impact the project.

must be done under the provisions of M.G.L. c.21E (and, potentially, c.21C) and OSHA and may require the submittal of a Release Abatement Plan or to be conducted as a Phase IV Remedial Action. Excavating contaminated soil or pumping contaminated groundwater could be considered response actions under the MCP. Comments from MassDEP state that conducting response actions without approval may result in a penalty. The Single EIR should provide additional details on how contaminated soils and groundwater will be handled if encountered during construction as outlined in comments from MassDEP and the Scope below.

Climate Change

Adaptation and Resiliency

Effective October 1, 2021, all MEPA projects are required to submit an output report from the MA Resilience Design Tool to assess the climate risks of the project. Based on the output report attached to the EENF, the project has a high exposure rating based on the project's location for extreme precipitation (urban flooding and riverine flooding) and extreme heat. Based on the 50-year useful life identified for the project and the self-assessed criticality of the new assets (pump station, finished water main and raw water main), the MA Resilience Design Tool recommends a planning horizon of 2070 and a return period associated with a 50-year (2% chance) storm event when designing the pump station and finished water main and a 25-year (4% chance) storm event when designing the raw water main for extreme precipitation.

Supplemental information provided by the Proponent indicates that the current ground elevation at the proposed pump station is approximately 225.89 feet; in comparison, the current 100-year flood elevation is 226.25 feet and the 500-year flood elevation for the site is approximately 227.5 feet based on FEMA mapping for Beaver Brook. The Proponent indicates that the finished floor of the proposed pump station will be located at an elevation above the 500-year flood elevation at a minimum and notes that as part of this update the height of the proposed structure has been increased from 10 feet to 13 feet to ensure the ability to meet this requirement. The Single EIR should provide supplement analysis of the project's climate resiliency measures in accordance with the Scope.

Greenhouse Gas Emissions

The project is not subject to review under the May 2010 MEPA Greenhouse Gas (GHG) Emissions Policy and Protocol (GHG Policy) because it does not exceed mandatory EIR thresholds under 301 CMR 11.03, and is not anticipated to generate 2,000 tons per year (tpy) or more of GHG emissions from conditioned spaces as required by the MEPA Interim Protocol for Analysis of EJ Impacts. As noted above, the Proponent is directed to consult with the MEPA Office, if the RDI application submitted to the WRC is denied such that the mandatory EIR threshold related to Interbasin Transfer Act approval may be implicated.

Construction Period

All construction activities should be managed in accordance with applicable MassDEP's regulations regarding Air Pollution Control (310 CMR 7.01, 7.09-7.10), and Solid Waste

Facilities (310 CMR 16.00 and 310 CMR 19.00, including the waste ban provision at 310 CMR 19.017). The project should include measures to reduce construction period impacts (e.g., noise, dust, odor, solid waste management) and emissions of air pollutants from equipment, including anti-idling measures in accordance with the Air Quality regulations (310 CMR 7.11). I encourage the Proponent to require that its contractors use construction equipment with engines manufactured to Tier 4 federal emission standards, or select project contractors that have installed retrofit emissions control devices or vehicles that use alternative fuels to reduce emissions of volatile organic compounds (VOCs), carbon monoxide (CO) and particulate matter (PM) from diesel-powered equipment. Off-road vehicles are required to use ultra-low sulfur diesel fuel (ULSD). If oil and/or hazardous materials are found during construction, the Proponent should notify MassDEP in accordance with the Massachusetts Contingency Plan (310 CMR 40.00). All construction activities should be undertaken in compliance with the conditions of all State and local permits.

SCOPE

General

The Single EIR should follow Section 11.07 of the MEPA regulations for outline and content and provide the information and analyses required in this Scope. It should clearly demonstrate that the Proponent has sought to avoid, minimize and mitigate Damage to the Environment to the maximum extent practicable.

Project Description and Permitting

The Single EIR should include an updated description of the project and identify any changes to the project since the filing of the EENF. The Single EIR should identify, describe, and assess the environmental impacts of any changes in the project that have occurred between the preparation of the EENF and the Single EIR. It should clearly identify and describe State, federal, and local permitting and review requirements associated with the project and provide an update on the status of each of these pending actions. The Single EIR should include a description and analysis of applicable statutory and regulatory standards and requirements, and a discussion of the project's consistency with those standards.

The Single EIR should include detailed site plans for existing and post-development conditions at a legible scale. The plan should clearly identify existing and proposed water mains, impervious areas, and stormwater and utility infrastructure. Updated site plans should include information as requested in the MassDEP comment letter including the existing and proposed treelines and the limits of BLSF based on surveyed elevations.

The information and analyses identified in this Scope should be addressed within the main body of the Single EIR and not in appendices. In general, appendices should only be used to provide raw data, such as drainage calculations, traffic counts, capacity analyses, and energy modeling, that is otherwise adequately summarized with text, tables, and figures within the main body and separated by tabs, or, if provided in electronic format, include links to individual sections. Any references in the Single EIR to materials provided in an appendix should include specific page numbers to facilitate the review.

Environmental Justice

The Single EIR should contain a description of measures the Proponent intends to undertake to promote public involvement by the identified EJ Populations within the DGA during the remainder of the MEPA review process. or a summary thereof, should be distributed to the EJ Reference List, and an updated list should be obtained from the MEPA Office prior to filing the DEIR so as to ensure that organizational contacts are up to date.

The Single EIR should include a separate section on "Environmental Justice," and should discuss whether the project will bring environmental benefits specifically to the identified EJ Populations. The Single EIR should also discuss whether other wells within the Town of Boxborough's Aquifer Protection District, which are not being supplied by the new source, may be affected by the Proponent's new withdrawal. As identified in comments from a Boxborough resident, the new water supply source in Littleton is also within the Boxborough Aquifer Protection District which supplies these additional wells which are within EJ Populations. The Single EIR should discuss the extent of construction period impacts on EJ Populations, including noise, construction time frames, and disruptions to surrounding roadways or other infrastructure. The Single EIR should estimate the number of truck trips that will result from construction activity, and describe the anticipated routes of travel and whether construction vehicles will pass through or by EJ neighborhoods.

Public Health

In accordance with St. 2021, c. 8, s. 57, the Single EIR should include a separate section on "Public Health," and discuss any known or reasonably foreseeable public health consequences that may result from the environmental impacts of the project. Particular focus should be given to any impacts that may materially exacerbate "vulnerable health EJ criteria," in accordance with the MEPA Interim Protocol for Analysis of EJ Impacts. To the extent any required Permits intended to protect public health, the Single EIR should contain specific discussion of such standards and how the project intends to meet or exceed them. The Single EIR should describe the PFAS treatment process, applicable public health standards, and the mechanisms by which the Proponent will continue to monitor water quality and take additional remedial actions to the extent continued contamination is found.

Wetlands and Waterways

As detailed in comments from MassDEP, the Single EIR should distinguish between impacts to existing impervious areas, existing disturbed areas such as roadway shoulders, and undisturbed forested areas, when quantifying impacts to wetland resource areas and Buffer Zone associated with the project. As required above, the Proponent should include existing and proposed treelines on the site plans; depict the location of BLSF based on surveyed elevations not GIS overlays; and confirm whether the project qualifies as a Limited Project under 310 CMR 10.53(3)(d) (underground and overhead public utilities). The Proponent should describe how wetland resource areas within off-road portions of the project will be restored, the anticipated long-term vegetated characteristics of the resource areas, maintenance requirements, and proposed invasive species control measures. The Single EIR should also address MassDEP comments related to the potential for wetland impacts associated with inadvertent returns from drilling lubricant used in horizontal directional drilling (HDD). Comments note that the Proponent must submit a Monitoring and Clean-up Plan to MassDEP and the Littleton Conservation Commission as part of the Notice of Intent for the project. The Proponent will also be required to submit a 401 Water Quality Certification if the volume of material dredged by the drilling equals or exceeds 100 cubic yards. The project will result in the creation of 0.35 acres of new impervious surfaces and the Single EIR should document the project's compliance with the MassDEP SMS.

As stated in comments from MassDEP Waterways, if the proposed project will involve dredging or other activities within any c.91 jurisdictional area, c.91 authorization will be required. The Single EIR should discuss the potential need for dredging if bedrock is hit and directional drilling is determined to be not possible, including possible volumes and the need for c. 91 authorization.

As noted above, the proposed site of the well, pumping station, and associated generator is in the 100-year floodplain (AE Zone) and must comply with federal, state and local measures related to floodplain development. Comments from the WRC note that the pumping station and associated generator are structures that would pose significant disruption in day-to-day life if their operations were disrupted by a flood, and should be either elevated to standards of ASCE 24, Ch. 2 or dry-floodproofed to ASCE 24, Ch 6. The Single EIR should document compliance with these standards. As noted below, the Single EIR should discuss resiliency of these structures to future climate conditions.

Water Supply

Comments from MassDEP indicate that the Proponent will need authorization from MassDEP to amend its existing Water Management Act Permit to add the new well source. In addition, the project may require an ITA Permit as the basin and community where the proposed water supply source is located is different from the basin and community where the wastewater from the source will be discharged. As indicated above, the Proponent has submitted a RDI permit. Comments from the WRC state that the request requires review and approval by a majority of the WRC. Comments from the WRC indicate that the Proponent will need additional information including the maximum capacity of the water supply connection, limiting factor of the transfer, and whether any water supply is being provided to Harvard. As noted, it is my expectation that WRC will decide the RDI request prior to filing the Single EIR, so that scoping may be adjusted as needed to reflect any new permitting requirements for the project. The Proponent is directed to consult with the MEPA Office to determine the procedure for upcoming filings, should the RDI be denied.

Rare Species

Comments from NHESP state that the EENF does not describe any impacts to Land Under Water (LUW) and Bank associated with Beaver Brook which suggests that drilling will occur below the river substrate and outside the Banks; however, no plan cross-sections are provided nor any details about the depth of drilling. The Single EIR should provide this information. Additionally, the Proponent should provide a contingency plan in the event that a slurry blowout occurs or in which bedrock is hit and directional drilling is determined to be not possible. Additional comments[9] received following the end of the comment period, note that the Proponent should consult with NHESP to ensure that there are no impacts to surface waters associated with the pumping that may affect Blandings turtle habitat.

As required above, comments from NHESP state that the Proponent should work NHESP to finalize its plans to avoid, minimize and mitigate impacts to state-listed species sufficient to avoid the necessity of a MESA Conservation and Management Permit (CMP). Should a CMP be required, NHESP will refer the Proponent to the MEPA office for consultation prior to issuance of a CMP. Projects resulting in a Take of state-listed species may only be permitted if they meet the performance standards for a CMP (CMP; 321 CMR 10.23). In order for a project to qualify for a CMP, the applicant must demonstrate that the project has avoided, minimized and mitigated impacts to state-listed species consistent with the following performance standards: (a) adequately assess alternatives to both temporary and permanent impacts to the state-listed species, (b) demonstrate that an insignificant portion of the local population will be impacted, and (c) develop and agree to carry out a conservation and management plan that provides a long-term net benefit to the conservation of the state-listed species.

Historical and Archaeological Resources

As required by comments and agreed to by the Proponent in supplemental information, a survey will be conducted to locate any historical boundary markers in the project limit of work with locations of the markers included on project plans. Comments further note that if the boundary markers are located in areas that could be affected by the project, then an avoidance and protection plan, as outlined in comments from MHC, should be developed and implemented to avoid and protect the markers. The Single EIR should include a summary of the protection measures to be implemented.

Hazardous Waste

As noted in comments from MassDEP, the project is located within or near four disposal sites/release notifications that have the potential to impact the project. These sites are identified by the following Release Tracking Numbers (RTNs)[10]:

- RTN 2-0019844 – 151 Taylor Street, Littleton
- RTN 2-0000352 - 59 Porter Road, Littleton
- RTN 2-0000928– Whitcomb Avenue, Boxborough
- RTN 2-0016466 - Harvard Road, Boxborough

[9] Email from Timothy McGuire, NHESP, to Jennifer Hughes, MEPA, dated August 30, 2023.
[10] Comments from MassDEP identify six additional RTNs that abut or within the project area but are unlikely to impact the project.

If oil and/or hazardous materials are identified during the implementation of this project, notification to MassDEP may be required pursuant to M.G.L. c. 21E and the MCP. A Licensed Site Professional (LSP) should be retained to determine if submittals to MassDEP are required to conduct the work or if notification is required. If dewatering activities are to occur at a site with contaminated groundwater, or in proximity to contaminated groundwater where dewatering can draw in the contamination, the Single EIR should include a plan to properly manage the groundwater and ensure site conditions are not exacerbated by these activities. The Single EIR should provide information related to all measures that will be taken to protect the public, including EJ Populations, and the environment from impacts related to contaminated soil or groundwater.

Climate Change

The Single EIR should discuss the resiliency of the well, pump station and associated water mains and other infrastructure to future climate conditions and should address the recommendations from the MA Resilience Design Tool. Specifically, the Single EIR should assess the resiliency of the pump station to future flood conditions and should use the numeric values and methodologies provided by the Tool (e.g., "riverine peak elevation") as a reference point. The Single EIR should discuss the extent to which any underground structures (water mains) will be resilient to future conditions, including whether and how climate change was considered in determining the depth of burial. To the extent upgrades to the stormwater management system are proposed, the Single EIR should evaluate the efficacy of the system to future precipitation levels and should use the 24-hour rainfall volumes provided by the Tool as a reference.

The Single EIR should discuss the project's compliance with National Flood Insurance Program (NFIP) requirements, including how structures have been designed to meet or exceed established base flood elevations for the site. To the extent the project is not projected to meet recommended climate standards for building elevation or stormwater design, the Single EIR should discuss whether the Proponent has engaged in adaptative flexible strategies and whether the project enables future upgrades or retrofits.

Mitigation and Draft Section 61 Findings

The Single EIR should include a separate chapter summarizing all proposed mitigation measures including construction-period measures. This chapter should also include a comprehensive list of all commitments made by the Proponent to avoid, minimize and mitigate the environmental and related public health impacts of the project, and should include a separate section outlining mitigation commitments relative to EJ Populations. The filing should contain clear commitments to implement these mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation. The list of commitments should be provided in a tabular format organized by subject matter (traffic, solid and hazardous waste, stormwater, environmental justice, etc.) and identify the Agency Action or Permit associated with each category of impact. Draft Section 61 Findings should be separately included for each Agency Action to be taken on the project.

Response to Comments

The Single EIR should contain a copy of this Certificate and a copy of each comment letter received. To ensure that the issues raised by commenters are addressed, the Single EIR should include direct responses to comments to the extent that they are within MEPA jurisdiction. This directive is not intended, and shall not be construed, to enlarge the scope of the Single EIR beyond what has been expressly identified in this certificate.

Circulation

The Proponent should circulate the Single EIR to each Person or Agency who previously commented on the EENF, each Agency from which the project will seek Permits, Land Transfers or Financial Assistance, and to any other Agency or Person identified in the Scope. Pursuant to 301 CMR 11.16(5), the Proponent may circulate copies electronically. However, the Proponent must make a reasonable number of hard copies available to accommodate those without convenient access to a computer and distribute these upon request on a first-come, first-served basis. A copy of the Single EIR should be made available for review in the Littleton, Harvard, and Boxborough Public Libraries.

September 1, 2023
Date

Rebecca L. Tepper

Comments received:

08/03/2023	Massachusetts Historical Commission (MHC)
08/24/2023	Massachusetts Water Resources Commission (WRC)
08/24/2023	Division of Fisheries and Wildlife (DFW) Natural Heritage and Endangered Species Program (NHESP)
08/24/2023	C. Markowitz
08/25/2023	Massachusetts Department of Environmental Protection (MassDEP)

RLT/JAH/jah

The Commonwealth of Massachusetts

August 3, 2023

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

Corey Godfrey
Water & Sewer Superintendent
Littleton Electric Light & Water Department
PO Box 2406
Littleton, MA 01460

RE: Littleton Water Supply Connection Project, Littleton, Boxborough, & Harvard, MA.
EEA #16736. MHC #RC.73475.

Dear Mr. Godfrey:

Staff of the Massachusetts Historical Commission (MHC), office of the State Historic Preservation Office, have reviewed the Environmental Notification Form (ENF) for the project referenced above and the MHC's files.

The ENF indicates that the project is proposed for funding from the US Environmental Protection Agency's (EPA) State Revolving Fund administered by the Massachusetts Department of Environmental Protection (DEP), and requires DEP permits. The project is proposed chiefly within existing streets and other previously impacted areas.

Review of the MHC's Inventory of Historic and Archaeological Assets of the Commonwealth identified two recorded historical properties within or close to the project impact area.

The information in the MHC's files indicates that the Harvard-Littleton Boundary Marker (MHC #HRV.926) is located on the west side of Whitcomb Avenue and Littleton County Road. The marker may be located approximately between STA 29+00 and STA 30+00 (ENF Appendix E, Plans, Sheet C106).

The information in the MHC's files indicates that the Boxborough-Harvard Boundary Marker (BXB.908) is located on the east side of Littleton County Road. The marker may be located in the approximate vicinity of STA 50+00 (Plans, Sheet C107).

More information pertaining to the two historical properties is available on the MHC's MACRIS (https://mhc-macris.net) and MACRIS Maps (https://maps.mhc-macris.net) programs.

The information in the MHC's files indicates that the boundary markers date to the early 20th century and were placed to resolve long-running disputes about the town boundaries that were decided by the Commonwealth. The markers appear to the MHC's staff to be historically significant because of their association with locally important events.

It is important to be aware that the MHC inventory information about HRV.926 (included on the inventory form for HRV.923) indicates that the historical properties inventory effort that identified historical boundary markers in Harvard was not comprehensive: "only markers on the town's public ways [in Harvard] have been examined, *and no effort was made to locate every example.*" It is possible that other boundary markers may be present in the project area. The three towns should have records of the

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www.state.ma.us/sec/mhc

locations of town boundary markers (see Mass. Gen. Laws, c. 42 for state laws relating to town boundary markers).

The MHC requests that a surveyor should locate any historical boundary markers in the project area and the locations of the markers should be indicated on the project plans.

If historical boundary markers are located in areas that could be affected by the project, then an avoidance and protection plan should be developed and implemented by the project planners to avoid and protect the markers.

The plan should include high-visibility temporary fencing around the location of the historic boundary markers, other physical barriers as necessary to prevent contact with the markers, and conditions in contract and construction documents that directs construction contractors and their employees to avoid and protect the markers during the project.

Please provide the MHC and the Boxborough, Harvard, and Littleton Historical Commissions with a copy of the proposed avoidance and protection plan for the historical markers.

The MHC requests that the Boxborough, Harvard, and Littleton Historical Commissions review and comment on the avoidance and protection plan and provide a copy of their written comments to the MHC.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800), M.G.L. c. 9, ss. 26-27C (950 CMR 71), and MEPA (301 CMR 11). If you have any questions, please contact me.

Sincerely,

Edward L. Bell
Deputy State Historic Preservation Officer
Massachusetts Historical Commission

xc:
Secretary Rebecca Tepper, EEA Attn. Jennifer Hughes
Maria Pinaud, DEP-SRF program
Boxborough Historical Commission
Harvard Historical Commission
Littleton Historical Commission
Alexandra Gaspar, Weston & Sampson Engineers, Inc.

August 24, 2023

MEPA Office
Executive Office of Energy and Environmental Affairs
Attn: Jennifer Hughes
100 Cambridge Street, Suite 900
Boston, MA 02114
Email Jennifer.Hughes@mass.gov

Subject: Littleton Water Supply Connection EEA #16736

Dear Ms. Hughes:

I am a resident of Boxborough and a member of the Boxborough Planning Board. I would like to provide the following comments and questions (in bold) to MEPA to consider during your review of the Littleton Water Supply Connection (EEA # 16736).

1) Of the MEPA Triggers, one that is most concerning is 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.

The new water supply well at 153 Taylor Road is approved to draw approximately 0 .5 million gallons per day (529,900 gpd) The new water supply well at 153 Taylor Road is less than ½ mile from the Boxborough Town Line. Presumably DEP performed a study prior to granting LELWD its well permit to determine that there was sufficient well yield at this location without impacting the surrounding communities.

Can the Proponent provide the study(ies) that demonstrated this safe yield and identify what percentage of water is being drawn from aquifer areas located within Boxborough?

2) As stated in the EENF, water flows are southeast to northwest. This is confirmed from mapping from the Town of Boxborough's Aquifer Protection District map. Boxborough is southeast of the well site. All of Boxborough's water use comes from its aquifers and the aquifer that LELWD's well is drawing from at Taylor Road is the largest of Boxborough's aquifer. Other residents and businesses that are not being supplied by the proposed new water line will continue to draw their water from this aquifer.

What is the impact to Boxborough's aquifer as a result of water from the aquifer located in Boxborough being pumped by Littleton Water and only 15% of it being returned to Boxborough?

Will the withdrawal reduce water levels in area wetlands and waterbodies?

Will the withdrawal change the recharge rate to the aquifer?

Will water recharge back into the same area where the water is being withdrawn?

3) From the EENF Water Supply Section, "The town of Littleton is currently preparing a Determination of Insignificance Application to be submitted to the Massachusetts Department of Conservation and Recreation (DCR) for this project. Preliminary discussions with DCR indicate the transfer of water from the Merrimack to the Concord River basins will be insignificant and not require an Interbasin Transfer (IBT) application."

The Proponent should be required to provide the Application to DCR and any response from DCR and share such information with the public before moving ahead with the Project.

The letter from Natural Heritage and Endangered Species should be received, shared with the public and any recommendations addressed prior to any work being done.

4) The EENF notes that the project is within a medium or high stress basin as established by the Massachusetts Water Resources Commission. Both the Concord and the Merrimack River Basins are listed as stressed[1]. According to EPA's water story mapping tool[2] for the Merrimack River, "The Merrimack was also listed as the fourth most threatened watershed in the country based on changes in water quality, due to potential conversion of private forested lands to housing."

The Proponent should provide the documents that discussed the impact of the original 1.4 million gallons per day withdrawal for the Taylor Street Well on the medium and high stressed basins (Merrimack and Concord River basins)

5) The Environmental Justice Section of the EENF identified outreach to the community to date.

Are there any Environmental Justice communities who depend on the aquifer but are not part of the project or being served by the project adversely impacted?

Thank you for your consideration.

Sincerely,

Cindy Markowitz

[1] Massachusetts Water Resources Commission, Stressed Basins in Massachusetts. December 13, 2001.

[2] From EPA Water Story Mapping Tool
https://epa.maps.arcgis.com/apps/MapSeries/index.html?appid=922e1c016c6e42b199f902d1cfb84bbd

THE COMMONWEALTH OF MASSACHUSETTS

WATER RESOURCES COMMISSION

100 CAMBRIDGE STREET, BOSTON MA 02114

August 24, 2023

Rebecca L. Tepper, Secretary
Executive Office of Energy and Environmental Affairs
Attention: Jennifer Hughes, MEPA Office
EOEEA #16736
100 Cambridge Street
Boston, MA 02114

Dear Secretary Tepper:

The Water Resources Commission (WRC) staff has reviewed the Expanded Environmental Notification Form (EENF) for the Littleton Electric Light & Water Department's (LELWD's) proposed Water Supply Connection. The proposed project includes a new water supply well and pumping station in Littleton for the LELWD, connection of the new water supply well to a water treatment plant in Littleton via a raw water transmission main, and construction of a finished water main from the LELWD system through Harvard to bring a treated water supply to the Town of Boxborough. As proposed, the Project involves activities within a 100-year floodplain as delineated on the current effective Flood Insurance Rate Maps (FIRM) for Middlesex County, dated July 7, 2014, and causes a transfer of water across both a municipal boundary and a major river basin boundary. In its role as the state coordinating agency for the National Flood Insurance Program, and as the entity entrusted with reviewing and approving interbasin transfers I submit the following comments on behalf of the WRC.

<u>National Flood Insurance Program (NFIP)</u>

WRC's Flood Hazard Management Program (FHMP), under agreement with the Federal Emergency Management Agency (FEMA), is the state coordinating agency for the NFIP. As such, the FHMP provides technical assistance to communities that participate in the NFIP related directly to the program and also related to floodplain management in general. Communities that participate in the NFIP are required by FEMA, as a condition of their participation, to regulate development within the 100-year floodplain in a manner that meets or exceeds the minimum standards established by FEMA, located at 44 CFR 60.3. Participating communities such as Littleton are required to adopt the NFIP requirements through locally enforceable measures. In Massachusetts, many of the requirements contained in 44 CFR 60.3 are enforced through existing state regulations such as the State Building Code (780 CMR) and Wetlands Protection Act regulations (310 CMR 10.00). Communities typically adopt the remainder of the requirements as part of a zoning ordinance or other locally enforceable measure. Littleton has a zoning ordinance that includes a Floodplain District section which has been accepted by FEMA as meeting their requirements under the NFIP.

In our role as NFIP coordinator, the FHMP offers comments on the proposed Project's relationship to many of the above regulations and requirements. The FHMP does not administer any of these requirements and therefore does not provide official determinations as to compliance with them; rather, our comments are provided as an overview of the requirements and the documentation that the FHMP believes may be necessary to demonstrate compliance with these requirements.

The currently effective FEMA FIRMs, dated July 7, 2014, show that the proposed site of the well, pumping station, and associated generator is in an AE zone. Because of its location in the 100-year floodplain, compliance with the requirements of several federal, state and local measures related to floodplain development is required.

The pumping station and associated generator in Littleton are structures that would pose significant disruption in day-to-day life if their operations were disrupted by a flood, and should be either elevated to standards of ASCE 24, Ch. 2 or dry-floodproofed to ASCE 24, Ch 6. Also, the proponent should be aware that climate change can bring further impacts to the proposed development. Changes to the state's precipitation regime are ongoing with further predicted changes to the amount and timing of rainfall. This may increase the potential for flooding to properties located in the 100-year floodplain.

Interbasin Transfer Act (ITA)

This project requires review under the Interbasin Transfer Act (313 CMR 4.00) as it causes a transfer of water across both a municipal boundary and a major river basin boundary. Littleton's sources are in the Merrimack River Basin. Boxborough has land area in the Merrimack and Concord River Basins.

The Water Supply Section of the EENF states the following: "The town of Littleton is currently preparing a Determination of Insignificance Application to be submitted to the Massachusetts Department of Conservation and Recreation (DCR) for this project. Preliminary discussions with DCR indicate the transfer of water from the Merrimack to the Concord River basins will be insignificant and not require an Interbasin Transfer (IBT) application.". WRC staff would like to clarify that the Insignificance review process requires the submittal of a Request for Determination of Insignificance (RDI). While this is a more streamlined and shorter process than for a full approval as laid out in 313 CMR 4.09 and does not require compliance with MEPA before consideration of the request, the request does require review by, and approval by a majority vote of, the WRC. Discussion and voting will occur at a future public meeting of the WRC.

WRC staff received the RDI application on August 15, 2023. LELWD's consultants have previously been in touch with WRC staff to discuss this project and the RDI. WRC staff will reach out directly to the consultants to request additional information necessary for the review of the project, such as the maximum capacity of the water supply connection, limiting factor of the transfer, and whether any water supply is being provided to Harvard.

If you have any questions regarding the NFIP-related comments or to request additional information, please contact Nadia Madden at (857) 261-1813 or at nadia.madden@mass.gov. For questions about the ITA process, please contact Vanessa Curran at vanessa.curran@mass.gov.

Thank you for the opportunity to comment on the EENF.

Vandana Rao, PhD
Executive Director, MA Water Resources Commission

cc: Water Resources Commission
Anne Carroll, DCR
Vanessa Curran, DCR
Erin Graham, DCR
Kevin MacKinnon, Weston and Sampson
Jill Getchell, Weston and Sampson
Nadia Madden, DCR
Eric Carlson, DCR
Joy Duperault, DCR
Ed Mullen, Littleton Building Commissioner

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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Maura T. Healey
Governor

Kimberley Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

Memorandum

To: Jennifer Hughes, Environmental Analyst, MEPA

From: Christine Walsh, Waterways Regulation Program, MassDEP

cc: Daniel J. Padien, Program Chief, Waterways Regulation Program, MassDEP

Re: Littleton Water Supply Connection / EEA #16736 – EENF
Comments from the Chapter 91 Waterways Regulation Program

Date: August 25, 2023

The Department of Environmental Protection Waterways Regulation Program (the "Department") has reviewed the above referenced Expanded Environmental Notification Form (EENF) #16736 submitted by Weston & Sampson on behalf of the Littleton Electric Light & Water Department (the "Proponent") for Littleton Water Supply Connection (the "Project"). The Proponent proposes connecting a new groundwater source and pumping station to the Whitcomb Avenue Water Treatment Plant through a proposed raw water transmission main and extending Littleton Electric Light & Water Department's finished water distribution system southward into Boxborough.

Chapter 91 Jurisdiction

Portions of the Project Site are within geographic areas that appear to be subject to jurisdiction pursuant to 310 CMR 9.04(1)(e), "*any non-tidal river or stream on which public funds have been expended for stream clearance, channel improvement, or any form of flood control or prevention work, either upstream or downstream within the river basin, except for any portion of any such river or stream which is not normally navigable during any season, by any vessel including canoe, kayak, raft, or rowboat.*"

Regulatory Review

The ENF does not address Chapter 91 jurisdiction. Based on a review of the plans, the proposed utility lines will be installed via directional drill beneath the waterways and therefore appear to be exempt from licensing in accordance with 310 CMR 9.05(3)(g)3. However, if the proposed project will involve dredging or other activities within any Chapter 91 jurisdictional area, Chapter 91 authorization will be required.

If there are any questions regarding the Department's comments, please contact Christine Walsh at christine.walsh@mass.gov.

August 25, 2023

Secretary Rebecca Tepper
Executive Office of Environmental Affairs
100 Cambridge Street, 9th Floor
Boston, MA 02114

Attention: MEPA Unit – Jennifer Hughes

Re: Environmental Notification Form (ENF)
Littleton Water Supply Connection
Littleton, Boxborough, Harvard
EEA #16736

Dear Secretary Tepper,

The Massachusetts Department of Environmental Protection's ("MassDEP") Central Regional Office has reviewed the ENF for the Littleton Water Supply Connection Project (the "Project"). Littleton Electric Light & Water Department (LELWD, the "Proponent") is proposing to connect a new groundwater source (Littleton Taylor Street Well, also known as the Digital Property Well) and pumping station to the Whitcomb Avenue Water Treatment Plant through a proposed raw water transmission main and to extend the LELWD water distribution system southward into Boxborough to connect 11 public water systems that are contaminated with sodium, chloride, and/or PFAS.

The Project is under MEPA review because it meets or exceeds the following review thresholds:

- 301 CMR 11.03 (3)(b)(f) - alteration of ½ or more acres of any other wetlands;
- 301 CMR 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;
- 301 CMR 11.03(4)(b)(3) - Construction of one or more New water mains five or more miles in length.

The Project requires the following State Agency Permits:

- MassDEP - Superseding Order of Conditions (if local Order of Conditions is appealed);
- MassDEP - Approval to site a source and conduct a pumping test for a source greater than 70 gallons per minute - BRP WS17 (already approved by MassDEP);
- MassDEP - Approval of Pumping Test Report for Source of 70 gallons per minute or greater - BRP WS19 (submitted);
- MassDEP - Approval to Construct a Source of 70 gallons per minute or greater - BRP WS20;
- MassDEP - Distribution Modifications for Systems that serve more than 3,300 people – BRP WS32;
- MassDEP – Water Management Act Permit Amendment – BRP WM02 (submitted);
- Massachusetts Department of Transportation – Access Permit.

One or more Environmental Justice Populations are located within the Designated Geographic Area around the Project. The Proponent received a loan from the 2023 State Revolving Fund Drinking Water Program (DWSRF 12149) so MEPA jurisdiction is broad. The Proponent is requesting permission to submit a Single Environmental Impact Report. MassDEP offers the following comments:

Water Supply

The Project consists of a new drinking water well to be located at 153 Taylor Street in Littleton, a transmission water main from this well to a treatment facility currently under construction at 15 Whitcomb Avenue in Littleton (EEA #16151), and a water main extension from the LELWD water system into Boxborough. The Project seeks to add 529,900 gallons per day (gpd) of water to the LELWD system from the new source. The additional water will provide redundancy to the LELWD system and will also serve a small area in the Town of Boxborough.

Of the 529,900 gpd for the Project, 65,000 gpd will be directed to an area in Boxborough that includes 11 small public water systems (PWSs). Ten of the 11 PWSs have exceedances of the drinking water standards for per- and poly-fluoroalkyl substances (PFAS). Several of these PWS are also above the drinking water guideline for sodium, chloride, and manganese and must treat for these and other contaminates. Three of the PWSs are Community Systems that serve about 1,000 residents, which is about 20% of Boxborough's population. The eight other systems are Non-Community commercial systems. The Town of Boxborough is designated as an Environmental Justice Population. Extension of the water line from Littleton to this area will avoid the need for the 11 small PWSs in this area to install individual treatment systems to comply with MassDEP's drinking water standards. Until the Project is completed, the PWSs are responsible for providing bottled water to their consumers.

The raw water main from the new well will extend cross country along Route 2, pass under Route 2 to get to Whitcomb Avenue, then extend north on Whitcomb Avenue to the treatment facility. After treatment, the new water main will connect to the existing water distribution system at Whitcomb Avenue and Nancy's Way, then continue south approximately 4.5 miles to 276 Codman Hill Road (Codman Hill Condominiums - PWS #2037001) in

Boxborough. The water main will extend south on Whitcomb Avenue to Beaver Brook Road, Swanson Road, and Codman Hill Road.

The proposed water line to be extended into Boxborough is a 12-inch water main, which will connect to an existing 8-inch water main. The new water main's capacity will be limited by the smaller water mains serving this new main. The permit for the new water main has not been submitted to MassDEP. A more detailed engineering review will occur upon submittal of this permit. In particular, MassDEP may require information concerning water-age questions that could arise due to the length of the water main.

The Proponent will need authorization from MassDEP to amend its existing Water Management Act Permit to add the new source. The Proponent is not seeking an increase in daily withdrawals beyond its current permitted amounts and therefore does not require a new WMA Permit for the Project. In addition, the Project may require an Interbasin Transfer Act Permit if the basin and community where the proposed water supply source is located are different from the basin and community where the wastewater from the source will be discharged. The Proponent will be filing a Determination of Insignificance Application with the Department of Conservation and Recreation for this transfer.

Wetlands

The ENF states that the Project will permanently impact 9,905 square feet (sf) of Bordering Land Subject to Flooding (BLSF), and 6,231 sf of Riverfront Area (RA). Temporary alterations will impact 1,420 sf of Bordering Vegetated Wetlands (BVW), 25,015 sf of BLSF, and 73,299 sf of RA. In addition, the Project will impact 72,694 sf of Buffer Zone (BZ). The Proponent states that the majority of the work will occur within existing paved roadway. Some of the areas where temporary impacts to BLSF, RA, and Buffer Zone will occur are currently comprised of paved roadway, however the ENF does not distinguish between existing impervious areas, existing disturbed areas such as roadway shoulders, and undisturbed forested areas, when quantifying impacts to wetland resource areas and Buffer Zone.

The Proponent will be required to submit Notices of Intent (NOIs) for proposed work within wetland resource areas and BZ to the Littleton and Boxborough Conservation Commissions (the "Commissions"), and MassDEP. All work in Harvard is outside of wetland resource areas and Buffer Zone, therefore the submittal of an NOI or Request for Determination of Applicability to the Harvard Conservation Commission will not be required for the work proposed along Littleton County Road. Upon receipt of the NOI filings, MassDEP may provide Project-specific comments to the Commissions and the Proponent as part of the File Number Issuance Notification Letters. Portions of the Project are located within Natural Heritage and Endangered Species Program (NHESP) Priority Habitat of Rare Species and Estimated Habitat of Rare Wildlife. A NHESP review of the Project is ongoing, and the Commissions should wait to receive a response from NHESP before closing their respective public hearings and issuing Order of Conditions.

MassDEP requests that the Proponent provide additional information related to wetland resource area impacts, wetland restoration, and stormwater management, in subsequent MEPA filings and NOIs. The Proponent should include existing and proposed treelines on the site plans; depict the location of BLSF based on surveyed elevations not GIS overlays; and confirm whether the Project qualifies as a Limited Project under 310 CMR 10.53(3)(d) (underground and overhead public utilities). The Proponent should describe how wetland resource areas within off-road portions of the Project will be restored, the anticipated long-term vegetated characteristics of the resource areas, maintenance requirements, and proposed invasive species control measures.

The Project will result in the creation of 0.35 acres of new impervious surfaces. The Proponent should verify that the Project will meet the Massachusetts Stormwater Standards (the "Standards") in future filings submitted to MEPA and the Commissions. MassDEP recommends Project-specific selection, placement, and inspection of erosion and sedimentation controls, to achieve compliance with the Standards and avoid additional impacts to wetland resource area.

The Project proposes horizontal directional drilling (HDD) beneath BVW. Inadvertent returns of drilling lubricant is a potential source of wetland impacts for projects that utilize HDD. The Proponent must submit a Monitoring and Clean-up Plan to MassDEP and the Littleton Conservation Commission as part of the Notice of Intent for the Project. This document must provide a comprehensive procedure for preventing and remediating inadvertent returns. A 401Water Quality Certification will be required for the HDD component of this Project if the volume of material dredged by the drilling equals or exceeds 100 cubic yards.

Bureau of Waste Site Cleanup (BWSC)

Based upon the information provided, BWSC searched its databases for disposal sites and release notifications located within and near the Project area. The following Release Tracking Numbers (RTN) associated with releases on or near the Project area were found:

<u>RTN 2-0019844</u> – 151 Taylor Street, Littleton, MA – Permanent Solution with no Conditions. This RTN is a historic release of diesel fuel from a 4,000-gallon aboveground storage tank (AST) at a commercial facility. The released diesel fuel impacted soil and groundwater at the subject site. The release was remediated by excavation and off-site recycling of petroleum-impacted soils. Post-excavation soil samples documented that residual soil concentrations were below MCP Method 1 S-1 soil standards, and monitoring of groundwater following soil excavation activities indicated that concentrations in groundwater were also below MCP Method 1 GW-1, GW-2 and GW-3 Groundwater Standards. A Permanent Solution with no Conditions was submitted to the Department in April 2017. This disposal site(s) abuts or is on the Project site and may have the potential to impact the Project.

<u>RTN 2-0000352</u> - 59 Porter Road, Littleton, MA – Permanent Solution with no Conditions. This RTN was issued due to a release of chlorinated volatile organic compounds (CVOCs) and metals to groundwater at a commercial facility historically utilized for printed circuit board and electronics manufacturing. The source of groundwater contamination was industrial wastewater discharged to the Site's septic system and leach field. Soil at the Site was not significantly impacted. In 1981, approximately 150 cubic feet of sludge was removed from the leach pit and in 1983, the building's process water floor drains and the pipe which discharged directly to the

leach field were sealed. Thus, the source of contamination was eliminated. Concentrations of the site's contaminants of concern (CVOCs and metals associated with plating) decreased and no longer exceeded their respective, applicable MCP Method 1 or Method 2 Groundwater Standards, and in September 2016, a Permanent Solution with no Conditions was submitted to the Department. This disposal site(s) abuts or is on the Project site and may have the potential to impact the Project.

RTN 2-0000928– Whitcomb Avenue, Boxborough, MA – Phase II Comprehensive Site Assessment. This RTN pertains to a historic release of chlorinated VOCs at a commercial/industrial property located on Whitcomb Avenue in Boxborough. At the time of discovery of the release, the site was owned and operated by a company that built and tested radar antennae and communications equipment. Some of the oil and/or hazardous material used/stored on-site included oils, cutting fluids, tetrachloroethene (PCE) paints, paint thinner, primer and epoxy resins stored and used in the painting areas of the building. Chlorinated VOCs, mainly trichloroethene (TCE), were reported in groundwater samples from one monitoring well in the southeast portion of the Site, and low levels of VOCs were also reported in one soil sample and in soil gas samples from that area of the site. The Phase II Report concluded that the site did not pose a significant risk of harm to human or environmental receptors and that additional response actions were not warranted. However, it appears as though the contaminant plume was not fully delineated downgradient of the impacted well. No additional information was available for this disposal site. This disposal site(s) abuts or is on the Project site and may have the potential to impact the Project.

RTN 2-0016466 - Harvard Road, Boxborough, MA – Class B-1 Response Action Outcome Statement. This site was a release of perchlorate to soil and groundwater at a residential condominium complex located on Harvard Road in Boxborough. The source of perchlorate impacts documented at the Site (via its detection in two on-site bedrock private water supply wells), was believed to be the blasting of ledge that occurred during the construction of an on-site wastewater treatment facility for the condominium complex in November 2003. Assessment activities indicated that soil impacts were limited to an approximately 500 square foot area to a depth of 2 feet below grade. The horizontal extent of perchlorate impacts to groundwater appeared to be limited to the portion of the site located immediately south of the on-site WWTF, in bedrock. A ClassB-1 RAO was submitted to the Department in March 2008 that indicated the site did not pose a significant risk of harm to human health, safety, public welfare and the environment has been achieved under site conditions at that time. This disposal site(s) abuts or is within the Project site and may have the potential to impact the Project.

The following sites abut or are within the Project area but are unlikely to impact the Project:

RTN 2-0016393 – 24 Porter Road, Littleton, MA – Class A-1 Response Action Outcome Statement. This RTN is related to a release of an estimated 20 gallons of hydraulic oil from a ruptured hydraulic line and tank of a trash compactor at a commercial facility. The release was confined to pavement and no storm water catch basins or other subsurface utilities were impacted by the release.

RTN 2-0011803 – Whitcomb Avenue, Littleton, MA – Class B-1 Response Action Outcome Statement. This RTN was issued due to a sudden release of approximately 175 gallons of potassium hydroxide (KOH) at Town Well #1 located in Whitcomb Avenue in Littleton. Response actions included collection of surficial soil samples in the release area and testing soil conditions for pH. Testing of soils within the surface area affected by the KOH solution release indicated no measurable long term adverse impact on vegetation or soils. Groundwater was not assessed and was presumed not to be impacted.

RTN 2-0010134 – Swanson Road, Boxborough, MA – Class A-1 Response Action Outcome Statement. This RTN was issued due to a failed tightness test on a former 5,000-gallon diesel fuel Underground Storage Tank (UST) at a former Mass Highway Department maintenance depot located on Swanson Road in Boxborough. As a result of the tightness test failure, the UST was excavated and removed from the site. Post UST removal soil sampling indicated that the there were no petroleum impacts to soil surrounding the UST. Groundwater was not encountered. A class A-1 RAO was submitted to the Department in July 1995. Although this disposal site(s) abuts or is on the Project site, it is unlikely to impact the Project.

RTN 2-0012431 – Swanson Road, Boxborough, MA – Class A-2 Response Action Outcome Statement. This RTN is related to a historical release of gasoline from a former 8,000-gallon gasoline UST at a former Mass Highway Department maintenance depot located on Swanson Road in Boxborough. Approximately three tons of impacted soil were excavated and transported of-site for disposal. Confirmatory soil sample laboratory analyses indicated that site contaminants of concern were not present in soil at concentrations greater than the respective laboratory method detection limits, and groundwater was not encountered during the excavation activities.

RTN 2-0010986 - Swanson Road, Boxborough, MA – Class A-2 Response Action Outcome Statement. This site involved the detection of benzene in a groundwater monitoring well at a former Mass Highway Department maintenance facility located on Swanson Road in Boxborough. Follow up groundwater sampling activities from on-site groundwater monitoring and water supply wells and from private drinking water wells identified within 500 feet of MW-4 indicated that contaminant concentrations were all below the MCP Method 1 GW-1 Groundwater Standards. Analytical results for groundwater samples collected at the Facility and select nearby properties over one year of monitoring showed the concentrations of benzene had degraded to concentrations below the laboratory detection limits.

RTN 2-0013430 - 60 Codman Hill Road, Boxborough, MA – Class A-1 Response Action Outcome Statement. This RTN is related to a release of approximately 20 gallons of hydraulic oil to pavement from a trash truck during trash collection activities at a commercial facility located on Codman Hill Road in Boxborough. The hydraulic oil affected pavement only and remediated to background conditions.

The Proponent is advised that excavating, removing and/or disposing of contaminated soil, pumping of contaminated groundwater, or working in contaminated media must be done under the provisions of M.G.L. c.21E (and, potentially, c.21C) and OSHA and may require the submittal of a Release Abatement Plan or to be conducted as a Phase IV Remedial

Action. Excavating contaminated soil or pumping contaminated groundwater could be considered response actions under the MCP. Conducting response actions without MassDEP approval may result in a penalty.

If oil and/or hazardous materials are identified during the implementation of this Project, notification to MassDEP may be required pursuant to M.G.L. c. 21E and the MCP. A Licensed Site Professional (LSP) should be retained to determine if submittals to MassDEP are required to conduct the work or if notification is required. The BWSC may be contacted for guidance if questions arise regarding contaminated material.

If dewatering activities are to occur at a site with contaminated groundwater, or in proximity to contaminated groundwater where dewatering can draw in the contamination, a plan must be in place to properly manage the groundwater and ensure site conditions are not exacerbated by these activities.

Construction activities for new structures or utilities at a disposal site shall not prevent or impede the implementation of likely assessment or remedial response actions at the site. Construction of structures at a contaminated site may be conducted as a Release Abatement Measure if assessment and remedial activities prescribed at 310 CMR 40.0442(3) are completed within and adjacent to the footprint of the proposed structure prior to or concurrent with the construction activities. Excavation of contaminated soils to construct clean utility corridors should be conducted for all new utility installations.

MassDEP appreciates the opportunity to comment on the Project. Complex coordination and planning for the Project with the Proponent, the Town of Boxborough, MassDOT, and the affected PWSs has been ongoing for more than a year and MassDEP supports the Project to provide drinking water that meets all applicable standards to this Environmental Justice Population.

If you have any questions regarding these comments, please do not hesitate to contact JoAnne Kasper-Dunne, Central Regional Office MEPA Coordinator, at (508) 767-2716.

Very truly yours,

Mary Jude Pigsley

Mary Jude Pigsley
Regional Director

cc: Commissioner's Office, MassDEP

MASSWILDLIFE

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

August 24, 2023

Rebecca Tepper, Secretary
Executive Office of Energy and Environmental Affairs
Attention: MEPA Office
Jennifer Hughes, EEA No. 16736
100 Cambridge Street
Boston, Massachusetts 02114

Project Name:	*Littleton Water Supply Connection*
Proponent:	*Littleton Electric Light & Water Department*
Location:	*Various- Littleton, Boxborough, Harvard*
Project Description:	*Water pump installation, water main extension*
Document Reviewed:	*Environmental Notification Form*
EEA File Number:	*16736*
NHESP Tracking No.:	*23-4202*

Dear Secretary Tepper,

The Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife (the Division) has reviewed the *Environmental Notification Form* for the proposed water main work across the towns of Littleton, Boxboro, and Harvard, MA and would like to offer the following comments.

As indicated in the *Massachusetts Natural Heritage Atlas* (15th Edition), portions of the project site are mapped as *Priority and Estimated Habitat* for state-listed species as habitat for the Eastern Meadowlark (*Sturnella magna*), a "Special Concern" species as well as Blanding's Turtle (*Emydoidea blandingii*), species state listed as "Threatened", and Blue-spotted Salamander (*Ambystoma laterale pop. 1*), species state listed as "Special Concern". These species and their habitats are protected pursuant to the Massachusetts Endangered Species Act (M.G.L c. 131A) and its implementing regulations (MESA, 321 CMR 10.00) and rare wetland wildlife habitat is protected in accordance with the Massachusetts Wetlands Protection Act and its implementing regulations (WPA, 310 CMR 10.58(4)(b) and 10.59).

On May 25, 2023, the Proponent applied for review pursuant to the MESA and the rare wetland wildlife habitat provisions of the WPA. Most of the proposed project will occur within existing, paved roadways or in the adjacent shoulder and likely only to require a state-listed species protection plan. However, the Division required that the applicant provide additional information on June 15, 2023 to clarify some of the limits of work. Of particular focus, is the proposed directional drilling to install the pipe under Beaver Brook just south of Route 2 (Raw Water Plan Cross Country, sheet C103, "DIRECTIONAL DRILLING"). The ENF does not describe any impacts to Land Under Water and Bank for Beaver Brook suggesting that drilling will occur below the river substrate and outside the Banks, but no plan cross-sections are provided nor any details about the depth of drilling. Additionally, the Proponent should provide a contingency plan in the event that a slurry blowout occurs or in which bedrock is hit and directional drilling is determined to be not possible.

For the majority of the project, we anticipate requiring the development of state-listed protection plans (e.g., include protective sweeps, barriers and time of year restrictions). For the directional drilling under Beaver Brook, we are hopeful that the directional drilling can be conducted as sufficient depth such that impacts to the habitat are avoided. In such a case, we would expect to allow the work to move forward subject to conditions (321 CMR 10.18); therefore, we recommend that the Proponent work with the Division to finalize its plans to avoid, minimize and mitigate impacts to state-listed species sufficient to avoid the necessity of a MESA Conservation and Management Permit (CMP). Should a CMP be required, the Division will refer the Proponent to the MEPA office for consultation prior to issuance of a CMP. Projects resulting in a Take of state-listed species may only be permitted if they meet the performance standards for a Conservation and Management Permit (CMP; 321 CMR 10.23). In order for a project to qualify for a CMP, the applicant must demonstrate that the project has avoided, minimized and mitigated impacts to state-listed species consistent with the following performance standards: (a) adequately assess alternatives to both temporary and permanent impacts to the state-listed species, (b) demonstrate that an insignificant portion of the local population will be impacted, and (c) develop and agree to carry out a conservation and management plan that provides a long-term net benefit to the conservation of the state-listed species.

The Division will not render a final decision until the MEPA review process and its associated public comment period is complete, and until all required CMP application materials have been submitted to the Division. As the MESA review process is ongoing, no alteration to the soil, surface, or vegetation associated with the proposed Project shall occur until the Division has made a final decision relative to the MESA.

If you have any questions about this letter, please contact Tim McGuire, Endangered Species Review Biologist, at (508) 389-6366 or timothy.mcguire2@mass.gov. We appreciate the opportunity to comment on this project.

Sincerely,

Everose Schlüter

Everose Schlüter, Ph.D.
Assistant Director

cc: Alexandra Gaspar, Weston & Sampson Engineers, Inc
Littleton Conservation Commission
Harvard Conservation Commission
Boxborough Conservation Commission
DEP Northeast Regional Office, MEPA

APPENDIX B

Statewide Environmental Justice Community Based Organizations

First Name	Last Name	Title	Phone	Email	Affiliation
Claire	B.W. Muller	Movement Building Director	508 308-9261	claire@uumassaction.org	Unitarian Universalist Mass Action Network
Julia	Blatt	Executive Director	(617) 714-4272	juliablatt@massriversalliance.org	Mass Rivers Alliance
Jodi	Valenta	Massachusetts State Director	(617) 367-6200	Jodi.Valenta@tpl.org	The Trust for Public Land
Kerry	Bowie	Board President	Not Provided	kerry@msaadapartners.com	Browning the GreenSpace
Sylvia	Broude	Executive Director	617 292-4821	sylvia@communityactionworks.org	Community Action Works
Heather	Clish	Director of Conservation & Recreation Policy	(617) 523-0655	hclish@outdoors.org	Appalachian Mountain Club
Johannes Brittney	Epke Jenkins	Staff Attorney Vice President	617 850-1761	jepke@clf.org Bjenkins@clf.org	Conservation Law Foundation
Ben	Hellerstein	MA State Director	617-747-4368	ben@environmentmassachusetts.org	Environment Massachusetts
Robb	Johnson	Executive Director	(978) 443-2233	robb@massland.org	Mass Land Trust Coalition
Cindy	Luppi	New England Director	617-338-8131 x208	cluppi@cleanwater.org	Clean Water Action
Lena Miles	Entin Gresham	Interim Co-Directors	Not Provided	Lena@N2NMa.org Miles@N2NMa.org	Neighbor to Neighbor Mass.
Rob	Moir	Executive Director	Not Provided	rob@oceanriver.org	Ocean River Institute
Deb	Pasternak	Director, MA Chapter	617-423-5775	deb.pasternak@sierraclub.org	Sierra Club MA
Heidi	Ricci	Director of Policy	Not Provided	hricci@massaudubon.org	Mass Audubon

GENERATED ON: 11/30/2023

Indigenous Organizations					
First Name	**Last Name**	**Title**	**Phone**	**Email**	**Affiliation**
Alma	Gordon	President	Not Provided	tribalcouncil@chappaquiddickwampanoag.org	Chappaquiddick Tribe of the Wampanoag Nation
Cheryll	Toney Holley	Chair	774-317-9138	crwritings@aol.com	Nipmuc Nation (Hassanamisco Nipmucs)
John	Peters, Jr.	Executive Director	617-573-1292	john.peters@mass.gov	Massachusetts Commission on Indian Affairs (MCIA)
Melissa	Ferretti	Chair	(508) 304-5023	melissa@herringpondtribe.org	Herring Pond Wampanoag Tribe
Patricia	D. Rocker	Council Chair	Not Provided	rockerpatriciad@verizon.net	Chappaquiddick Tribe of the Wampanoag Nation, Whale Clan
Raquel	Halsey	Executive Director	(617) 232-0343	rhalsey@naicob.org	North American Indian Center of Boston
Cora	Pierce	Not Provided	Not Provided	Coradot@yahoo.com	Pocassett Wampanoag Tribe
Elizabth	Soloman	Not Provided	Not Provided	Solomon.Elizabeth@gmail.com	Massachusetts Tribe at Ponkapoag

Federally Recognized Tribes			
First	**Last**	**Title**	**Phone**
Bettina	Washington	Tribal Historic Preservation Officer	508-560-9014
Brian	Weeden	Chair	774-413-0520

Email	Affiliation
thpo@wampanoagtribe-nsn.gov	Wampanoag Tribe of Gay Head (Aquinnah)
Brian.Weeden@mwtribe-nsn.gov	Mashpee Wampanoag Tribe

PROJECT: Littleton Water Supply Connection MEPA Review File Number: EEA# 16736

LOCATION: Various – Littleton, Boxborough, Harvard

PROPONENT: Littleton Electric Light & Water Department

This notice serves as an update on the Littleton Water Supply Connection project. An Environmental Notification Form (ENF) was submitted to the Massachusetts Environmental Policy Act (MEPA) Office for review and public comment. Notice of the ENF was published in the Environmental Monitor on July 26, 2023. Because the project is within 1 mile of an Environmental Justice (EJ) community, a mandatory Environmental Impact Report (EIR) is required. No other MEPA threshold was triggered that would require a mandatory EIR.

A certificate on the ENF was issued September 1, 2023, setting forth a Scope primarily limited to environmental justice, public health, and water supply.

In response to the ENF certificate comments, a Single Environmental Impact Report (SEIR) was submitted by Weston & Sampson (W&S) on behalf of the Littleton Electric Light & Water Department on December 15, 2023. The additional information includes the following:

- Greater Detail of Project Description
- Greater detail of the Existing Environment on site
- Assessment of Impacts to Surrounding EJ Communities
- Mitigation Measures

Electronic copies of the SEIR have been sent to the Conservation Commission and Planning Board of Littleton, Boxborough and Harvard for public review.

If you have any additional questions or comments, please reach out to Weston &Sampson – Alexandra Gaspar by calling 978-532-1900 or via email: gaspara@wseinc.com on Mon-Fri between the hours of 8 AM to 4 PM.

APPENDIX C

Stormwater Report

Littleton, Massachusetts

Taylor Street Well and Raw Water Main

October 16, 2023
Revised: December 14, 2023

JOB NO: ENG23-0679

Weston & Sampson
55 Walkers Brook Drive, Suite 100
Reading, MA 01867

www.westonandsampson.com
Tel: 978-532-1900 Fax: 978-977-0100

Table of Contents

Checklist for Stormwater Report

A. Introduction

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

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

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

COMMONWEALTH OF MASSACHUSETTS
JAMES I.
PEARSON
CIVIL
No. 50675
REGISTERED
PROFESSIONAL ENGINEER
12/14/2023

12/14/2023
Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

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

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☐ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☒ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

REVISED 12/14/23

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist (continued)

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

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

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

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist (continued)

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

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Stormwater Report Summary

December 14, 2023

Applicant/Project Name: Littleton Electric Light & Water Department
Taylor Street Well and Raw Water Main

Project Address: 151 & 153 Taylor Street, Littleton, MA

Application Prepared by:
Firm: Weston & Sampson, Inc.
Registered PE: James Pearson, P.E.

Below is an explanation regarding MassDEP Standards 1-10 as they apply to the Taylor Street Well and Raw Water Main project:

Project Information

The Littleton Electric Light & Water Department proposes to develop a new drinking water well at a Town owned parcel located off Taylor Street to augment the Town's active water supply sources. Access to the site will be provided through an easement located on abutting property owned by Amazon. Work involved with this project will 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.

The existing site is predominantly wooded and surrounded by a large wetland complex. Terrain is complex, with flat upland grassed areas, and undulating rolling hills located within wooded areas. Elevations range from 237-feet to 233-feet on the grassed portion of the Amazon site, and from 244-feet to 223-feet on the wooded portion located on Town owned property. Resource areas include bordering vegetated wetland, the 100-foot wetland buffer, and a Zone II wellhead protection area. NRCS soil mapping shows the site being comprised primarily of Quonset sandy loam and sandy Udorthents. Numerous well borings throughout the area generally confirm the subsurface conditions and can be found in Attachment C of this report.

Standard 1: No New Untreated Discharges

The proposed project will create no new untreated discharges. Runoff from pollutant generating impervious areas will be captured in the stormwater management system and treated prior to discharge. All outlets have been designed to prevent scour and erosion to receiving waterbodies.

REVISED 12/14/23

Standard 2: Peak Rate Attenuation

Existing and proposed conditions were modeled using HydroCAD computer software. A table, summarizing peak discharges for the 2-Yr, 10-Yr, 25-Yr, 50-Yr, and 100-Yr storm events can be found in Attachment D of this report. The proposed design is such that peak discharge rates do not exceed pre-development rates, even in the 100-year storm scenario.

To ensure that the work incorporates the performance standards recommended in the DEP's Stormwater Management Policy, necessary erosion and sedimentation control measures will be utilized during construction, as depicted on the site plans.

Standard 3: Recharge

Standard 3 has been met. The required recharge volume has been provided within the proposed stormwater BMPs. Supporting calculations can be found in Attachment E of this report.

Standard 4: Water Quality

Standard 4 has been met to the maximum extent practicable. Treatment practices have been designed to capture the required water quality volume and remove greater than 80% of TSS overall, based upon 1-IN of runoff volume due to the location of the project within a Zone II. The proposed stormwater management system has also been designed to remove greater than 44% of TSS prior to entering the infiltration basin by providing grassed channels which discharge to a sediment forebay.

At the location of the well building, due to site constraints such as existing topography, proximity to the bordering vegetated wetland, and shallow groundwater elevations, we propose a stormwater management design to the maximum extent practicable. To maintain minimum separation to groundwater, the proposed infiltration trench is only 18-inches deep and all available space at this location was needed to provide the required water quality volume. We investigated several options to provide a vegetated filter strip for pre-treatment in this area, however neither option proved feasible as we are unable to change the geometry of the proposed infiltration trench by raising the road without directly impacting the wetland resource area or by moving the trench further inland without producing a significant cut into the adjacent hillside where topography sharply rises, and concerns of higher groundwater elevations exist. A non-structural BMP will also be implemented at the well building location as access to the site will be restricted, and pollutant generation will be limited. Supporting calculations can be found in Attachment E of this report.

During the project, appropriate BMPs will be used to minimize sedimentation and soil erosion.

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

This site is not considered a LUHPPL, Standard 5 does not apply.

Standard 6: Critical Areas

This project is located within a Zone II of a public water supply.

Standard 7: Redevelopments and Other Projects Subject to the Standards Only to the Maximum Extent Practicable

This is not a redevelopment project, Standard 7 does not apply.

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

A detailed Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan is included in Attachment G of this report. To ensure that the work incorporates the performance standards recommended in the DEP's Stormwater Management Policy, necessary erosion and sedimentation control measures will be utilized during construction.

Standard 9: Operation and Maintenance Plan

An operations and maintenance plan is included in Attachment H of this report.

Standard 10: Prohibition of Illicit Discharges

An illicit discharge compliance statement has been included in Attachment I of this report.

Registered Professional Engineer's Certification

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

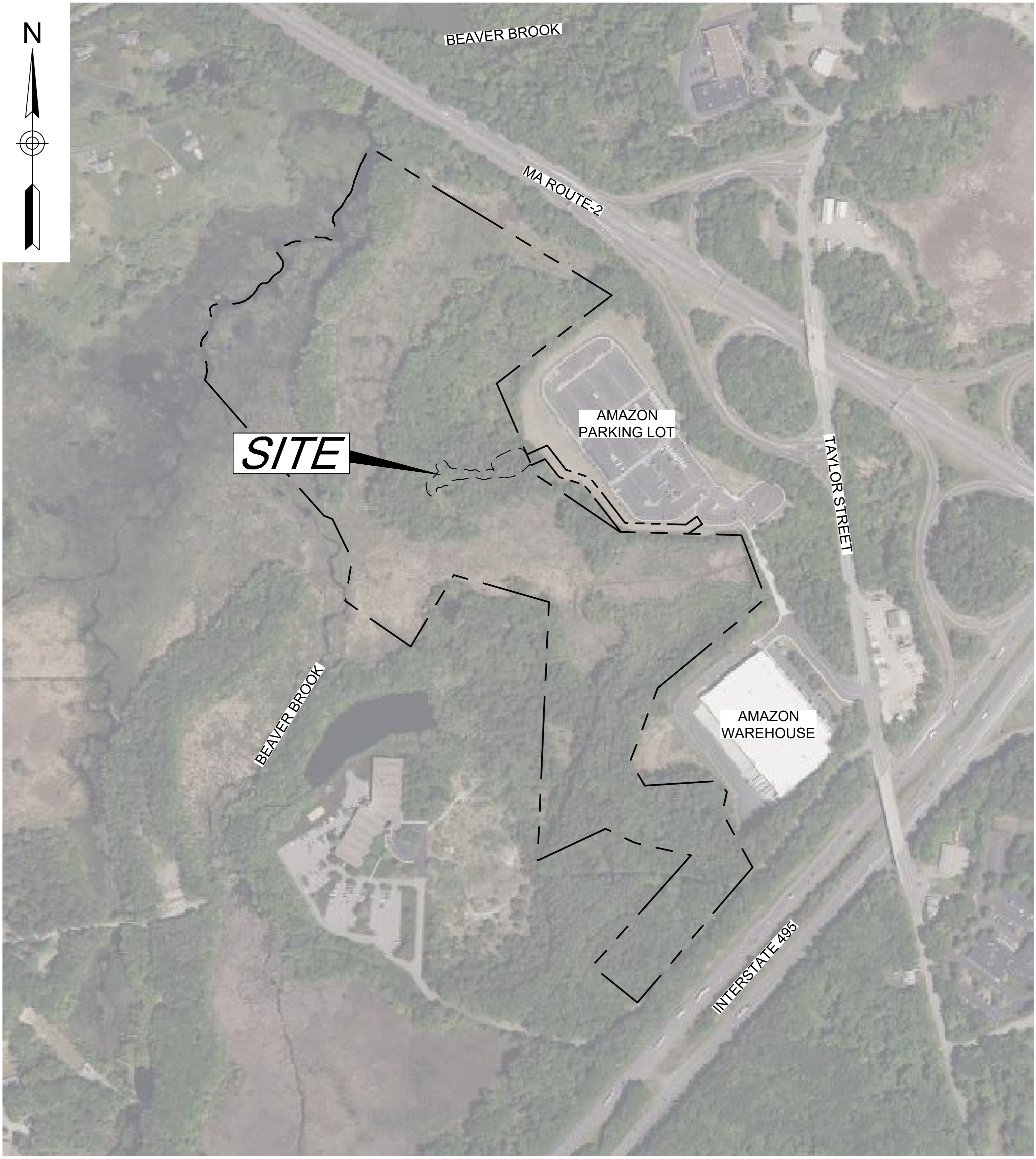
Registered Professional Engineer Block and Signature

12/14/2023

Signature and Date

REVISED 12/14/23

Attachment A - Locus Map



500 250 0 500

SCALE 1"= 500

LOCUS MAP

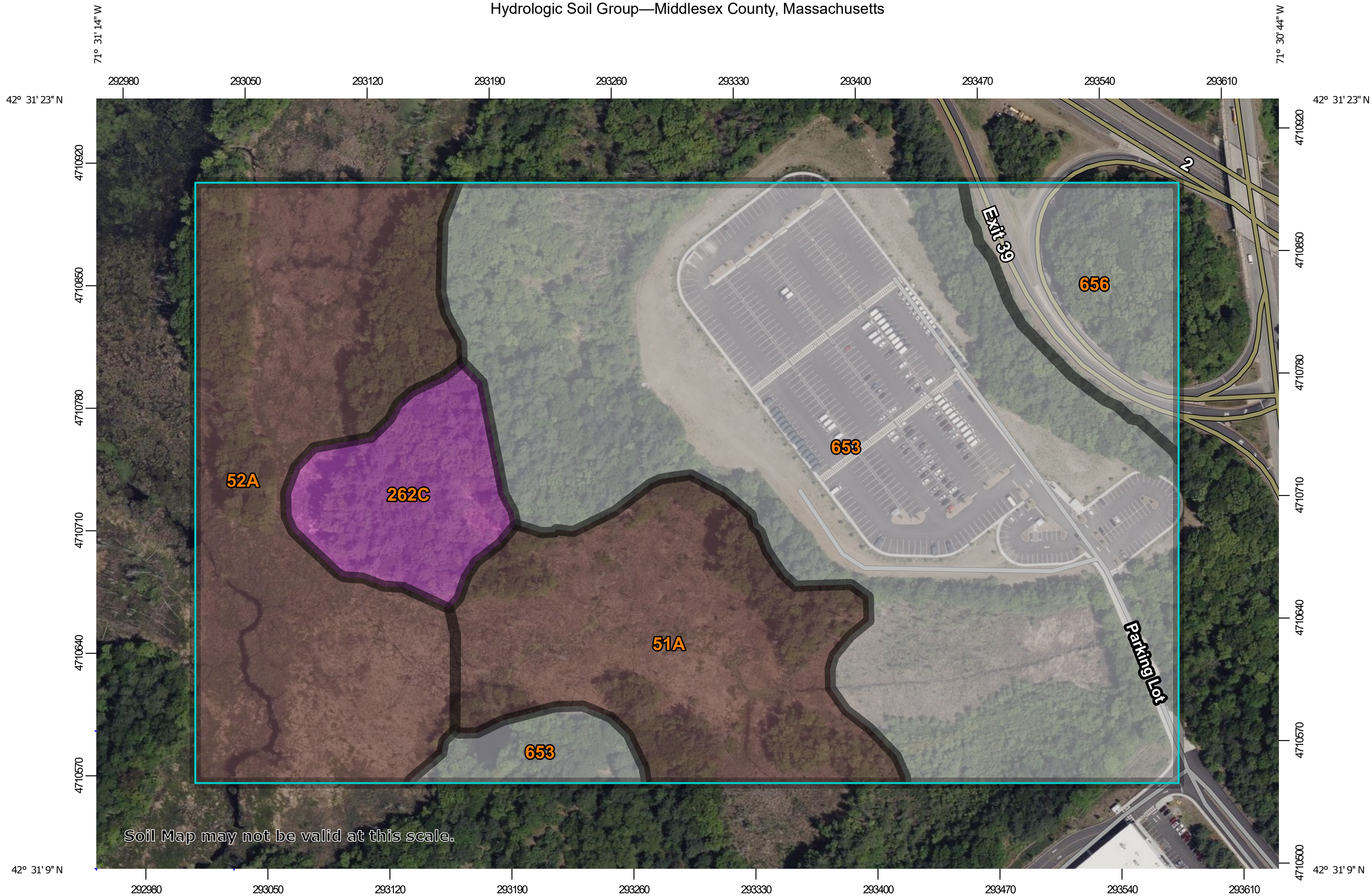
Weston & Sampson

Weston & Sampson Engineers, Inc.

55 Walkers Brook Drive, Suite 100, Reading MA 01867

Attachment B - NRCS Soils Map, Soils Report, and HSG Classifications

Hydrologic Soil Group—Middlesex County, Massachusetts



Map Scale: 1:3,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 45, 90, 180, 270

Feet: 0, 150, 300, 600, 900

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

MAP LEGEND

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

Soils

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 23, Sep 12, 2023

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	B/D	7.3	15.3%
52A	Freetown muck, 0 to 1 percent slopes	B/D	10.4	21.6%
262C	Quonset sandy loam, 8 to 15 percent slopes	A	2.8	5.8%
653	Udorthents, sandy		24.4	50.9%
656	Udorthents-Urban land complex		3.1	6.4%
Totals for Area of Interest			**48.0**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Attachment C - Groundwater Memorandums & Boring Logs

Groundwater Analysis Summary

December 14, 2023

To support the design of two proposed infiltration practices at the location of the Taylor Street Well site, Hydrogeologists from Weston & Sampson performed two analyses to determine probable groundwater elevations at the site.

At the location of the proposed infiltration basin, a Frimpter Analysis was performed. The Frimpter method entails using statistical analysis of long-term groundwater measurements from a network of established groundwater observation wells located within similar geologic and topographic settings to establish probable high groundwater elevations. Generally, the Frimpter method is more conservative and predicts higher groundwater elevations than what is present on site.

For estimating probable high groundwater elevations at the location of the proposed infiltration trench, groundwater monitoring data from observation wells located around the proposed well site was analyzed. Although readings taken from the observation wells occurred during a period of extreme drought, elevations recorded from survey data at the nearby vegetated wetlands correspond closely to the groundwater elevations observed in the wells. While groundwater elevations fluctuate based upon climate conditions and typically present at lower elevations during periods of drought, wetland delineations are primarily determined by analyzing the types of wetland vegetation present. Wetland vegetation growth is typically supported by groundwater and grows within 1-foot of the groundwater table, if the groundwater elevations were significantly higher at this location than what was shown in the well observations, evidence of wetland vegetation would be found at higher elevations than what the current delineation demonstrates. For a preliminary analysis of groundwater elevation at this location, we feel that this analysis provides a reasonably accurate estimate of probable high groundwater elevations.

Stormwater test pits will be conducted at both locations prior to the start of construction to verify soil conditions and estimated seasonal high groundwater elevations.

712 Brook Street, Suite 103, Rocky Hill, CT 06067
Tel: 860.513.1473

MEMORANDUM

TO:	File
FROM:	Jill Getchell
DATE:	September 29, 2023
SUBJECT:	Seasonal High Groundwater Estimations

Weston & Sampson has evaluated probable high groundwater elevations at the proposed Taylor Street Well Site in Littleton, Massachusetts. Using the data set from the pumping test conducted in September 2022, the Frimpter Method (USGS OFR 80-1205), a method for estimating the seasonal high groundwater elevation for a single point, was conducted on the 200-ft Observation Well located near the proposed Taylor Street Well. The Frimpter method for estimation of probable high groundwater levels (S_h) at unmonitored sites and is represented by the following relationship:

$$S_h = S_c - \frac{S_r}{OW_r}(OW_c - OW_{max})$$

where,

S_c = measured depth to water at site (feet)
S_r = range of water level where the site is located (feet)
OW_r = measured depth to water in well which is used to correlate with the water levels at the site (feet)
OW_c = depth to recorded maximum water level at the observation well which is used to correlate with the water levels at the site (feet)
OW_{max} = recorded upper limit of annual range of water level at the observation well that is used to correlate with the water levels at the site (feet)

The measured depth to water at the site on September 23, 2022 (highest observed static elevation) was used as the basis for the calculation. The site was assumed to be equivalent to a valley flat composed of sand and gravel due to the site's topography. An appropriate range of water levels (S_r) was assumed to be 4.2 feet (Frimpter, 1980). OW_r, OW_c and OW_{max} were each extracted from the nearby USGS monitoring wells (MA-WWW 160 WESTFORD, MA and MA-ACW 158 ACTON, MA). These USGS wells were used for the evaluation based on the distance from the 200-ft observation well and aquifer characteristics. Probable High Groundwater Elevations are summarized in the table below:

	MA-ACW 158 ACTON, MA	MA-WWW 160 WESTFORD, MA
200-ft OB Well DTW (ft btoc)	9.31	
200-ft OB Well Stickup Height (ft)	0.92	
200-ft OB Well TOC Elevation (ft NAVD 88)	230.88	
S_c (ft bg)	8.39	8.39
S_r (ft)	4.2	4.2
OW_c (ft bg)	19.94	12.66
OW_{max} (ft)	13.34	9.56
OW_r (ft bg)	6.35	3.51
S_h (ft bg)	4.03	4.68
S_h Elevation (ft NAVD 88)	225.94	225.28

Therefore, the estimated range of probable high groundwater levels at the site range from 4.03 to 4.68 ft bg (225.28 to 225.94 ft NAVD 88).

Path: P:\MA\Littleton MA\Digital Property New Source Approval\007 GIS\Mapfiles\WS 19\11 - Static Contour Map.mxd User: GetchellJ Saved: 11/2/2022 5:16:09 PM Opened: 12/5/2023 11:53:55 AM

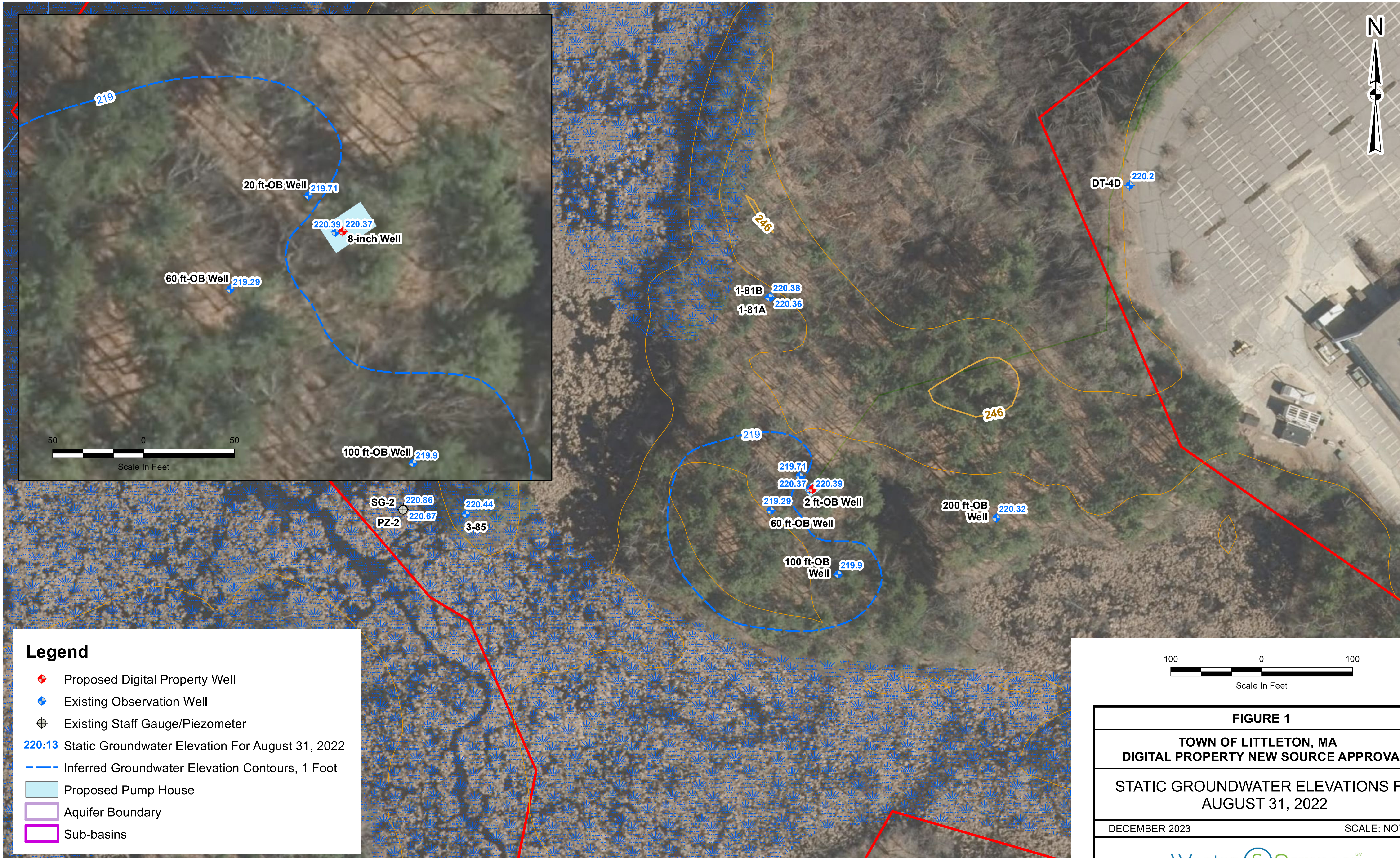


FIGURE 1

TOWN OF LITTLETON, MA
DIGITAL PROPERTY NEW SOURCE APPROVAL

STATIC GROUNDWATER ELEVATIONS FOR AUGUST 31, 2022

DECEMBER 2023 | SCALE: NOTED

Weston & Sampson

55 Walkers Brook Drive, Suite 100, Reading, MA 01867
Tel: 978.532.1900

MEMORANDUM

TO: Aaron Guazzaloca

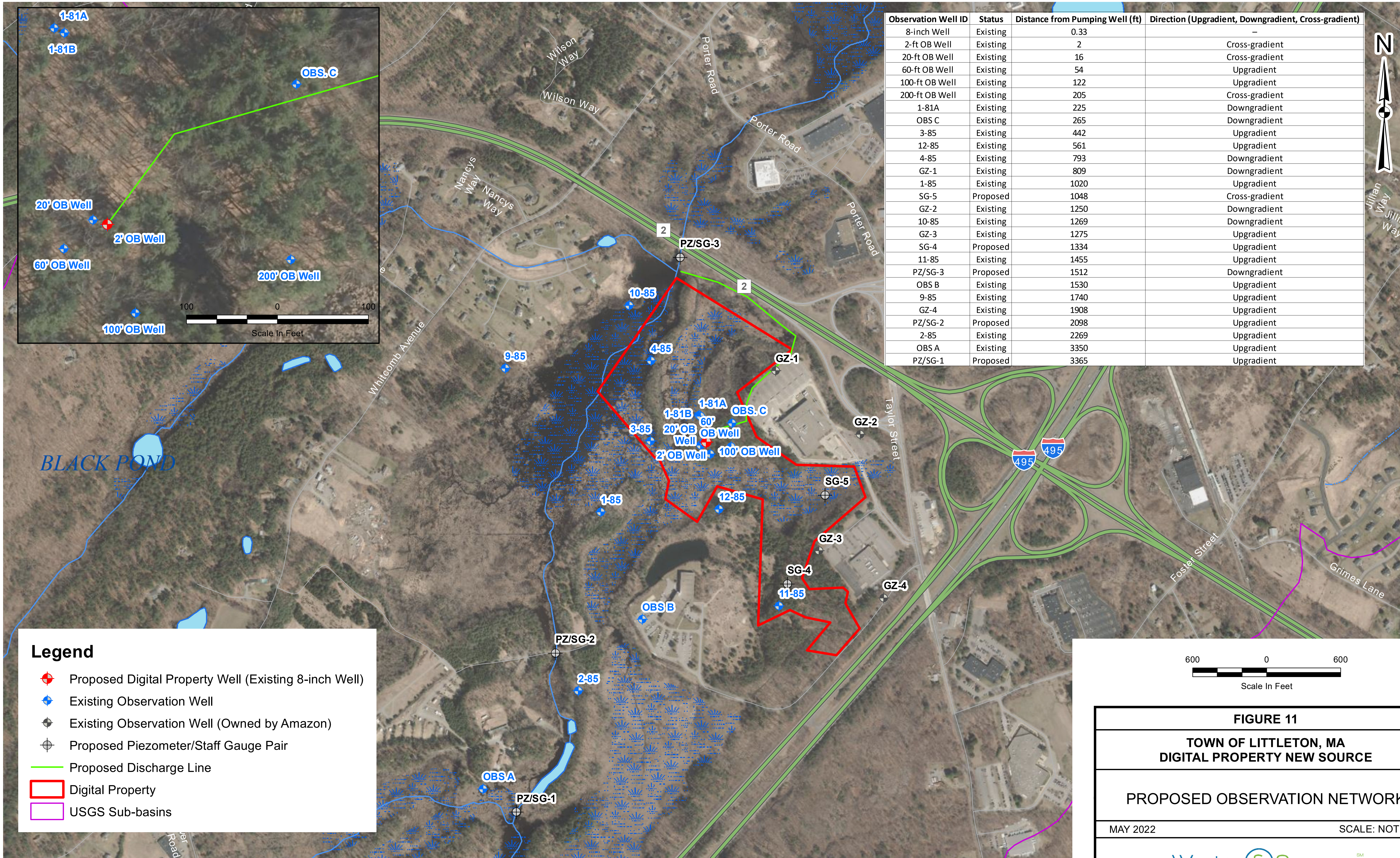
FROM: Jill Getchell

DATE: December 12, 2023

SUBJECT: Groundwater Elevation Estimations

Weston & Sampson has evaluated groundwater and surface water elevations near the proposed Taylor Street Well Site in Littleton, Massachusetts. Using the water level data set collected prior to the pumping test conducted in September 2022, groundwater elevations were plotted adjacent to the observation wells surrounding the proposed Taylor Street Well pump house (Figure 1). This dataset was compared to 2012 LiDAR data from MassGIS to assess the surface water elevations in the surrounding wetlands.

Based on the 2012 LiDAR data, the surface-water elevations in the surrounding wetlands can vary between 220 to 221 ft msl (no corresponding date) close to the proposed pump house area. Since measurements of surface water and groundwater were not made on the same day, a comparison of the wetlands surface water elevations to the groundwater elevations from the September 2022 pumping test cannot be completed accurately. It should be assumed that there may be some error associated with the wetland elevations derived from the LiDAR data and additional variability depending on the corresponding wetland location. The groundwater elevations near the pump house that were established in August 2022 during a period of extreme drought range between 219.5 and 220.5 ft msl. Based on the distributions of these elevations relative to the local topography, the expected groundwater flow direction under non-pumping conditions should be towards the wetlands which then discharges into Beaver Brook. The corresponding natural hydraulic gradient between the upland areas (the pump house area) and the wetlands should be relatively flat given the 1) observed hydraulic gradient throughout the aquifer and 2) the homogeneity of the aquifer materials in the vicinity.



Observation Well ID	Status	Distance from Pumping Well (ft)	Direction (Upgradient, Downgradient, Cross-gradient)
8-inch Well	Existing	0.33	–
2-ft OB Well	Existing	2	Cross-gradient
20-ft OB Well	Existing	16	Cross-gradient
60-ft OB Well	Existing	54	Upgradient
100-ft OB Well	Existing	122	Upgradient
200-ft OB Well	Existing	205	Cross-gradient
1-81A	Existing	225	Downgradient
OBS C	Existing	265	Downgradient
3-85	Existing	442	Upgradient
12-85	Existing	561	Upgradient
4-85	Existing	793	Downgradient
GZ-1	Existing	809	Downgradient
1-85	Existing	1020	Upgradient
SG-5	Proposed	1048	Cross-gradient
GZ-2	Existing	1250	Downgradient
10-85	Existing	1269	Downgradient
GZ-3	Existing	1275	Upgradient
SG-4	Proposed	1334	Upgradient
11-85	Existing	1455	Upgradient
PZ/SG-3	Proposed	1512	Downgradient
OBS B	Existing	1530	Upgradient
9-85	Existing	1740	Upgradient
GZ-4	Existing	1908	Upgradient
PZ/SG-2	Proposed	2098	Upgradient
2-85	Existing	2269	Upgradient
OBS A	Existing	3350	Upgradient
PZ/SG-1	Proposed	3365	Upgradient

FIGURE 11

TOWN OF LITTLETON, MA
DIGITAL PROPERTY NEW SOURCE

PROPOSED OBSERVATION NETWORK

MAY 2022 SCALE: NOTED

Weston & Sampson

D.L. MAHER CO.

GROUND WATER DEVELOPMENT

P.O. BOX 127 71 CONCORD STREET

NORTH READING • MA. 01864 • 617/933-3210

Test Well No. 8" well D.L.M. Job No. 85-086-HG

Driller S. Kelly Helper P. Finn

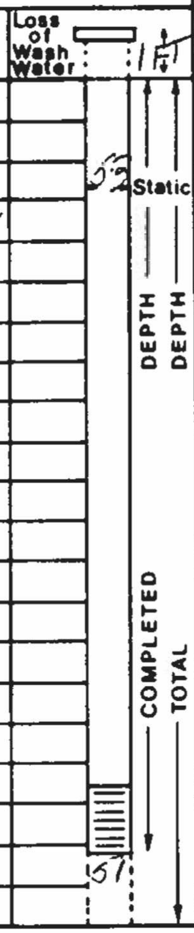
Client Littleton

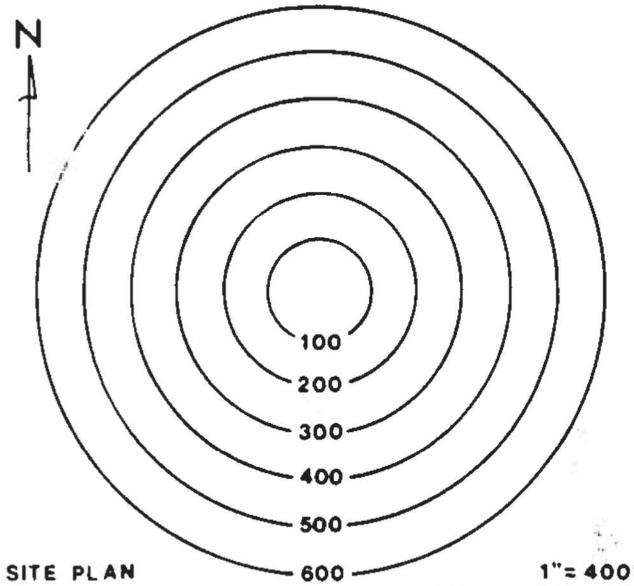
Location Digital Well Site

Owner's Representative

Date Started: 1/7/86 Date Finished: 1/13/86

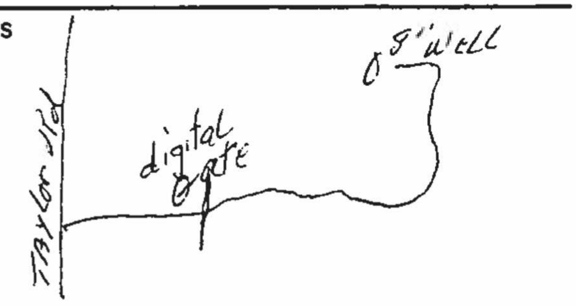
DEPTH From	To	Soil Classification
0	24	Fine to Course Brown
		Sand + Large Rocks
24	39	Fine to Course
		Brown Sand + M. Gravel
39	49	Fine to Course
		Brown Sand +
		Small Gravel
49	51	Fine to Medium
		Brown Sand





SITE PLAN 1"= 400'

LOCUS



TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Exposed	Material	Slot Size	Riser	Hours Dev.	Hours Pumped
	8"	51FT		41FT	10FT	10FT	S.S.	40	8" R. Packer	10	10

REMARKS:

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static	8" 125 DD 12 - GPF 10.4				
	obs 125 - DD 7.5 - GPF 16.6				

Water Sample

Date Time

Sent To:

Field Quality

CO_2 Taste

Fe Odor

Mn Hardness

D. L. MAHER CO.

LOG OF TEST WELL

Log of Well for Littleton Test No. #81-2

Address

Well located at OFF OF TAYLOR Rd in LITTLETON County, State of MASS

Date Drilling started JAN 26, 81 Date Test Hole Completed JAN 28, 81

Total depth to bottom of Well 54'-3" Diameter Test Hole 2½"

Water stands when not pumping 5' feet 2" inches from the surface of the grour

EACH STRATUM	DEPTH OF STRATA	FORMATION FOUND EACH STRATUM
0'	21'	med coarse Brn Sand & Gravel
21'	28'	" "
28'	35'	" "
35'	42'	" "
42'	50'	" "
50	54'	Brn to Grey Fine Sand & Gravel
	54'-3"	Refusal
		Set Screen at 50'

Did Well Clear Up? Yes

How Long? 3/4 hr

Time Pumped? 4 hr

Drawdown 2' Ft. 0" In.

Capacity 60 GPM VAC 15"

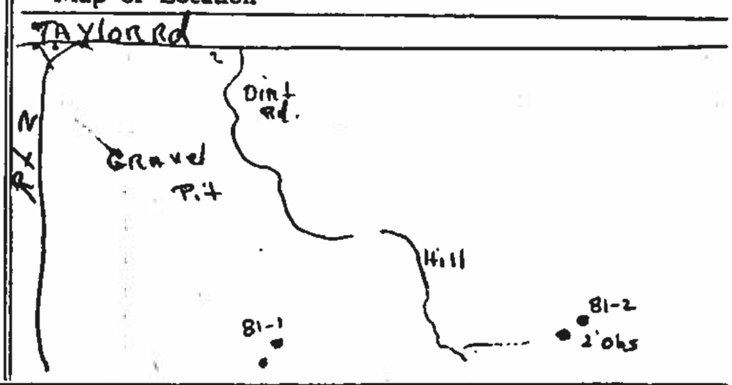
Time Required for Recovery?

Was Well Pulled? No

Observation Yes What Depth? 50'

Was Observation Well Pulled? No

Map of Location



Remarks and opinion of Test Set 50 slot screen in test well
Set 30 slot screen in 2' obs well. Both Pumped 60 GPM.
2' obs well had 15" VAC
Test well had - 19" VAC.

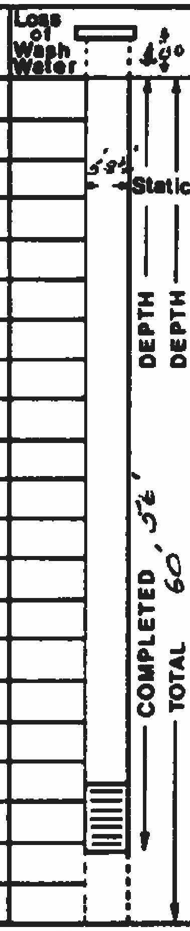
Driller T. Pelczar

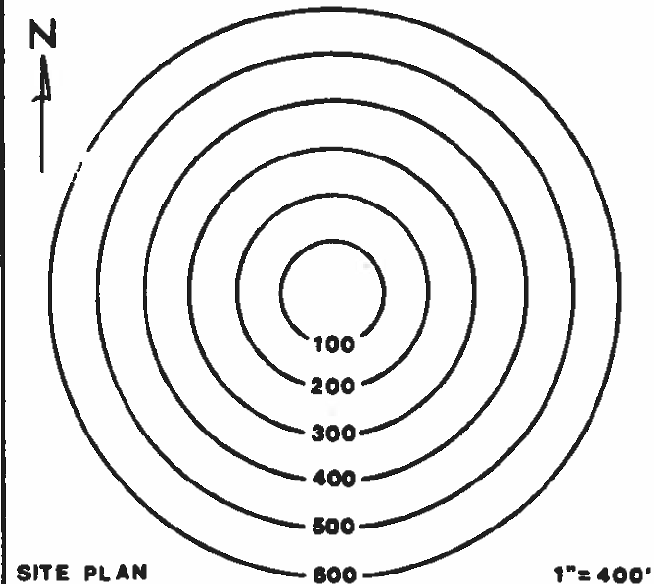
Helpers P. Bishop

D.L. MAHER CO.
GROUND WATER DEVELOPMENT
P.O. BOX 127 71 CONCORD STREET
NORTH READING • MA. 01864 • 617/933-3210

Test Well No. #1-85 D.L.M. Job No. 85-086-T
Driller John Graglia Helper David Maher
Client Littleton Water Dept
Location off Taylor Rd.
Owner's Representative Savas Danos
Date Started: 7-22-85 Date Finished: 7-22-85

DEPTH From	To	Soil Classification	Loss of Wash Water
0	21'	Large Broken gravel	
		Fine to Medium Brown	
		sand	
21'	28'	Fine to Medium Brown	
		sand and sharp gravel	
28'	35'	Sharp gray gravel	
		and Fine to Medium	
		Gray sand	
35	56'	sharp Broken gray	
		gravel and fine to	
		medium gray sand	
	60'	Refusal	





SITE PLAN 1" = 400'

LOCUS See Map Attached For well's #1 to #11

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Riser	Hours Dev.	Hours Pumped
#1-85	2½"	60	56'	49'	6'	6'	1½" Armco	60	5'	½ hr	

REMARKS: well pumps 30 gpm vac 17"

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample

Date ______ Time ______

Sent To:

Field Quality

CO_2 ______ Taste ______

Fe ______ Odor ______

Mn ______ Hardness ______

Ph ______ Color ______

D.L. MAHER CO.

GROUND WATER DEVELOPMENT

P.O. BOX 127 71 CONCORD STREET

NORTH READING • MA. 01864 • 617/933-3210

Test Well No. #2-85 D.L.M. Job No. 85-086-T

Driller John Graglia Helper David Maher

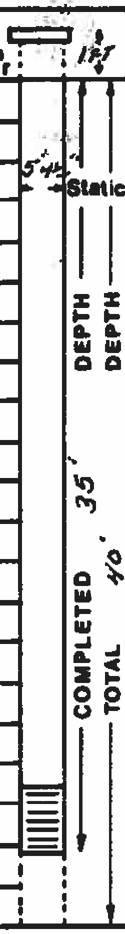
Client Littleton Water Dept

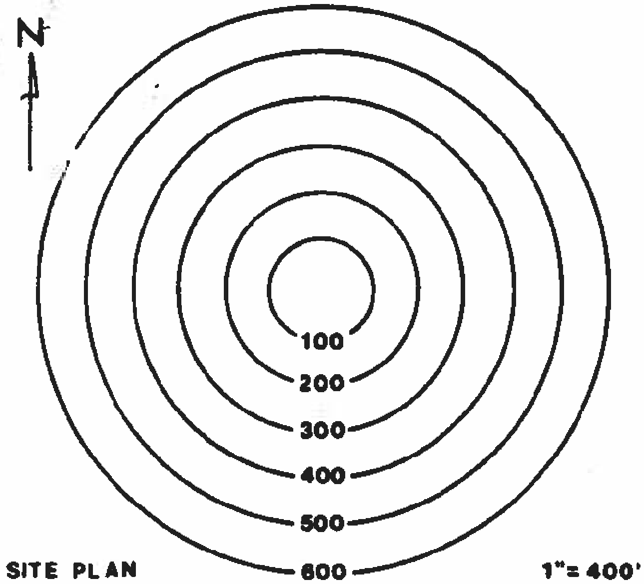
Location off Taylor Rd.

Owner's Representative Savas Danas

Date Started: 7-23-85 Date Finished: 7-23-85

DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0	6'	well going crooked	
0	21'	fine to medium brown sand and sharp gravel	
21'	28'	sharp broken gray gravel fine gray sand	
28'	35'	fine to medium gray sand and sharp broken gravel	YES
35'	40'	sharp broken gray gravel with gray clay	
	40'	Refusal	





SITE PLAN 1"= 400'

LOCUS

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Riser	Hours Dev.	Hours Pumped
#2-85	2½"	40'	35'	28'	6	6'	1¼" Armco	60	5'	½ hr	
2A-85		6.'		0							

REMARKS: well pumps 40 GPM vac 14" "(Total Pipe Driven 46')"

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample

Date Time

Sent To:

Field Quality

CO_2 Taste

Fe Odor

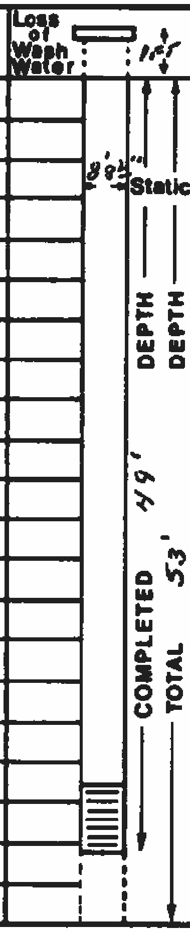
Mn Hardness

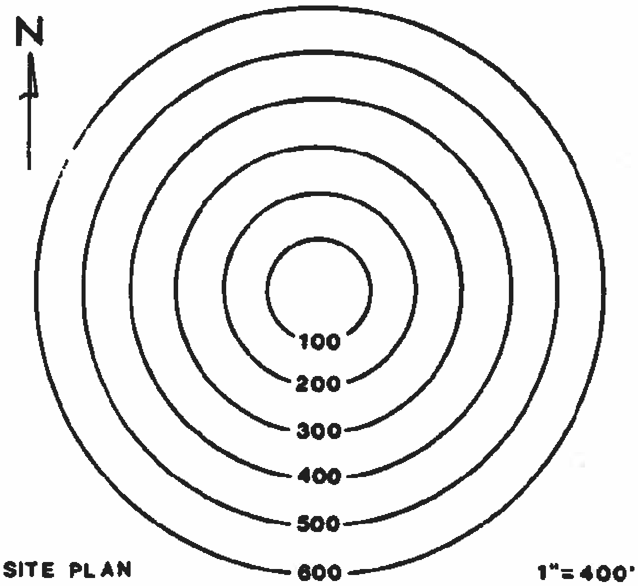
Ph Color

D.L. MAHER CO.
GROUND WATER DEVELOPMENT
P.O. BOX 127 — 71 CONCORD STREET
NORTH READING • MA. 01864 • 617/933-3210

Test Well No. #3-85 — D.L.M. Job No. 85-086-T
Driller John Graglia — Helper David Maher
Client Littleton Water Dept.
Location off Taylor Rd.
Owner's Representative Savas Danos
Date Started: 7-24-85 — Date Finished: 7-25-85

DEPTH From	To	Soil Classification	Loss of Wash Water
0	4'	hit rock	
0	5'	going crooked	
0	21'	grayish brown sand	
		and sharp gravel	
21'	28'	sharp gray gravel	
		and fine to medium gray	
		sand	
28'	49'	sharp broken gray	
		gravel fine to medium	
		gray sand	
	53	Refusal	





SITE PLAN 1"=400'

LOCUS

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Riser	Hours Dev.	Hours Pumped
#3-85	2½"	53'	49'	42'	6'	6'	1½" Armco	80	5'	½ hr	1hr Teclear

3A 4' pulled 3B 5' pulled

REMARKS: well pumps 60GPM vac 8" static 8'9½" (total pipe driven 62')

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample

Date ________ Time ________

Sent To:

Field Quality

CO_2 ________ Taste ________

Fe ________ Odor ________

Mn ________ Hardness ________

Ph ________ Color ________

D.L. MAHER CO.

GROUND WATER DEVELOPMENT

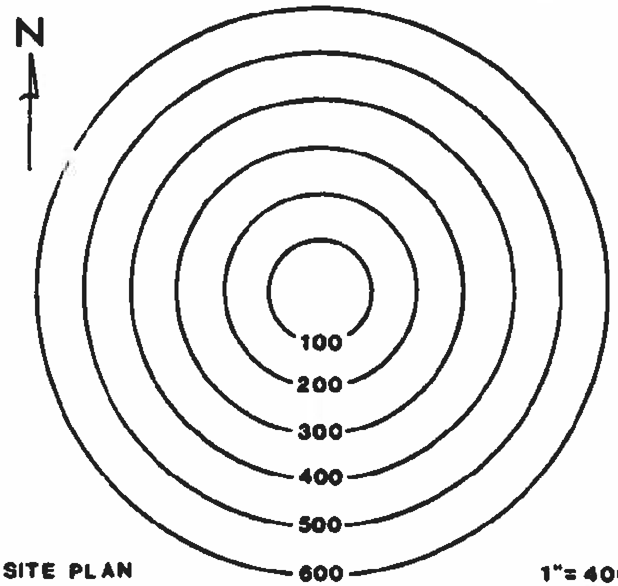
P.O. BOX 127 71 CONCORD STREET
NORTH READING • MA. 01864 • 617/933-3210

Test Well No. #4-85 D.L.M. Job No. 85-086-T
Driller John Graglia Helper David Maher
Client Littleton Water Dept.
Location off Taylor Rd
Owner's Representative Savas Danos
Date Started: 7-25-85 Date Finished: 7-26-85

DEPTH From	To	Soil Classification	Loss of Wash Water
0	14'	Pipe going crooked	
0	21'	Sharp Brown gravel	
		Fine Brown sand.	
	23'	Refusal.	

1ft
10' Static
COMPLETED DEPTH 21'
TOTAL DEPTH 23'

N



SITE PLAN 1" = 400'

LOCUS

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Riser	Hours Dev.	Hours Pumped
#4-85	2½"	23'	21'	21'	6'	2½'	1¼" Armco	60	5'	15 min	½ hr
4A	14' pulled										

REMARKS: well pumps 10 GPM VAC 25" (Total pipe driven 37')

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample

Date Time

Sent To:

Field Quality

CO_2 Taste

Fe Odor

Mn Hardness

Ph Color

D.L. MAHER CO.

GROUND WATER DEVELOPMENT

P.O. BOX 127 71 CONCORD STREET

NORTH READING • MA. 01864 • 617/933-3210

Test Well No. #5-85 2½" cb D.L.M. Job No. 85-086-T

Driller John Braglia Helper David Maher

Client Littleton Water Dept

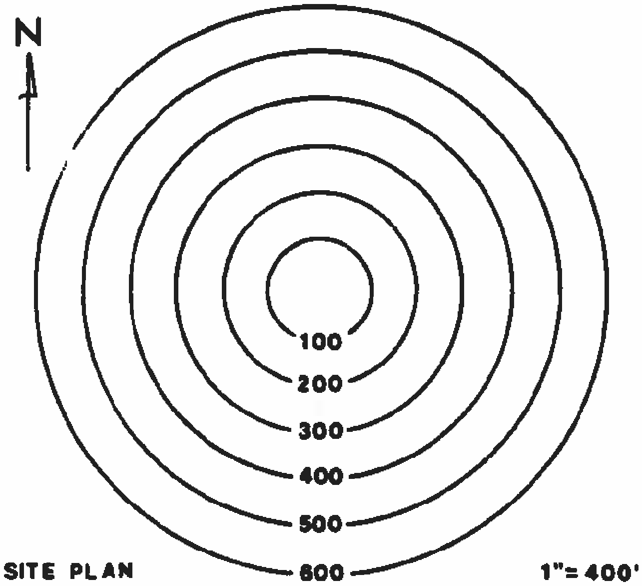
Location off of Taylor Rd.

Owner's Representative Savas Danos

Date Started: 7-29-85 Date Finished: 7-29-85

DEPTH From	To	Soil Classification	Loss of Wash Water
0	7'	hit Large Rock	
0	21'	medium to coarse Brown sand and gravel	
21'	46'	medium to coarse Brown sand and gravel	
46'	49'	gray fine sand and sharp gravel	
	49'	not refusal	

1½' Static 6'7" COMPLETED DEPTH 42' TOTAL DEPTH 49'



SITE PLAN 1" = 400'

LOCUS

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Riser	Hours Dev.	Hours Pumped
#5-85	2½"	49'	42'	35'	6'	6'	1¼" Armco	40	5'	½ hr	

REMARKS: Well pumps 35gpm vac 15" (Total pipe driven 56')

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample

Date ______ Time ______

Sent To:

Field Quality

CO_2 ______ Taste ______

Fe ______ Odor ______

Mn ______ Hardness ______

Ph ______ Color ______

D.L. MAHER CO.

GROUND WATER DEVELOPMENT

P.O. BOX 127 71 CONCORD STREET

NORTH READING • MA. 01864 • 617/933-3210

Test Well No. #6-85 100' cap D.L.M. Job No. 85-086-T

Driller John Graglia Helper David Maher

Client Littleton Water Dept.

Location off Taylor Rd.

Owner's Representative Savas Danos

Date Started: 7-30-85 Date Finished: 7-30-85

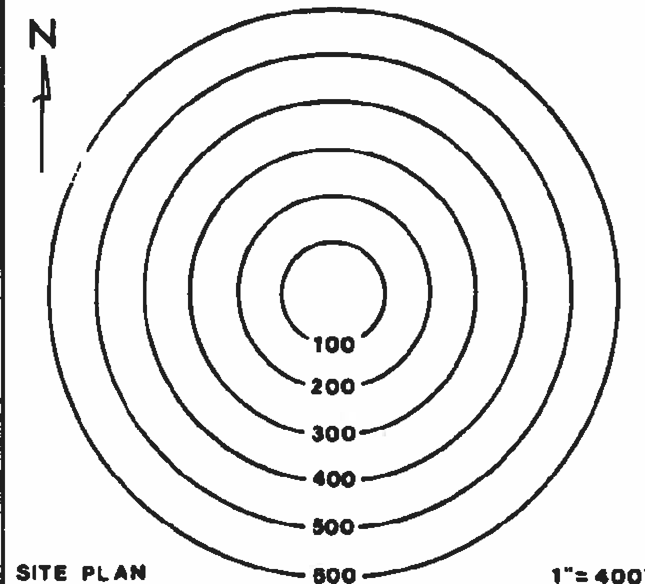
DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0	28'	Fine to medium	
		Brown sand and gravel	
28'	49'	medium to coarse	
		Brown sand and gravel	
	51'	Refusal	

1 FT

6'7" Static

COMPLETED DEPTH 49'

TOTAL DEPTH 51'



SITE PLAN 1" = 400'

LOCUS

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Screen Riser	Hours Dev.	Hours Pumped
#6-85	2½"	51'	49'	42'	6'	6'	1½" Armco	40	5'	½ hr	

REMARKS: well pumps 60 GPM VAC 11"

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample

Date ______ Time ______

Sent To:

Field Quality

CO_2 ______ Taste ______

Fe ______ Odor ______

Mn ______ Hardness ______

Ph ______ Color ______

D.L. MAHER CO.

GROUND WATER DEVELOPMENT

P.O. BOX 127 71 CONCORD STREET

NORTH READING • MA. 01864 • 617/933-3210

Test Well No. #7-85 50'ah D.L.M. Job No. 85-096-T

Driller John Grashia Helper David Maher

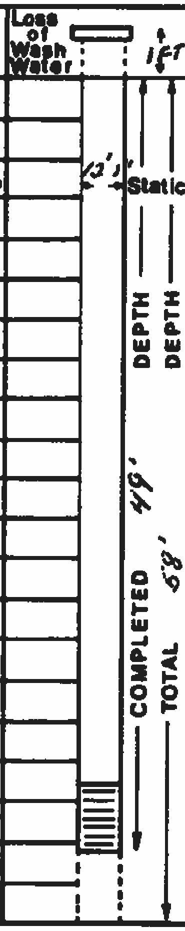
Client Littleton water Dept

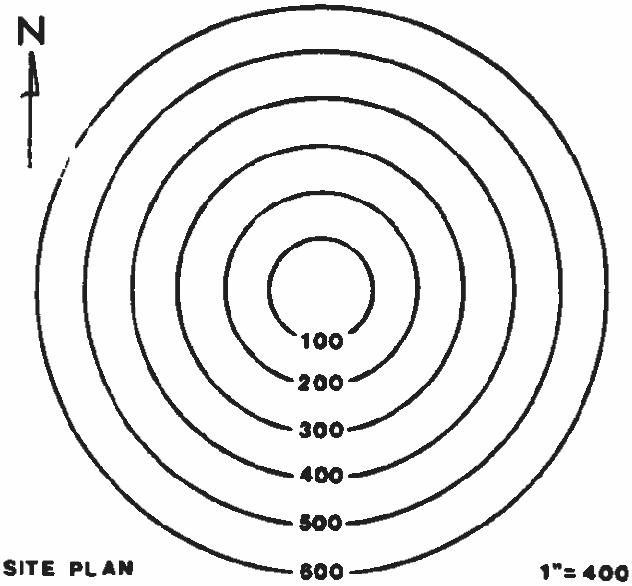
Location Off Tayler Rd.

Owner's Representative Savas Danos

Date Started: 7-30-85 Date Finished: 7-31-85

DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0	28'	Fine to Medium Brown	
		sand and gravel	
28'	49'	Medium to Coarse Brown	
		sand and gravel	
49'	56	Fine Brown sand some	
		sharp gravel	
	58'	Refusal	





SITE PLAN 1" = 400'

LOCUS

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Screen Riser	Hours Dev.	Hours Pumped
#7-85	2½"	58'	49'	42'	6'	6'	1½" Armco	40	5'	½ hr	

REMARKS: Set 30 slot screen at 56' well tight Pulled screen Reset 40 slot at 49'
well Pumps 50 GPM VAC 15"

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample

Date ______ Time ______

Sent To:

Field Quality

CO_2 ______ Taste ______

Fe ______ Odor ______

Mn ______ Hardness ______

Ph ______ Color ______

D.L. MAHER CO.
GROUND WATER DEVELOPMENT
P.O. BOX 127 71 CONCORD STREET
NORTH READING • MA. 01864 • 617/933-3210

Test Well No. #8-85 200' .. D.L.M. Job No. 85-086-T
Driller John Graglia Helper David Maher
Client Littleton Water Dept
Location off Taylor Rd.
Owner's Representative Savas Danas
Date Started: 7-31-85 Date Finished: 8-1-85

DEPTH From	To	Soil Classification	Loss of Wash Water
0	28'	Fine to medium Brown sand and gravel	
28'	35'	medium to coarse Brown sand and gravel	
35'	42'	Fine Brown sand changing to gray fine sand.	
42'	49'	Fine gray sand some sharp gravel.	
49'	56'	Fine gray sand some sharp gravel	
	58'	Refusal	

1½'
10'4" Static
COMPLETED DEPTH 56'
TOTAL DEPTH 58'

N
100
200
300
400
500
600
SITE PLAN 1" = 400'

LOCUS

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Riser	Hours Dev.	Hours Pumped
#8-85	2½"	58'	56'	49'	6'	6'	1½" Armco	20	5'	½ hr	

REMARKS: well pumps 5 GPM VAC 24"

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample
Date Time
Sent To:

Field Quality
CO_2 Taste
Fe Odor
Mn Hardness
Ph Color

D.L. MAHER CO.

GROUND WATER DEVELOPMENT

P.O. BOX 127 71 CONCORD STREET

NORTH READING • MA. 01864 • 617/933-3210

Test Well No. P 9-85 D.L.M. Job No. 85-086-T

Driller John Graglia Helper David Maher

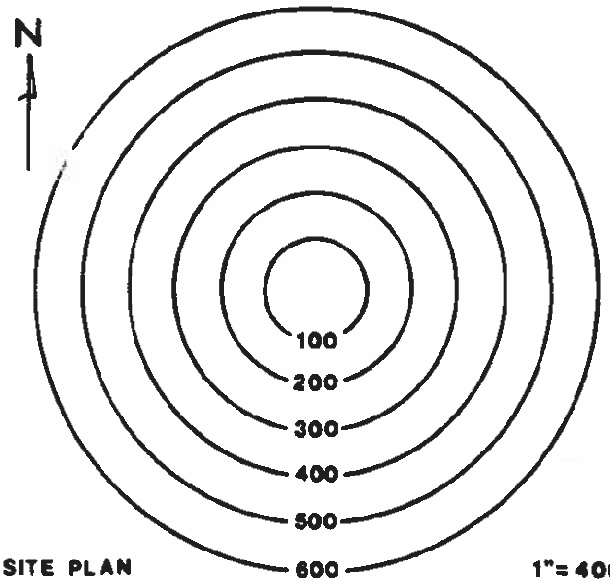
Client Littleton Water Dept

Location off Taylor Rd.

Owner's Representative Savas Danos

Date Started: 8-1-85 Date Finished: 8-1-85

DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0	21'	Fine to medium Brown	
		sand and sharp gravel	
21'	28'	Fine Brown sand	
		some sharp gravel	
28'	35'	Fine Brown sand changing	
		to sharp gray gravel	
		some clay	
35'	40'	sharp gray gravel and	
		clay.	
	40'	Refusal	



SITE PLAN 1" = 400'

LOCUS

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Riser	Hours Dev.	Hours Pumped
P 9-85	2½"	40'	21'	21'	6'	3'	1¼" Armco	40	5	½ hr	

REMARKS: well pumps 30 gpm vac 26"

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample

Date ______ Time ______

Sent To:

Field Quality

CO_2 ______ Taste ______

Fe ______ Odor ______

Mn ______ Hardness ______

Ph ______ Color ______

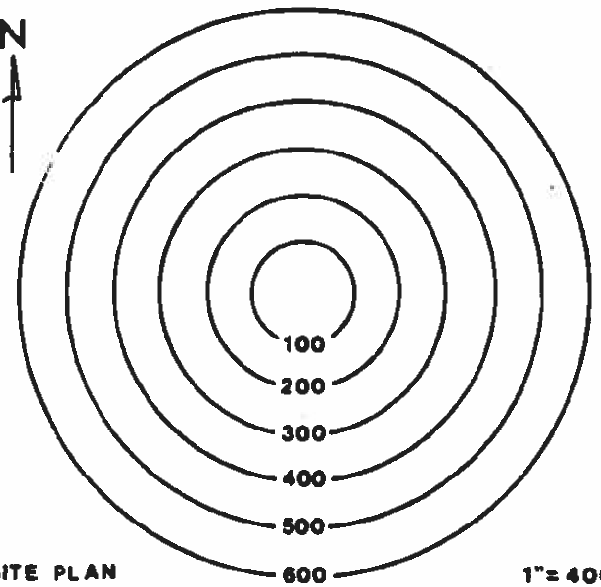
D.L.MAHER CO.
GROUND WATER DEVELOPMENT
P.O. BOX 127 71 CONCORD STREET
NORTH READING • MA. 01864 • 617/933-3210

Test Well No. #10-85 D.L.M. Job No. 85-056-T
Driller John Graglia Helper David Maher
Client Littleton Water Dept
Location off Taylor Rd.
Owner's Representative Savas Danos
Date Started: 8-1-85 Date Finished: 8-2-85

DEPTH From	To	Soil Classification	Loss of Wash Water
0	21'	Fine to medium brown sand and gravel	
21'	28'	Fine brown sand	
28'	34'	Fine brown sand changing to sharp gray gravel and clay	
	34'	Refusal	

36'
5'4" Static
COMPLETED DEPTH 21'
TOTAL DEPTH 34'

N



SITE PLAN 1" = 400'

LOCUS

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Screen Riser	Hours Dev.	Hours Pumped
#10-85	2½"	34'	21'	21'	6'	3'	1¼" Armco	40	5'		

REMARKS: set 40 slot screen at 25' exposed 6' well tight, pulled and reset at 21' exposed 3FT well pumps 35 gpm vac 18"

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample

Date ______ Time ______

Sent To:

Field Quality

CO_2 ______ Taste ______

Fe ______ Odor ______

Mn ______ Hardness ______

Ph ______ Color ______

D.L. MAHER CO.

GROUND WATER DEVELOPMENT

P.O. BOX 127 71 CONCORD STREET

NORTH READING • MA. 01864 • 617/933-3210

Test Well No. #11-85 D.L.M. Job No. 85-086-T

Driller John Graglia Helper David Maher

Client Littleton Water Dept

Location Off Taylor Rd.

Owner's Representative Savas Danos

Date Started: 8-2-85 Date Finished: 8-2-85

DEPTH From	To	Soil Classification	Loss of Wash Water
0	21'	Sharp Brown gravel	
		Fine Brown sand.	
	23'	Refusal	

3FT

8'2" Static

DEPTH 21'

COMPLETED DEPTH 21'

TOTAL DEPTH 23'

N

100 200 300 400 500 600

SITE PLAN 1" = 400'

LOCUS

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Screen Riser	Hours Dev.	Hours Pumped
#11-85	2½"	23'	21'	21'	6'	3'	1¼" Armco	10	5'		

REMARKS: did not pump well. well does take water

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample

Date Time

Sent To:

Field Quality

CO_2 Taste

Fe Odor

Mn Hardness

Ph Color

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Well Design and Installation
151 & 153 Taylor Street
Littleton, Massachusetts

BORING NO.: GZ-1
SHEET: 1 of 1
PROJECT NO: 01.0175200.00
REVIEWED BY: JRP

Drilling Co.: Drilex Environmental, Inc.
Foreman: Jamie
Logged By: Matthew McGavick

Type of Rig: Track Mounted
Rig Model: CME-55
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.):
Final Boring Depth (ft.): 24
Date Start - Finish: 6/2/2021 - 6/2/2021

H. Datum:
V. Datum:

Auger/Casing Type: HSA
I.D./O.D.: 4.5"/8.5"
Hmr Weight (lb.):
Hmr Fall (in.):
Other:

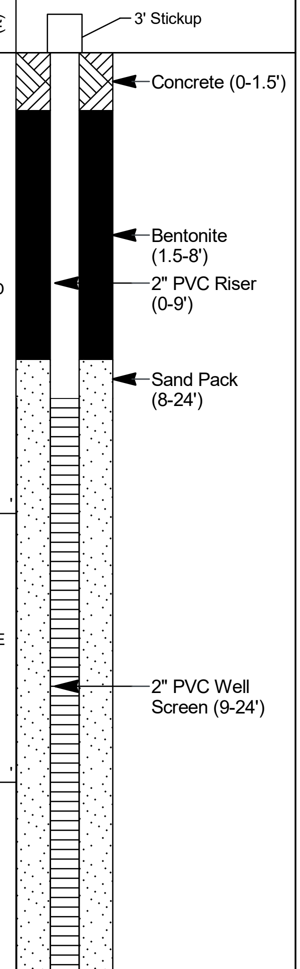
Sampler Type: Split Spoon
I.D./O.D (in.): 1.375"/2"
Sampler Hmr Wt: 140
Sampler Hmr Fall: 30
Other:

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
6/4/21	1235	16.98		

Depth (ft)	Casing Blows/ Core Rate Min/ft	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum Depth (ft)	Stratum Description
0		S-1	0-2					S-1: Tan, fine to medium SAND, some Gravel, little Silt (Fill).	1			
5		S-2	5-7	24	7	7 3 2 7	5	S-2: Very loose brown, fine to medium SANd, some Gravel, little Silt.				FINE TO MEDIUM SAND
10		S-3	10-12	24	7	2 3 2 3	5	S-3: Very loose, GRAVEL and fine to medium SAND, little Silt.				
		S-4	12-14	24	15	3 5 6 5	11	S-4: (Top 10") Loose, tan-orange, fine to coarse SAND, little Silt, little Gravel. S-4: (Bottom 5") Loose, tan, fine to coarse SAND, little Gravel, trace Silt, wet/moist.			12'	FINE TO VERY COARSE SAND
15		S-5	17-19	24	15	7 6 7 7	13	S-5: Brown, fine to very coarse SAND, little Gravel, little Silt, wet.				
20									2		19'	
25								Bottom of boring at 24 feet.				
30												

Equipment Installed



REMARKS

1. Manually excavated to 30 to 36 inches below ground surface (bgs) to pre-clear location.
2. No samples collected between 19 and 24 feet bgs. Augered to final depth to install well.

See log key for explanation of sample descriptions and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-1

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Well Design and Installation
151 & 153 Taylor Street
Littleton, Massachusetts

BORING NO.: GZ-2
SHEET: 1 of 1
PROJECT NO: 01.0175200.00
REVIEWED BY: JRP

Drilling Co.:	Drilex Environmental, Inc.	**Type of Rig:** Track Mounted	**Boring Location:** See Plan	**H. Datum:**	
Foreman:	Jamie	**Rig Model:** CME-55	**Ground Surface Elev. (ft.):**		
Logged By:	Matthew McGavick	**Drilling Method:** HSA	**Final Boring Depth (ft.):** 23	**V. Datum:**	
			Date Start - Finish: 6/2/2021 - 6/2/2021		

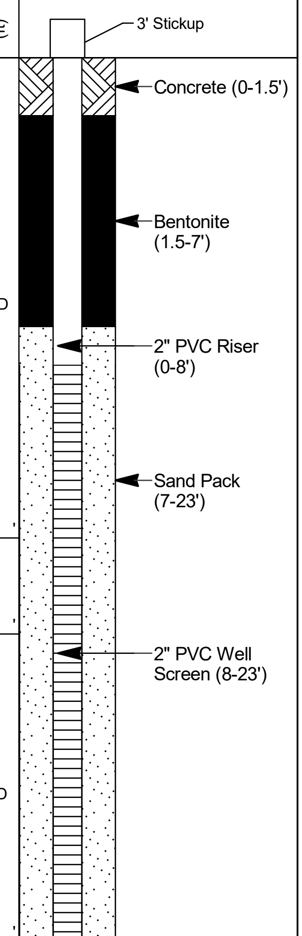
Auger/Casing Type:	HSA	**Sampler Type:**	Split Spoon
I.D./O.D.:	4.5"/8.5"	**I.D./O.D (in.):**	1.375"/2"
Hmr Weight (lb.):		**Sampler Hmr Wt:**	140
Hmr Fall (in.):		**Sampler Hmr Fall:**	30
Other:		**Other:**	

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
6/4/21	1350	19.02		

Depth (ft)	Casing Blows/ Core Rate Min/ft	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum Depth (ft)	Stratum Description	Elev. (ft)
								S-1: Tan, fine to medium SAND, some Gravel, little Silt (Fill).	1				
5		S-2	5-7	24	8	6 7 / 7 7	14	S-2: Loose, tan-brown, fine to coarse SAND, little Silt, little Gravel.				FINE TO COARSE SAND	
		S-3	7-9	24	13	7 6 / 8 10	14	S-3: (Top 8") Loose, tan-brown, fine to coarse SAND, little Silt, little Gravel. S-3: (Bottom 5") Tan, fine to coarse SAND, little Gravel, trace Silt.					
10		S-4	10-12	24	15	4 5 / 8 9	13	S-4: Loose, tan, fine to coarse SAND, little Gravel, trace Silt.					
		S-5	12-14	24	20	7 5 / 5 10	10	S-5: (Top 7") Tan, fine to coarse SAND, little Gravel, trace Silt. S-5: (Bottom 13") Loose, tan, fine SAND, little Silt, bottom half wet.			12.5'	FINE SAND	
15											15'		
		S-6	17-19	24	24	4 5 / 3 3	8	S-6: Loose, tan, fine to medium SAND, little Silt, wet.				FINE TO MEDIUM SAND	
20									2				
											23'		
								Bottom of boring at 23 feet.					
25													
30													

Equipment Installed



REMARKS

1. Manually excavated to 30 to 36 inches below ground surface (bgs) to pre-clear location.
2. No samples collected between 19 and 23 feet bgs. Augered to final depth to install well.

See log key for explanation of sample descriptions and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-2

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Well Design and Installation
151 & 153 Taylor Street
Littleton, Massachusetts

BORING NO.: GZ-3
SHEET: 1 of 1
PROJECT NO: 01.0175200.00
REVIEWED BY: JRP

Drilling Co.: Drilex Environmental, Inc.	**Type of Rig:** Track Mounted	**Boring Location:** See Plan	**H. Datum:**
Foreman: Jamie	**Rig Model:** CME-55	**Ground Surface Elev. (ft.):**	**V. Datum:**
Logged By: Matthew McGavick	**Drilling Method:** HSA	**Final Boring Depth (ft.):** 14	
		Date Start - Finish: 6/2/2021 - 6/2/2021	

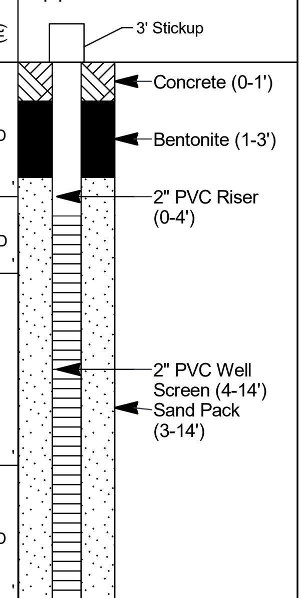
Auger/Casing Type: HSA	**Sampler Type:** Split Spoon
I.D./O.D.: 4.5"/8.5"	**I.D./O.D (in.):** 1.375"/2"
Hmr Weight (lb.):	**Sampler Hmr Wt:** 140
Hmr Fall (in.):	**Sampler Hmr Fall:** 30
Other:	**Other:**

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
6/4/21	1500	9.21		

Depth (ft)	Casing Blows/ Core Rate Min/ft	Sample No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum Depth (ft)	Stratum Description
		S-1	1-3	24	15	2 3 4 4	7	S-1: (Top 13") Loose, dark brown, fine to medium SAND, some Silt, trace Gravel. S-1: (Bottom 2") Loose, tan-orange, fine to medium SAND, little Silt, little Gravel.	1			FINE TO MEDIUM SAND
		S-2	3-5	24	14	4 10 7 5	17	S-2: (Top 8") Loose, tan-orange, fine to medium SAND, little Silt, little Gravel. S-2: (Bottom 6") Loose, tan, fine to coarse SAND, little Gravel, trace Silt.			3.5'	FINE TO COARSE SAND
5		S-3	5-7	24	16	3 4 5 5	9	S-3: (Top 5") Loose, tan, fine to coarse SAND, little Gravel, trace Silt, moist. S-3: (Bottom 11") Loose, tan, fine SAND, little Silt, wet.			5.5'	FINE SAND
10		S-4	10-12	24	24	4 5 4 2	9	S-4: (Top 4") Loose, tan, SILT, little fine Sand, wet. S-4: (Bottom 20") Loose, tan, fine to medium SAND, trace Silt, wet.	2		10.5'	FINE TO MEDIUM SAND
											14'	
15								Bottom of boring at 14 feet.				
20												
25												
30												

Equipment Installed



REMARKS

1. Manually excavated to 14 inches below ground surface (bgs); found large root.
2. No samples collected between 12 and 14 feet bgs. Augered to final depth to install well.

See log key for explanation of sample descriptions and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-3

TEST BORING LOG

GZA GeoEnvironmental, Inc. *Engineers and Scientists*	Well Design and Installation 151 & 153 Taylor Street Littleton, Massachusetts	**BORING NO.:** GZ-4 **SHEET:** 1 of 1 **PROJECT NO:** 01.0175200.00 **REVIEWED BY:** JRP

Drilling Co.: Drilex Environmental, Inc. **Foreman:** Jamie **Logged By:** Matthew McGavick	**Type of Rig:** Track Mounted **Rig Model:** CME-55 **Drilling Method:** HSA	**Boring Location:** See Plan **Ground Surface Elev. (ft.):** **Final Boring Depth (ft.):** 21 **Date Start - Finish:** 6/2/2021 - 6/2/2021	**H. Datum:** **V. Datum:**

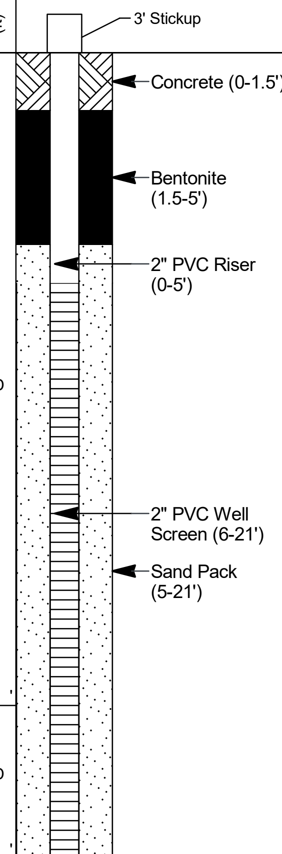
Auger/Casing Type: HSA **I.D./O.D.:** 4.5"/8.5" **Hmr Weight (lb.):** **Hmr Fall (in.):** **Other:**	**Sampler Type:** Split Spoon **I.D./O.D (in.):** 1.375"/2" **Sampler Hmr Wt:** 140 **Sampler Hmr Fall:** 30 **Other:**

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
6/4/21	1120	15.48		

Depth (ft)	Casing Blows/ Core Rate Min/ft	Sample No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum Description
									1		
									2		
5		S-1	5-7	24	6	7 11 6 7	17	S-1: Loose, brown, fine to medium SAND, some Gravel, little Silt.			FINE TO MEDIUM SAND
10		S-2	10-12	24	0	8 16 16 20	32	S-2: No recovery. Bottom half of spoon wet.			
		S-3	12-14	24	15	33 46 46 36	92	S-3: Dense, tan-gray, fine to medium SAND, some Silt, some Gravel, wet.			
15											17'
		S-4	17-19	24	18	24 30 32 33	62	S-4: Dense, tan, fine to medium SAND and SILT, little Gravel. Till-like material.	3		FINE TO MEDIUM SAND AND SILT
20											21'
								Bottom of boring at 21 feet.			
25											
30											

Equipment Installed



REMARKS

1. Manually excavated to 30 to 34 inches below ground surface to pre-clear location.
2. The drilling auger encountered an apparent boulder at approximately 9 feet and shifted laterally. This shift caused the augers to encounter and damage a small gauge electrical line serving the adjacent street lights.
3. No samples collected between 19 and 21 feet bgs. Augered to final depth to install well.

See log key for explanation of sample descriptions and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-4

Attachment D - HydroCAD Reports

Stormwater Discharge Summary Table

Taylor Street Well and Raw Water Main
Littleton, MA
December 14, 2023

		Peak Discharge (CFS)	
Analysis Point	**24-Hr Storm Event**	**Pre-Development**	**Post-Development**
A	2-YR	0.00	0.00
	10-YR	0.18	0.13
	25-YR	1.08	0.81
	50-YR	2.27	2.01
	100-YR	4.07	3.59

REVISED 12/14/23

NOAA Atlas 14, Volume 10, Version 3
Location name: Littleton, Massachusetts, USA*
Latitude: 42.5185°, Longitude: -71.5132°
Elevation: 243 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.326 (0.254-0.411)	0.388 (0.302-0.490)	0.489 (0.381-0.620)	0.572 (0.442-0.729)	0.687 (0.515-0.912)	0.773 (0.568-1.05)	0.865 (0.617-1.21)	0.970 (0.654-1.38)	1.12 (0.729-1.66)	1.25 (0.792-1.88)
10-min	0.462 (0.360-0.583)	0.549 (0.428-0.694)	0.692 (0.538-0.877)	0.811 (0.626-1.03)	0.974 (0.729-1.29)	1.10 (0.805-1.48)	1.23 (0.874-1.72)	1.38 (0.927-1.96)	1.59 (1.03-2.34)	1.77 (1.12-2.66)
15-min	0.543 (0.424-0.686)	0.646 (0.504-0.816)	0.814 (0.633-1.03)	0.954 (0.737-1.22)	1.15 (0.858-1.52)	1.29 (0.947-1.75)	1.44 (1.03-2.02)	1.62 (1.09-2.31)	1.87 (1.21-2.76)	2.09 (1.32-3.13)
30-min	0.737 (0.576-0.931)	0.878 (0.685-1.11)	1.11 (0.861-1.40)	1.30 (1.00-1.65)	1.56 (1.17-2.07)	1.76 (1.29-2.38)	1.96 (1.40-2.75)	2.20 (1.48-3.14)	2.55 (1.65-3.76)	2.84 (1.80-4.26)
60-min	0.932 (0.727-1.18)	1.11 (0.865-1.40)	1.40 (1.09-1.77)	1.64 (1.27-2.09)	1.97 (1.48-2.62)	2.22 (1.63-3.01)	2.48 (1.77-3.49)	2.79 (1.88-3.98)	3.23 (2.09-4.76)	3.60 (2.28-5.40)
2-hr	1.18 (0.926-1.47)	1.42 (1.12-1.78)	1.82 (1.43-2.29)	2.15 (1.68-2.72)	2.61 (1.97-3.45)	2.95 (2.18-3.98)	3.31 (2.39-4.64)	3.75 (2.54-5.31)	4.42 (2.87-6.45)	4.98 (3.16-7.41)
3-hr	1.35 (1.07-1.68)	1.64 (1.30-2.05)	2.12 (1.67-2.65)	2.51 (1.96-3.16)	3.05 (2.32-4.02)	3.45 (2.57-4.64)	3.89 (2.82-5.44)	4.42 (3.00-6.23)	5.23 (3.41-7.61)	5.93 (3.77-8.78)
6-hr	1.72 (1.38-2.13)	2.10 (1.67-2.60)	2.72 (2.16-3.37)	3.23 (2.55-4.02)	3.93 (3.01-5.13)	4.45 (3.34-5.94)	5.02 (3.66-6.97)	5.71 (3.89-7.98)	6.78 (4.43-9.77)	7.70 (4.91-11.3)
12-hr	2.19 (1.76-2.68)	2.66 (2.14-3.26)	3.43 (2.74-4.22)	4.07 (3.24-5.03)	4.95 (3.81-6.40)	5.60 (4.22-7.40)	6.31 (4.63-8.67)	7.16 (4.90-9.92)	8.48 (5.56-12.1)	9.60 (6.15-14.0)
24-hr	2.62 (2.13-3.18)	3.20 (2.59-3.89)	4.14 (3.35-5.05)	4.93 (3.95-6.04)	6.01 (4.66-7.71)	6.81 (5.17-8.92)	7.68 (5.67-10.5)	8.73 (6.00-12.0)	10.3 (6.82-14.7)	11.7 (7.54-16.9)
2-day	2.97 (2.43-3.58)	3.66 (2.99-4.41)	4.79 (3.90-5.79)	5.73 (4.63-6.96)	7.02 (5.49-8.94)	7.97 (6.10-10.4)	9.01 (6.70-12.2)	10.3 (7.10-14.0)	12.3 (8.12-17.2)	14.0 (9.02-20.0)
3-day	3.24 (2.67-3.88)	3.98 (3.27-4.78)	5.20 (4.25-6.25)	6.20 (5.04-7.50)	7.58 (5.96-9.61)	8.60 (6.61-11.1)	9.72 (7.26-13.1)	11.1 (7.68-15.0)	13.2 (8.76-18.5)	15.1 (9.72-21.4)
4-day	3.50 (2.89-4.18)	4.27 (3.52-5.10)	5.52 (4.53-6.62)	6.56 (5.35-7.91)	8.00 (6.30-10.1)	9.06 (6.98-11.7)	10.2 (7.63-13.7)	11.6 (8.07-15.7)	13.8 (9.16-19.2)	15.7 (10.1-22.2)
7-day	4.21 (3.50-4.99)	5.02 (4.17-5.96)	6.34 (5.24-7.55)	7.44 (6.11-8.90)	8.95 (7.08-11.2)	10.1 (7.79-12.8)	11.3 (8.44-14.9)	12.7 (8.87-17.0)	14.9 (9.93-20.6)	16.8 (10.9-23.6)
10-day	4.89 (4.08-5.77)	5.72 (4.77-6.76)	7.08 (5.89-8.40)	8.21 (6.78-9.78)	9.77 (7.76-12.1)	10.9 (8.47-13.8)	12.2 (9.10-16.0)	13.6 (9.52-18.1)	15.7 (10.5-21.6)	17.5 (11.4-24.5)
20-day	6.90 (5.81-8.07)	7.79 (6.56-9.13)	9.26 (7.76-10.9)	10.5 (8.71-12.4)	12.1 (9.69-14.8)	13.4 (10.4-16.7)	14.7 (11.0-18.9)	16.1 (11.3-21.2)	18.0 (12.1-24.5)	19.5 (12.7-27.0)
30-day	8.57 (7.26-9.97)	9.51 (8.05-11.1)	11.1 (9.32-12.9)	12.3 (10.3-14.5)	14.1 (11.3-17.1)	15.5 (12.0-19.1)	16.8 (12.5-21.3)	18.2 (12.9-23.8)	19.9 (13.4-26.9)	21.2 (13.8-29.3)
45-day	10.6 (9.06-12.3)	11.7 (9.91-13.5)	13.3 (11.3-15.5)	14.7 (12.3-17.1)	16.6 (13.3-19.9)	18.0 (14.1-22.0)	19.5 (14.5-24.4)	20.8 (14.8-27.0)	22.4 (15.1-30.1)	23.5 (15.4-32.2)
60-day	12.4 (10.6-14.3)	13.5 (11.5-15.5)	15.2 (12.9-17.6)	16.6 (14.0-19.4)	18.6 (15.0-22.3)	20.2 (15.8-24.5)	21.7 (16.1-27.0)	23.0 (16.4-29.8)	24.5 (16.6-32.8)	25.6 (16.7-34.9)

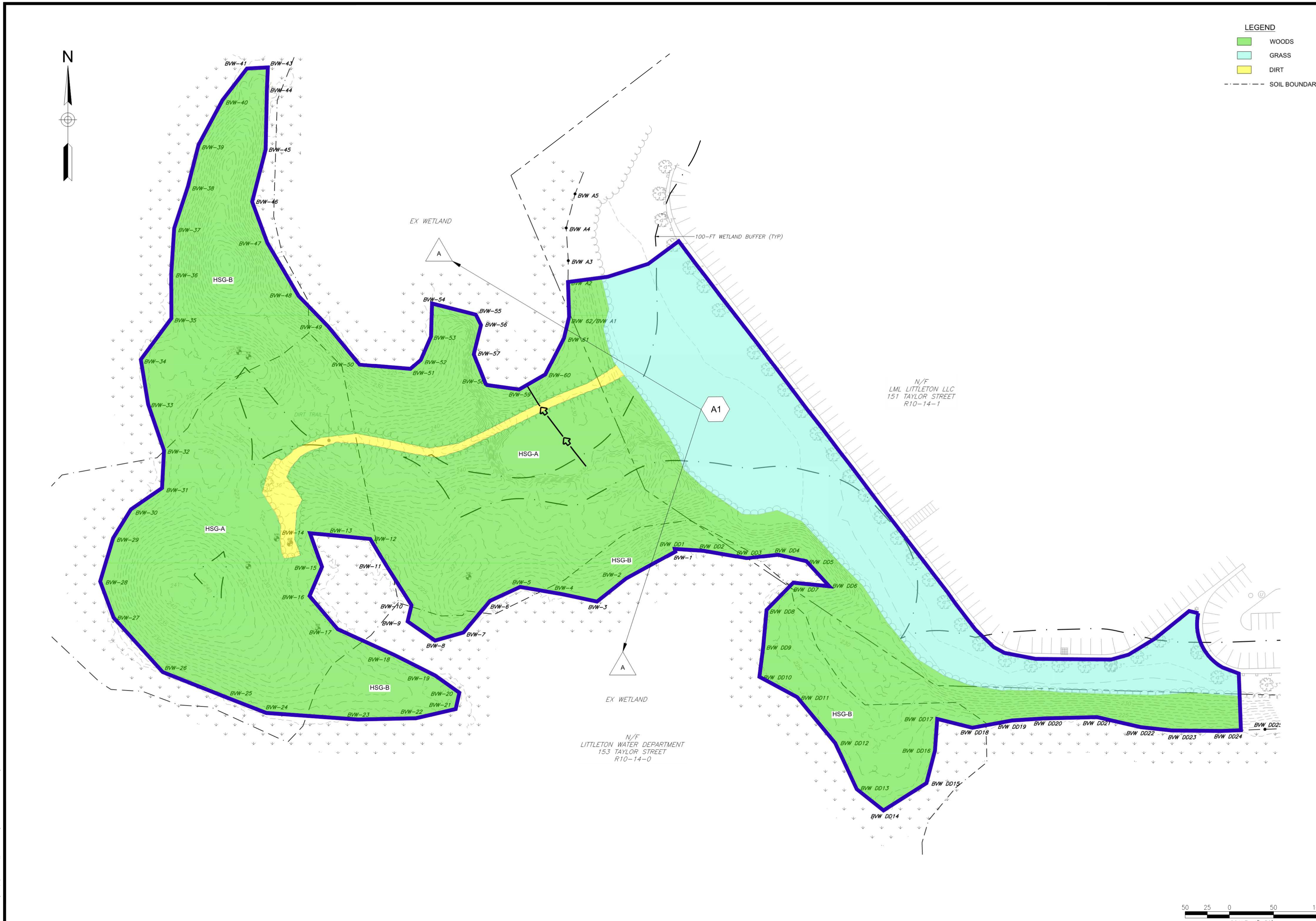
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



Project:

LITTLETON WATER DEPARTMENT

TAYLOR STREET WELL AND RAW WATER MAIN

151 & 153 TAYLOR STREET, LITTLETON, MA 01460

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description
1	12/14/23	PER PEER REVIEW

Seal:

Issued For:

PERMITTING - NOT FOR CONSTRUCTION

Scale:	AS SHOWN
Date:	OCTOBER 16, 2023
Drawn By:	AKG
Reviewed By:	JIP
Approved By:	JIP
W&S Project No.:	ENG23-0679
W&S File No.:	

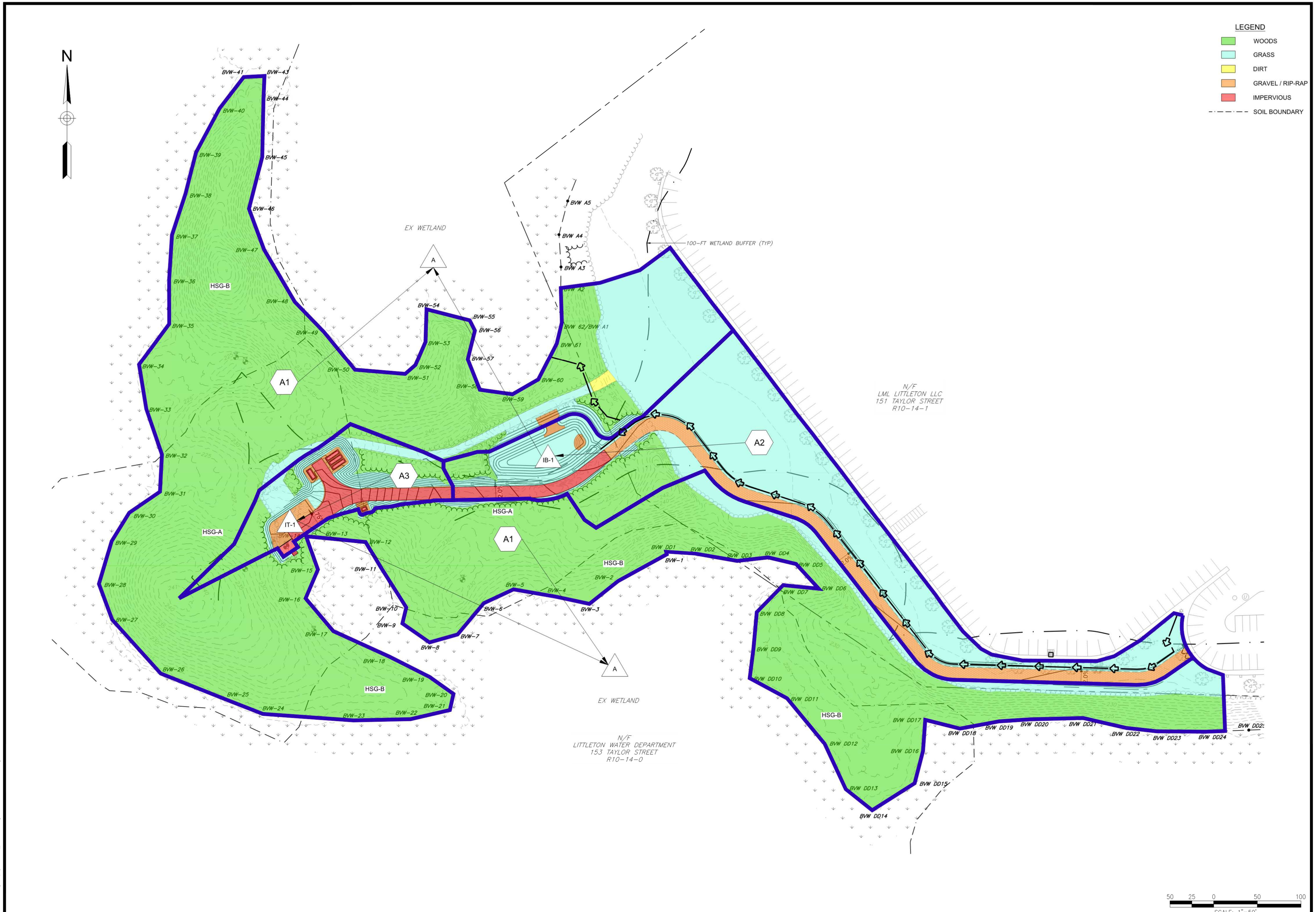
Drawing Title:

EXISTING HYDROLOGIC MAP

Sheet Number:

FIG-1

Rev: 1.8 Date: 10/24/2019



Project:

LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

TAYLOR STREET WELL AND RAW WATER MAIN

151 & 153 TAYLOR STREET, LITTLETON, MA 01460

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1	12/14/23	PER PEER REVIEW

Seal:

Issued For:

PERMITTING - NOT FOR CONSTRUCTION

Scale: AS SHOWN

Date: OCTOBER 16, 2023

Drawn By: AKG

Reviewed By: JIP

Approved By: JIP

W&S Project No.: ENG23-0679

W&S File No.:

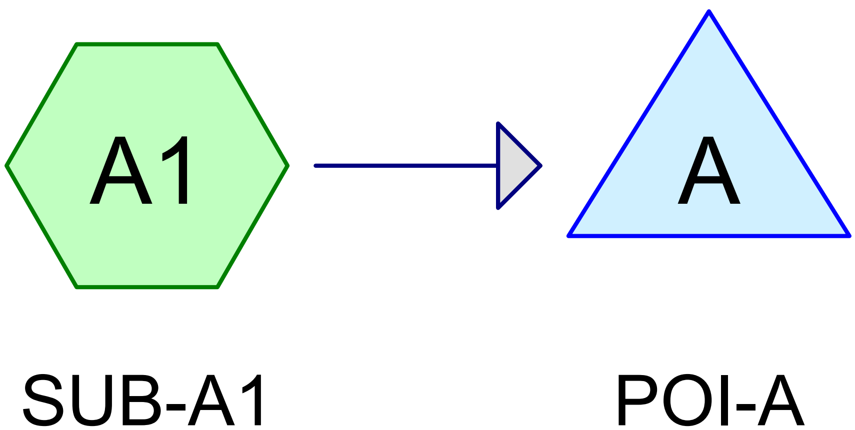
Drawing Title:

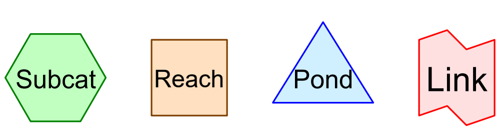
PROPOSED HYDROLOGIC MAP

Sheet Number:

FIG-2

Rev: 1.8 Date: 10/24/2019





Routing Diagram for EX-HydroCAD
Prepared by Weston & Sampson Engineers, Inc, Printed 12/7/2023

REVISED 12/14/23

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Yr	Type III 24-hr		Default	24.00	1	3.20	2
2	10-Yr	Type III 24-hr		Default	24.00	1	4.93	2
3	25-Yr	Type III 24-hr		Default	24.00	1	6.01	2
4	50-Yr	Type III 24-hr		Default	24.00	1	6.81	2
5	100-Yr	Type III 24-hr		Default	24.00	1	7.68	2

REVISED 12/14/23

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
77,738	39	>75% Grass cover, Good, HSG A (A1)
6,735	72	Bare soil, HSG A (A1)
200,417	30	Woods, Good, HSG A (A1)
78,748	55	Woods, Good, HSG B (A1)
363,638	**38**	**TOTAL AREA**

REVISED 12/14/23

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
284,890	HSG A	A1
78,748	HSG B	A1
0	HSG C	
0	HSG D	
0	Other	
363,638		**TOTAL AREA**

REVISED 12/14/23

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
77,738	0	0	0	0	77,738	>75% Grass cover, Good	
6,735	0	0	0	0	6,735	Bare soil	
200,417	78,748	0	0	0	279,165	Woods, Good	
284,890	**78,748**	**0**	**0**	**0**	**363,638**	**TOTAL AREA**	

REVISED 12/14/23

Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentA1: SUB-A1 Runoff Area=363,638 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=114' Tc=14.0 min CN=38 Runoff=0.00 cfs 0 cf

Pond A: POI-A Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 363,638 sf Runoff Volume = 0 cf Average Runoff Depth = 0.00"
100.00% Pervious = 363,638 sf 0.00% Impervious = 0 sf

REVISED 12/14/23

Summary for Subcatchment A1: SUB-A1

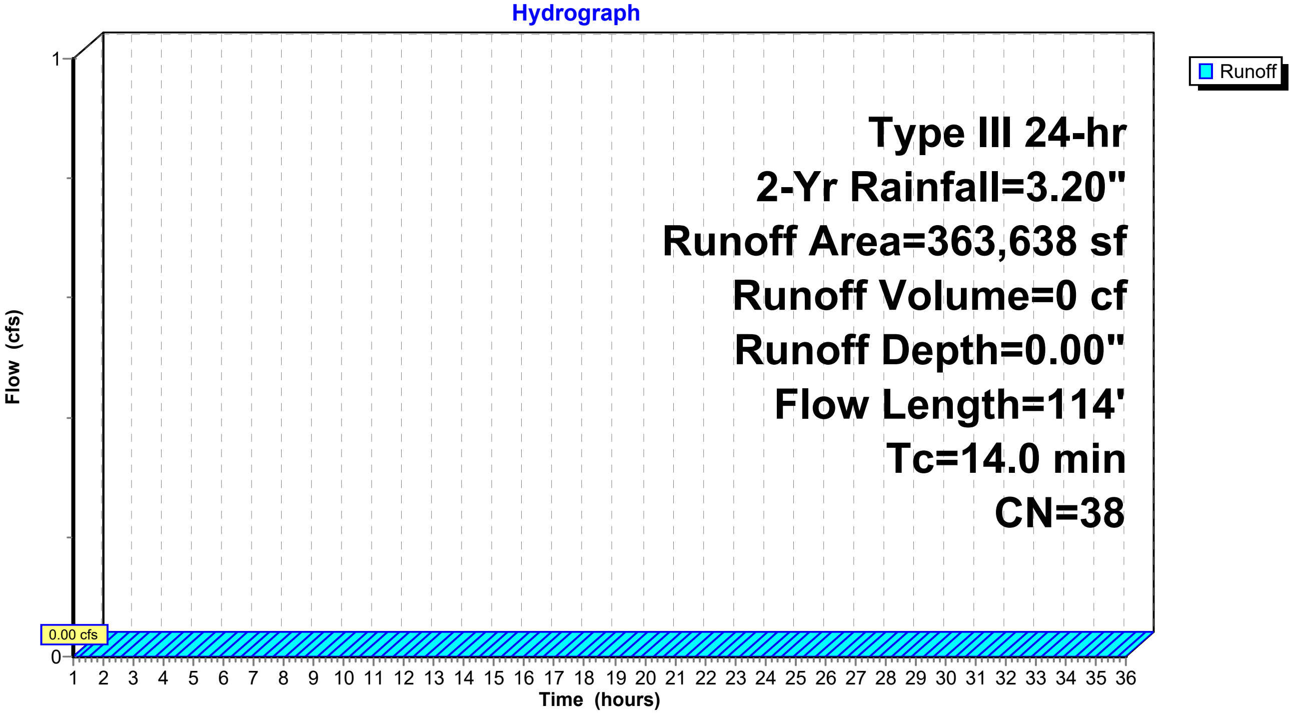
Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Pond A : POI-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.20"

	Area (sf)	CN	Description
	200,417	30	Woods, Good, HSG A
	78,748	55	Woods, Good, HSG B
	77,738	39	>75% Grass cover, Good, HSG A
*	6,735	72	Bare soil, HSG A
	363,638	38	Weighted Average
	363,638		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	50	0.0175	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
1.1	43	0.0175	0.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	21	0.2850	2.67		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.0	114	Total			

Subcatchment A1: SUB-A1



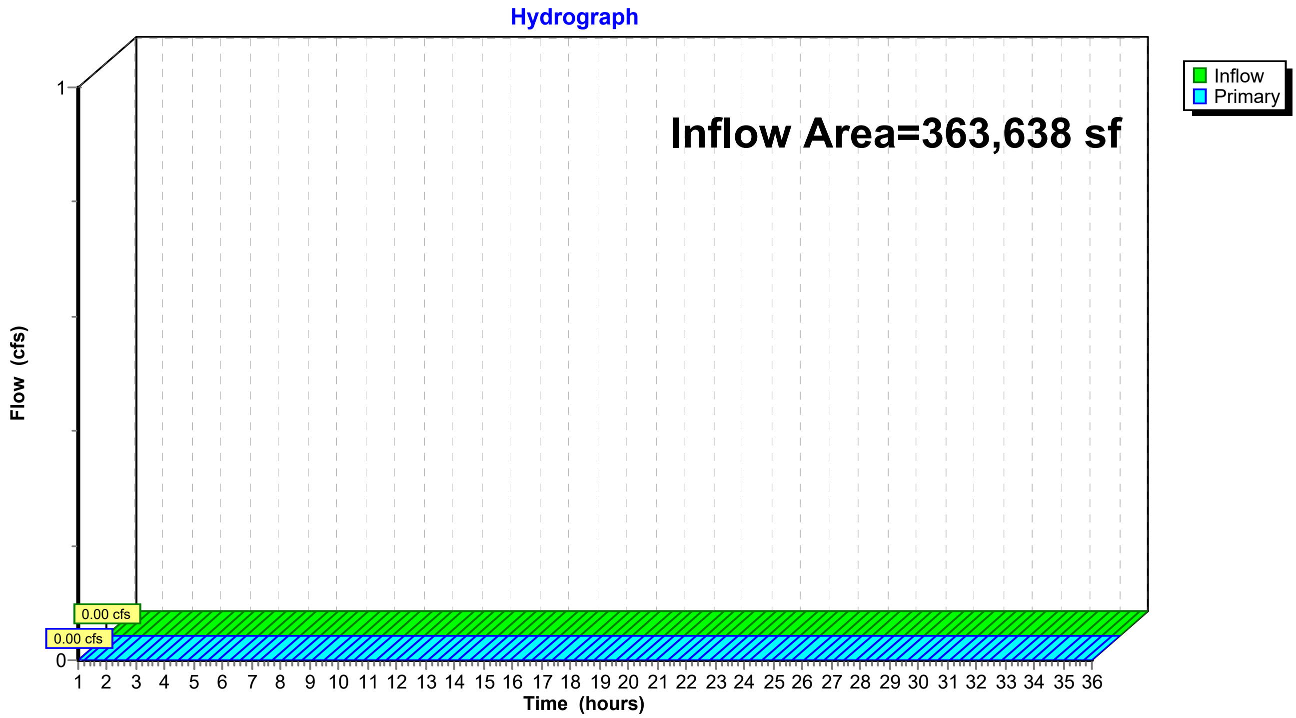
REVISED 12/14/23

Summary for Pond A: POI-A

Inflow Area =	363,638 sf,	0.00% Impervious,	Inflow Depth = 0.00"	for 2-Yr event
Inflow =	0.00 cfs @	1.00 hrs, Volume=	0 cf	
Primary =	0.00 cfs @	1.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2

Pond A: POI-A



REVISED 12/14/23

Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentA1: SUB-A1 Runoff Area=363,638 sf 0.00% Impervious Runoff Depth=0.15"
Flow Length=114' Tc=14.0 min CN=38 Runoff=0.18 cfs 4,682 cf

Pond A: POI-A Inflow=0.18 cfs 4,682 cf
Primary=0.18 cfs 4,682 cf

Total Runoff Area = 363,638 sf Runoff Volume = 4,682 cf Average Runoff Depth = 0.15"
100.00% Pervious = 363,638 sf 0.00% Impervious = 0 sf

REVISED 12/14/23

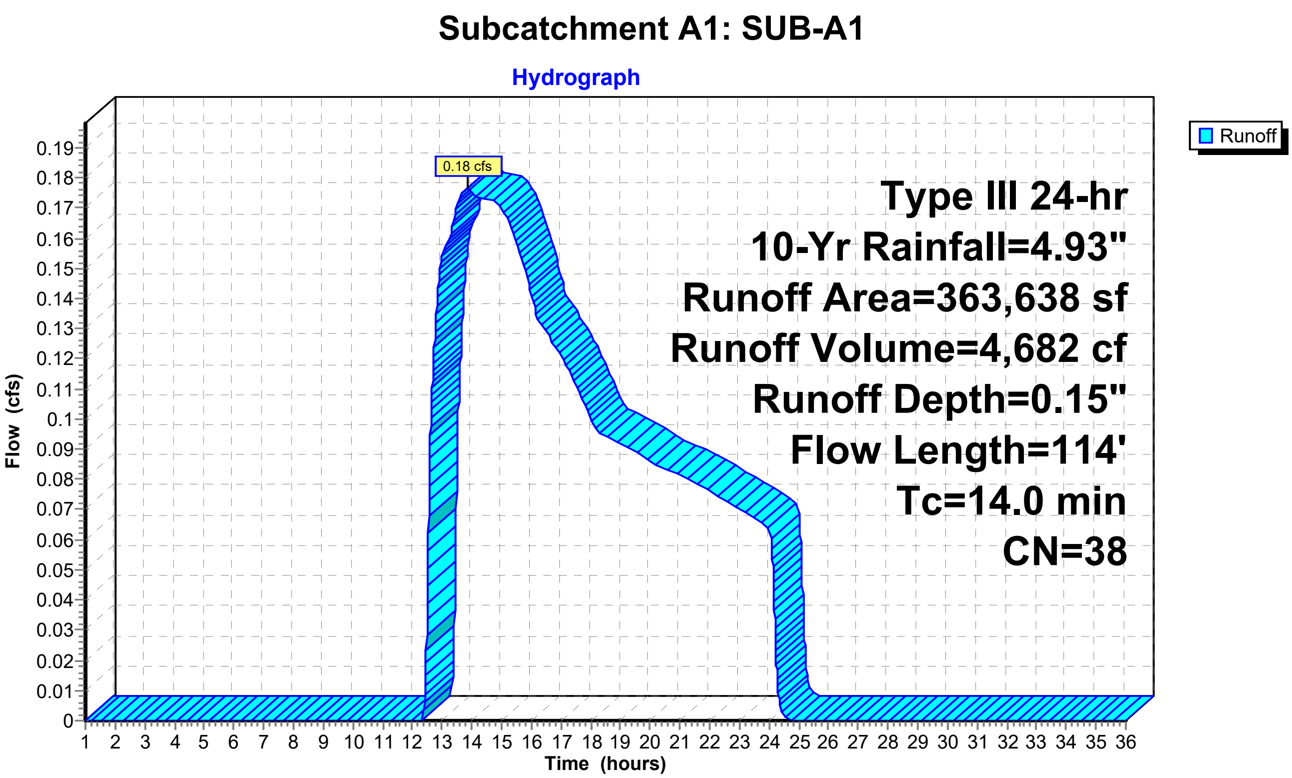
Summary for Subcatchment A1: SUB-A1

Runoff = 0.18 cfs @ 13.86 hrs, Volume= 4,682 cf, Depth= 0.15"
Routed to Pond A : POI-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.93"

	Area (sf)	CN	Description
	200,417	30	Woods, Good, HSG A
	78,748	55	Woods, Good, HSG B
	77,738	39	>75% Grass cover, Good, HSG A
*	6,735	72	Bare soil, HSG A
	363,638	38	Weighted Average
	363,638		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	50	0.0175	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
1.1	43	0.0175	0.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	21	0.2850	2.67		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.0	114	Total			



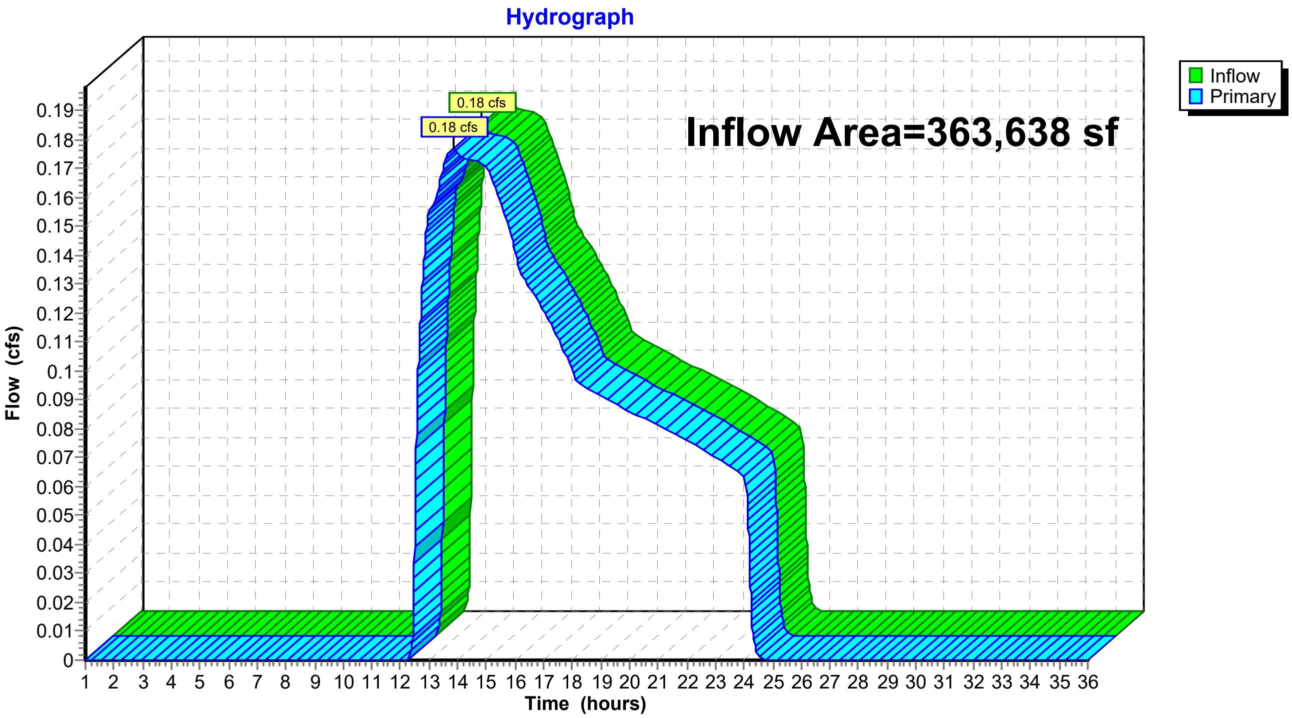
REVISED 12/14/23

Summary for Pond A: POI-A

Inflow Area = 363,638 sf, 0.00% Impervious, Inflow Depth = 0.15" for 10-Yr event
Inflow = 0.18 cfs @ 13.86 hrs, Volume= 4,682 cf
Primary = 0.18 cfs @ 13.86 hrs, Volume= 4,682 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2

Pond A: POI-A



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Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentA1: SUB-A1 Runoff Area=363,638 sf 0.00% Impervious Runoff Depth=0.40"
Flow Length=114' Tc=14.0 min CN=38 Runoff=1.08 cfs 11,994 cf

Pond A: POI-A Inflow=1.08 cfs 11,994 cf
Primary=1.08 cfs 11,994 cf

Total Runoff Area = 363,638 sf Runoff Volume = 11,994 cf Average Runoff Depth = 0.40"
100.00% Pervious = 363,638 sf 0.00% Impervious = 0 sf

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Summary for Subcatchment A1: SUB-A1

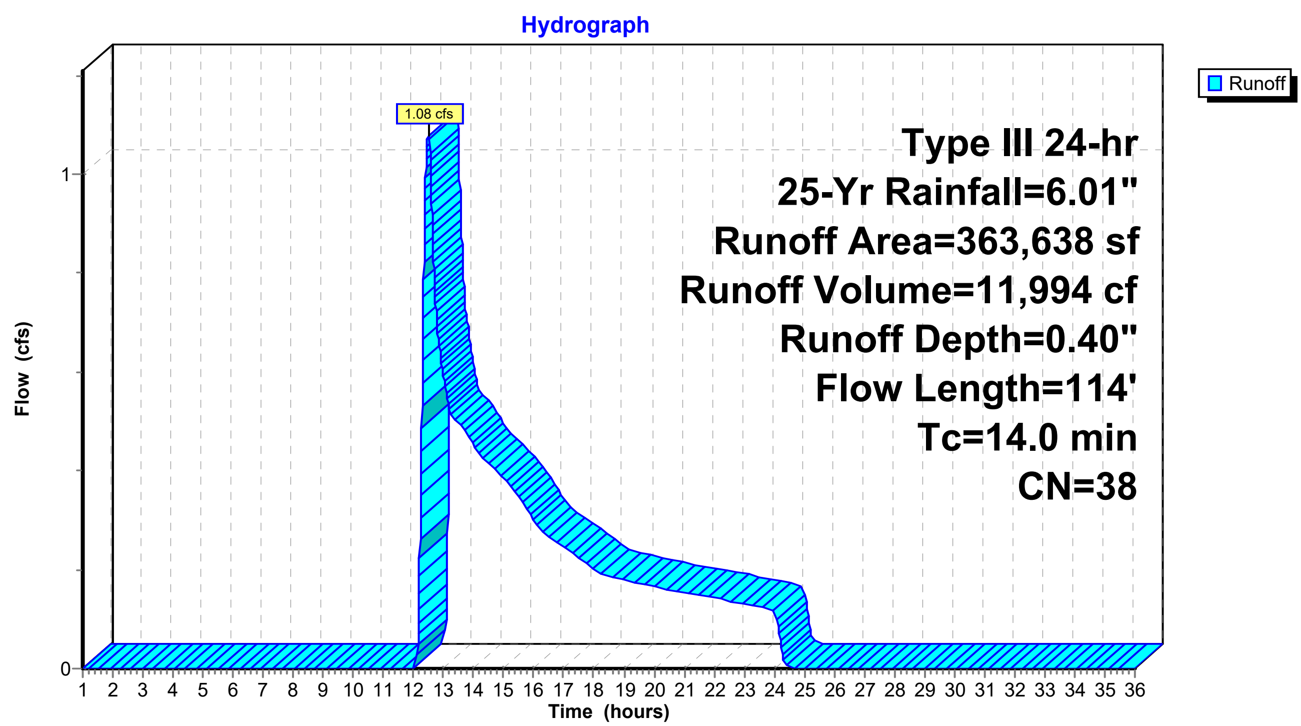
Runoff = 1.08 cfs @ 12.49 hrs, Volume= 11,994 cf, Depth= 0.40"
Routed to Pond A : POI-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.01"

	Area (sf)	CN	Description
	200,417	30	Woods, Good, HSG A
	78,748	55	Woods, Good, HSG B
	77,738	39	>75% Grass cover, Good, HSG A
*	6,735	72	Bare soil, HSG A
	363,638	38	Weighted Average
	363,638		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	50	0.0175	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
1.1	43	0.0175	0.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	21	0.2850	2.67		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.0	114	Total			

Subcatchment A1: SUB-A1



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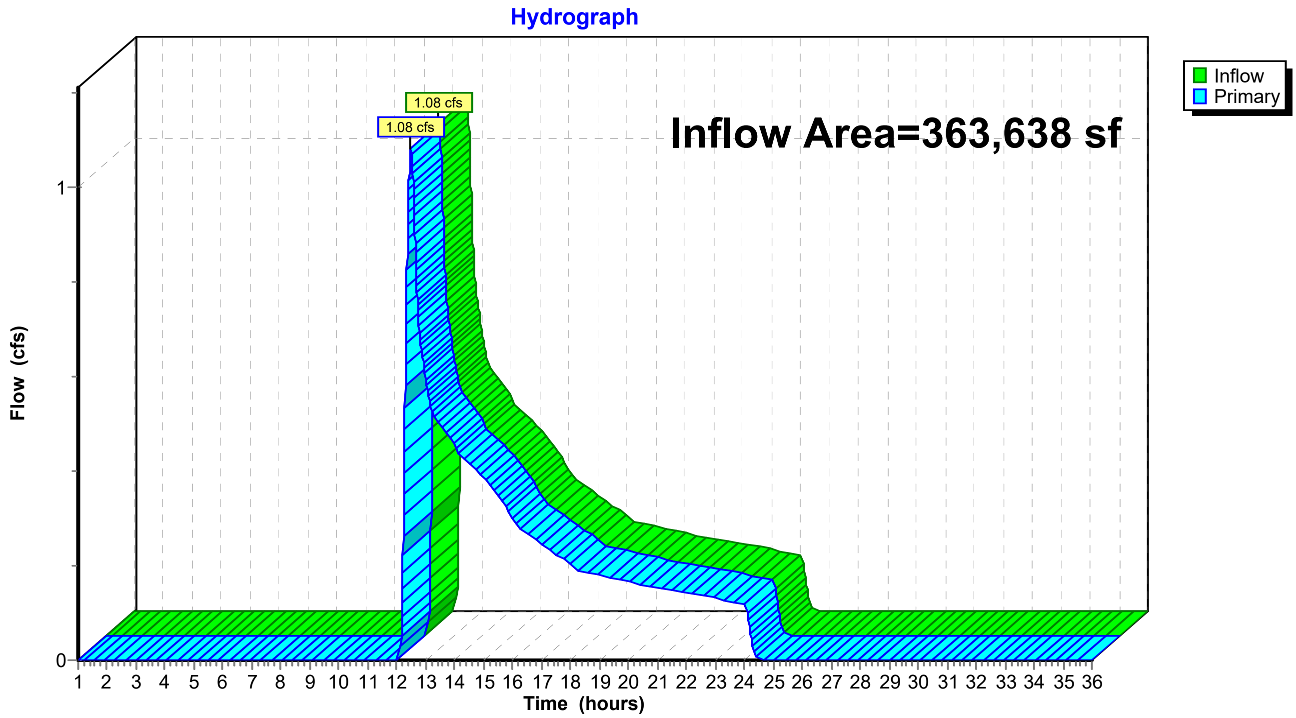
Summary for Pond A: POI-A

Inflow Area = 363,638 sf, 0.00% Impervious, Inflow Depth = 0.40" for 25-Yr event
Inflow = 1.08 cfs @ 12.49 hrs, Volume= 11,994 cf
Primary = 1.08 cfs @ 12.49 hrs, Volume= 11,994 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2

Pond A: POI-A



Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentA1: SUB-A1 Runoff Area=363,638 sf 0.00% Impervious Runoff Depth=0.63"
Flow Length=114' Tc=14.0 min CN=38 Runoff=2.27 cfs 19,193 cf

Pond A: POI-A Inflow=2.27 cfs 19,193 cf
Primary=2.27 cfs 19,193 cf

Total Runoff Area = 363,638 sf Runoff Volume = 19,193 cf Average Runoff Depth = 0.63"
100.00% Pervious = 363,638 sf 0.00% Impervious = 0 sf

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Summary for Subcatchment A1: SUB-A1

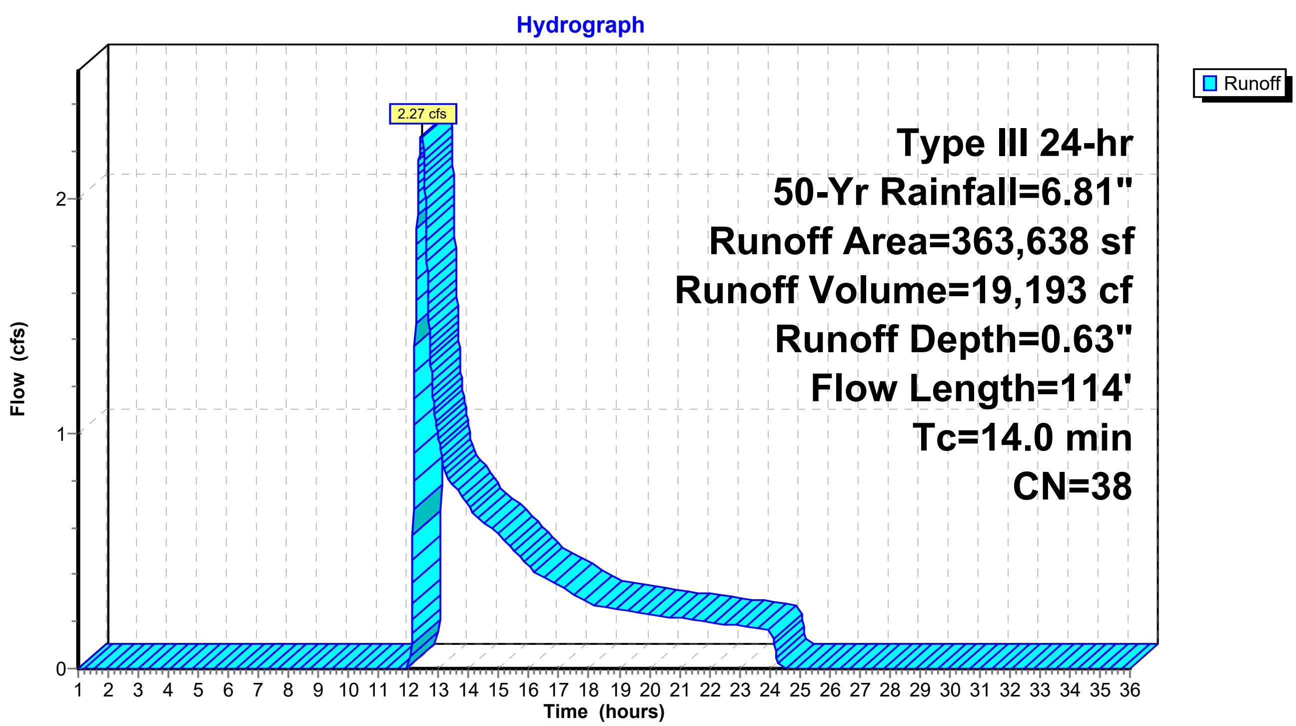
Runoff = 2.27 cfs @ 12.42 hrs, Volume= 19,193 cf, Depth= 0.63"
Routed to Pond A : POI-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=6.81"

	Area (sf)	CN	Description
	200,417	30	Woods, Good, HSG A
	78,748	55	Woods, Good, HSG B
	77,738	39	>75% Grass cover, Good, HSG A
*	6,735	72	Bare soil, HSG A
	363,638	38	Weighted Average
	363,638		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	50	0.0175	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
1.1	43	0.0175	0.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	21	0.2850	2.67		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.0	114	Total			

Subcatchment A1: SUB-A1



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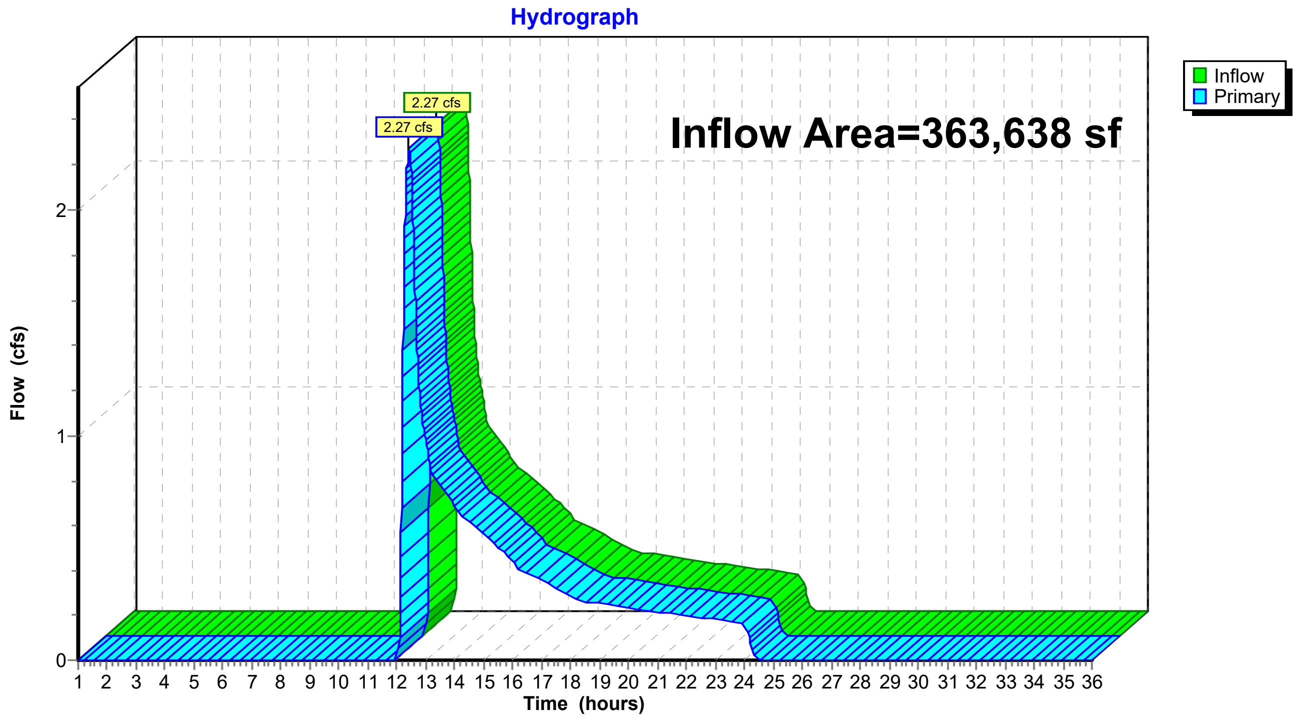
Summary for Pond A: POI-A

Inflow Area =	363,638 sf,	0.00% Impervious,	Inflow Depth = 0.63"	for 50-Yr event	
Inflow =	2.27 cfs @	12.42 hrs, Volume=	19,193 cf		
Primary =	2.27 cfs @	12.42 hrs, Volume=	19,193 cf,	Atten= 0%,	Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2

Pond A: POI-A



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Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentA1: SUB-A1 Runoff Area=363,638 sf 0.00% Impervious Runoff Depth=0.94"
Flow Length=114' Tc=14.0 min CN=38 Runoff=4.07 cfs 28,514 cf

Pond A: POI-A Inflow=4.07 cfs 28,514 cf
Primary=4.07 cfs 28,514 cf

Total Runoff Area = 363,638 sf Runoff Volume = 28,514 cf Average Runoff Depth = 0.94"
100.00% Pervious = 363,638 sf 0.00% Impervious = 0 sf

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Summary for Subcatchment A1: SUB-A1

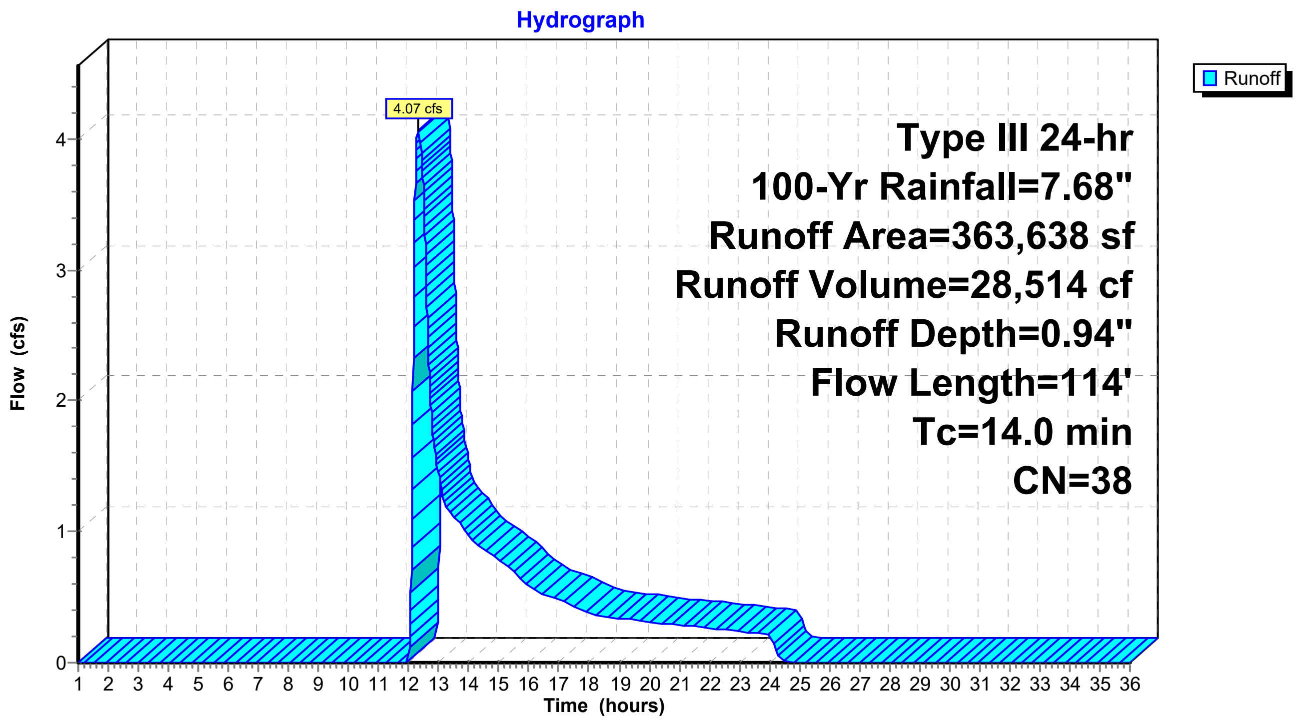
Runoff = 4.07 cfs @ 12.31 hrs, Volume= 28,514 cf, Depth= 0.94"
Routed to Pond A : POI-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=7.68"

	Area (sf)	CN	Description
	200,417	30	Woods, Good, HSG A
	78,748	55	Woods, Good, HSG B
	77,738	39	>75% Grass cover, Good, HSG A
*	6,735	72	Bare soil, HSG A
	363,638	38	Weighted Average
	363,638		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	50	0.0175	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
1.1	43	0.0175	0.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	21	0.2850	2.67		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.0	114	Total			

Subcatchment A1: SUB-A1



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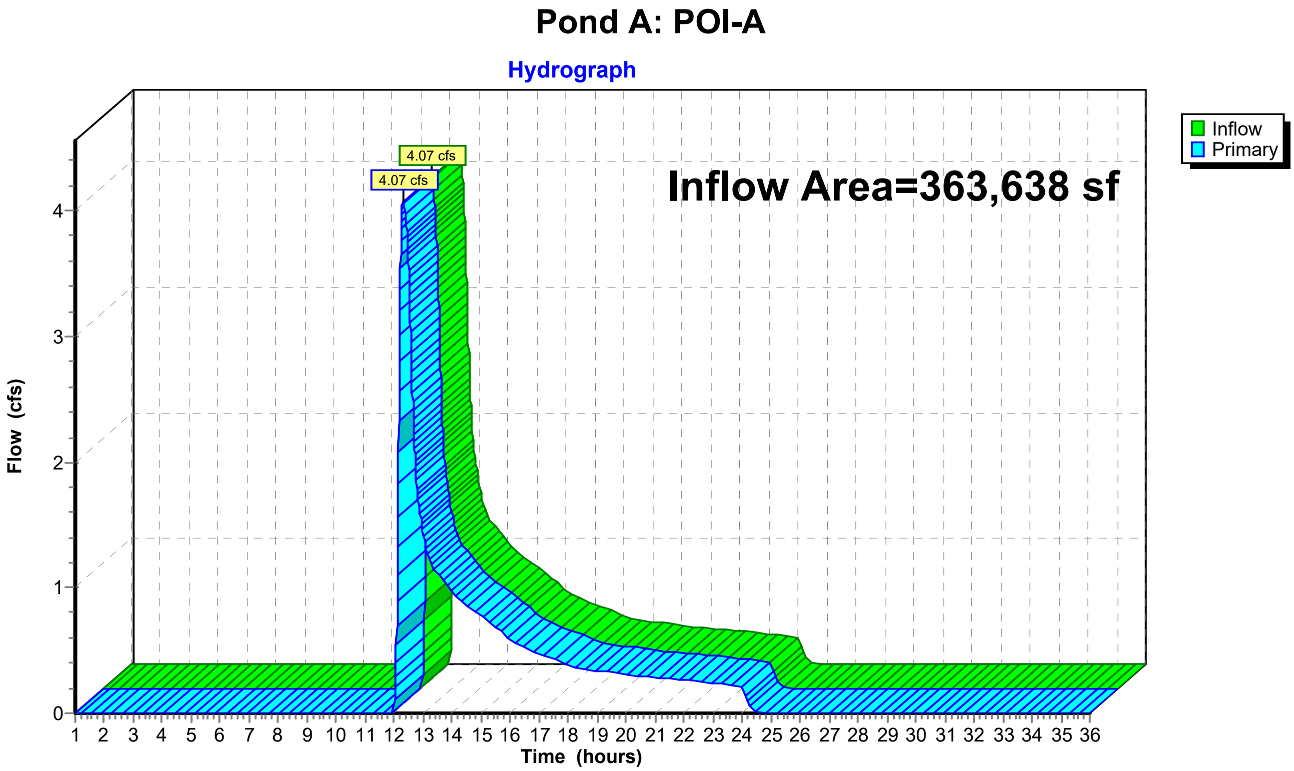
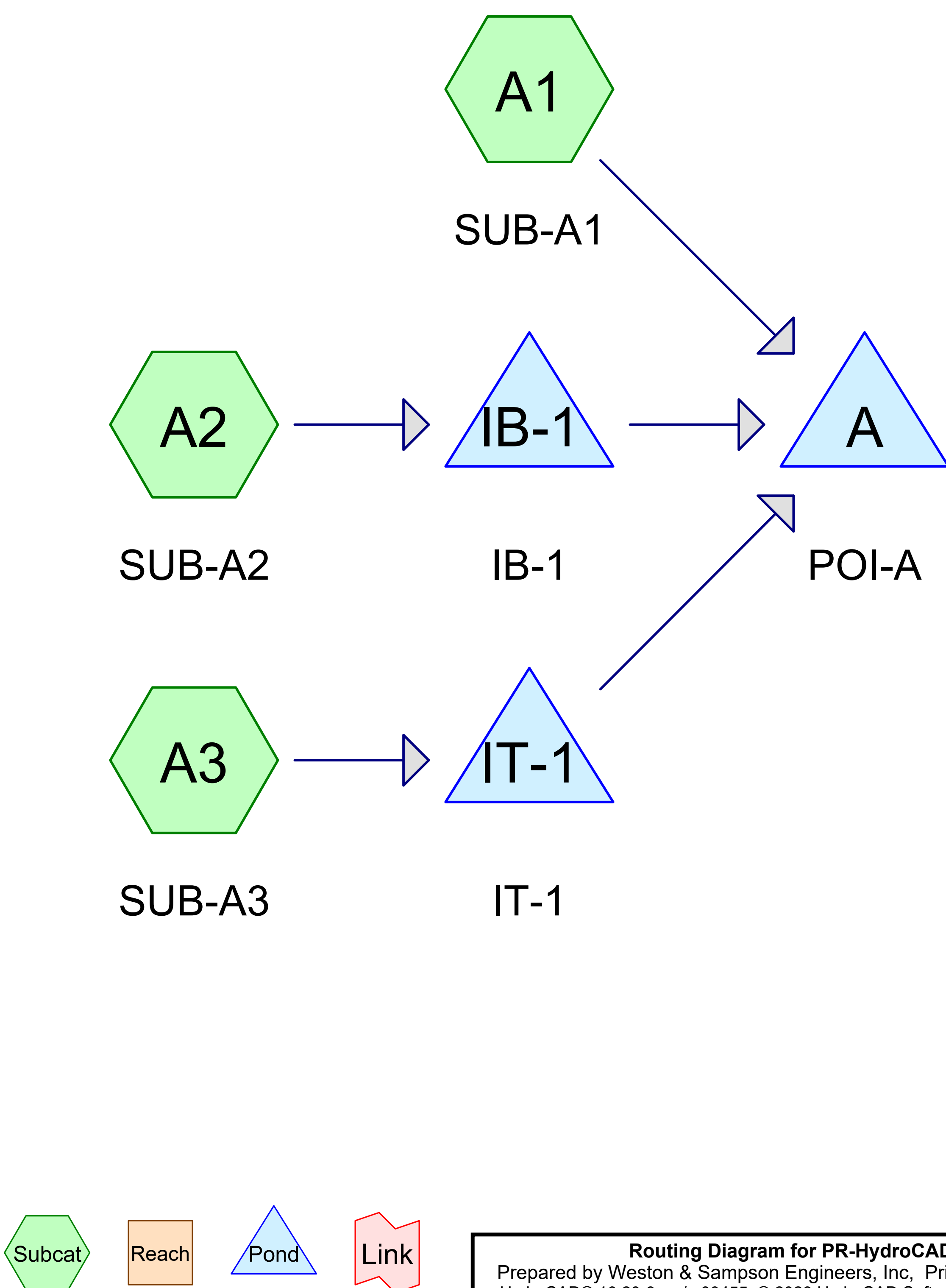
Summary for Pond A: POI-A

Inflow Area = 363,638 sf, 0.00% Impervious, Inflow Depth = 0.94" for 100-Yr event
Inflow = 4.07 cfs @ 12.31 hrs, Volume= 28,514 cf
Primary = 4.07 cfs @ 12.31 hrs, Volume= 28,514 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2





Routing Diagram for PR-HydroCAD
Prepared by Weston & Sampson Engineers, Inc, Printed 12/8/2023
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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Yr	Type III 24-hr		Default	24.00	1	3.20	2
2	10-Yr	Type III 24-hr		Default	24.00	1	4.93	2
3	25-Yr	Type III 24-hr		Default	24.00	1	6.01	2
4	50-Yr	Type III 24-hr		Default	24.00	1	6.81	2
5	100-Yr	Type III 24-hr		Default	24.00	1	7.68	2

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
87,828	39	>75% Grass cover, Good, HSG A (A1, A2, A3)
367	77	Bare soil, HSG A (A1)
11,455	76	Gravel driveway, HSG A (A2)
6,508	98	Paved driveway, HSG A (A2, A3)
2,335	76	Rip-rap / Crushed stone, HSG A (A2, A3)
289	76	Rip-rap, HSG A (A1)
240	98	Roofs, HSG A (A3)
419	98	Unconnected impervious, HSG A (A1, A3)
175,449	30	Woods, Good, HSG A (A1, A2, A3)
78,748	55	Woods, Good, HSG B (A1)
363,638	**41**	**TOTAL AREA**

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
284,890	HSG A	A1, A2, A3
78,748	HSG B	A1
0	HSG C	
0	HSG D	
0	Other	
363,638		**TOTAL AREA**

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
87,828	0	0	0	0	87,828	>75% Grass cover, Good	
367	0	0	0	0	367	Bare soil	
11,455	0	0	0	0	11,455	Gravel driveway	
6,508	0	0	0	0	6,508	Paved driveway	
289	0	0	0	0	289	Rip-rap	
2,335	0	0	0	0	2,335	Rip-rap / Crushed stone	
240	0	0	0	0	240	Roofs	
419	0	0	0	0	419	Unconnected impervious	
175,449	78,748	0	0	0	254,197	Woods, Good	
284,890	**78,748**	**0**	**0**	**0**	**363,638**	**TOTAL AREA**	

Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentA1: SUB-A1 Runoff Area=272,685 sf 0.01% Impervious Runoff Depth=0.00"
Flow Length=116' Tc=13.8 min CN=38 Runoff=0.00 cfs 0 cf

SubcatchmentA2: SUB-A2 Runoff Area=71,036 sf 3.73% Impervious Runoff Depth=0.06"
Flow Length=840' Tc=15.9 min CN=46 Runoff=0.01 cfs 341 cf

SubcatchmentA3: SUB-A3 Runoff Area=19,917 sf 22.48% Impervious Runoff Depth=0.17"
Tc=6.0 min UI Adjusted CN=52 Runoff=0.02 cfs 287 cf

Pond A: POI-A Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Pond IB-1: IB-1 Peak Elev=229.00' Storage=2 cf Inflow=0.01 cfs 341 cf
Discarded=0.01 cfs 341 cf Primary=0.00 cfs 0 cf Outflow=0.01 cfs 341 cf

Pond IT-1: IT-1 Peak Elev=222.49' Storage=2 cf Inflow=0.02 cfs 287 cf
Discarded=0.02 cfs 287 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 287 cf

Total Runoff Area = 363,638 sf Runoff Volume = 629 cf Average Runoff Depth = 0.02"
98.03% Pervious = 356,471 sf 1.97% Impervious = 7,167 sf

Summary for Subcatchment A1: SUB-A1

Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Pond A : POI-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.20"

	Area (sf)	CN	Description
	160,924	30	Woods, Good, HSG A
	78,748	55	Woods, Good, HSG B
	32,321	39	>75% Grass cover, Good, HSG A
*	289	76	Rip-rap, HSG A
*	367	77	Bare soil, HSG A
*	36	98	Unconnected impervious, HSG A
	272,685	38	Weighted Average
	272,649		99.99% Pervious Area
	36		0.01% Impervious Area
	36		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	50	0.0175	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.9	42	0.0240	0.77		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	24	0.3400	2.92		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.8	116	Total			

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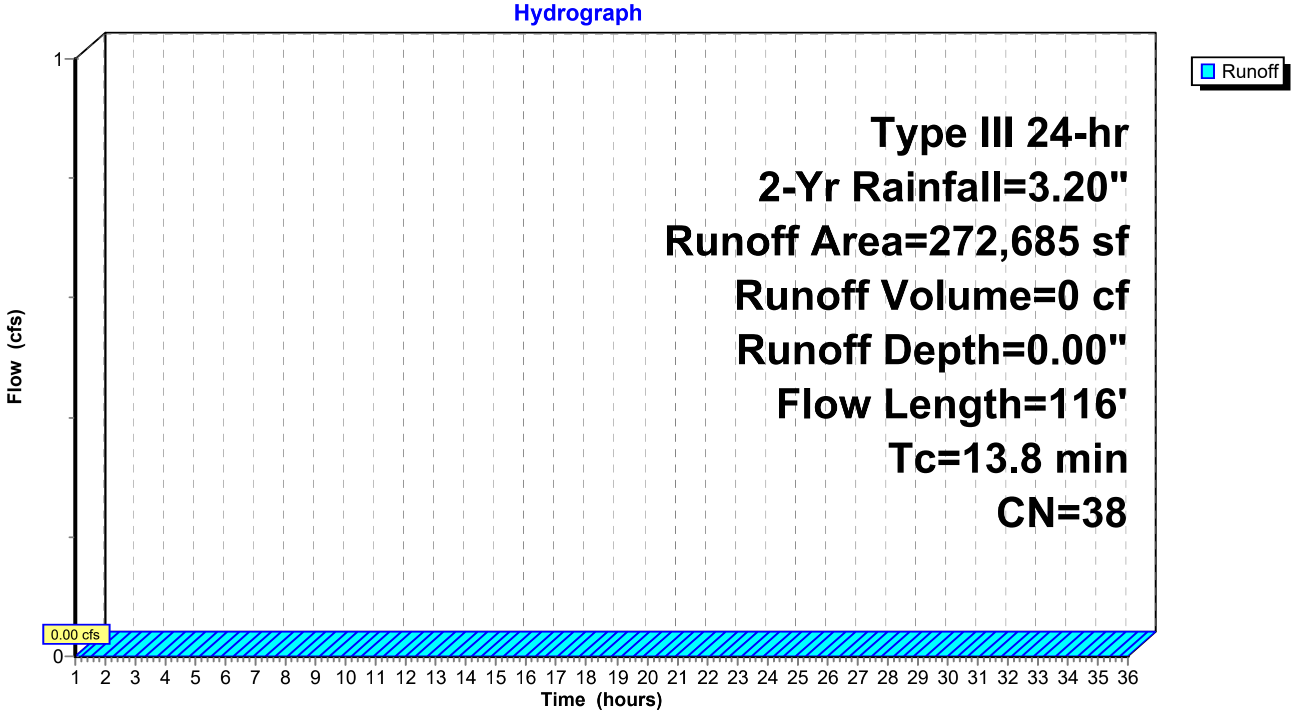
Subcatchment A1: SUB-A1



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Summary for Subcatchment A2: SUB-A2

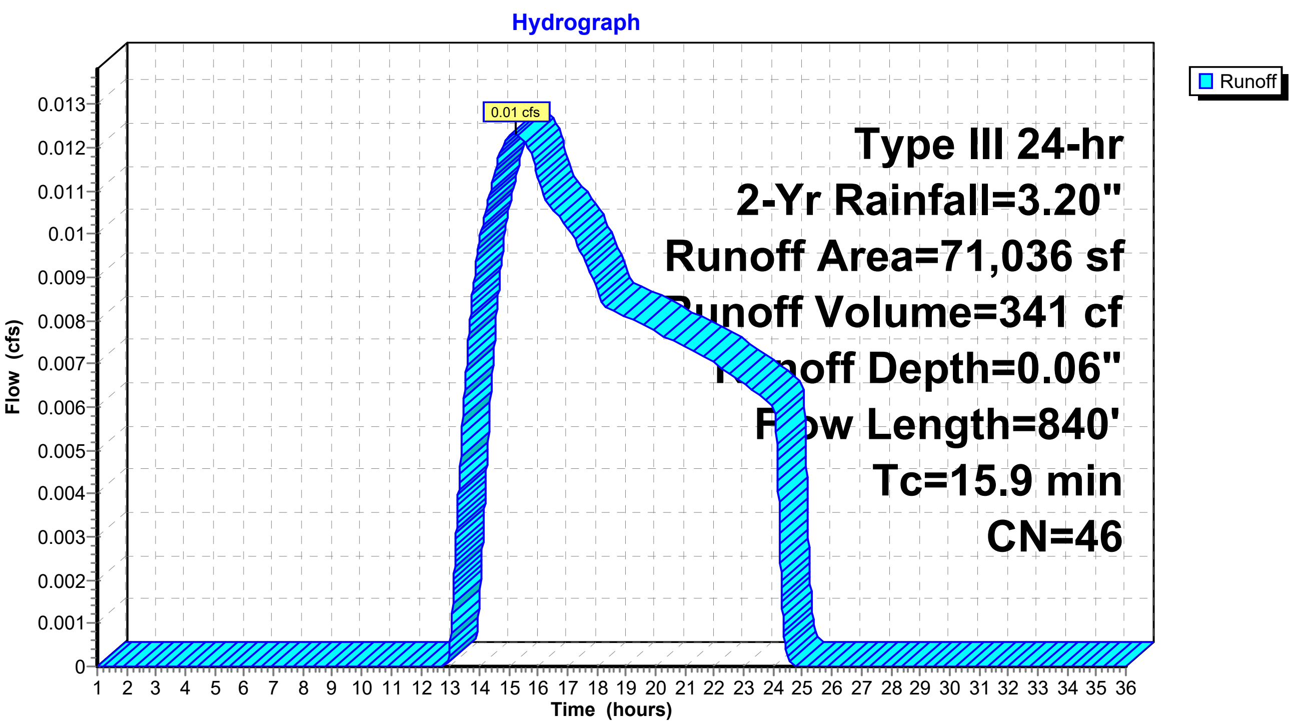
Runoff = 0.01 cfs @ 15.21 hrs, Volume= 341 cf, Depth= 0.06"
Routed to Pond IB-1 : IB-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.20"

	Area (sf)	CN	Description
	48,567	39	>75% Grass cover, Good, HSG A
*	11,455	76	Gravel driveway, HSG A
	7,961	30	Woods, Good, HSG A
*	2,653	98	Paved driveway, HSG A
*	400	76	Rip-rap / Crushed stone, HSG A
	71,036	46	Weighted Average
	68,383		96.27% Pervious Area
	2,653		3.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	45	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
10.8	795	0.0050	1.23	1.23	**Channel Flow,** Area= 1.0 sf Perim= 4.8' r= 0.21' n= 0.030 Earth, grassed & winding
15.9	840	Total			

Subcatchment A2: SUB-A2



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Summary for Subcatchment A3: SUB-A3

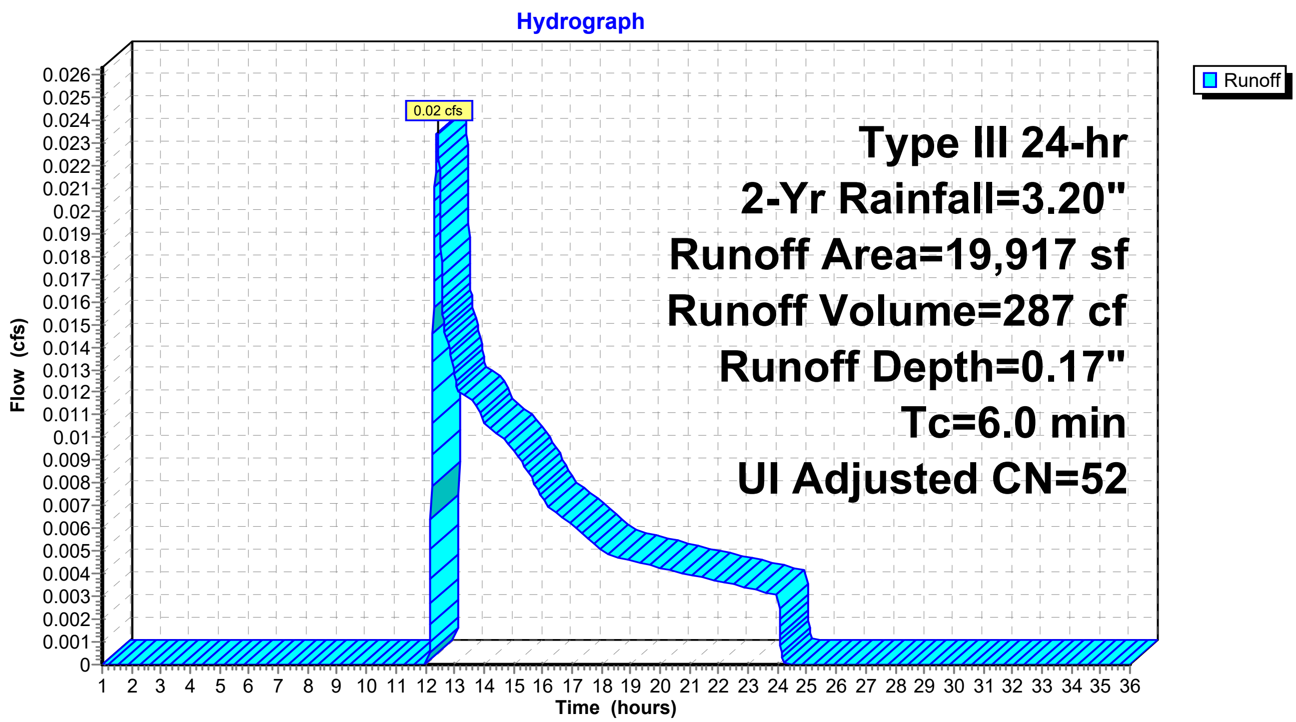
Runoff = 0.02 cfs @ 12.41 hrs, Volume= 287 cf, Depth= 0.17"
Routed to Pond IT-1 : IT-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.20"

	Area (sf)	CN	Adj	Description
	6,564	30		Woods, Good, HSG A
	6,940	39		>75% Grass cover, Good, HSG A
*	3,855	98		Paved driveway, HSG A
*	1,935	76		Rip-rap / Crushed stone, HSG A
*	383	98		Unconnected impervious, HSG A
	240	98		Roofs, HSG A
	19,917	53	52	Weighted Average, UI Adjusted
	15,439			77.52% Pervious Area
	4,478			22.48% Impervious Area
	383			8.55% Unconnected

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

Subcatchment A3: SUB-A3



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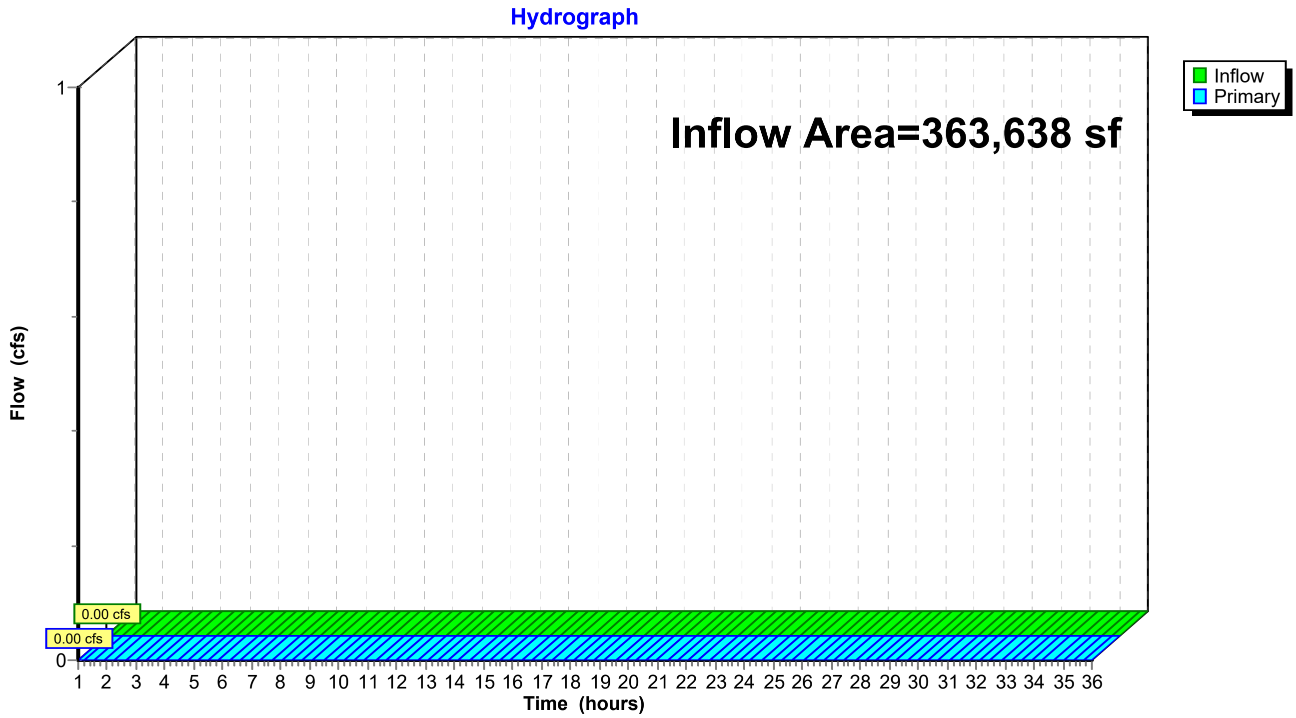
Summary for Pond A: POI-A

Inflow Area = 363,638 sf, 1.97% Impervious, Inflow Depth = 0.00" for 2-Yr event
Inflow = 0.00 cfs @ 1.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2

Pond A: POI-A



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Summary for Pond IB-1: IB-1

Inflow Area = 71,036 sf, 3.73% Impervious, Inflow Depth = 0.06" for 2-Yr event
Inflow = 0.01 cfs @ 15.21 hrs, Volume= 341 cf
Outflow = 0.01 cfs @ 15.26 hrs, Volume= 341 cf, Atten= 0%, Lag= 2.8 min
Discarded = 0.01 cfs @ 15.26 hrs, Volume= 341 cf
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf
Routed to Pond A : POI-A

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 229.00' @ 15.26 hrs Surf.Area= 1,711 sf Storage= 2 cf

Plug-Flow detention time= 3.0 min calculated for 341 cf (100% of inflow)
Center-of-Mass det. time= 3.0 min (1,094.4 - 1,091.4)

Volume	Invert	Avail.Storage	Storage Description
#1	229.00'	12,733 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
229.00	1,710	0	0
230.00	2,407	2,059	2,059
231.00	3,141	2,774	4,833
232.00	3,935	3,538	8,371
233.00	4,789	4,362	12,733

Device	Routing	Invert	Outlet Devices
#1	Discarded	229.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	231.90'	**20.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.01 cfs @ 15.26 hrs HW=229.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=229.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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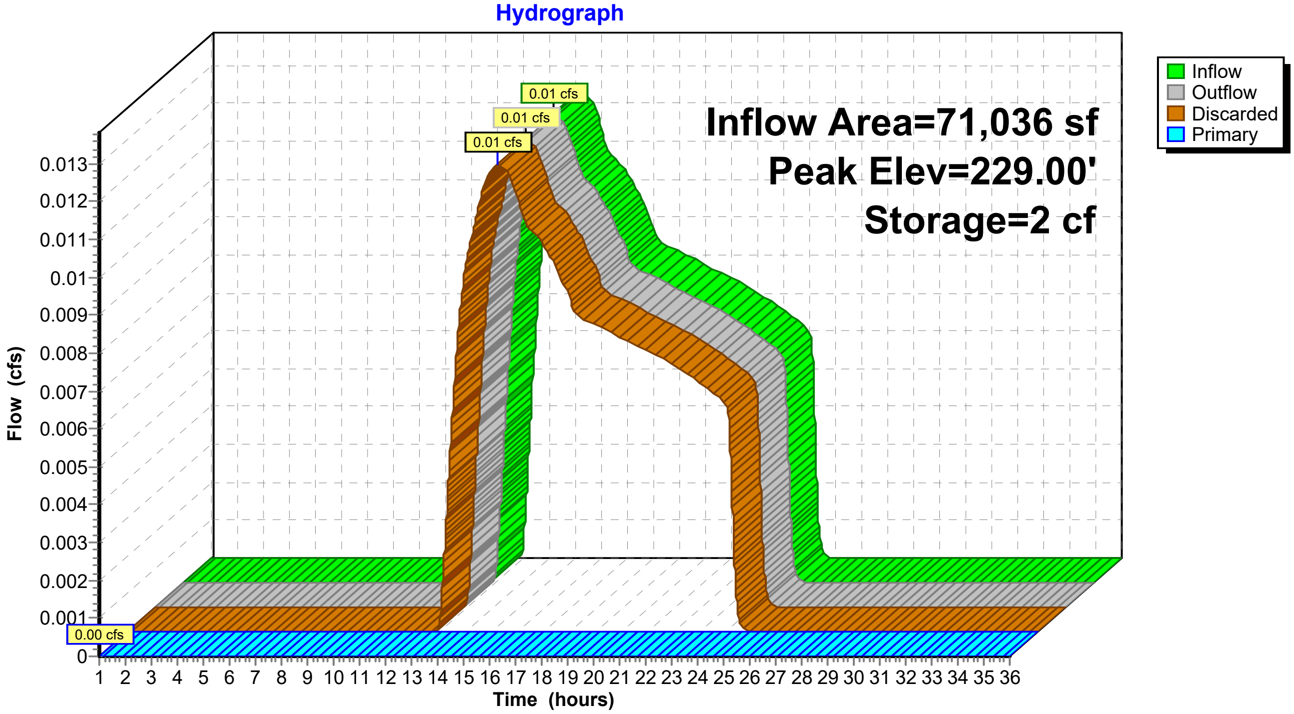
Pond IB-1: IB-1



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Summary for Pond IT-1: IT-1

Inflow Area = 19,917 sf, 22.48% Impervious, Inflow Depth = 0.17" for 2-Yr event
Inflow = 0.02 cfs @ 12.41 hrs, Volume= 287 cf
Outflow = 0.02 cfs @ 12.43 hrs, Volume= 287 cf, Atten= 1%, Lag= 1.2 min
Discarded = 0.02 cfs @ 12.43 hrs, Volume= 287 cf
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf
Routed to Pond A : POI-A

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 222.49' @ 12.43 hrs Surf.Area= 912 sf Storage= 2 cf

Plug-Flow detention time= 1.2 min calculated for 287 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (986.0 - 984.8)

Volume	Invert	Avail.Storage	Storage Description
#1	222.49'	1,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

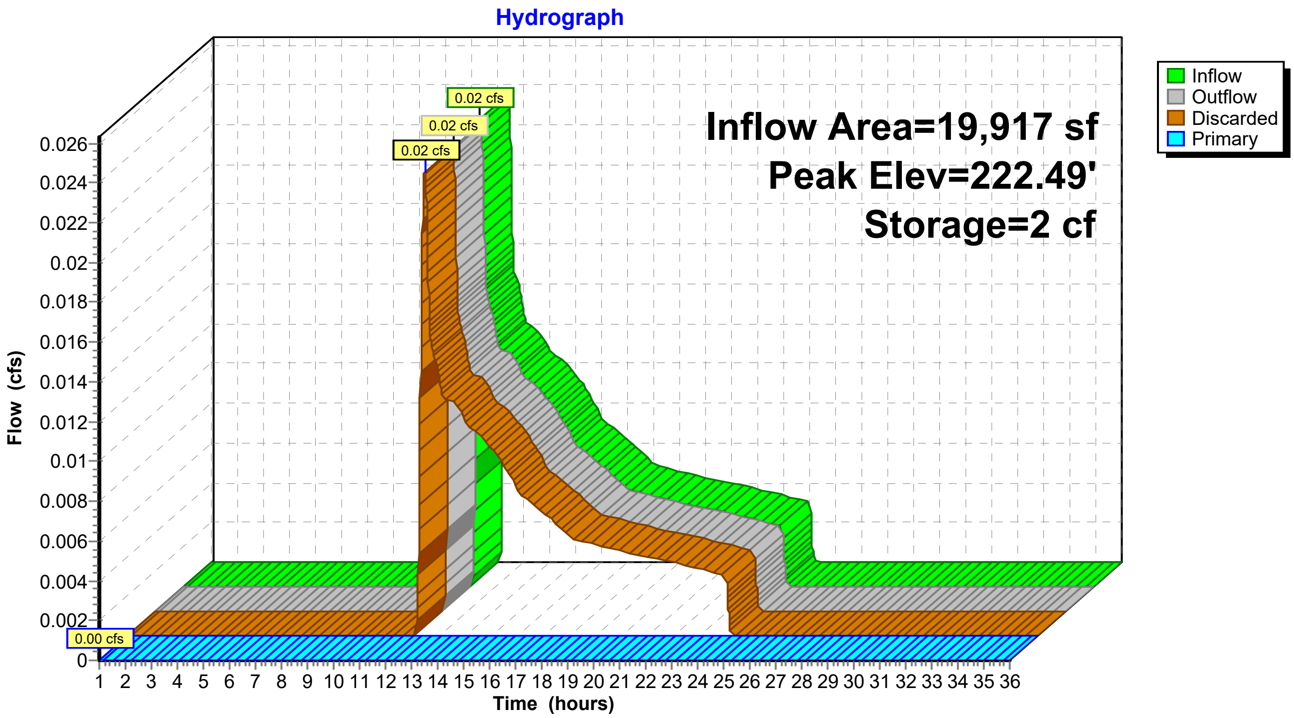
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
222.49	912	0.0	0	0
222.50	912	40.0	4	4
224.00	912	40.0	547	551
224.01	912	100.0	9	560
224.50	1,839	100.0	674	1,234

Device	Routing	Invert	Outlet Devices
#1	Discarded	222.49'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	224.14'	**42.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.02 cfs @ 12.43 hrs HW=222.49' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=222.49' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond IT-1: IT-1



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Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentA1: SUB-A1 Runoff Area=272,685 sf 0.01% Impervious Runoff Depth=0.15"
Flow Length=116' Tc=13.8 min CN=38 Runoff=0.13 cfs 3,511 cf

SubcatchmentA2: SUB-A2 Runoff Area=71,036 sf 3.73% Impervious Runoff Depth=0.47"
Flow Length=840' Tc=15.9 min CN=46 Runoff=0.32 cfs 2,756 cf

SubcatchmentA3: SUB-A3 Runoff Area=19,917 sf 22.48% Impervious Runoff Depth=0.77"
Tc=6.0 min UI Adjusted CN=52 Runoff=0.29 cfs 1,282 cf

Pond A: POI-A Inflow=0.13 cfs 3,511 cf
Primary=0.13 cfs 3,511 cf

Pond IB-1: IB-1 Peak Elev=229.24' Storage=439 cf Inflow=0.32 cfs 2,756 cf
Discarded=0.10 cfs 2,756 cf Primary=0.00 cfs 0 cf Outflow=0.10 cfs 2,756 cf

Pond IT-1: IT-1 Peak Elev=223.33' Storage=305 cf Inflow=0.29 cfs 1,282 cf
Discarded=0.05 cfs 1,282 cf Primary=0.00 cfs 0 cf Outflow=0.05 cfs 1,282 cf

Total Runoff Area = 363,638 sf Runoff Volume = 7,549 cf Average Runoff Depth = 0.25"
98.03% Pervious = 356,471 sf 1.97% Impervious = 7,167 sf

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Summary for Subcatchment A1: SUB-A1

Runoff = 0.13 cfs @ 13.85 hrs, Volume= 3,511 cf, Depth= 0.15"
Routed to Pond A : POI-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.93"

	Area (sf)	CN	Description
	160,924	30	Woods, Good, HSG A
	78,748	55	Woods, Good, HSG B
	32,321	39	>75% Grass cover, Good, HSG A
*	289	76	Rip-rap, HSG A
*	367	77	Bare soil, HSG A
*	36	98	Unconnected impervious, HSG A
	272,685	38	Weighted Average
	272,649		99.99% Pervious Area
	36		0.01% Impervious Area
	36		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	50	0.0175	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.9	42	0.0240	0.77		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	24	0.3400	2.92		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.8	116	Total			

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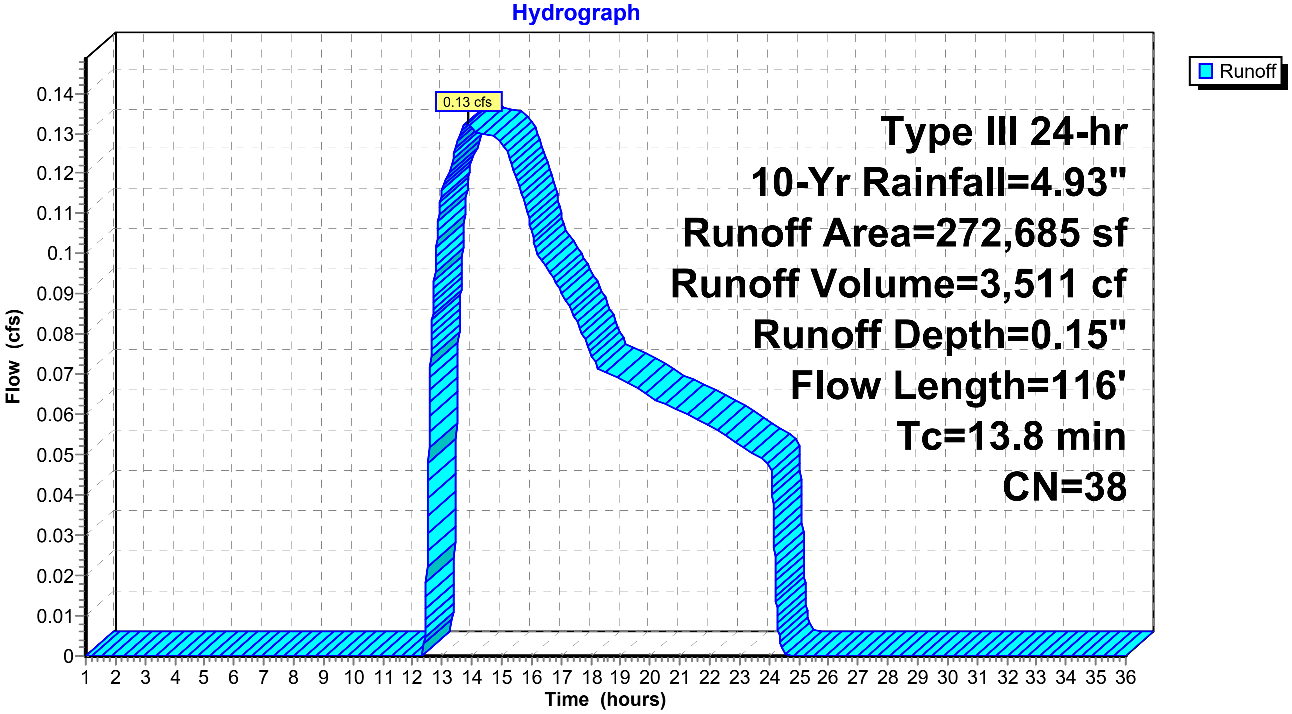
Subcatchment A1: SUB-A1



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Summary for Subcatchment A2: SUB-A2

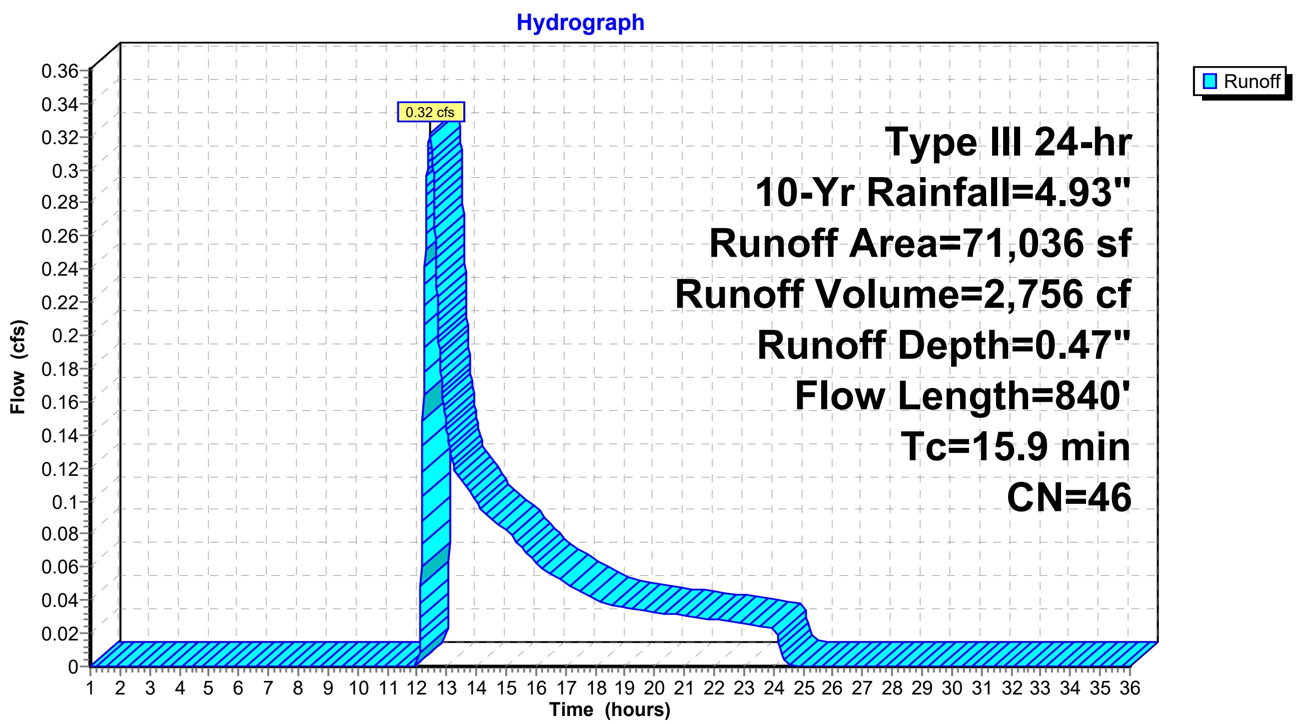
Runoff = 0.32 cfs @ 12.45 hrs, Volume= 2,756 cf, Depth= 0.47"
Routed to Pond IB-1 : IB-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.93"

	Area (sf)	CN	Description
	48,567	39	>75% Grass cover, Good, HSG A
*	11,455	76	Gravel driveway, HSG A
	7,961	30	Woods, Good, HSG A
*	2,653	98	Paved driveway, HSG A
*	400	76	Rip-rap / Crushed stone, HSG A
	71,036	46	Weighted Average
	68,383		96.27% Pervious Area
	2,653		3.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	45	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
10.8	795	0.0050	1.23	1.23	**Channel Flow,** Area= 1.0 sf Perim= 4.8' r= 0.21' n= 0.030 Earth, grassed & winding
15.9	840	Total			

Subcatchment A2: SUB-A2



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Summary for Subcatchment A3: SUB-A3

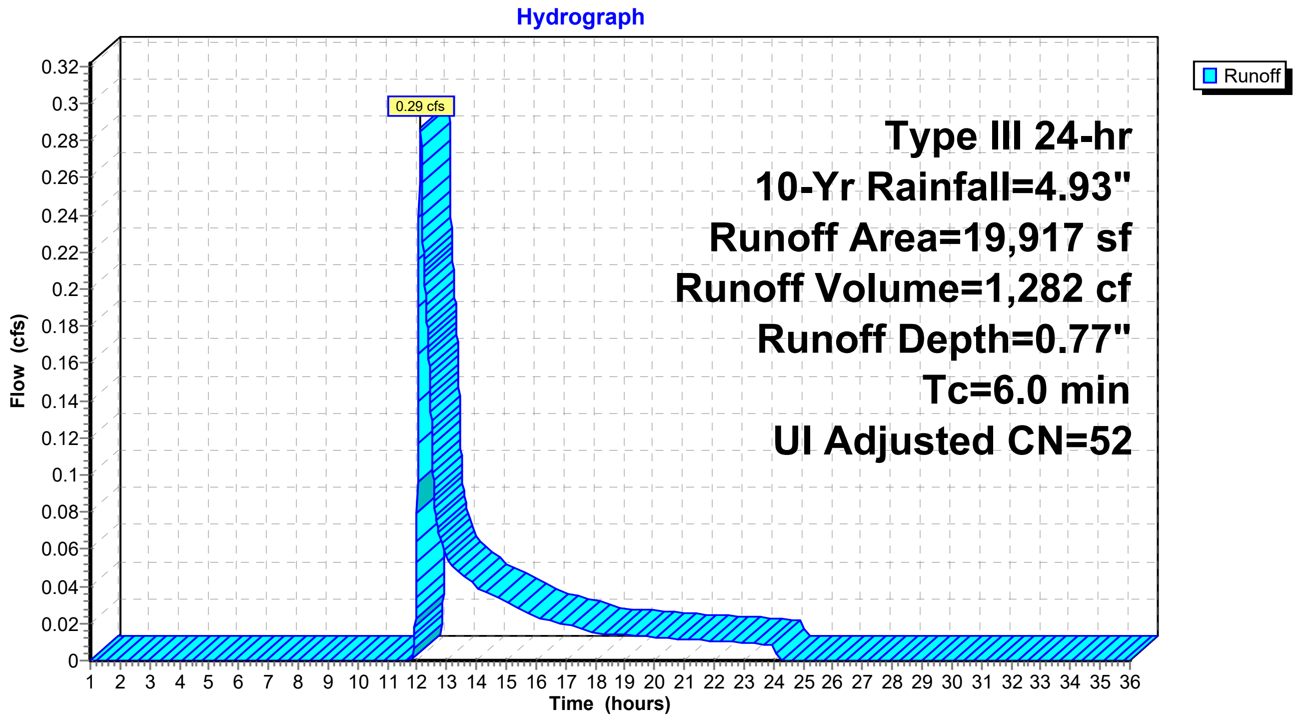
Runoff = 0.29 cfs @ 12.12 hrs, Volume= 1,282 cf, Depth= 0.77"
Routed to Pond IT-1 : IT-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.93"

	Area (sf)	CN	Adj	Description
	6,564	30		Woods, Good, HSG A
	6,940	39		>75% Grass cover, Good, HSG A
*	3,855	98		Paved driveway, HSG A
*	1,935	76		Rip-rap / Crushed stone, HSG A
*	383	98		Unconnected impervious, HSG A
	240	98		Roofs, HSG A
	19,917	53	52	Weighted Average, UI Adjusted
	15,439			77.52% Pervious Area
	4,478			22.48% Impervious Area
	383			8.55% Unconnected

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

Subcatchment A3: SUB-A3



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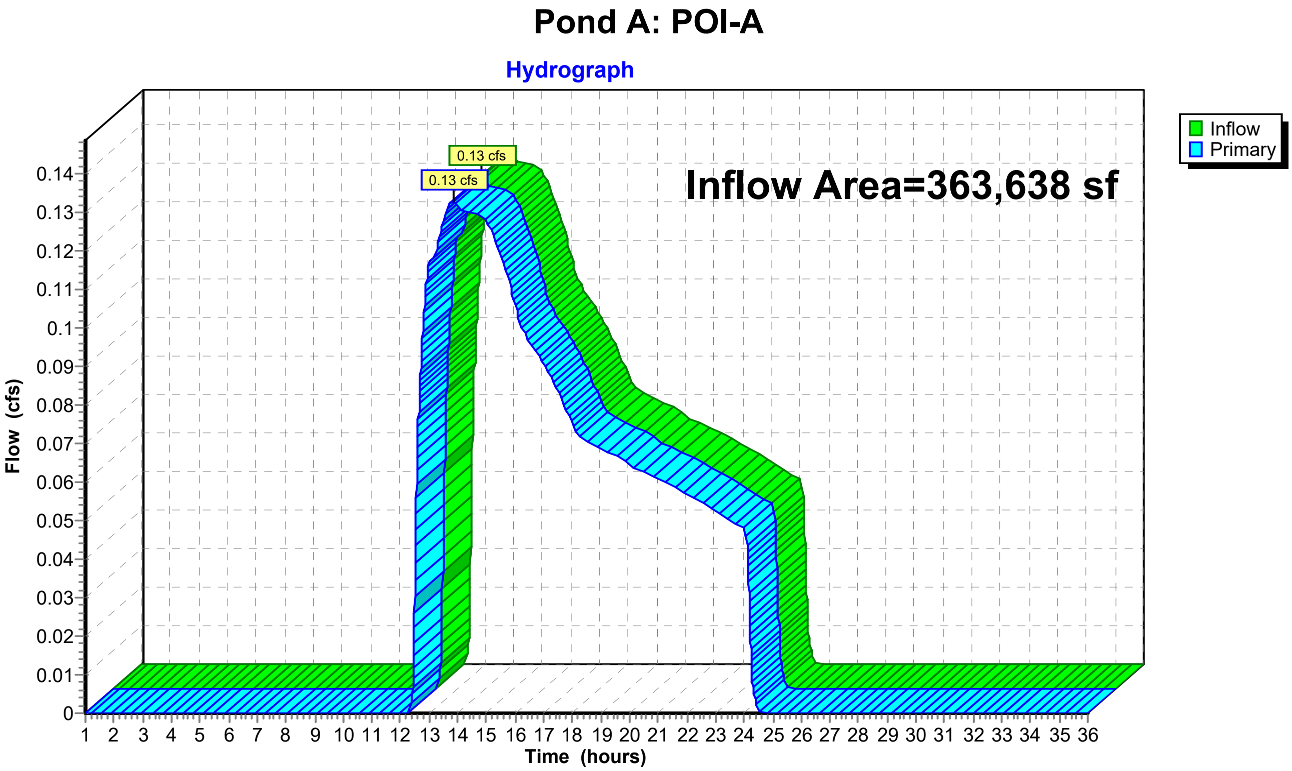
Summary for Pond A: POI-A

Inflow Area = 363,638 sf, 1.97% Impervious, Inflow Depth = 0.12" for 10-Yr event
Inflow = 0.13 cfs @ 13.85 hrs, Volume= 3,511 cf
Primary = 0.13 cfs @ 13.85 hrs, Volume= 3,511 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2



Summary for Pond IB-1: IB-1

Inflow Area = 71,036 sf, 3.73% Impervious, Inflow Depth = 0.47" for 10-Yr event
Inflow = 0.32 cfs @ 12.45 hrs, Volume= 2,756 cf
Outflow = 0.10 cfs @ 13.81 hrs, Volume= 2,756 cf, Atten= 67%, Lag= 81.5 min
Discarded = 0.10 cfs @ 13.81 hrs, Volume= 2,756 cf
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf
Routed to Pond A : POI-A

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 229.24' @ 13.81 hrs Surf.Area= 1,880 sf Storage= 439 cf

Plug-Flow detention time= 35.9 min calculated for 2,755 cf (100% of inflow)
Center-of-Mass det. time= 35.9 min (986.6 - 950.7)

Volume	Invert	Avail.Storage	Storage Description
#1	229.00'	12,733 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
229.00	1,710	0	0
230.00	2,407	2,059	2,059
231.00	3,141	2,774	4,833
232.00	3,935	3,538	8,371
233.00	4,789	4,362	12,733

Device	Routing	Invert	Outlet Devices
#1	Discarded	229.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	231.90'	**20.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.10 cfs @ 13.81 hrs HW=229.24' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=229.00' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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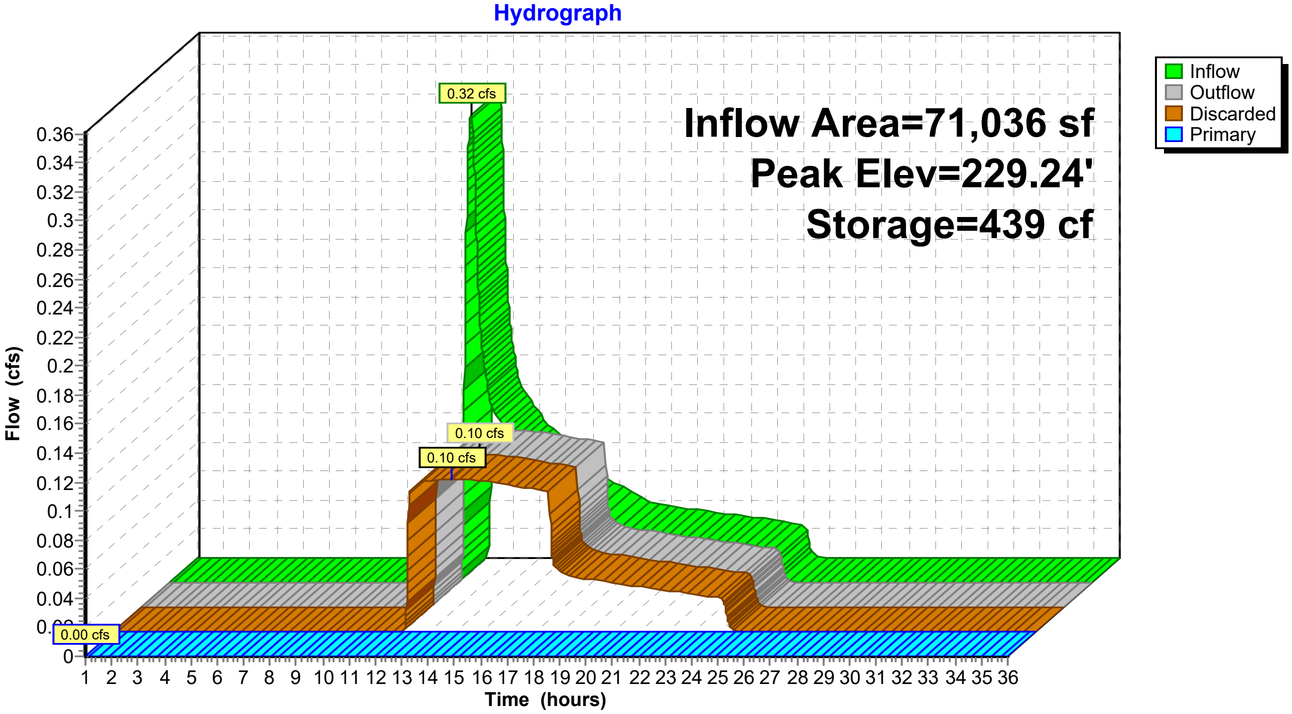
Pond IB-1: IB-1



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Summary for Pond IT-1: IT-1

Inflow Area = 19,917 sf, 22.48% Impervious, Inflow Depth = 0.77" for 10-Yr event
Inflow = 0.29 cfs @ 12.12 hrs, Volume= 1,282 cf
Outflow = 0.05 cfs @ 12.02 hrs, Volume= 1,282 cf, Atten= 82%, Lag= 0.0 min
Discarded = 0.05 cfs @ 12.02 hrs, Volume= 1,282 cf
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf
Routed to Pond A : POI-A

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 223.33' @ 13.12 hrs Surf.Area= 912 sf Storage= 305 cf

Plug-Flow detention time= 50.8 min calculated for 1,282 cf (100% of inflow)
Center-of-Mass det. time= 50.8 min (957.6 - 906.8)

Volume	Invert	Avail.Storage	Storage Description
#1	222.49'	1,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
222.49	912	0.0	0	0
222.50	912	40.0	4	4
224.00	912	40.0	547	551
224.01	912	100.0	9	560
224.50	1,839	100.0	674	1,234

Device	Routing	Invert	Outlet Devices
#1	Discarded	222.49'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	224.14'	**42.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.05 cfs @ 12.02 hrs HW=222.51' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=222.49' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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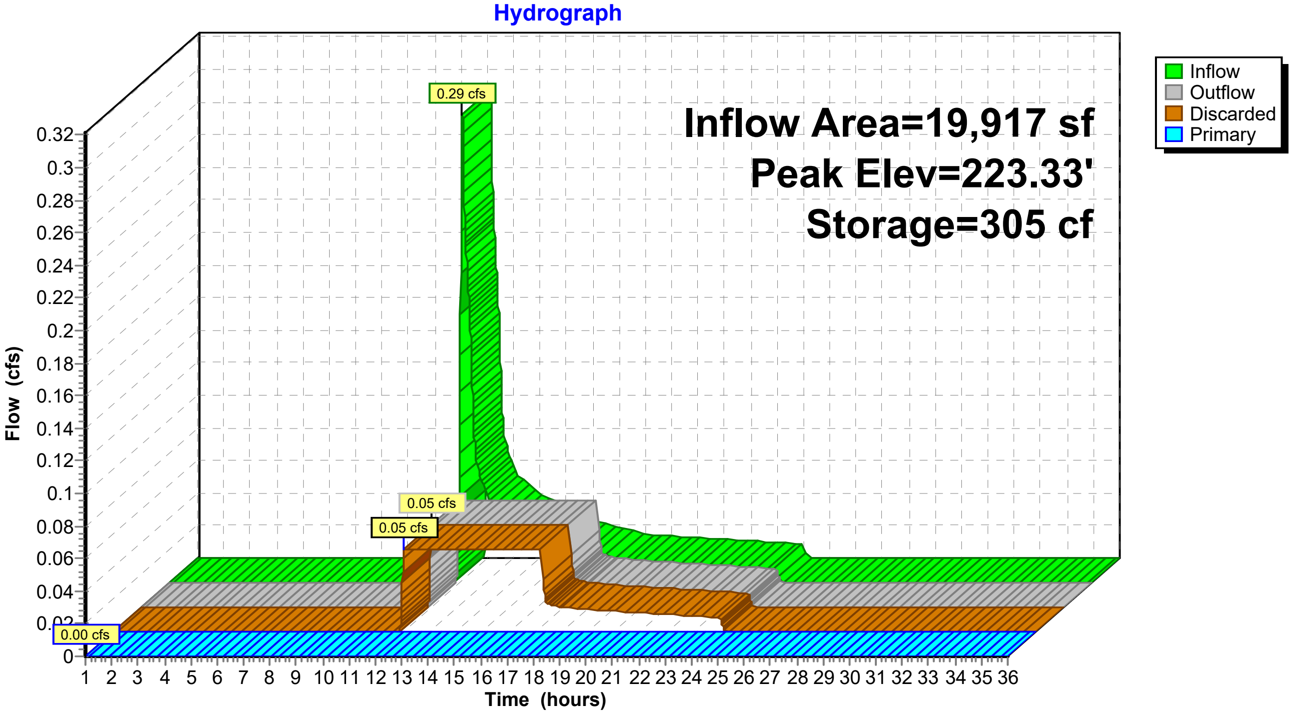
Pond IT-1: IT-1


Hydrograph
Inflow
Outflow
Discarded
Primary
Inflow Area=19,917 sf
Peak Elev=223.33'
Storage=305 cf
0.29 cfs
0.05 cfs
0.05 cfs
0.00 cfs
Flow (cfs)
Time (hours)

Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentA1: SUB-A1 Runoff Area=272,685 sf 0.01% Impervious Runoff Depth=0.40"
Flow Length=116' Tc=13.8 min CN=38 Runoff=0.81 cfs 8,994 cf

SubcatchmentA2: SUB-A2 Runoff Area=71,036 sf 3.73% Impervious Runoff Depth=0.87"
Flow Length=840' Tc=15.9 min CN=46 Runoff=0.81 cfs 5,155 cf

SubcatchmentA3: SUB-A3 Runoff Area=19,917 sf 22.48% Impervious Runoff Depth=1.29"
Tc=6.0 min UI Adjusted CN=52 Runoff=0.58 cfs 2,148 cf

Pond A: POI-A Inflow=0.81 cfs 9,041 cf
Primary=0.81 cfs 9,041 cf

Pond IB-1: IB-1 Peak Elev=229.87' Storage=1,750 cf Inflow=0.81 cfs 5,155 cf
Discarded=0.13 cfs 5,155 cf Primary=0.00 cfs 0 cf Outflow=0.13 cfs 5,155 cf

Pond IT-1: IT-1 Peak Elev=224.14' Storage=699 cf Inflow=0.58 cfs 2,148 cf
Discarded=0.07 cfs 2,101 cf Primary=0.03 cfs 47 cf Outflow=0.09 cfs 2,148 cf

Total Runoff Area = 363,638 sf Runoff Volume = 16,297 cf Average Runoff Depth = 0.54"
98.03% Pervious = 356,471 sf 1.97% Impervious = 7,167 sf

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Summary for Subcatchment A1: SUB-A1

Runoff = 0.81 cfs @ 12.49 hrs, Volume= 8,994 cf, Depth= 0.40"
Routed to Pond A : POI-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.01"

	Area (sf)	CN	Description
	160,924	30	Woods, Good, HSG A
	78,748	55	Woods, Good, HSG B
	32,321	39	>75% Grass cover, Good, HSG A
*	289	76	Rip-rap, HSG A
*	367	77	Bare soil, HSG A
*	36	98	Unconnected impervious, HSG A
	272,685	38	Weighted Average
	272,649		99.99% Pervious Area
	36		0.01% Impervious Area
	36		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	50	0.0175	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.9	42	0.0240	0.77		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	24	0.3400	2.92		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.8	116	Total			

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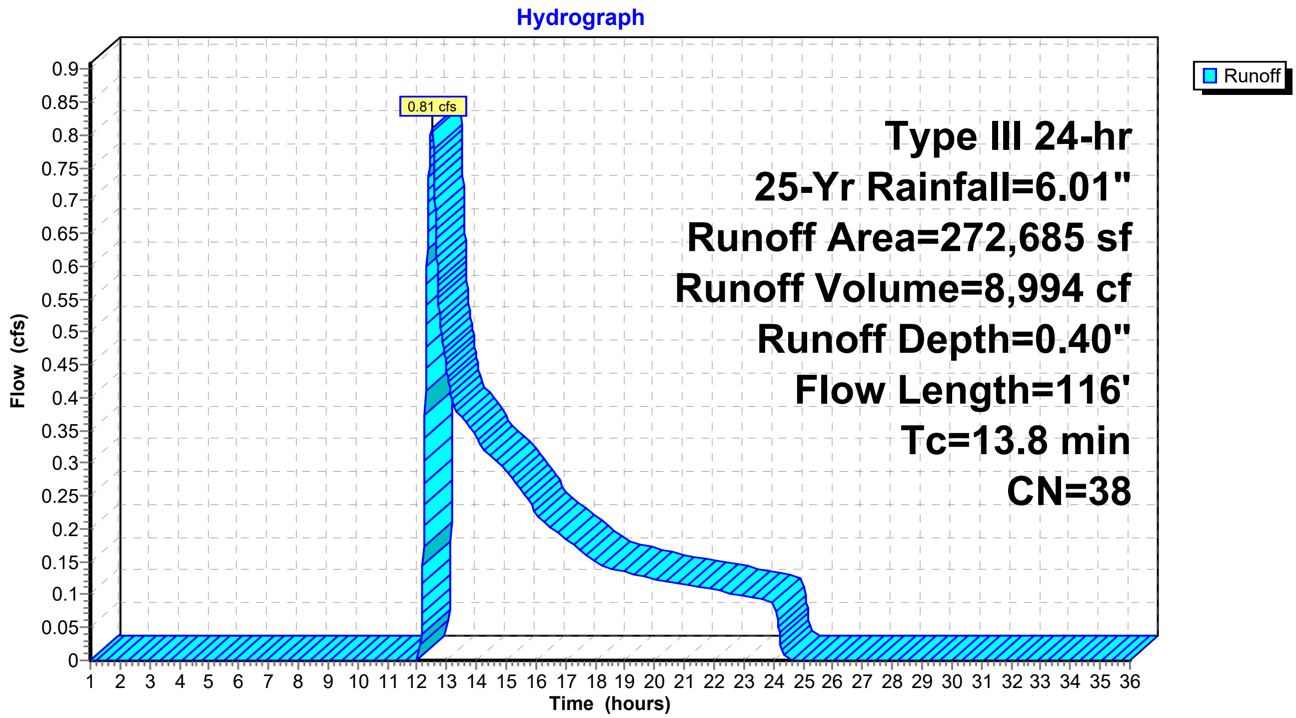
Subcatchment A1: SUB-A1



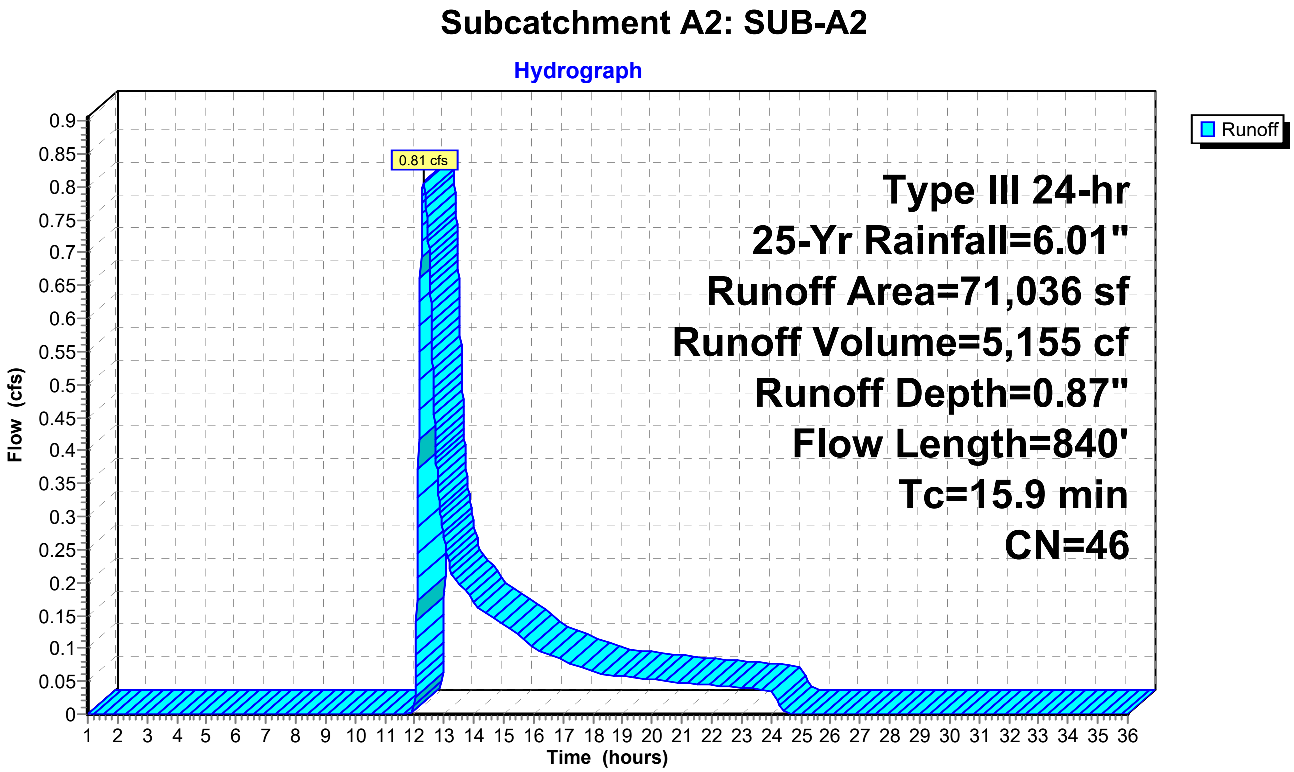
Summary for Subcatchment A2: SUB-A2

Runoff = 0.81 cfs @ 12.31 hrs, Volume= 5,155 cf, Depth= 0.87"
Routed to Pond IB-1 : IB-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.01"

	Area (sf)	CN	Description
	48,567	39	>75% Grass cover, Good, HSG A
*	11,455	76	Gravel driveway, HSG A
	7,961	30	Woods, Good, HSG A
*	2,653	98	Paved driveway, HSG A
*	400	76	Rip-rap / Crushed stone, HSG A
	71,036	46	Weighted Average
	68,383		96.27% Pervious Area
	2,653		3.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	45	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
10.8	795	0.0050	1.23	1.23	**Channel Flow,** Area= 1.0 sf Perim= 4.8' r= 0.21' n= 0.030 Earth, grassed & winding
15.9	840	Total			



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Summary for Subcatchment A3: SUB-A3

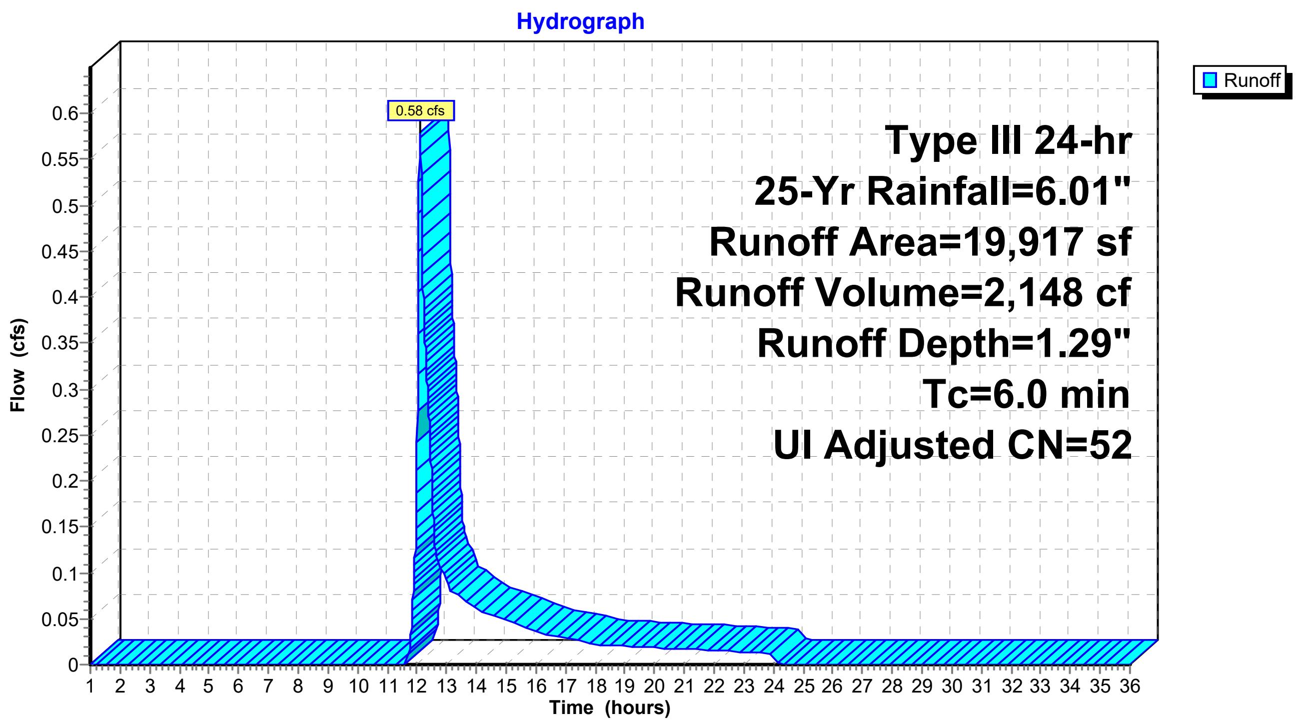
Runoff = 0.58 cfs @ 12.10 hrs, Volume= 2,148 cf, Depth= 1.29"
Routed to Pond IT-1 : IT-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.01"

	Area (sf)	CN	Adj	Description
	6,564	30		Woods, Good, HSG A
	6,940	39		>75% Grass cover, Good, HSG A
*	3,855	98		Paved driveway, HSG A
*	1,935	76		Rip-rap / Crushed stone, HSG A
*	383	98		Unconnected impervious, HSG A
	240	98		Roofs, HSG A
	19,917	53	52	Weighted Average, UI Adjusted
	15,439			77.52% Pervious Area
	4,478			22.48% Impervious Area
	383			8.55% Unconnected

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

Subcatchment A3: SUB-A3



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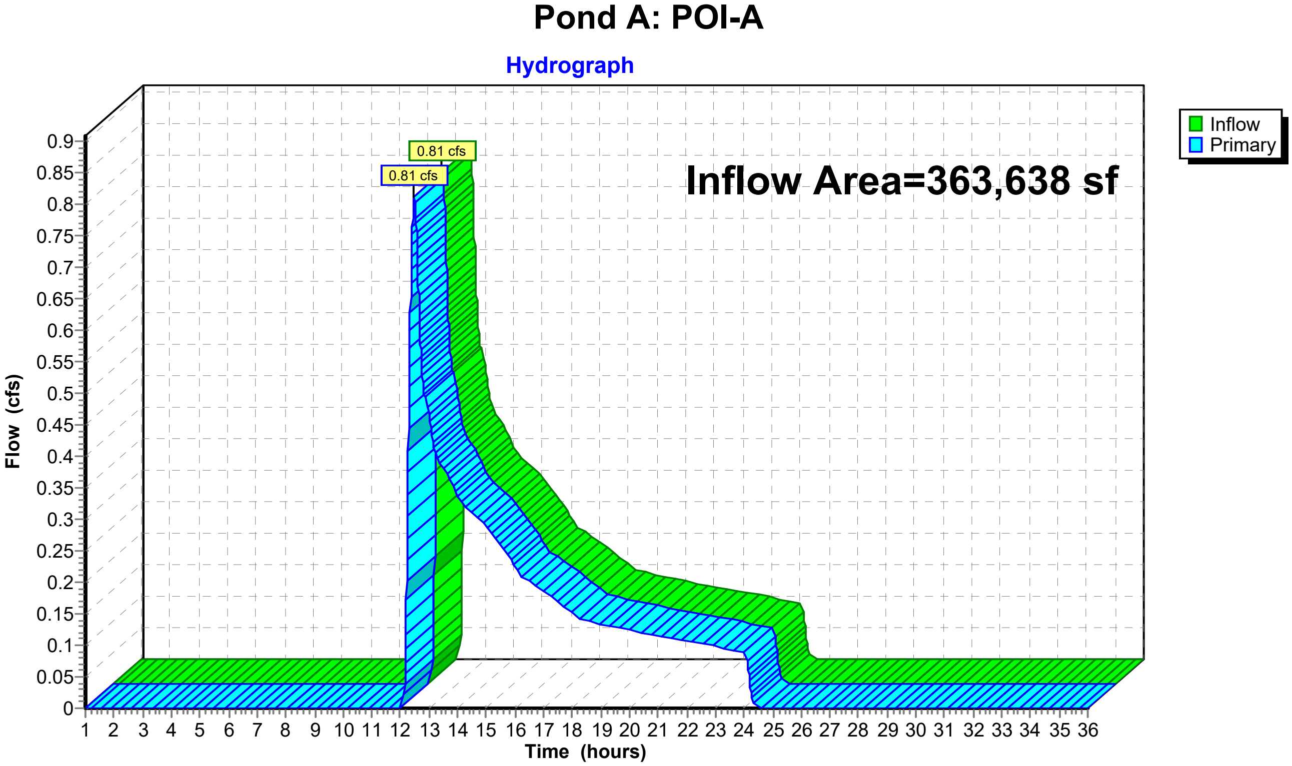
Summary for Pond A: POI-A

Inflow Area = 363,638 sf, 1.97% Impervious, Inflow Depth = 0.30" for 25-Yr event
Inflow = 0.81 cfs @ 12.49 hrs, Volume= 9,041 cf
Primary = 0.81 cfs @ 12.49 hrs, Volume= 9,041 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2



Summary for Pond IB-1: IB-1

Inflow Area = 71,036 sf, 3.73% Impervious, Inflow Depth = 0.87" for 25-Yr event
Inflow = 0.81 cfs @ 12.31 hrs, Volume= 5,155 cf
Outflow = 0.13 cfs @ 15.22 hrs, Volume= 5,155 cf, Atten= 84%, Lag= 174.8 min
Discarded = 0.13 cfs @ 15.22 hrs, Volume= 5,155 cf
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf
Routed to Pond A : POI-A

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 229.87' @ 15.22 hrs Surf.Area= 2,316 sf Storage= 1,750 cf

Plug-Flow detention time= 154.9 min calculated for 5,153 cf (100% of inflow)
Center-of-Mass det. time= 154.9 min (1,075.9 - 921.1)

Volume	Invert	Avail.Storage	Storage Description
#1	229.00'	12,733 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
229.00	1,710	0	0
230.00	2,407	2,059	2,059
231.00	3,141	2,774	4,833
232.00	3,935	3,538	8,371
233.00	4,789	4,362	12,733

Device	Routing	Invert	Outlet Devices
#1	Discarded	229.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	231.90'	**20.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.13 cfs @ 15.22 hrs HW=229.87' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=229.00' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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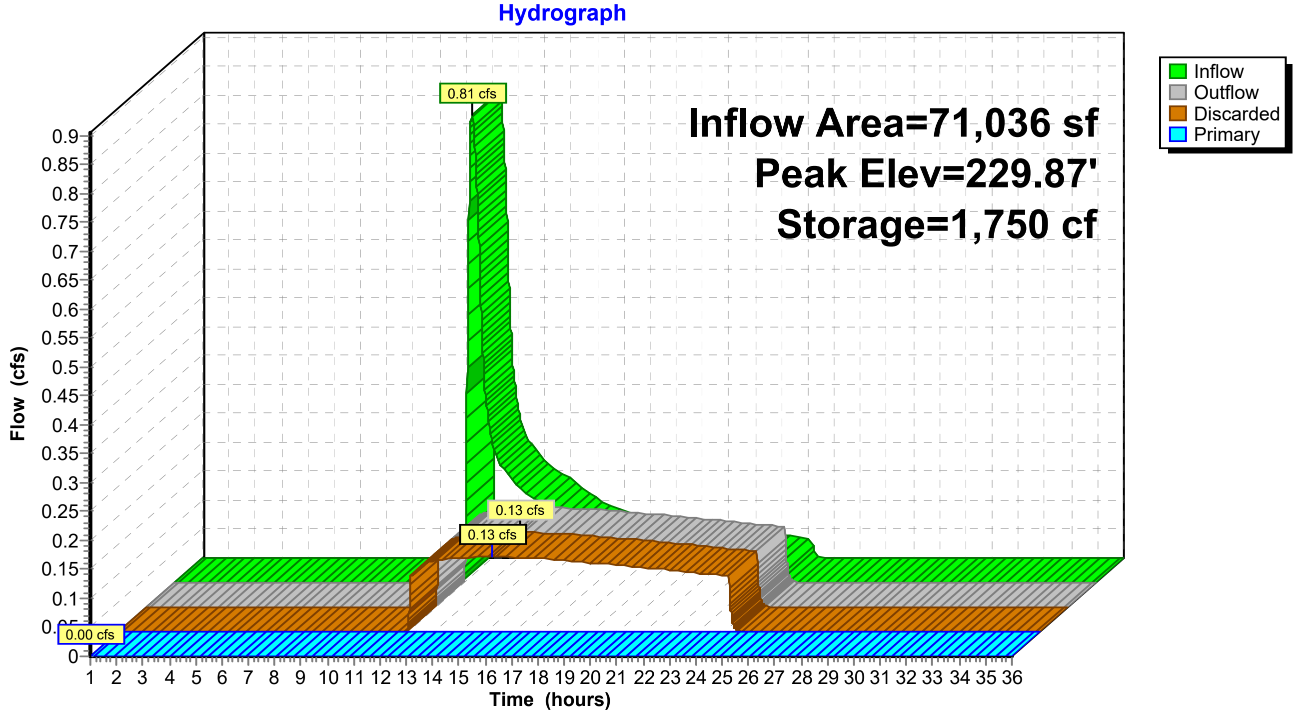
Pond IB-1: IB-1


Hydrograph
Inflow
Outflow
Discarded
Primary
Inflow Area=71,036 sf
Peak Elev=229.87'
Storage=1,750 cf
0.81 cfs
0.13 cfs
0.13 cfs
0.00 cfs
Flow (cfs)
Time (hours)

Summary for Pond IT-1: IT-1

Inflow Area = 19,917 sf, 22.48% Impervious, Inflow Depth = 1.29" for 25-Yr event
Inflow = 0.58 cfs @ 12.10 hrs, Volume= 2,148 cf
Outflow = 0.09 cfs @ 12.93 hrs, Volume= 2,148 cf, Atten= 84%, Lag= 49.7 min
Discarded = 0.07 cfs @ 12.93 hrs, Volume= 2,101 cf
Primary = 0.03 cfs @ 12.93 hrs, Volume= 47 cf
Routed to Pond A : POI-A

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 224.14' @ 12.93 hrs Surf.Area= 1,166 sf Storage= 699 cf

Plug-Flow detention time= 124.1 min calculated for 2,148 cf (100% of inflow)
Center-of-Mass det. time= 124.1 min (1,011.0 - 886.9)

Volume	Invert	Avail.Storage	Storage Description
#1	222.49'	1,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
222.49	912	0.0	0	0
222.50	912	40.0	4	4
224.00	912	40.0	547	551
224.01	912	100.0	9	560
224.50	1,839	100.0	674	1,234

Device	Routing	Invert	Outlet Devices
#1	Discarded	222.49'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	224.14'	**42.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.07 cfs @ 12.93 hrs HW=224.14' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.03 cfs @ 12.93 hrs HW=224.14' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.17 fps)

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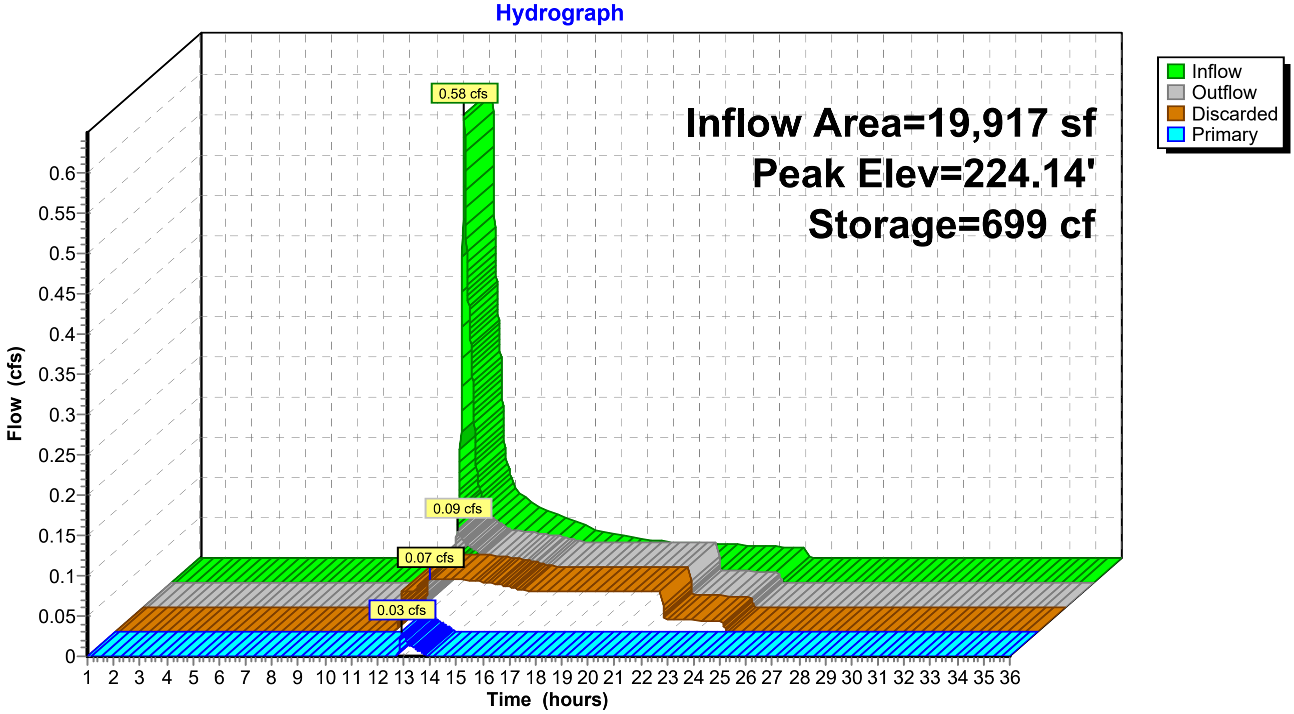
Pond IT-1: IT-1



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Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentA1: SUB-A1 Runoff Area=272,685 sf 0.01% Impervious Runoff Depth=0.63"
Flow Length=116' Tc=13.8 min CN=38 Runoff=1.71 cfs 14,392 cf

SubcatchmentA2: SUB-A2 Runoff Area=71,036 sf 3.73% Impervious Runoff Depth=1.23"
Flow Length=840' Tc=15.9 min CN=46 Runoff=1.31 cfs 7,275 cf

SubcatchmentA3: SUB-A3 Runoff Area=19,917 sf 22.48% Impervious Runoff Depth=1.74"
Tc=6.0 min UI Adjusted CN=52 Runoff=0.83 cfs 2,881 cf

Pond A: POI-A Inflow=2.01 cfs 14,901 cf
Primary=2.01 cfs 14,901 cf

Pond IB-1: IB-1 Peak Elev=230.39' Storage=3,063 cf Inflow=1.31 cfs 7,275 cf
Discarded=0.15 cfs 7,275 cf Primary=0.00 cfs 0 cf Outflow=0.15 cfs 7,275 cf

Pond IT-1: IT-1 Peak Elev=224.16' Storage=719 cf Inflow=0.83 cfs 2,881 cf
Discarded=0.07 cfs 2,372 cf Primary=0.35 cfs 509 cf Outflow=0.41 cfs 2,881 cf

Total Runoff Area = 363,638 sf Runoff Volume = 24,548 cf Average Runoff Depth = 0.81"
98.03% Pervious = 356,471 sf 1.97% Impervious = 7,167 sf

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Summary for Subcatchment A1: SUB-A1

Runoff = 1.71 cfs @ 12.41 hrs, Volume= 14,392 cf, Depth= 0.63"
Routed to Pond A : POI-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=6.81"

	Area (sf)	CN	Description
	160,924	30	Woods, Good, HSG A
	78,748	55	Woods, Good, HSG B
	32,321	39	>75% Grass cover, Good, HSG A
*	289	76	Rip-rap, HSG A
*	367	77	Bare soil, HSG A
*	36	98	Unconnected impervious, HSG A
	272,685	38	Weighted Average
	272,649		99.99% Pervious Area
	36		0.01% Impervious Area
	36		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	50	0.0175	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.9	42	0.0240	0.77		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	24	0.3400	2.92		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.8	116	Total			

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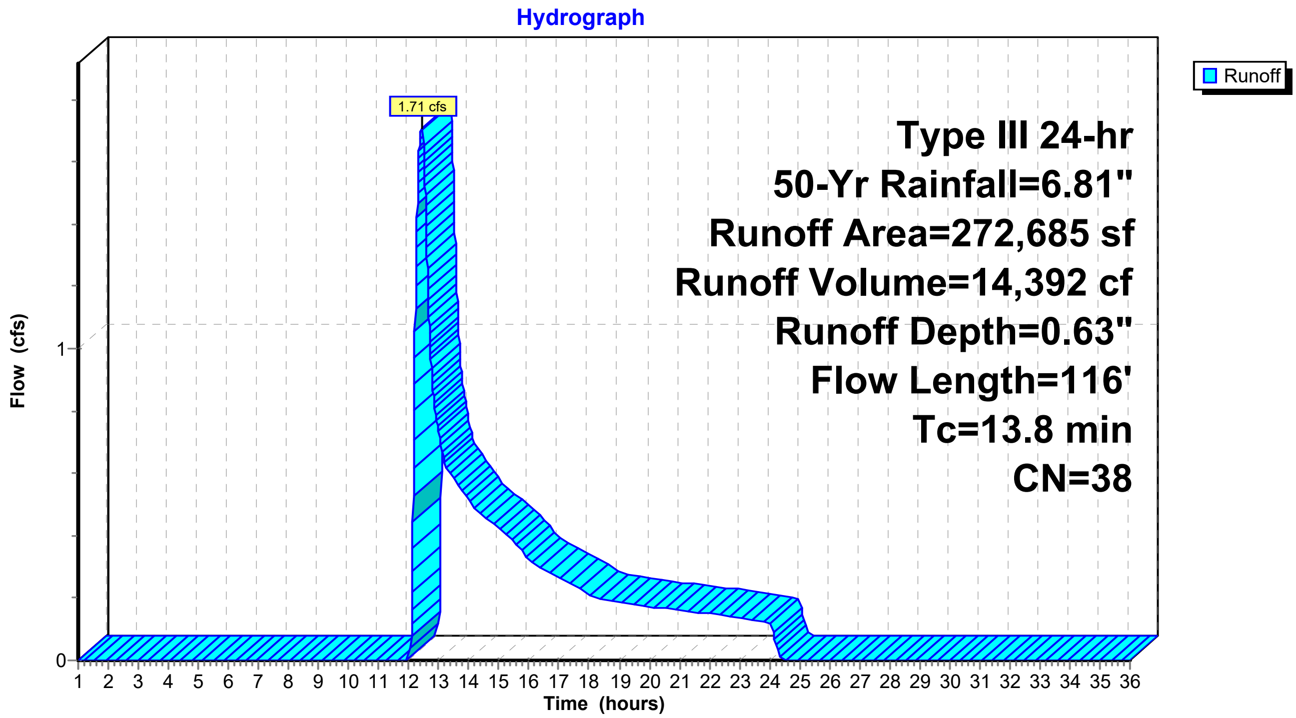
Subcatchment A1: SUB-A1



Summary for Subcatchment A2: SUB-A2

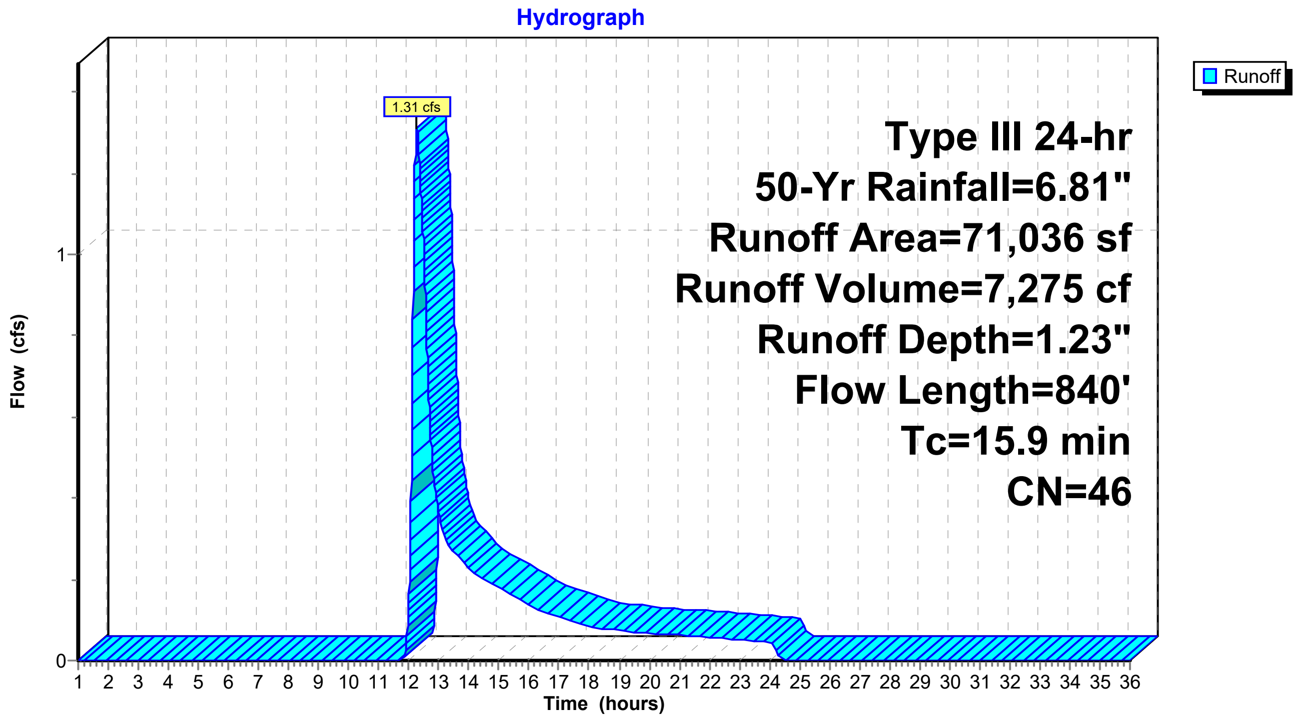
Runoff = 1.31 cfs @ 12.28 hrs, Volume= 7,275 cf, Depth= 1.23"
Routed to Pond IB-1 : IB-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=6.81"

	Area (sf)	CN	Description
	48,567	39	>75% Grass cover, Good, HSG A
*	11,455	76	Gravel driveway, HSG A
	7,961	30	Woods, Good, HSG A
*	2,653	98	Paved driveway, HSG A
*	400	76	Rip-rap / Crushed stone, HSG A
	71,036	46	Weighted Average
	68,383		96.27% Pervious Area
	2,653		3.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	45	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
10.8	795	0.0050	1.23	1.23	**Channel Flow,** Area= 1.0 sf Perim= 4.8' r= 0.21' n= 0.030 Earth, grassed & winding
15.9	840	Total			

Subcatchment A2: SUB-A2



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Summary for Subcatchment A3: SUB-A3

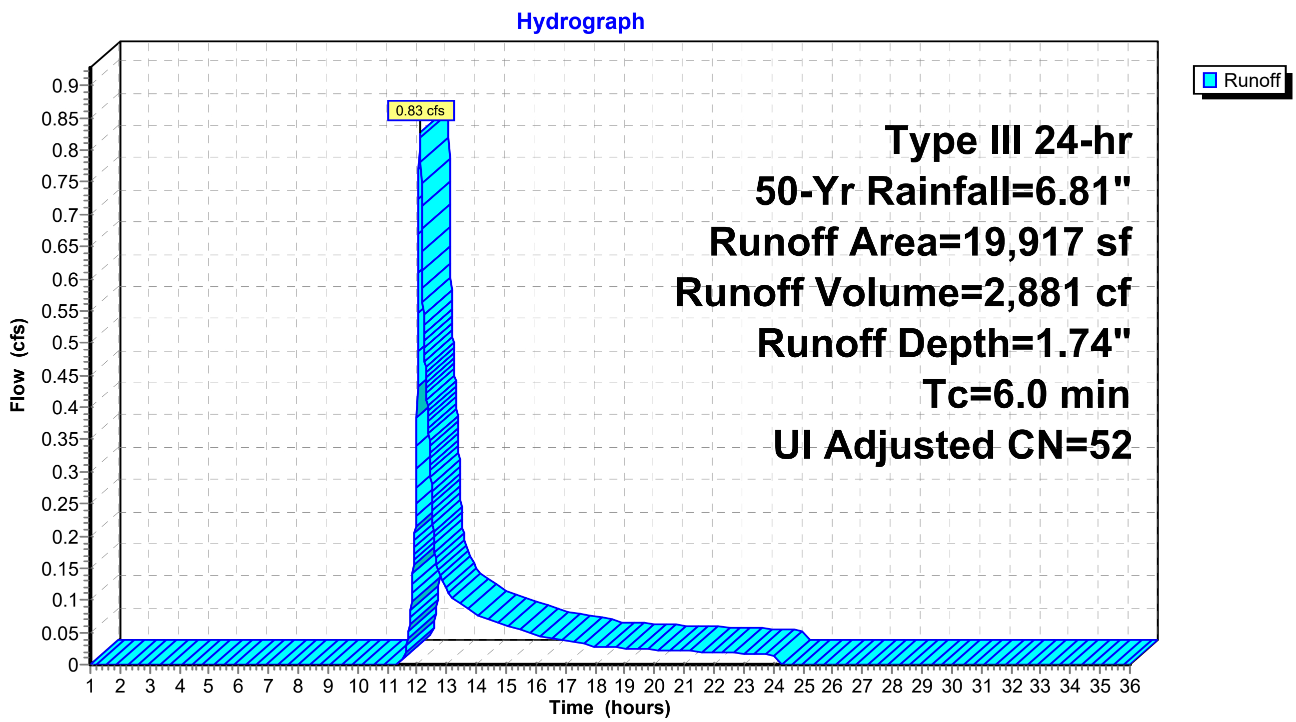
Runoff = 0.83 cfs @ 12.10 hrs, Volume= 2,881 cf, Depth= 1.74"
Routed to Pond IT-1 : IT-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=6.81"

	Area (sf)	CN	Adj	Description
	6,564	30		Woods, Good, HSG A
	6,940	39		>75% Grass cover, Good, HSG A
*	3,855	98		Paved driveway, HSG A
*	1,935	76		Rip-rap / Crushed stone, HSG A
*	383	98		Unconnected impervious, HSG A
	240	98		Roofs, HSG A
	19,917	53	52	Weighted Average, UI Adjusted
	15,439			77.52% Pervious Area
	4,478			22.48% Impervious Area
	383			8.55% Unconnected

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

Subcatchment A3: SUB-A3



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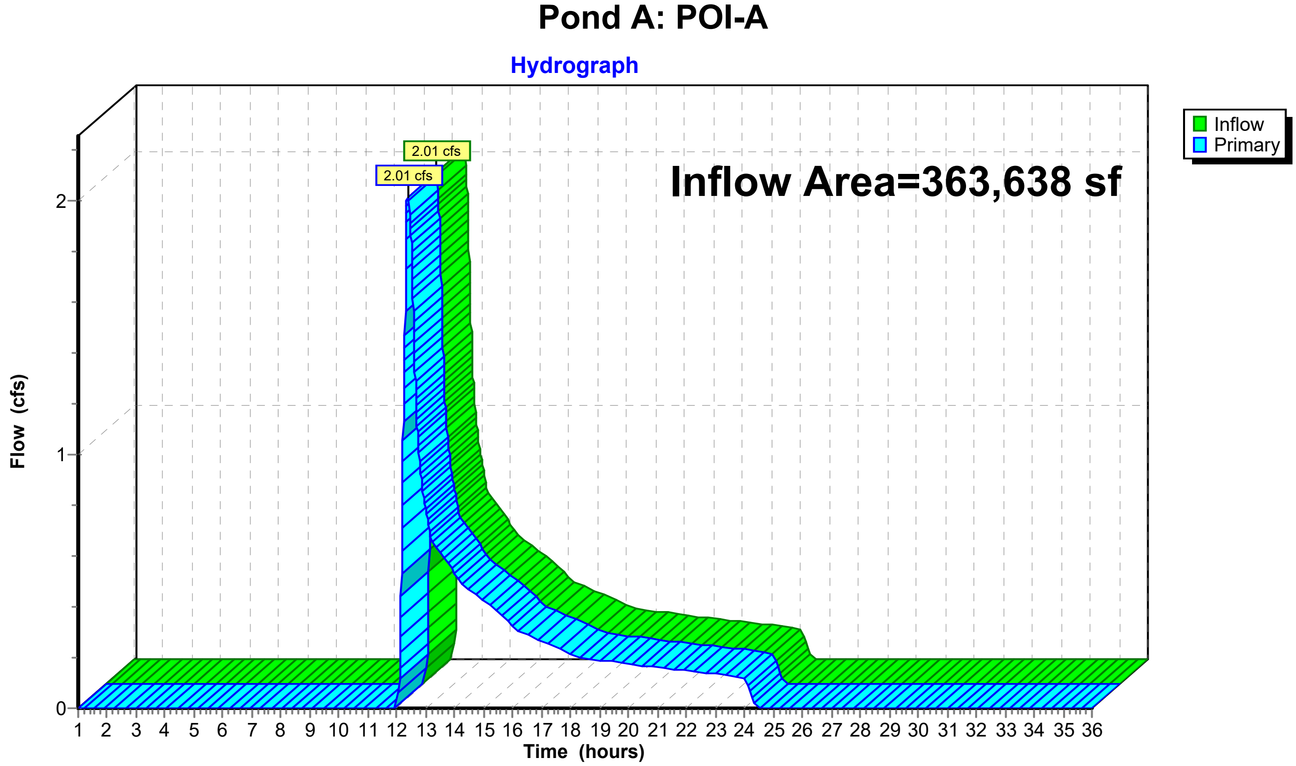
Summary for Pond A: POI-A

Inflow Area = 363,638 sf, 1.97% Impervious, Inflow Depth = 0.49" for 50-Yr event
Inflow = 2.01 cfs @ 12.38 hrs, Volume= 14,901 cf
Primary = 2.01 cfs @ 12.38 hrs, Volume= 14,901 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2



Summary for Pond IB-1: IB-1

Inflow Area = 71,036 sf, 3.73% Impervious, Inflow Depth = 1.23" for 50-Yr event
Inflow = 1.31 cfs @ 12.28 hrs, Volume= 7,275 cf
Outflow = 0.15 cfs @ 15.67 hrs, Volume= 7,275 cf, Atten= 89%, Lag= 203.8 min
Discarded = 0.15 cfs @ 15.67 hrs, Volume= 7,275 cf
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf
Routed to Pond A : POI-A

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 230.39' @ 15.67 hrs Surf.Area= 2,696 sf Storage= 3,063 cf

Plug-Flow detention time= 246.9 min calculated for 7,273 cf (100% of inflow)
Center-of-Mass det. time= 246.9 min (1,153.9 - 907.0)

Volume	Invert	Avail.Storage	Storage Description
#1	229.00'	12,733 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
229.00	1,710	0	0
230.00	2,407	2,059	2,059
231.00	3,141	2,774	4,833
232.00	3,935	3,538	8,371
233.00	4,789	4,362	12,733

Device	Routing	Invert	Outlet Devices
#1	Discarded	229.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	231.90'	**20.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.15 cfs @ 15.67 hrs HW=230.39' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=229.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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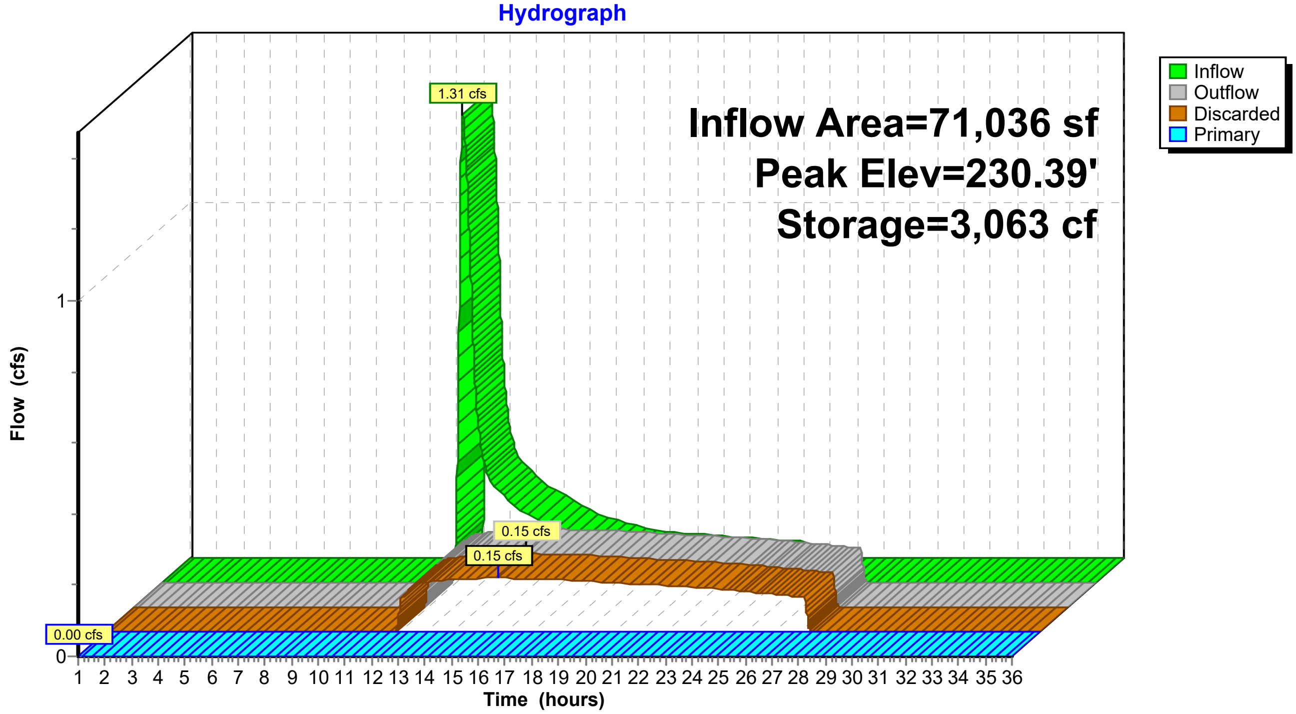
Pond IB-1: IB-1


Hydrograph
1.31 cfs
0.15 cfs
0.15 cfs
0.00 cfs
Inflow Area=71,036 sf
Peak Elev=230.39'
Storage=3,063 cf
Inflow
Outflow
Discarded
Primary
Flow (cfs)
1
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Time (hours)

Summary for Pond IT-1: IT-1

Inflow Area = 19,917 sf, 22.48% Impervious, Inflow Depth = 1.74" for 50-Yr event
Inflow = 0.83 cfs @ 12.10 hrs, Volume= 2,881 cf
Outflow = 0.41 cfs @ 12.34 hrs, Volume= 2,881 cf, Atten= 50%, Lag= 14.4 min
Discarded = 0.07 cfs @ 12.34 hrs, Volume= 2,372 cf
Primary = 0.35 cfs @ 12.34 hrs, Volume= 509 cf
Routed to Pond A : POI-A

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 224.16' @ 12.34 hrs Surf.Area= 1,198 sf Storage= 719 cf

Plug-Flow detention time= 110.5 min calculated for 2,880 cf (100% of inflow)
Center-of-Mass det. time= 110.4 min (987.1 - 876.6)

Volume	Invert	Avail.Storage	Storage Description
#1	222.49'	1,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
222.49	912	0.0	0	0
222.50	912	40.0	4	4
224.00	912	40.0	547	551
224.01	912	100.0	9	560
224.50	1,839	100.0	674	1,234

Device	Routing	Invert	Outlet Devices
#1	Discarded	222.49'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	224.14'	**42.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.07 cfs @ 12.34 hrs HW=224.16' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.35 cfs @ 12.34 hrs HW=224.16' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 0.35 cfs @ 0.39 fps)

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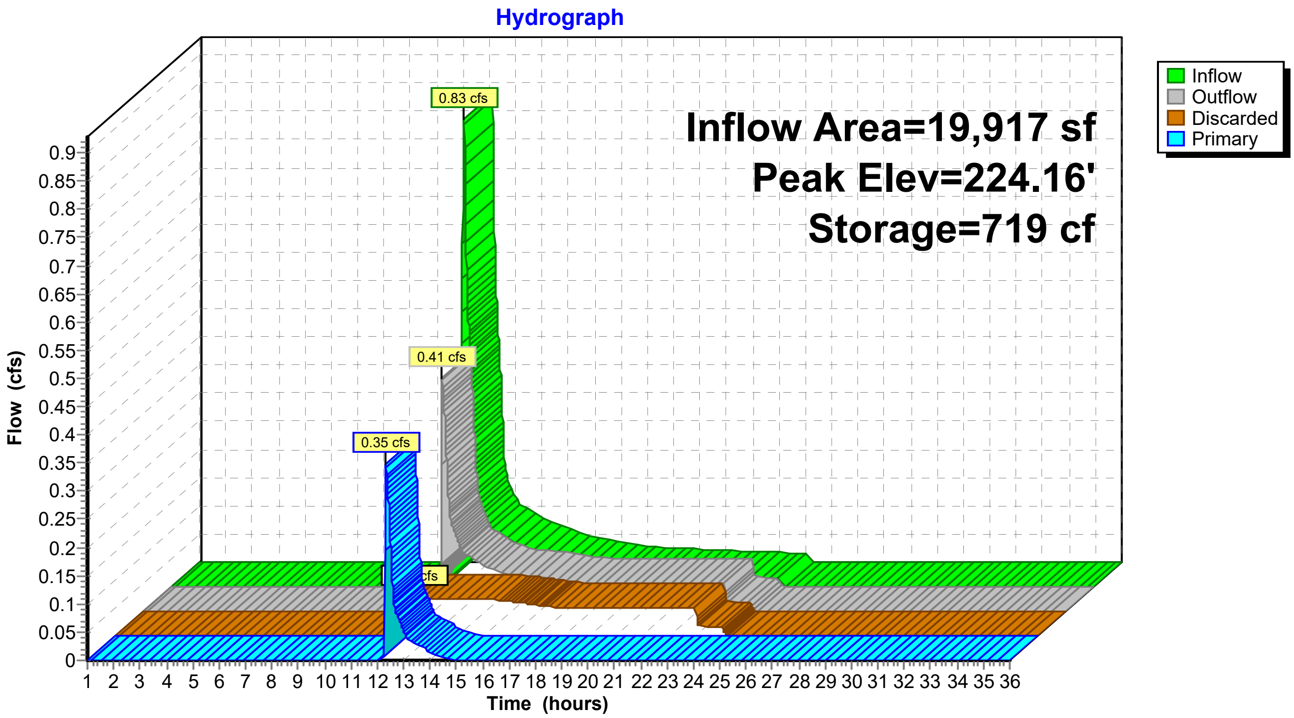
Pond IT-1: IT-1



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Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentA1: SUB-A1 Runoff Area=272,685 sf 0.01% Impervious Runoff Depth=0.94"
Flow Length=116' Tc=13.8 min CN=38 Runoff=3.06 cfs 21,382 cf

SubcatchmentA2: SUB-A2 Runoff Area=71,036 sf 3.73% Impervious Runoff Depth=1.67"
Flow Length=840' Tc=15.9 min CN=46 Runoff=1.95 cfs 9,859 cf

SubcatchmentA3: SUB-A3 Runoff Area=19,917 sf 22.48% Impervious Runoff Depth=2.26"
Tc=6.0 min UI Adjusted CN=52 Runoff=1.12 cfs 3,750 cf

Pond A: POI-A Inflow=3.59 cfs 22,514 cf
Primary=3.59 cfs 22,514 cf

Pond IB-1: IB-1 Peak Elev=230.97' Storage=4,740 cf Inflow=1.95 cfs 9,859 cf
Discarded=0.17 cfs 9,859 cf Primary=0.00 cfs 0 cf Outflow=0.17 cfs 9,859 cf

Pond IT-1: IT-1 Peak Elev=224.17' Storage=735 cf Inflow=1.12 cfs 3,750 cf
Discarded=0.07 cfs 2,618 cf Primary=0.71 cfs 1,132 cf Outflow=0.78 cfs 3,750 cf

Total Runoff Area = 363,638 sf Runoff Volume = 34,991 cf Average Runoff Depth = 1.15"
98.03% Pervious = 356,471 sf 1.97% Impervious = 7,167 sf

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Summary for Subcatchment A1: SUB-A1

Runoff = 3.06 cfs @ 12.31 hrs, Volume= 21,382 cf, Depth= 0.94"
Routed to Pond A : POI-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=7.68"

	Area (sf)	CN	Description
	160,924	30	Woods, Good, HSG A
	78,748	55	Woods, Good, HSG B
	32,321	39	>75% Grass cover, Good, HSG A
*	289	76	Rip-rap, HSG A
*	367	77	Bare soil, HSG A
*	36	98	Unconnected impervious, HSG A
	272,685	38	Weighted Average
	272,649		99.99% Pervious Area
	36		0.01% Impervious Area
	36		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	50	0.0175	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.9	42	0.0240	0.77		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	24	0.3400	2.92		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.8	116	Total			

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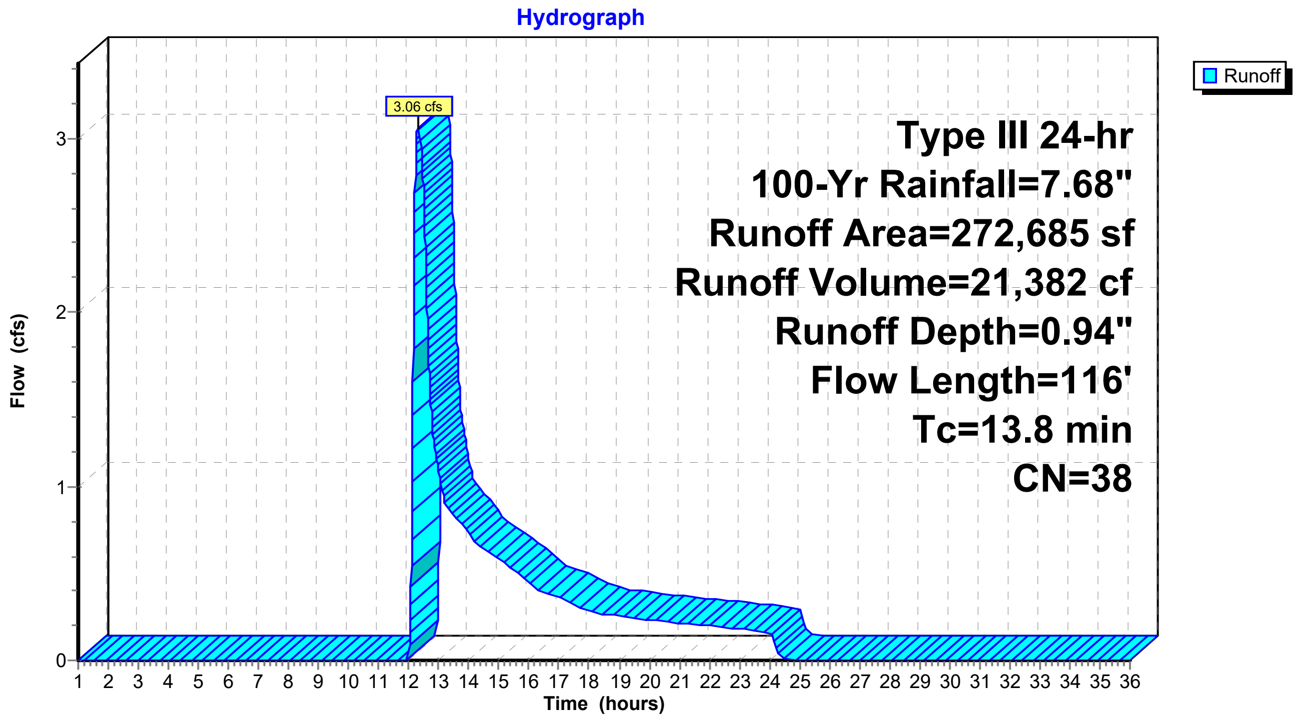
Subcatchment A1: SUB-A1



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Summary for Subcatchment A2: SUB-A2

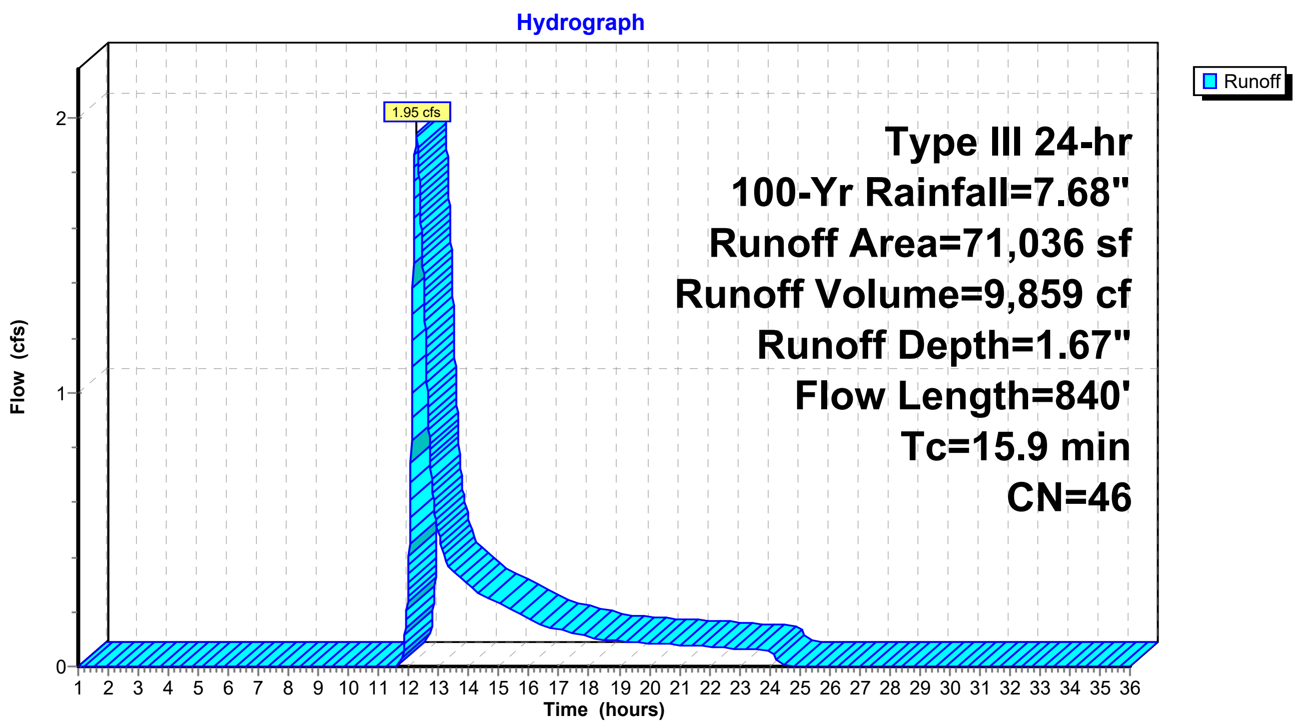
Runoff = 1.95 cfs @ 12.25 hrs, Volume= 9,859 cf, Depth= 1.67"
Routed to Pond IB-1 : IB-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=7.68"

	Area (sf)	CN	Description
	48,567	39	>75% Grass cover, Good, HSG A
*	11,455	76	Gravel driveway, HSG A
	7,961	30	Woods, Good, HSG A
*	2,653	98	Paved driveway, HSG A
*	400	76	Rip-rap / Crushed stone, HSG A
	71,036	46	Weighted Average
	68,383		96.27% Pervious Area
	2,653		3.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	45	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
10.8	795	0.0050	1.23	1.23	**Channel Flow,** Area= 1.0 sf Perim= 4.8' r= 0.21' n= 0.030 Earth, grassed & winding
15.9	840	Total			

Subcatchment A2: SUB-A2



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Summary for Subcatchment A3: SUB-A3

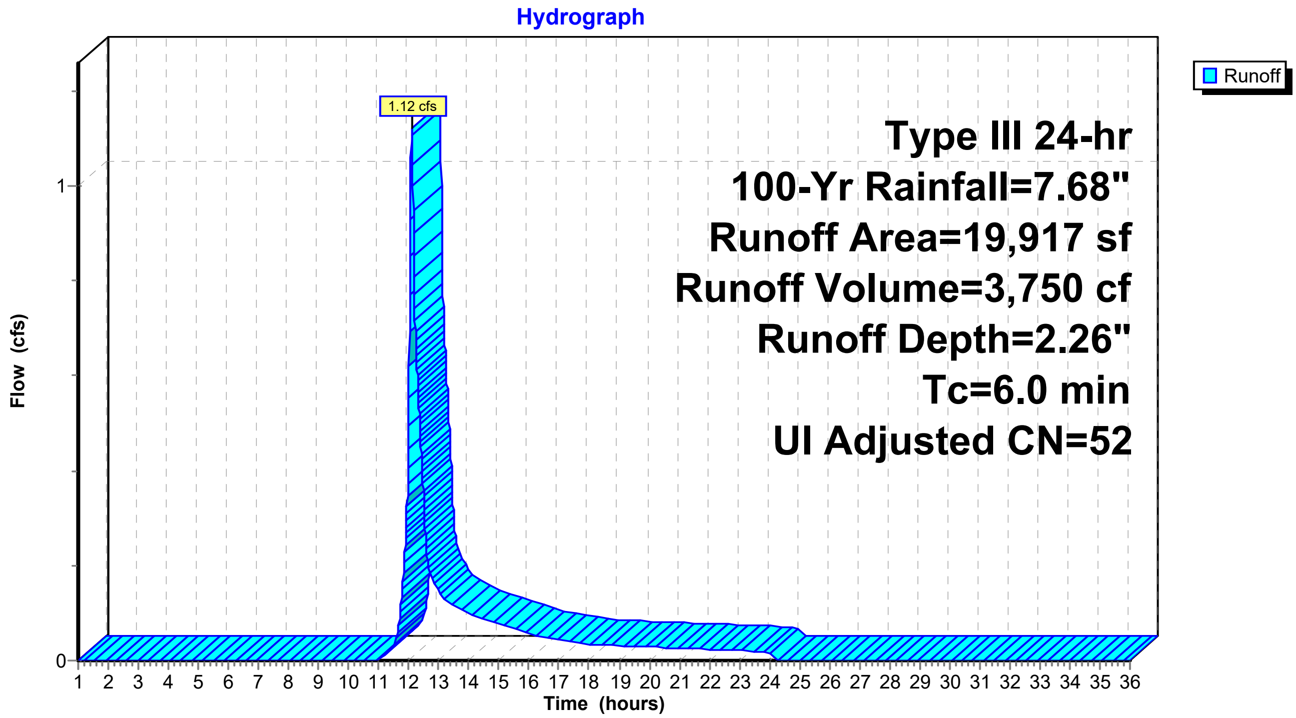
Runoff = 1.12 cfs @ 12.10 hrs, Volume= 3,750 cf, Depth= 2.26"
Routed to Pond IT-1 : IT-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=7.68"

	Area (sf)	CN	Adj	Description
	6,564	30		Woods, Good, HSG A
	6,940	39		>75% Grass cover, Good, HSG A
*	3,855	98		Paved driveway, HSG A
*	1,935	76		Rip-rap / Crushed stone, HSG A
*	383	98		Unconnected impervious, HSG A
	240	98		Roofs, HSG A
	19,917	53	52	Weighted Average, UI Adjusted
	15,439			77.52% Pervious Area
	4,478			22.48% Impervious Area
	383			8.55% Unconnected

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

Subcatchment A3: SUB-A3



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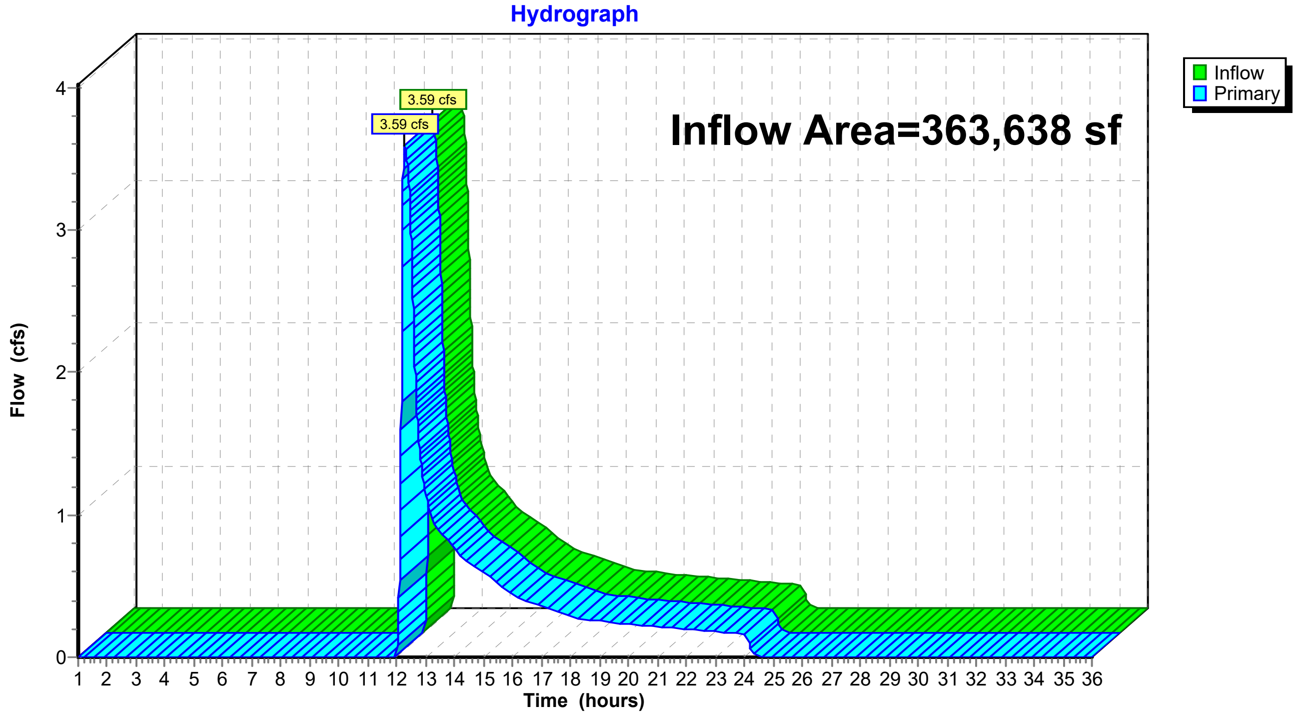
Summary for Pond A: POI-A

Inflow Area = 363,638 sf, 1.97% Impervious, Inflow Depth = 0.74" for 100-Yr event
Inflow = 3.59 cfs @ 12.28 hrs, Volume= 22,514 cf
Primary = 3.59 cfs @ 12.28 hrs, Volume= 22,514 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2

Pond A: POI-A



Summary for Pond IB-1: IB-1

Inflow Area = 71,036 sf, 3.73% Impervious, Inflow Depth = 1.67" for 100-Yr event
Inflow = 1.95 cfs @ 12.25 hrs, Volume= 9,859 cf
Outflow = 0.17 cfs @ 15.96 hrs, Volume= 9,859 cf, Atten= 91%, Lag= 222.4 min
Discarded = 0.17 cfs @ 15.96 hrs, Volume= 9,859 cf
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf
Routed to Pond A : POI-A

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 230.97' @ 15.96 hrs Surf.Area= 3,119 sf Storage= 4,740 cf

Plug-Flow detention time= 334.9 min calculated for 9,856 cf (100% of inflow)
Center-of-Mass det. time= 334.9 min (1,230.5 - 895.6)

Volume	Invert	Avail.Storage	Storage Description
#1	229.00'	12,733 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
229.00	1,710	0	0
230.00	2,407	2,059	2,059
231.00	3,141	2,774	4,833
232.00	3,935	3,538	8,371
233.00	4,789	4,362	12,733

Device	Routing	Invert	Outlet Devices
#1	Discarded	229.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	231.90'	**20.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.17 cfs @ 15.96 hrs HW=230.97' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=229.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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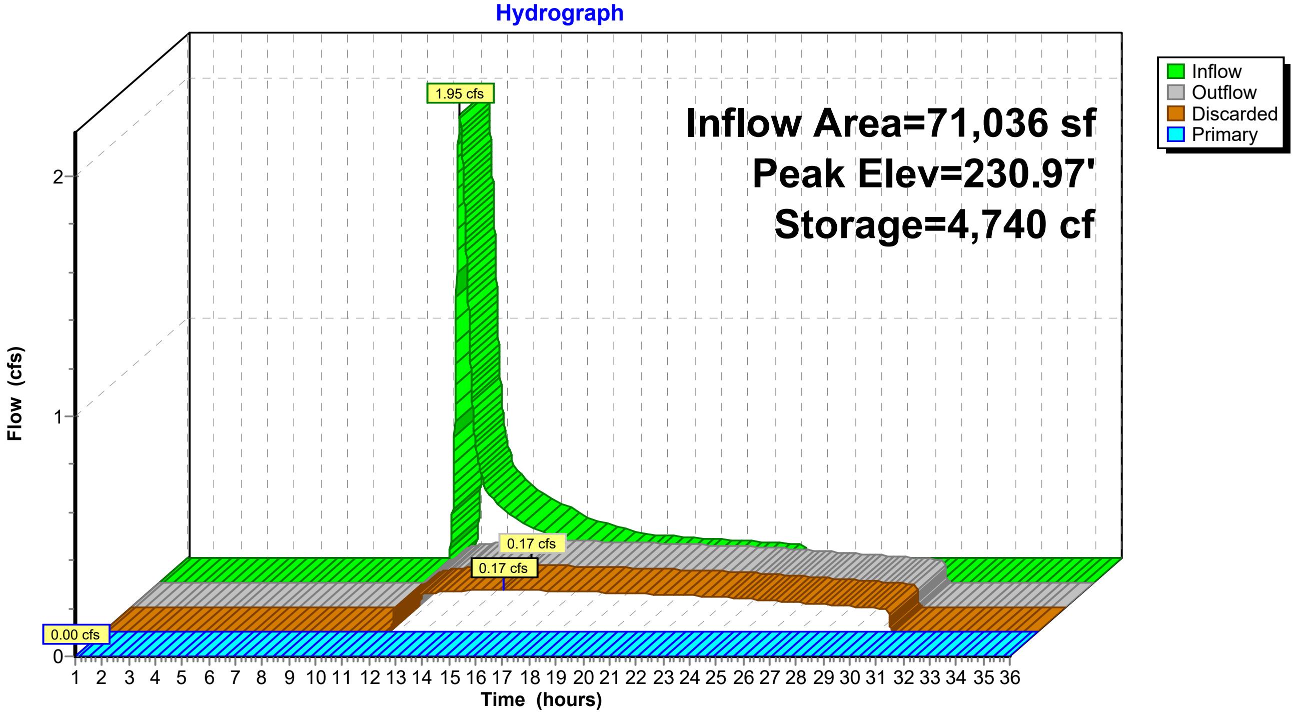
Pond IB-1: IB-1


Hydrograph
1.95 cfs
0.17 cfs
0.17 cfs
0.00 cfs
Inflow Area=71,036 sf
Peak Elev=230.97'
Storage=4,740 cf
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
2
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

Summary for Pond IT-1: IT-1

Inflow Area = 19,917 sf, 22.48% Impervious, Inflow Depth = 2.26" for 100-Yr event
Inflow = 1.12 cfs @ 12.10 hrs, Volume= 3,750 cf
Outflow = 0.78 cfs @ 12.19 hrs, Volume= 3,750 cf, Atten= 30%, Lag= 5.6 min
Discarded = 0.07 cfs @ 12.19 hrs, Volume= 2,618 cf
Primary = 0.71 cfs @ 12.19 hrs, Volume= 1,132 cf
Routed to Pond A : POI-A

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 224.17' @ 12.19 hrs Surf.Area= 1,223 sf Storage= 735 cf

Plug-Flow detention time= 97.8 min calculated for 3,750 cf (100% of inflow)
Center-of-Mass det. time= 97.8 min (965.8 - 868.0)

Volume	Invert	Avail.Storage	Storage Description
#1	222.49'	1,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
222.49	912	0.0	0	0
222.50	912	40.0	4	4
224.00	912	40.0	547	551
224.01	912	100.0	9	560
224.50	1,839	100.0	674	1,234

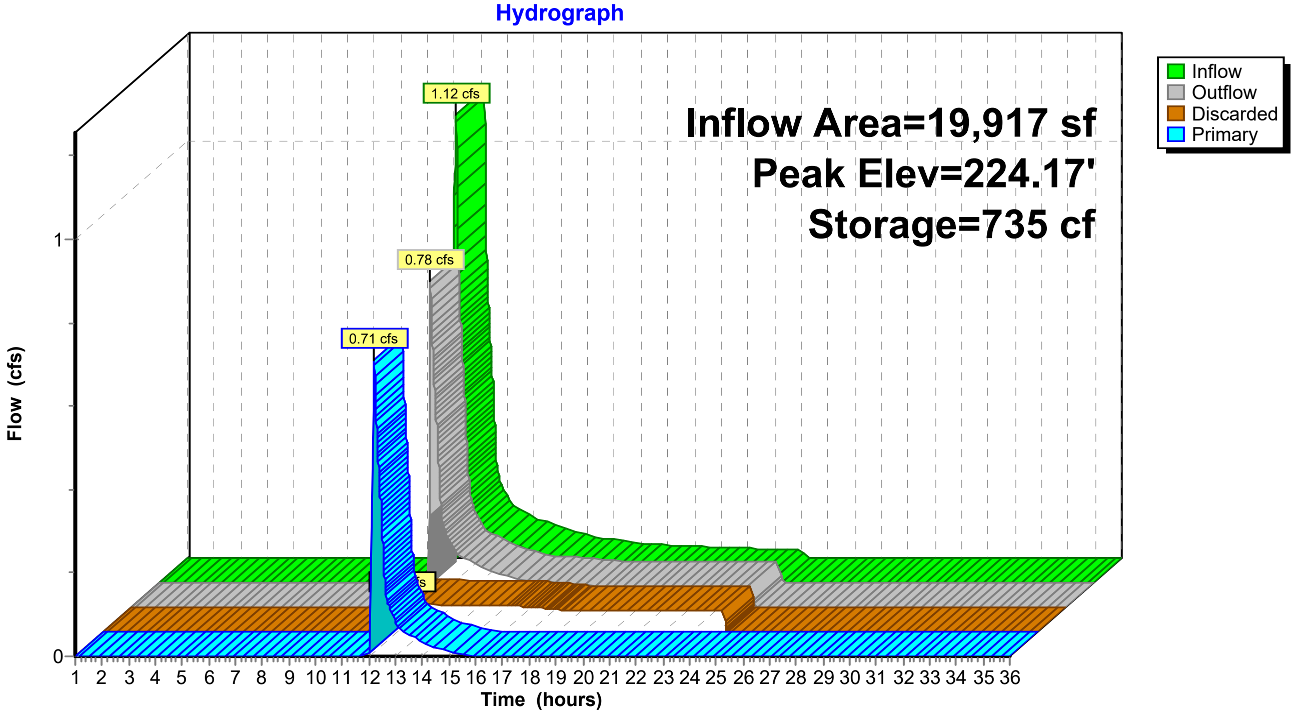
Device	Routing	Invert	Outlet Devices
#1	Discarded	222.49'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	224.14'	**42.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.07 cfs @ 12.19 hrs HW=224.17' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.71 cfs @ 12.19 hrs HW=224.17' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.71 cfs @ 0.50 fps)

REVISED 12/14/23

Pond IT-1: IT-1


Hydrograph
1.12 cfs
0.78 cfs
0.71 cfs
Inflow Area=19,917 sf
Peak Elev=224.17'
Storage=735 cf
Inflow
Outflow
Discarded
Primary
Flow (cfs)
1
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Time (hours)

Attachment E - Calculations

V

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

TSS Removal Calculation Worksheet

Location: Infiltration Basin with Sediment Forebay

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Grass Channel	**0.50**	**1.00**	**0.50**	**0.50**
Infiltration Basin	**0.80**	**0.50**	**0.40**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**

Total TSS Removal = 90%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **Taylor Street Well and Raw Water Supply, Littleton MA**
Prepared By: **Aaron Guzzaloca**
Date: **10/16/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

V

TSS Removal Calculation Worksheet

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Infiltration Trench

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Infiltration Trench	0.80	1.00	0.80	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Taylor Street Well and Raw Water Supply, Littleton MA
Prepared By: Aaron Guzzaloca
Date: 12/14/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

REVISED 12/14/23

Weston & Sampson

Recharge Volume Calculations (Static Method)

Taylor Street Well and Raw Water Main
Littleton, MA
December 14, 2023

Infiltration Basin						
Required Recharge Volume						
Hydrologic Soils Group:	**A**	**B**	**C**	**D**	**Total**	
Total Proposed Impervious Area:	2,653	0	0	0	2,653	(SF)
Target Factor:	0.60	0.35	0.25	0.10		
Recharge Volume:	133	0	0	0	133	(CF)

Provided Recharge Volume		
Elevation of Lowest Invert:	231.90	(FT)
Volume Below Lowest Outlet:	7,981	(CF)

Drawdown Time		
Saturated Hydraulic Conductivity (Rawls Rate):	2.41	(IN/HR)
Bottom Area of Infiltration Basin:	1,710	(SF)
Drawdown Time:	23.2	(HRS)

Infiltration Trench						
Required Recharge Volume						
Hydrologic Soils Group:	**A**	**B**	**C**	**D**	**Total**	
Total Proposed Impervious Area:	4,508	0	0	0	4,508	(SF)
Target Factor:	0.60	0.35	0.25	0.10		
Recharge Volume:	225	0	0	0	225	(CF)

Provided Recharge Volume		
Elevation of Lowest Invert:	224.14	(FT)
Volume Below Lowest Outlet:	695	(CF)

Drawdown Time		
Saturated Hydraulic Conductivity (Rawls Rate):	2.41	(IN/HR)
Bottom Area of Infiltration Basin:	912	(SF)
Drawdown Time:	3.8	(HRS)

REVISED 12/14/23

Water Quality Volume Calculations

Taylor Street Well and Raw Water Main
Littleton, MA
December 14, 2023

Required Water Quality Storage Calculation
Proposed Impervious Area (SF) x 1-IN x 1-FT/12-IN = Required WQV

Location	Area (SF)	Required WQV (CF)	Provided WQV (CF)	BMP Description
Roadway Basin	2,653	221	7,981	Infiltration Basin
Well Building	3,855	321	695	Infiltration Trench

REVISED 12/14/23

Stage-Area-Storage for Pond IB-1: IB-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
229.00	1,710	0	231.60	3,617	6,860
229.05	1,745	86	231.65	3,657	7,042
229.10	1,780	174	231.70	3,697	7,226
229.15	1,815	264	231.75	3,737	7,412
229.20	1,849	356	231.80	3,776	7,599
229.25	1,884	449	231.85	3,816	7,789
229.30	1,919	544	231.90	3,856	7,981
229.35	1,954	641	231.95	3,895	8,175
229.40	1,989	740	232.00	3,935	8,371
229.45	2,024	840	232.05	3,978	8,568
229.50	2,059	942	232.10	4,020	8,768
229.55	2,093	1,046	232.15	4,063	8,970
229.60	2,128	1,151	232.20	4,106	9,175
229.65	2,163	1,259	232.25	4,149	9,381
229.70	2,198	1,368	232.30	4,191	9,589
229.75	2,233	1,479	232.35	4,234	9,800
229.80	2,268	1,591	232.40	4,277	10,013
229.85	2,302	1,705	232.45	4,319	10,228
229.90	2,337	1,821	232.50	4,362	10,445
229.95	2,372	1,939	232.55	4,405	10,664
230.00	2,407	2,059	232.60	4,447	10,885
230.05	2,444	2,180	232.65	4,490	11,109
230.10	2,480	2,303	232.70	4,533	11,334
230.15	2,517	2,428	232.75	4,576	11,562
230.20	2,554	2,555	232.80	4,618	11,792
230.25	2,591	2,683	232.85	4,661	12,024
230.30	2,627	2,814	232.90	4,704	12,258
230.35	2,664	2,946	232.95	4,746	12,494
230.40	2,701	3,080	233.00	**4,789**	**12,733**
230.45	2,737	3,216			
230.50	2,774	3,354			
230.55	2,811	3,493			
230.60	2,847	3,635			
230.65	2,884	3,778			
230.70	2,921	3,923			
230.75	2,958	4,070			
230.80	2,994	4,219			
230.85	3,031	4,370			
230.90	3,068	4,522			
230.95	3,104	4,676			
231.00	3,141	4,833			
231.05	3,181	4,991			
231.10	3,220	5,151			
231.15	3,260	5,313			
231.20	3,300	5,477			
231.25	3,340	5,643			
231.30	3,379	5,811			
231.35	3,419	5,980			
231.40	3,459	6,152			
231.45	3,498	6,326			
231.50	3,538	6,502			
231.55	3,578	6,680			

VOLUME BELOW LOWEST OUTLET

REVISED 12/14/23

Stage-Area-Storage for Pond IT-1: IT-1 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
223.53	912	379	224.05	988	598
223.54	912	383	224.06	1,007	608
223.55	912	387	224.07	1,026	618
223.56	912	390	224.08	1,044	628
223.57	912	394	224.09	1,063	639
223.58	912	398	224.10	1,082	650
223.59	912	401	224.11	1,101	661
223.60	912	405	224.12	1,120	672
223.61	912	409	224.13	1,139	683
223.62	912	412	224.14	1,158	695
223.63	912	416	224.15	1,177	706
223.64	912	420	224.16	1,196	718
223.65	912	423	224.17	1,215	730
223.66	912	427	224.18	1,234	742
223.67	912	430	224.19	1,253	755
223.68	912	434	224.20	1,271	767
223.69	912	438	224.21	1,290	780
223.70	912	441	224.22	1,309	793
223.71	912	445	224.23	1,328	806
223.72	912	449	224.24	1,347	820
223.73	912	452	224.25	1,366	833
223.74	912	456	224.26	1,385	847
223.75	912	460	224.27	1,404	861
223.76	912	463	224.28	1,423	875
223.77	912	467	224.29	1,442	889
223.78	912	471	224.30	1,461	904
223.79	912	474	224.31	1,480	919
223.80	912	478	224.32	1,498	934
223.81	912	482	224.33	1,517	949
223.82	912	485	224.34	1,536	964
223.83	912	489	224.35	1,555	979
223.84	912	492	224.36	1,574	995
223.85	912	496	224.37	1,593	1,011
223.86	912	500	224.38	1,612	1,027
223.87	912	503	224.39	1,631	1,043
223.88	912	507	224.40	1,650	1,060
223.89	912	511	224.41	1,669	1,076
223.90	912	514	224.42	1,688	1,093
223.91	912	518	224.43	1,707	1,110
223.92	912	522	224.44	1,725	1,127
223.93	912	525	224.45	1,744	1,144
223.94	912	529	224.46	1,763	1,162
223.95	912	533	224.47	1,782	1,180
223.96	912	536	224.48	1,801	1,198
223.97	912	540	224.49	1,820	1,216
223.98	912	544	224.50	**1,839**	**1,234**
223.99	912	547			
224.00	912	551			
224.01	912	560			
224.02	931	569			
224.03	950	579			
224.04	969	588			

VOLUME BELOW LOWEST OUTLET

REVISED 12/14/23

Sediment Forebay Sizing Calculations

Taylor Street Well and Raw Water Main
Littleton, MA
December 14, 2023

Forebay Volume:

Minimum Required Volume = 0.1-IN x Impervious Area

Impervious Area:	2,653	(SF)
Volume Required:	22	(CF)
Volume Provided:	61	(CF)

Volume Calculation			
Elevation (FT)	**Area (SF)**	**Incremental Volume (CF)**	**Cumulative Volume (CF)**
229	25	0	0
230	97	61	**61**

REVISED 12/14/23

INFILTRATION BASIN GROUNDWATER MOUNDING CALCULATIONS

use consistent units (e.g. feet & days **or** inches & hours)

Input Values

4.8200	***R***	**Recharge (infiltration) rate (feet/day)**
0.310	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
382.75	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
43.830	**x**	**1/2 length of basin (x direction, in feet)**
12.500	**y**	**1/2 width of basin (y direction, in feet)**
3.000	**t**	**duration of infiltration period (days)**
51.000	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

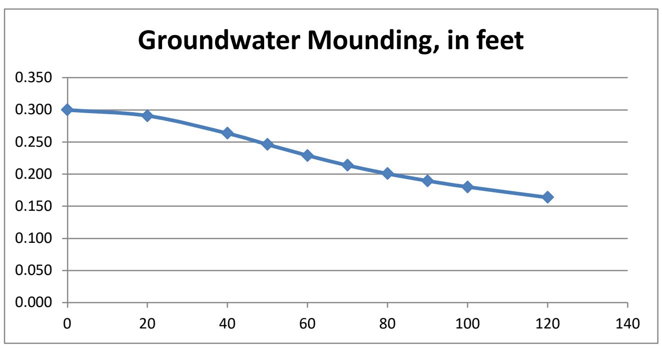
inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

51.300	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.300	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
0.300	**0**
0.291	**20**
0.264	**40**
0.246	**50**
0.229	**60**
0.214	**70**
0.201	**80**
0.190	**90**
0.180	**100**
0.164	**120**

Re-Calculate Now



CALCULATION NOTES:

Infiltration rate was calculated using the Rawls rate of 2.41 IN/HR

Hydraulic conductivity was calculated using Ksat data obtained from NRCS (refer to attached NRCS Ksat report)

Initial thickness of the saturated zone was calculated based upon a bedrock depth obtained from the logs for boring 3-85 which is the closest boring with a refusal depth of 53-feet (refer to boring logs in Attachment C)

INFILTRATION TRENCH GROUNDWATER MOUNDING CALCULATIONS

use consistent units (e.g. feet & days **or** inches & hours)

Input Values

4.8200	*R*	**Recharge (infiltration) rate (feet/day)**
0.310	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
382.77	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
29.000	**x**	**1/2 length of basin (x direction, in feet)**
8.250	**y**	**1/2 width of basin (y direction, in feet)**
3.000	**t**	**duration of infiltration period (days)**
51.000	**hi(0)**	**initial thickness of saturated zone (feet)**
51.149	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.149	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

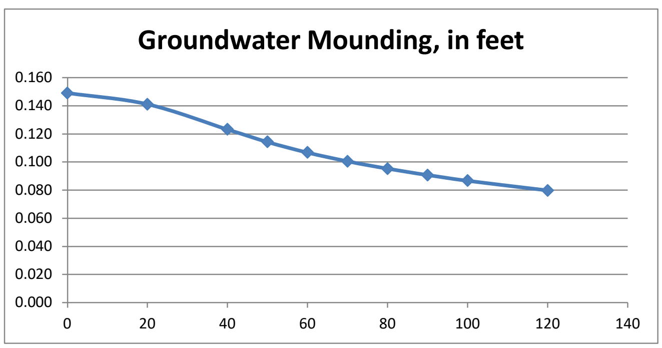
Conversion Table

inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
0.149	**0**
0.141	**20**
0.123	**40**
0.114	**50**
0.107	**60**
0.101	**70**
0.095	**80**
0.091	**90**
0.087	**100**
0.080	**120**

Re-Calculate Now



CALCULATION NOTES:

Infiltration rate was calculated using the Rawls rate of 2.41 IN/HR

Hydraulic conductivity was calculated using Ksat data obtained from NRCS (refer to attached NRCS Ksat report)

Initial thickness of the saturated zone was calculated based upon a bedrock depth obtained from the logs for boring 3-85 which is the closest boring with a refusal depth of 53-feet (refer to boring logs in Attachment C)

D.L.MAHER CO.
GROUND WATER DEVELOPMENT
P.O. BOX 127 71 CONCORD STREET
NORTH READING • MA. 01864 • 617/933-3210

Test Well No. #3-85 D.L.M. Job No. 85-086-T
Driller John Graglia Helper David Maher
Client Littleton Water Dept.
Location off Tayler Rd.
Owner's Representative Savas Danos
Date Started: 7-24-85 Date Finished: 7-25-85

DEPTH From	To	Soil Classification	Loss of Wash Water
0	4'	hit rock	
0	5'	going crooked	
0	21'	grayish brown sand and sharp gravel	
21'	28'	sharp gray gravel and fine to medium gray sand	
28'	49'	sharp broken gray gravel fine to medium gray sand	
	53	Refusal	

1 1/2' Static 8'9 1/2" COMPLETED DEPTH 49' TOTAL DEPTH 53'

N
SITE PLAN 100 200 300 400 500 600 1" = 400'

LOCUS

TIME AND MATERIALS

Test Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	Screen Length	Screen Exposed	Screen Material	Screen Slot Size	Riser	Hours Dev.	Hours Pumped
#3-85	2 1/2"	53'	49'	42'	6'	6'	1 1/2" Armco	80	5'	1/2 hr	1hr Tuckear
3A	4'	pulled		3B	5'	pulled					

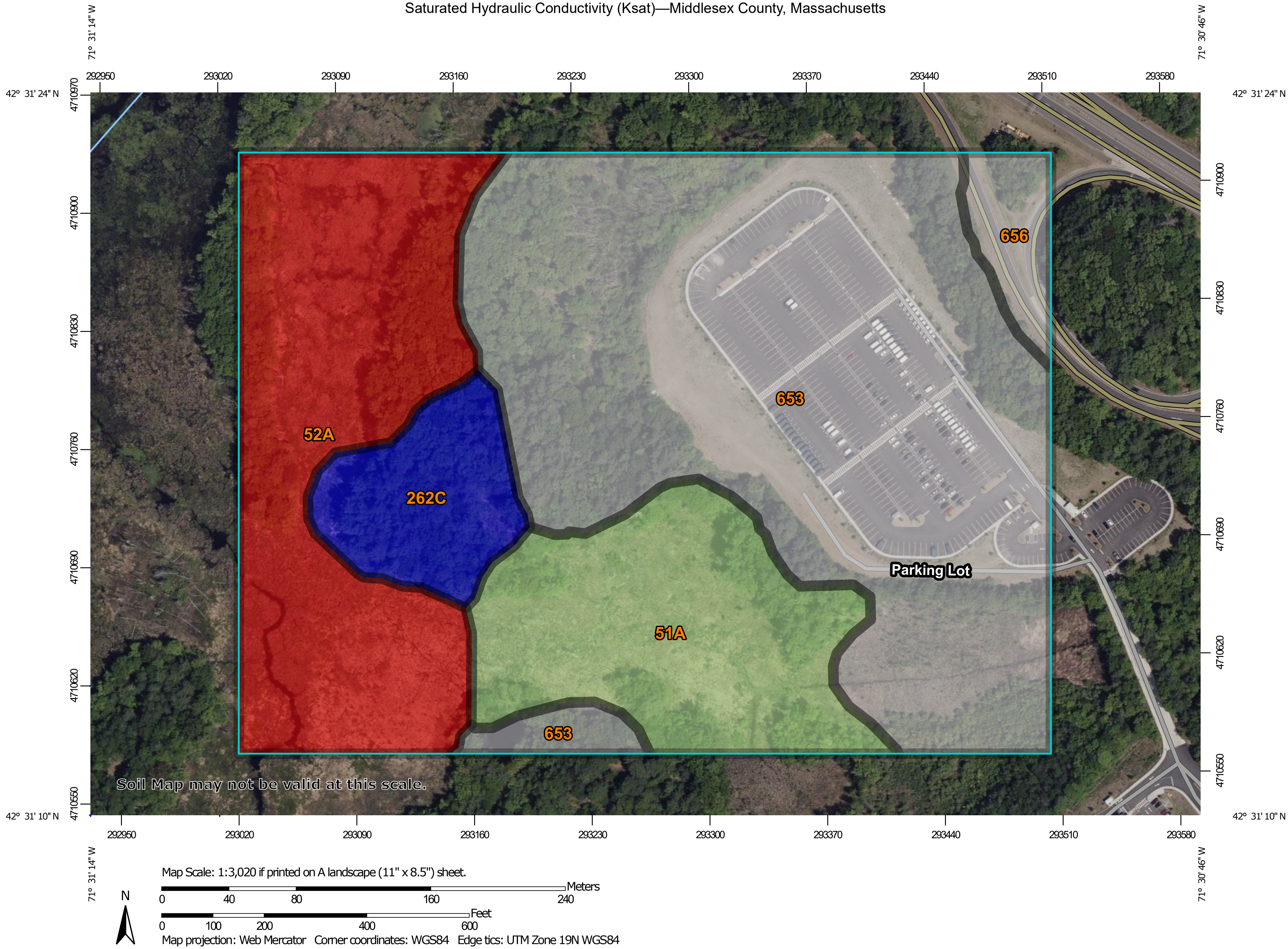
REMARKS: well pumps 60 gpm vac 8" static 8'9 1/2" (Total pipe driven 62')

Pump Test on Hole No. Date

Time	G.P.M.	Water Levels Vac	Obs. No.	Obs. No.	Obs. No.
Static					

Water Sample
Date ______ Time ______
Sent To:
Field Quality
CO_2 ______ Taste ______
Fe ______ Odor ______
Mn ______ Hardness ______
Ph ______ Color ______

Saturated Hydraulic Conductivity (Ksat)—Middlesex County, Massachusetts



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- <= 10.0000
- > 10.0000 and <= 83.8130
- > 83.8130 and <= 135.0333
- Not rated or not available

Soil Rating Lines

- <= 10.0000
- > 10.0000 and <= 83.8130
- > 83.8130 and <= 135.0333
- Not rated or not available

Soil Rating Points

- <= 10.0000
- > 10.0000 and <= 83.8130
- > 83.8130 and <= 135.0333
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 23, Sep 12, 2023

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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

Saturated Hydraulic Conductivity (Ksat)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	83.8130	6.9	16.1%
52A	Freetown muck, 0 to 1 percent slopes	10.0000	10.1	23.6%
262C	Quonset sandy loam, 8 to 15 percent slopes	135.0333	2.8	6.5%
653	Udorthents, sandy		21.8	51.1%
656	Udorthents-Urban land complex		1.2	2.7%
Totals for Area of Interest			**42.7**	**100.0%**

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

Top Depth: 24

Bottom Depth: 636

Units of Measure: Inches

Summary for Reach SW-1: SW-1

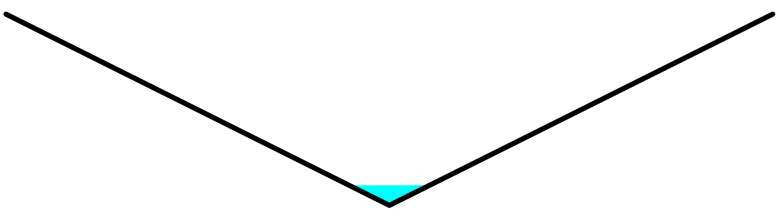
STA 0+00 to STA 8+10

Inflow Area = 71,274 sf, 3.99% Impervious, Inflow Depth = 0.06" for 2-Yr event
Inflow = 0.01 cfs @ 15.06 hrs, Volume= 343 cf
Outflow = 0.01 cfs @ 15.39 hrs, Volume= 343 cf, Atten= 2%, Lag= 19.9 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.54 fps, Min. Travel Time= 24.8 min
Avg. Velocity = 0.39 fps, Avg. Travel Time= 35.0 min

Peak Storage= 18 cf @ 15.39 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 0.42'
Bank-Full Depth= 1.00' Flow Area= 2.0 sf, Capacity= 4.85 cfs

0.00' x 1.00' deep channel, n= 0.025 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 4.00'
Length= 810.0' Slope= 0.0049 '/'
Inlet Invert= 235.65', Outlet Invert= 231.71'



Summary for Reach SW-1: SW-1

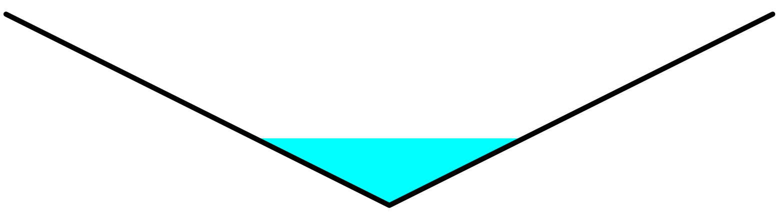
STA 0+00 to STA 8+10

Inflow Area = 71,274 sf, 3.99% Impervious, Inflow Depth = 0.47" for 10-Yr event
Inflow = 0.36 cfs @ 12.29 hrs, Volume= 2,765 cf
Outflow = 0.30 cfs @ 12.44 hrs, Volume= 2,765 cf, Atten= 16%, Lag= 9.3 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.21 fps, Min. Travel Time= 11.2 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 22.8 min

Peak Storage= 199 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.35' , Surface Width= 1.40'
Bank-Full Depth= 1.00' Flow Area= 2.0 sf, Capacity= 4.85 cfs

0.00' x 1.00' deep channel, n= 0.025 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 4.00'
Length= 810.0' Slope= 0.0049 '/'
Inlet Invert= 235.65', Outlet Invert= 231.71'



Summary for Reach SW-2: SW-2

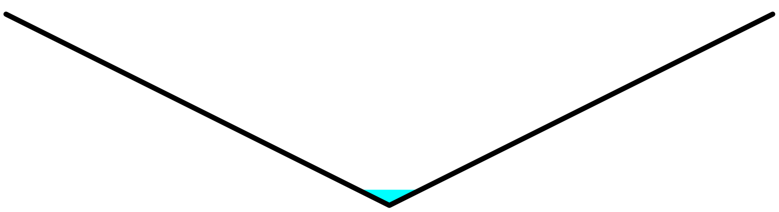
STA 8+10 to STA 10+00

Inflow Area = 71,274 sf, 3.99% Impervious, Inflow Depth = 0.06" for 2-Yr event
Inflow = 0.01 cfs @ 15.06 hrs, Volume= 343 cf
Outflow = 0.01 cfs @ 15.11 hrs, Volume= 343 cf, Atten= 0%, Lag= 2.7 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.92 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 3.9 min

Peak Storage= 3 cf @ 15.11 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 0.33'
Bank-Full Depth= 1.00' Flow Area= 2.0 sf, Capacity= 9.74 cfs

0.00' x 1.00' deep channel, n= 0.025 Earth, grassed & straight
Side Slope Z-value= 2.0 '/' Top Width= 4.00'
Length= 190.0' Slope= 0.0196 '/'
Inlet Invert= 235.44', Outlet Invert= 231.71'



Summary for Reach SW-2: SW-2

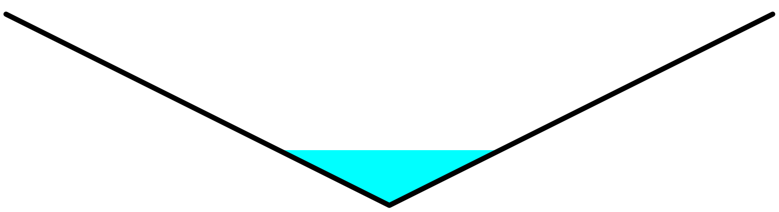
STA 8+10 to STA 10+00

Inflow Area = 71,274 sf, 3.99% Impervious, Inflow Depth = 0.47" for 10-Yr event
Inflow = 0.36 cfs @ 12.29 hrs, Volume= 2,765 cf
Outflow = 0.35 cfs @ 12.31 hrs, Volume= 2,765 cf, Atten= 0%, Lag= 1.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.13 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.27 fps, Avg. Travel Time= 2.5 min

Peak Storage= 32 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.29' , Surface Width= 1.15'
Bank-Full Depth= 1.00' Flow Area= 2.0 sf, Capacity= 9.74 cfs

0.00' x 1.00' deep channel, n= 0.025 Earth, grassed & straight
Side Slope Z-value= 2.0 '/' Top Width= 4.00'
Length= 190.0' Slope= 0.0196 '/'
Inlet Invert= 235.44', Outlet Invert= 231.71'



Attachment F - Long Term Pollution Prevention Plan

Long Term Pollution Prevention Plan

To meet the requirements of Standard 4 of the Massachusetts Stormwater Handbook, this Long Term Pollution Prevention Plan is provided to identify the proper procedures of practices for source control and pollution prevention.

Storage and Handling of Oil and other Hazardous Materials

Any hazardous materials that will be used ancillary to the site will be stored inside, or off site.

Spill Prevention/Response

Spill kits will be kept at a local Town facility, and spills shall be cleaned up immediately. Spills of any hazardous material over 10 gallons will be reported to the Massachusetts Department of Environmental Protection within 24 hours.

Operation and Maintenance of Stormwater Control Structures

Included in Attachment H of this appendix is the Operation and Maintenance plan for this site, which includes periodic cleaning of stormwater infrastructure. The Littleton Water Department (LWD) will be responsible for the implementation of the plan.

Landscaping

Maintenance of landscaped areas shall be the responsibility of the LWD. Use of fertilizers, herbicides, and pesticides shall not be allowed on site.

Septic System

There will be no onsite septic facilities.

Vehicle Washing

Vehicle washing shall not be performed on site. Vehicles can be rinsed with a high volume of water at low pressure. This is considered dust water by the DEP and accounts for what may be rinsed off the vehicle when it rains.

Non-Hazardous Waste Management/Good Housekeeping Practices

All non-hazardous waste shall be stored in designated trash or recycling containers onsite for periodic collection by the local trash collector. The LWD shall have maintenance staff who monitor the site for the accumulation of trash. Any trash that is seen onsite shall immediately be collected and placed into designated trash or recycling containers.

Prohibition of Illicit Discharges

Illicit discharges to the onsite stormwater management system shall be strictly prohibited. Illicit discharges are defined as any direct or indirect non-stormwater discharge to the onsite stormwater system. Requirements related to Illicit Discharges are further detailed in the attached Illicit Discharge Compliance Statement in Attachment I.

De-icing & Snow Disposal

Salt and sand shall not be used to treat the existing paved surfaces of the site during snow and ice events. Snow will be temporarily stored within peripheral areas of the site and allowed to melt and drain back to onsite stormwater systems. When needed, snow shall be removed from the site and disposed of in accordance with all local, state, and federal regulations. Snow storage shall be prohibited within all wetlands.

Emergency Contact Information

Owner/Operator:
Littleton Water Department
Corey Godfrey
Water & Sewer Superintendent
39 Ayer Road, Littleton, MA 01460
cgodfrey@lelwd.com
978-540-2222

Engineer:
James Pearson, P.E.
Weston & Sampson, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978-532-1900

Attachment G - Construction Period Pollution and Erosion and Sedimentation Control Plan

Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan

SECTION 1: Introduction

The Littleton Electric Light & Water Department proposes to develop a new drinking water well at a Town owned parcel located off Taylor Street to augment the Town's active water supply sources. Access to the site will be provided through an easement located on abutting property owned by Amazon. Work involved with this project will 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.

As part of this project, this "Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan" has been created to ensure that onsite erosion is prevented and sediment is controlled to prevent it from leaving the site.

SECTION 2: Construction Period Pollution Prevention Measures

Best Management Practices (BMPs) will be utilized as Construction Period Pollution Prevention Measures to reduce potential pollutants and prevent any off-site discharge. The objectives of the BMPs for construction activity are to minimize the disturbed areas, stabilize any disturbed areas, control the site perimeter and retain sediment. Both erosion and sedimentation controls and non-stormwater best management measures will be used to minimize site disturbance and ensure compliance with the performance standards of the WPA and Stormwater Standards. Measures will be taken to minimize the area disturbed by construction activities to reduce the potential for soil erosion and stormwater pollution problems. All pollution prevention and erosion control measures which are required on the site plans and in the SWPPP shall be followed along with the guidance in this document. In addition, good housekeeping measures will be followed for the day-to-day operation of the construction site under the control of the contractor to minimize the impact of construction. This section describes the control practices that will be in place during construction activities. All recommended control practices will comply with the standards set in the MA DEP Stormwater Policy Handbook.

2.1 Minimize Disturbed Area and Protect Natural Features and Soil

In order to minimize disturbed areas all work will be completed within well-defined work limits. These work limits are shown on the construction plans. The Contractor shall not disturb native vegetation in the undisturbed wooded area without prior approval from the Engineer. The Contractor will be responsible to make sure that all workers know the proper work limits and do not extend their work into the undisturbed areas. The protective measures are described in more detail in the following sections.

2.2 Control Stormwater Flowing onto and through the project

All construction areas adjacent to drainage features will be lined with compost filter tubes and silt fence. The tubes and silt fence will be inspected daily and accumulated silt will be removed as appropriate. In addition, any storage of material will require a second level of protection by surrounding the areas with another row of compost filter tubes. A stabilized construction entrance/exit is proposed so that equipment visiting the site can remove any accumulated dirt and mud from vehicles to prevent tracking the mud onto public roads.

2.3 Stabilize Soils

The Contractor shall limit the area of land which is exposed and free from vegetation during construction. In areas where the period of exposure will be greater than two (2) months, mulching, the use of erosion control mats, or other protective measures shall be provided as specified.

The Contractor shall take account of the conditions of the soil where erosion control seeding will take place to ensure that materials used for re-vegetation are adaptive to the sediment control.

Following the completion of construction, embankment areas will be finished with topsoil and seed. Slopes in excess of 3H:1V will be stabilized with erosion matting to prevent erosion during the interim period in which vegetation is being established. The overland areas of the proposed construction staging areas will also be re-seeded.

2.4 Proper storage and cover of any stockpiles

The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared as a part of this project and shall require written approval of the Engineer.

Adequate measures for erosion and sediment control such as the placement of compost filter tubes around the downstream perimeter of stockpiles shall be employed to protect any downstream areas from siltation.

The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.

2.5 Perimeter Controls and Sediment Barriers

Erosion control lines as described in Section 5 will be utilized to ensure that no sedimentation occurs outside the perimeter of the work area.

2.6 Storm Drain Inlet Protection

Storm drain inlets will be protected from sediment.

2.7 Retain Sediment On-Site

The Contractor will be responsible to monitor all erosion control measures. Whenever necessary the Contractor will clear all sediment from the compost filter tubes and silt fence that have been silted up during construction. Daily monitoring should be conducted using the attached Monitoring Form.

The following good housekeeping practices will be followed on-site during the construction project.

2.8 Material Handling and Waste Management

All materials stored on-site will be stored in a neat, orderly manner in appropriate containers. All materials will be kept in their original containers with the original manufacturer’s label. Substances will not be mixed with one another unless recommended by the manufacturer.

All waste materials will be collected and stored in a securely lidded metal container from a licensed management company. The waste and any construction debris from the site will be hauled off-site daily and disposed of properly. The contractor will be responsible for all waste removal. Manufacturer’s recommendations for proper use and disposal will be followed for all materials. Sanitary waste will be collected from the portable units a minimum of once a week, by a licensed sanitary waste management contractor.

2.9 Designated Washout Areas

The Contractor shall perform washout into contained areas designated for that purpose to prevent cement-laden water from leaving the site.

2.10 Proper Equipment/Vehicle Fueling and Maintenance Practices

On-site vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the risk of leakage. To ensure that leaks on stored equipment do not contaminate the site, oil-absorbing mats will be placed under all equipment during storage. Regular fueling and service of the equipment may be performed using approved methods and with care taken to minimize chance of spills. Any petroleum products will be stored in tightly sealed containers that are clearly labeled.

2.11 Equipment/Vehicle Washing

The Contractor will be responsible to ensure that no equipment is washed on-site.

SECTION 3: Spill Prevention and Control Plan

The Contractor will be responsible for preventing spills in accordance with the project specifications and applicable federal, state, and local regulations. The Contractor will identify a properly trained site employee, involved with the day-to-day site operations to be the spill prevention and cleanup coordinator. The name(s) of the responsible spill personnel will be posted on-site. Each employee will be instructed that all spills are to be reported to the spill prevention and cleanup coordinator.

3.1 Spill Control Equipment

Spill control/containment equipment will be kept in the Work Area. Materials and equipment necessary for spill cleanup will be kept either in the Work Area or in an otherwise accessible on-site location. Equipment and materials will include, but not be limited to, absorbent booms/mats, brooms, dust pans, mops, rags, gloves, goggles, sand, plastic and metal containers specifically for this purpose. It is the responsibility of the Contractor to ensure the inventory will be readily accessible and maintained.

3.2 Notification

All workers will be directed to inform the on-site supervisor of a spill event. The supervisor will assess the incident and initiate proper containment and response procedures immediately upon notification. Workers should avoid direct contact with spilled materials during the containment procedures. Primary notification of a spill should be made to the local Fire Department and Police Departments. Secondary Notification will be to the certified cleanup contractor if deemed necessary by Fire and/or Police personnel. The third level of notification is to the DEP. The specific cleanup contractor to be used will be identified by the Contractor prior to commencement of construction activities.

3.3 Spill Containment and Clean-Up Measures

Spills will be contained with granular sorbent material, sand, sorbent pads, booms or all of the above to prevent spreading. Certified cleanup contractors should complete spill cleanup. The material manufacturer’s recommended methods for spill cleanup will be clearly posted and on-site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

3.4 Hazardous Materials Spill Report

The Contractor will report and record any spill. The spill report will present a description of the release, including the quantity and type of material, date of the spill, circumstances leading to the release, location of spill, response actions and personnel, documentation of notifications and corrective measures implemented to prevent reoccurrence.

This document does not relieve the Contractor of the Federal reporting requirements of 40 CFR Part 110, 40 CFR Part 117, 40 CFR Part 302 and the State requirements specified under the Massachusetts Contingency Plan (M.C.P) relating to spills or other releases of oils or hazardous substances. Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117 or 40 CFR Part 302, occurs during a twenty-four (24) hour period, the Contractor is required to comply with the response requirements of the above mentioned regulations. Spills of oil or hazardous material in excess of the reportable quantity will be reported to the National Response Center (NRC).

SECTION 4: Contact Information/Responsible Parties

Owner/Operator:
Littleton Water Department
Corey Godfrey
Water & Sewer Superintendent
39 Ayer Road, Littleton, MA 01460
cgodfrey@lelwd.com
978-540-2222

Engineer:
James Pearson, P.E.
Weston & Sampson, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978-532-1900

Site Inspector:
TBD

Contractor:
TBD

SECTION 5: Erosion and Sedimentation Control

Erosion and Sedimentation Controls are shown on the project plans. A Stormwater Pollution Prevention Plan (SWPPP) will be required for this project in accordance with EPA regulations. The contractor shall refer to the SWPPP for additional requirements.

SECTION 6: Site Development Plans

A full set of site development plans are included with this submittal.

SECTION 7: Operation and Maintenance of Erosion Control

If there is a failure to the controls the Contractor, under the supervision of the Engineer, will be required to stop work until the failure is repaired.

Periodically throughout the work, whenever the Engineer deems it necessary, the sediment that has been deposited against the controls will be removed to ensure that the controls are working properly.

SECTION 8: Inspection Schedule

During construction the erosion and sedimentation controls will be inspected daily. Once the Contractor is selected, an on-site inspector will be selected to work closely with the Engineer to insure that all erosion and sedimentation controls are in place and working properly. An Inspection Form is included.

Inspection Form

Inspected By: ______________________________ Date: _________ Time: ________

YES	NO	DOES NOT APPLY	ITEM
			Do any erosion/siltation control measures require repair or clean out to maintain adequate function?
			Is there any evidence that sediment is leaving the site and entering the wetlands?
			Are any temporary soil stockpiles or construction materials located in non-approved areas?
			Are on-site construction traffic routes, parking, and storage of equipment and supplies located in areas not specifically designed for them?
			Is there any evidence that sediment is entering stormwater management systems?

Specific location, current weather conditions, and action to be taken:

____

____

____

____

____

____

Other Comments:

____

____

____

Pending the actions noted above I certify that the site is in compliance with the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan.

Signature: ________________________________ Date: _______________________

Attachment H - Operations and Maintenance Plan

Operations & Maintenance Plan

1.0 Introduction

The following document has been written to comply with the stormwater guidelines set forth by the Massachusetts Department of Environmental Protection (MassDEP). The intent of these guidelines is to encourage Low Impact Development techniques to improve the quality of the stormwater runoff. These techniques, also known as Best Management Practices (BMPs) collect, store, and treat the runoff before discharging to adjacent environmental resources.

2.0 Purpose

This Operations & Maintenance Plan (O&M Plan) is intended to provide a mechanism for the consistent inspection and maintenance of each BMP installed on the project site. Included in this O&M Plan is a description of the BMP type and an inspection form for the BMP. The Littleton Water Department (LWD) is the owner and operator of the system and is responsible for its upkeep and maintenance. This work will be funded on an annual basis through the owner's operating budget.

In the event the Owner sells the property, it is the Owner's responsibility to transfer this plan as well as the past operation and maintenance records to the new property owner.

3.0 BMP Descriptions

3.1 Infiltration Basins

Infiltration basins are used to provide stormwater treatment, detention, and groundwater recharge to mitigate peak stormwater discharges and remove total suspended solids from the stormwater runoff.

3.2 Infiltration Trenches

Infiltration trenches are excavated trenches which are backfilled with crushed stone and receive stormwater runoff via either sheet flow or pipe conveyance. They provide stormwater detention and groundwater recharge to mitigate peak discharges and remove total suspended solids.

3.3 Sediment Forebays

Sediment forebays are designed to allow temporary ponding of stormwater runoff which allows sedimentation of total suspended solids. The bay is typically lined with stone riprap but can also be grassed and contains a stone check dam to release retained water.

3.4 Grassed Swales

Grassed swales treat stormwater runoff by providing long retention times for the water travelling through it so that total suspended solids are allowed to settle. The swales also contain stone check dams to increase retention time.

4.0 Inspection, Maintenance Checklist, and Schedule

4.1 Infiltration Basins

Infiltration basins shall be inspected every three months during the first year, and annually thereafter. Inspection shall include all items noted below.

All accumulated sediment and debris in the stormwater infiltration basins should be removed and disposed of according to local, state, and federal regulations. The basin bottom and side slopes shall be mowed as needed, and at least twice a year at a minimum. Any grassed areas of the basin, which are near any paved areas that use salt in deicing applications should be re-seeded in the spring. Vegetation in infiltration basin bottoms shall likewise be inspected for degradation. Any accumulated sediment shall be removed, and bare spots should be re-seeded as needed.

Pipe inlets and outfalls from stormwater infiltration basins shall be inspected for plugging or damage and cleaned or repaired immediately. Any vegetation, soil or debris that forms a barrier to flow shall be removed. If any soil erosion is noted, erosion shall be repaired, and bare spots shall be armored with stone riprap. Embankments, spillways, and swales that affect the operation of the basin shall likewise be inspected for blockage or damage. Any accumulated debris that may impede stormwater flow shall be removed, and any noted erosion shall be repaired with stone riprap.

4.2 Infiltration Trenches

Infiltration trenches should be inspected at least two times per year, in the fall and spring, to inspect for debris that may be covering the crushed stone at the surface of the trench. Debris should be removed to allow runoff to freely enter the stone at the surface. During the winter, the infiltration trench should be cleared of snow after each snowstorm to guard against excessive snow/ice buildup at the surface of the crushed stone.

4.3 Sediment Forebays

Sediment forebays shall be inspected on a monthly basis and shall be cleaned four times per year. Check the sediment forebay for accumulated trash and debris at least once per month and remove by hand. Sediment shall be removed as needed and at least four times per year by hand or by using a vacuum truck. Check for signs of erosion and rilling in the forebay when removing sediments, and repair with stone riprap, or re-seed as needed.

4.4 Grassed Swales

Grassed swales must be inspected at least once a year for signs of erosion, sediment accumulation, vegetation loss and for the presence of invasive species. Any debris or sedimentation must be removed, and all areas of vegetation loss must be repaired. Periodic mowing of the swales is also required and at least 4-IN of grass must be maintained in the bottom of the swale. Repair check dams with stone as needed.

4.5 Inspections and Record Keeping

- An inspection form should be filled out each, and every time maintenance work is performed.
- A binder should be kept that contains all of the completed inspection forms and any other related materials.
- A review of Operation & Maintenance actions should take place annually such that the Stormwater BMPs are being taken care of in the manner illustrated in this Operation & Maintenance Plan.
- Operation & Maintenance log forms for the last three years, at a minimum, shall be kept on site.
- The inspection and maintenance schedule may be refined in the future based on the findings and results of this Operation & Maintenance program or policy.

5.0 Stormwater Management System Owner/Responsible Party

The stormwater management system shall be owned and maintained by the following party or its future designee/assigns:

Littleton Water Department
Corey Godfrey
Water & Sewer Superintendent
39 Ayer Road, Littleton, MA 01460
cgodfrey@lelwd.com
978-540-2222

This operation and Maintenance Plan will be recorded with the registry of deeds so that current and future owners are aware of the requirement for proper operation and maintenance of the onsite stormwater system.

6.0 General Good Housekeeping Practices

All non-hazardous waste shall be stored in designated trash or recycling containers onsite for periodic collection by the local trash collector. The owner shall have maintenance staff who monitor the site for the accumulation of trash. Any trash that is seen onsite shall immediately be collected and placed into designated trash or recycling containers.

7.0 Estimated Operations and Maintenance Budget

The estimated budget for annual operations and maintenance of this stormwater system is $1,500 per year.

Infiltration Basins

Frequency: Inspect every three months during the first year and annually thereafter. Mow basins at least twice a year at a minimum.

Structure Number: ______________________________

Inspected By: ______________ Date: ________

Observations: ______________________________
____
____

Actions Taken: ______________________________
____
____

Instructions: Inspect grassed area. Mow grass as needed in infiltration basins. Remove accumulated trash and debris. Remove sediment and re-seed bare spots as needed, including in basin bottom. Inspect pipe inlets/outfalls for damage, erosion, or blockage, remove blockage as needed, repair erosion with riprap. Inspect embankments, spillways and swales for erosion or blockage. Repair erosion with riprap, remove blockage as needed. All trash, debris, and sediments should be disposed of in accordance with local, state, and federal regulations.

Infiltration Trenches

Frequency: Inspect at least twice per year, and after every major storm event. During winter months, inspect after every snow event.

Structure Number: ______________________________

Inspected By: ______________ Date: _______

Observations: ______________________________
____
____

Actions Taken: ______________________________
____
____

Instructions: Remove any accumulated trash, debris, and sediments which can inhibit stormwater flow into the surface stone of the trench. Remove grass clippings from surface of trench after mowing and remove any tree seedlings before they become established. Check any inlet and outlet pipes for clogging and remove as needed. If any ponding is noted after storm events, the trench may need to be rehabilitated. Remove crushed stone aggregate, filter fabric, and accumulated sediments from the trench then replace with new crushed stone and filter fabric. All trash and debris should be disposed of in accordance with local, state, and federal regulations.

Sediment Forebays

Frequency: Inspect monthly for trash and debris accumulation, remove as needed. Four times a year at a minimum, remove sediments.

Structure Number: ______________________________

Inspected By: ______________ Date: _______

Observations: ______________________________
____
____

Actions Taken: ______________________________
____
____

Instructions: Check for accumulation of sediment, trash, and debris monthly and remove trash and debris as needed. Every three months, remove sediments from forebay by hand or with a vacuum truck. Remove any vegetative growth or debris that restricts flow through the check dam. Check for signs of erosion and repair or replace any lost stone in the forebay or check dam with 4-6” riprap.

Grassed Swales

Frequency: Inspect quarterly in the first year and then annually during the spring each year after.

Structure Number: ______________________________

Inspected By: ________________ Date: ________

Observations: ______________________________
____
____

Actions Taken: ______________________________
____
____

Instructions: Check for accumulation of sediment, signs of erosion and loss of vegetation. Remove sediment and debris that restricts flow. Mow as needed to maintain a minimum of 4-IN of grass in the swale and repair any areas of vegetation loss. Repair any check dams with stone as needed. All trash, debris, and sediments should be disposed of in accordance with local, state, and federal regulations.

Attachment I – Illicit Discharge Compliance Statement

Illicit Discharge Compliance Statement

Section I – Purpose/Intent

The purpose of this document is to provide for the health, safety, and general welfare of the citizens of Massachusetts through the regulation of non-stormwater discharges into existing outstanding resource areas near the site to the maximum extent practicable, as required by federal and state law. To the best of our knowledge and belief, there are no illicit discharges occurring under existing conditions on this site within the meaning expressed under Standard 10 of the Massachusetts Stormwater Handbook. This document establishes methods for controlling the introduction of pollutants into existing outstanding resource areas to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process.

Section II - Definitions

For the purposes of this statement, the following shall mean:

Best Management Practices (BMPs): Schedules of activities, prohibitions of practices, general good housekeeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Clean Water Act: The federal Water Pollution Control Act (33 U.S.C § 1251 et seq.), and any subsequent amendments thereto.

Construction Activity: Activities subject to the Massachusetts Erosion and Sedimentation Control Act or NPDES Construction Permits. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.

Hazardous Materials: Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Illegal Connection: An illegal connection is defined as either of the following:

a. Any pipe, open channel, drain or conveyance, whether on the surface or subsurface, which allows an illicit discharge to enter the outstanding resource area including but not limited to any conveyances which allow any non-stormwater discharge including sewage, process wastewater, and wash water, regardless of whether said drain or connection has been previously allowed, permitted, or approved by an authorized enforcement agency; or

b. Any pipe, open channel, drain or conveyance connected to the Town of Littleton storm water treatment system which has not been documented in plans, maps, or equivalent records and approved by an authorized enforcement agency.

Illicit Discharge: Any direct or indirect non-stormwater discharge to the Town of Littleton stormwater treatment system, except as exempted in Section III of this ordinance.

Industrial Activity: Activities subject to NPDES Industrial Permits as defined in 40CFR, Section 122.26 (b) (14).

National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit: A permit issued by MassDEP under authority delegated pursuant to 33 USC § 1342 (b) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general area-wide basis.

Town of Littleton Stormwater Treatment System: Any facility, owned or maintained by the Town of Littleton, designed or used for collecting and/or conveying stormwater, including but not limited to roads with drainage systems, Town of Littleton streets, curbs, gutters, inlets, catch basins, piped storm drains, pumping facilities, infiltration, retention and detention basins, natural and man-made or altered drainage channels, reservoirs, and other drainage structures.

Non-Stormwater Discharge: Any discharge to the storm drain system that is not composed entirely of stormwater.

Person: Any individual, association, organization, partnership, firm, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, city, county or other political subdivision of the State, interstate body, or any other legal entity.

Pollutant: Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; petroleum hydrocarbons; automotive fluids; cooking grease; detergents (biodegradable or otherwise); degreasers; cleaning chemicals; non-hazardous liquid and solid wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; liquid and solid wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; concrete and cement; and noxious or offensive matter of any kind.

Pollution: Contamination or other alteration of any water's physical, chemical, or biological properties by addition of any constituent including but not limited to a change in temperature, taste, color, turbidity, or odor of such waters, or the discharge of any liquid, gaseous, solid, radioactive, or other substance into any such waters as will or is likely to create a nuisance or render such waters harmful, detrimental, or injurious to the public health, safety, welfare, or environment, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.

Premises: Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

Stormwater: Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation and resulting from such precipitation.

Wastewater: Any water or other liquid discharged from a facility, that has been used, as for washing, flushing, or in a manufacturing process, and so contains waste products.

<u>Section III - Prohibitions</u>

Prohibition of Illicit Discharges:

No person shall throw, drain, or otherwise discharge, cause or allow others under its control to throw, drain, or otherwise discharge into the Town of Littleton stormwater treatment system or watercourses any materials, including but not limited to, any pollutants or waters containing any pollutants, other than stormwater. It is to the best knowledge and belief of the project proponent that no illicit discharges currently exist at the project site. The commencement, conduct or continuance of any illicit discharge to the storm drain system is prohibited except as described as follows:

1. Water line flushing performed by a government agency, other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, natural riparian habitat or wetland flows, and any other water source not containing pollutants;

2. Discharges or flows from fire fighting, and other discharges specified in writing by the Town of Littleton as being necessary to protect public health and safety;

3. Dye testing is an allowable discharge, but requires notification to the Town of Littleton prior to the time of the test;

4. Any non-stormwater discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for a discharge to the Town of Littleton stormwater treatment system.

Section IV - Industrial or Construction Activity Discharges

Any person subject to an industrial or construction activity NPDES stormwater discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the Town of Littleton prior to allowing discharges to the Town of Littleton stormwater treatment system.

Section V - Notification of Spills and Accidental Discharges

Notwithstanding other requirements of law, as soon as any person responsible for a facility, activity or operation, or responsible for emergency response for a facility, activity or operation has information of any known or suspected release of pollutants or non-stormwater discharges from that facility, activity, or operation which are resulting or may result in illicit discharges or pollutants discharging into stormwater, the Town of Littleton stormwater treatment system, State Waters, or Waters of the U.S., said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release so as to minimize the effects of the discharge. In the event of such a release of hazardous materials, said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the Town of Littleton DPW in person or by phone no later than the next business day, including the nature, quantity and time of occurrence of the discharge. Notifications in person or by phone shall be confirmed by written notice, via certified mail return receipt requested addressed to the Town of Littleton DPW within three (3) business days of the initial notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

IN WITNESS WHEREOF the parties hereto have executed copies of this Agreement on the ______ day of ____________________, __________.

____

APPENDIX D

SECTION 01740

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION:

The Contractor must employ at all times during the progress of its work adequate cleanup measures and safety precautions to prevent injuries to persons or damage to property. The Contractor shall immediately, upon request by the Engineer provide adequate material, equipment and labor to cleanup and make safe any and all areas deemed necessary by the Engineer.

1.02 RELATED WORK:

A. Section 00700 GENERAL CONDITIONS

B. Section 01110 CONTROL OF WORK AND MATERIALS

C. Section 01140 SPECIAL PROVISIONS

D. Section 01570 ENVIRONMENTAL PROTECTION

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

3.01 DAILY CLEANUP:

A. The Contractor shall clean up, at least daily, all refuse, rubbish, scrap and surplus material, debris and unneeded construction equipment resulting from the construction operations and sweep the area. The site of the work and the adjacent areas affected thereby shall at all times present a neat, orderly and workmanlike appearance.

B. Upon written notification by the Engineer, the Contractor shall within 24 hours clean up those areas, which in the Engineer's opinion are in violation of this section and the above referenced sections of the specifications.

C. If in the opinion of the Engineer, the referenced areas are not satisfactorily cleaned up, all other work on the project shall stop until the cleanup is satisfactory.

3.02 MATERIAL OR DEBRIS IN DRAINAGE FACILITIES:

A. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, gutters, drains, pipes, structures, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches, channels, drains, pipes, structures, and work shall, upon completion of the work, be left in a clean and neat condition.

3.03 REMOVAL OF TEMPORARY BUILDINGS, STRUCTURES AND EQUIPMENT:

A. On or before completion of the work, the Contractor shall, unless otherwise specifically required or permitted in writing, tear down and remove all temporary buildings and structures it built; shall remove all temporary works, tools and machinery or other construction equipment it furnished; shall remove all rubbish from any grounds which it has occupied; shall remove silt fences and hay bales used for trapping sediment; and shall leave the roads and all parts of the property and adjacent property affected by its operations in a neat and satisfactory condition.

3.04 RESTORATION OF DAMAGED PROPERTY:

A. The Contractor shall restore or replace, when and as required, any property damaged by its work, equipment or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk and landscaping work. Materials, equipment, and methods for such restoration shall be as approved by the Engineer.

3.05 FINAL CLEANUP:

A. Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the construction site to its original or specified condition. This cleanup shall include removing all trash and debris off of the premises. Before acceptance, the Engineer shall approve the condition of the site.

END OF SECTION

\\Wse03.local\WSE\Projects\MA\Littleton MA\Digital Property New Source Approval\008 Permitting\NOI Boxborough\Appendix E Specs\SECTION 01740-Cleaning Up.docx

APPENDIX E

Frac-Out Contingency Plan for Horizontal Directional Drilling

Frac-out, or inadvertent return of drilling lubricant, is a potential concern when the Horizontal Direction Drill (HDD) is used under sensitive habitats, waterways, and areas of concern for cultural resources. The HDD procedure uses bentonite slurry, a fine clay material, as a drilling lubricant. The bentonite is non-toxic and is identified as Wyoming clay in the geological community.

Pro-Active Frac-Out Plan

1. Prior to any HDD drilling operations proper containment techniques will be installed to ensure that any potential frac-out impact area is minimized.
    - Containment techniques will include four (4) rows of turbidity curtains within the river channel. One curtain will be placed just north of the crossing, while another will be placed further north, as a secondary containment area. Because this is a tidal stream, two additional curtains will similarly be placed south of the crossing.

Training

1. Prior to the start of construction, the site supervisor shall ensure that the crew members receive training in the following:
    - The provisions of the Frac-out contingency plan, equipment maintenance and site specific permit and monitoring requirements,
    - Inspection procedures for release prevention and containment equipment and materials,
    - Contractor/crew obligation to immediately stop the drilling operation upon first evidence of the occurrence of a frac-out and to immediately report any frac-out releases,
    - Contractor/crew member responsibilities in the event of a release,
    - Operation of release prevention and control equipment and the location of release control materials, as necessary and appropriate, and
    - Protocols for communication with agency representatives who might be on-site during the clean-up effort.

Contingency Plan

1. The HDD crew will monitor in accessible areas the entry and exit pits, bore path and general drilling area for the purposes of identifying a bentonite leak. Early detection is the first defense in minimizing a frac out.
    - The contractor is alerted to a potential frac out based on the pressure of the drilling fluid or a lack of fluid return in the entry pit. A sudden decrease in the drilling fluid pressure indicates the fluid may have been inadvertently released from the drill hole.
    - Monitoring will be conducted continuously during drilling operations by a crew member who will visually inspect the pathway throughout the day
2. A Vacuum truck company will be notified prior to work and be “on-call” and in good working order, either at the work site, or at an offsite location within 15 minutes of the project.

3. If equipment is required to be operated near a riverbed, absorbent pads and plastic sheeting for placement beneath motorized equipment shall be used to protect the riverbed from engine fluids.
4. The contractor will be responsible for the following:
    - Identifying all sensitive areas
    - Supplying and establishing required barriers prior to drilling. This may include straw bales, silt fencing/ curtains, or sand bags.
    - Any site remediation required beyond the initial drilling fluid containment.
5. Drill crew will be informed of sensitive areas and will be able to identify these areas.
6. Once a frac out is identified all work will cease immediately.
7. Immediately contact supervisory personnel and Conservation Agent (on site during all HDD activities).
8. The extent and location of the bentonite leak will be identified.
9. If the frac-out is terrestrial:
    - If the frac-out has reached the surface, the site will be isolated with straw bales, sand bags, or silt fencing to surround and contain the drilling mud.
    - Consult with appropriate supervisory personnel and conservation agent in taking appropriate action.
    - Any material contaminated with bentonite shall be removed by hand to a depth of 2-feet, contained and properly disposed of, as required by law. Fluid on vegetation will be removed by hand, if possible, to protect the vegetation. The drilling contractor shall be responsible for ensuring that the bentonite is either properly disposed of at an approved disposal facility or properly recycled in an approved manner. The site supervisor shall notify and take any necessary follow-up response actions in coordination with agency representatives. The site supervisor will coordinate the mobilization of equipment stored off-site locations (i.e. vacuum trucks) on an as needed basis.
    - In order to attempt sealing or plugging of the frac-out pathway from the bore to the soil surface, appropriate “lost circulation materials” will be added to the existing drilling fluids slurry. The following considerations will be made:
        - “Lost circulation materials” will be approved by conservation commission agent prior to start of HDD.
        - Use of “lost circulation material” which is specific for HDD applications. It shall not be organic in nature, but inorganic so as to not create an environment conducive for bacterial growth.
        - This “lost circulation material” can function by plugging, bridging, or swelling in place.
        - The appropriate concentrations of this material will be added, based upon guidelines from it’s product data sheets, & (or) from a qualified drilling fluids manufacturer’s representative recommendations.
        - If needed, an appropriate amount of time will be given for the “lost circulation material” to seal or swell in place. This will require cessation of drilling activities for a period of time.
10. If the frac-out is aquatic (i.e., under water):
    - Monitor frac-out for 4 hours to determine if the drilling mud congeals. (Bentonite will usually harden, effectively sealing the frac-out location).

- Consult with appropriate supervisory personnel and conservation agent regarding appropriate action among the following:
    - ➢ If drilling mud congeals, take no other action that would potentially suspend sediments in the water column.
    - ➢ If drilling mud does not congeal, erect isolation/containment environment (underwater boom and curtain).
- Use of appropriate HDD “lost circulation materials” as described in the terrestrial frac-out agenda, will be utilized.
- If the fracture becomes unmanageable or does not stabilize, a spill response team would be called in to contain and clean up excess drilling mud in the water. Phone numbers of spill response teams in the area will be on site.

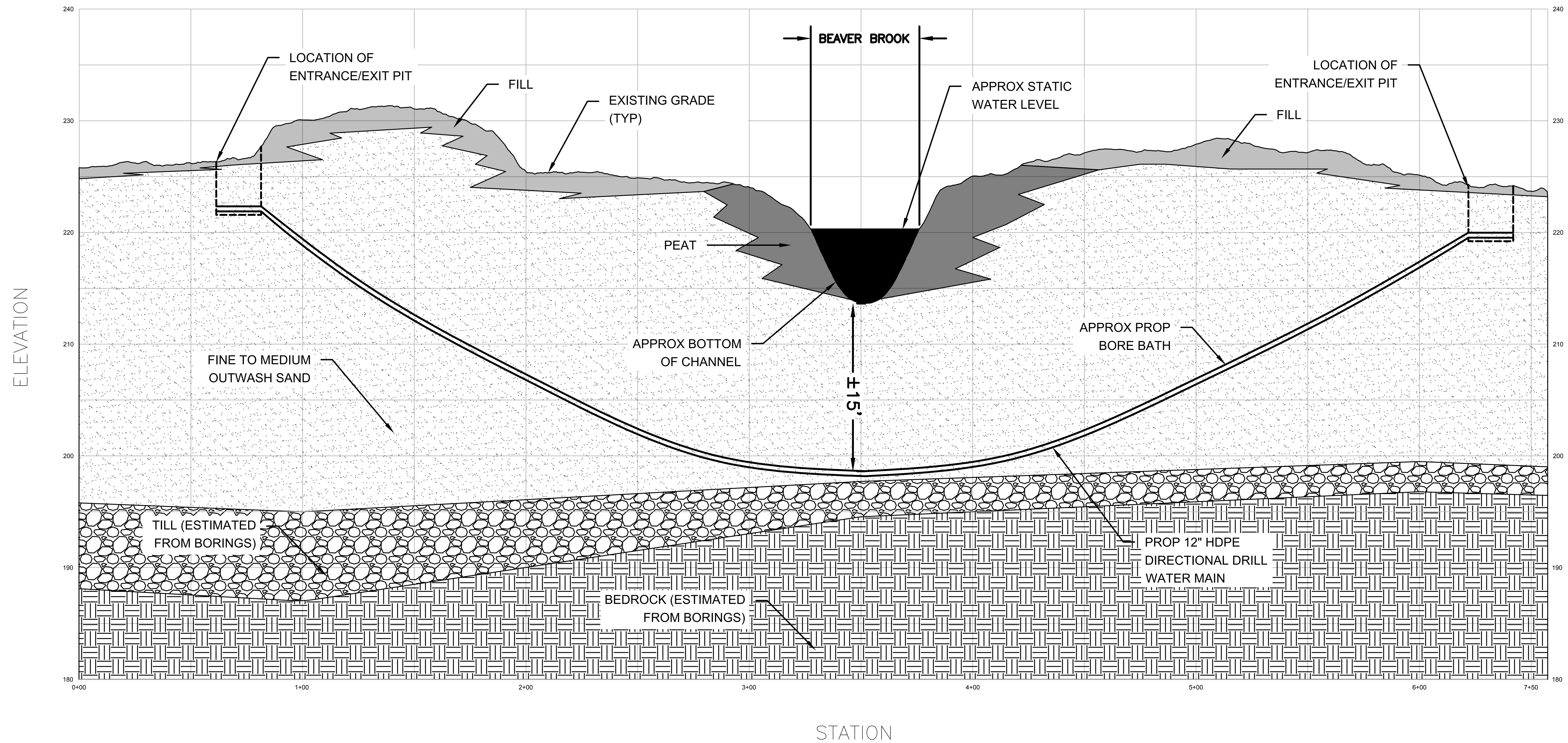
11. After frac-out is stabilized and any required removal is completed, document post-cleanup conditions with photographs and prepare frac-out incident report describing time, place, actions taken to remediate frac-out and measures implemented to prevent recurrence. A report will be given to the contractor and conservation commission/agent that will be responsible for remediation of the sensitive area.
12. The site supervisor shall ensure all waste materials are properly containerized, labeled, and removed from the site to an approved disposal facility by personnel experienced in the removal, transport and disposal of drilling mud.
    - At no time shall water containing mud, silt, bentonite or other pollutants be allowed to enter a lake, flowing stream or any other water source.

Should the project result in direct Resource Area impacts beyond those already described in the Notice of Intent, the Division retains the right to require full restoration of impacted areas and, at the Division’s sole discretion, an ‘after-the-fact’ Conservation & Management Permit pursuant to 321 CMR 10.23 (CMP). In such a circumstance, the Applicant will be required to meet the performance standard to achieve a long-term Net Benefit. Projects resulting in a Take of state-listed species may only be permitted if they meet the performance standards for a CMP. The proponent must demonstrate that the project has avoided, minimized and mitigated impacts to state-listed species consistent with the following performance standards: (a) the applicant has adequately assessed alternatives to both temporary and permanent impacts to state-listed species; (b) an insignificant portion of the local population would be impacted by the project; and (c) the applicant agrees to carry out a conservation and management plan that provides a long-term Net Benefit to the conservation of the state-listed species impacted.

Notified Parties:
Division of Fisheries and Wildlife
Timothy McGuire
508-389-6366
Timothy.mcguire@mass.gov

Littleton Conservation Commission
Amy Green
978-540-2428
agreen@littletonma.org

APPENDIX F



PROFILE

SCALE: 1"=30' HORIZ
1"=6' VERT

NOTES:

1. AT LEAST 30 DAYS PRIOR TO MOBILIZATION OF EQUIPMENT, THE CONTRACTOR SHALL SUBMIT A DETAILED INSTALLATION PLAN TO THE ENGINEER FOR REVIEW. INFORMATION SHALL INCLUDE THE FOLLOWING:

- A DETAILED PLAN AND PROFILE OF THE BORE PLOTTED AT A SCALE NO SMALLER THAN 1-IN EQUALS 20-FT (H) AND 1-IN EQUALS 2-FT (V).
- LOCATIONS OF ENTRY AND EXIT PITS.
- THE PLOTTED BORE PATH SHALL ENSURE THAT PIPE JOINTS DO NOT DEFLECT MORE THAN 50 PERCENT OF THE MANUFACTURER'S RECOMMENDED MAXIMUM DEFLECTION.
- MINIMUM PIPE WALL THICKNESS SHALL BE BASED ON A DR OF 11. CONTRACTOR AND PIPE MANUFACTURER SHALL MUTUALLY DETERMINE ACTUAL WALL THICKNESS REQUIRED, BASED ON STATIC AND DYNAMIC LOADS.
- CALCULATIONS OF STRESSES AND LONGITUDINAL STRAINS DEVELOPED IN PIPE DURING HANDLING AND INSTALLATION.

2. ALL NEW DUCTILE IRON WATER MAIN SHALL RECEIVE POLYETHYLENE ENCASEMENT.

Project:
LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

COA:

Seal:

Issued For:
DEP REVIEW ONLY

Scale: AS NOTED

Date: NOVEMBER 2023
Drawn By: GJK
Reviewed By: SBR
Approved By: TEM
W&S Project No.: ENG23-0679
W&S File No.:

Drawing Title:
BEAVER BROOK DIRECTIONAL DRILL

Sheet Number:
C201

APPENDIX G

SOURCE FINAL REPORT
BEAVER BROOK WELLS
LITTLETON, MASSACHUSETTS

Prepared For:

The Littleton Water Department
39 Ayer Road
Littleton, Massachusetts

Prepared By:

GeoInsight, Inc.
One Monarch Drive, Suite 201
Littleton, Massachusetts
info@geoinc.com
www.geoinsight.com
Tel: 978-679-1600
Fax: 978-679-1601

June 18, 2018

GeoInsight Project 8541-000

\\Geomao\MAO_Projects\8541 - Tighe-Bond Beaver Brook Wells Littleton\Final Report\8541_2018-06-19_Source Final Report.pdf

Enter your transmittal number → X280794
Transmittal Number

Your unique Transmittal Number can be accessed online: http://mass.gov/dep/service/online/trasmfrm.shtml or call MassDEP's InfoLine at 617-338-2255 or 800-462-0444 (from 508, 781, and 978 area codes).

Massachusetts Department of Environmental Protection

Transmittal Form for Permit Application and Payment

1. Please type or print. A separate Transmittal Form must be completed for each permit application.

2. Make your check payable to the Commonwealth of Massachusetts and mail it with a copy of this form to: DEP, P.O. Box 4062, Boston, MA 02211.

3. Three copies of this form will be needed.

Copy 1 - the original must accompany your permit application.
Copy 2 must accompany your fee payment.
Copy 3 should be retained for your records

4. Both fee-paying and exempt applicants must mail a copy of this transmittal form to:

MassDEP
P.O. Box 4062
Boston, MA
02211

*** Note:**
For BWSC Permits, enter the LSP.

A. Permit Information

BRPWS19
1. Permit Code: 7 or 8 character code from permit instructions

New Source Approval >70 GPM
2. Name of Permit Category

Beaver Brook Wells Yield Increase
3. Type of Project or Activity

B. Applicant Information – Firm or Individual

Littleton Water Department
1. Name of Firm - Or, if party needing this approval is an individual enter name below:

2. **Last Name** of Individual
3. **First Name** of Individual
4. MI

39 Ayer Road
5. Street Address

Littleton
6. City/Town

MA
7. State

01460
8. Zip Code

9. Telephone #
10. Ext. #

Corey Godfrey
11. Contact Person

12. e-mail address (optional)

C. Facility, Site or Individual Requiring Approval

Beaver Brook Wells
1. Name of Facility, Site Or Individual

2. Street Address

Great Road
3. City/Town

4. State
5. Zip Code
6. Telephone #
7. Ext. #

8. DEP Facility Number (if Known)
9. Federal I.D. Number (if Known)
10. BWSC Tracking # (if Known)

D. Application Prepared by (if different from Section B)*

GeoInsight
1. Name of Firm Or Individual

One Monarch Drive
2. Address

Littleton
3. City/Town

MA
4. State

01460
5. Zip Code

6. Telephone #
7. Ext. #

David G. Harwood
8. Contact Person

9. LSP Number (BWSC Permits only)

E. Permit - Project Coordination

1. Is this project subject to MEPA review? ☐ yes ☒ no
If yes, enter the project's EOEA file number - assigned when an Environmental Notification Form is submitted to the MEPA unit:

EOEA File Number

F. Amount Due

DEP Use Only

Permit No:

Rec'd Date:

Reviewer:

Special Provisions:

1. ☒ **Fee** Exempt (city, town or municipal housing authority)(state agency if fee is $100 or less).
There are no fee exemptions for BWSC permits, regardless of applicant status.
2. ☐ Hardship Request - payment extensions according to 310 CMR 4.04(3)(c).
3. ☐ Alternative Schedule Project (according to 310 CMR 4.05 and 4.10).
4. ☐ Homeowner (according to 310 CMR 4.02).

Check Number
Dollar Amount
Date

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Drinking Water Program

BRP WS Application

For Drinking Water Program (Water Supply) Permits or Approvals

X280794
Transmittal Number

Facility ID# (if known)

A. Application

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

tab

return

1. Is this application for ☒ an **Original** or ☐ a **Resubmittal?**

2. Applicant:

Littleton Water Department			
Name			Address
Littleton	MA	01460	Corey Godfrey	
City	State	Zip	Contact	Telephone

3. Consultant:

GeoInsight			One Monarch Drive
Name			Address
Littleton	MA	01460	David G. Harwood	
City	State	Zip	Contact	Telephone

B. Permit

Please check the permit or approval for which you are applying:

Zone II Determination for Existing Sources
- ☐ BRP WS 07 Approval to Conduct Pump Test for Zone II Delineation
- ☐ BRP WS 08 Approval of Zone II Delineation

New Technology
- ☐ BRP WS 11 Minor New Technology Approval; where no field test required
  - ☐ Drinking Water Additive
  - ☐ Cross Connection Device
  - ☐ Water Vending Machine
  - ☐ Other (specify):
- ☐ BRP WS 12 Major New Technology Approval: where field testing is required
- ☐ BRP WS 27 New Technology with Third-party Approval
- ☐ BRP WS 28 Vending Site/Source Prototype
- ☐ BRP WS 31 Vending and POU/POE Devices with Third-party Approval

New Source Approvals <70 gpm
- ☐ BRP WS 13 Exploratory Phase, Site Examination, Land Use Survey and Approval to Conduct Pumping Test
- ☐ BRP WS 15 Pumping Test Report Approval and Approval to Construct Source

New Source Approvals = or > 70 gpm
- ☐ BRP WS 17 Exploratory Phase, Site Examination, Land Use Survey, and Conduct Pumping Test
- ☒ BRP WS 19 Pumping Test Report Approval
- ☐ BRP WS 20 To Construct Source

Water Treatment Approvals
- ☐ BRP WS 21 To Conduct Pilot Study
- ☐ BRP WS 22 Pilot Study Report
- ☐ BRP WS 23A To Construct Facility <40,000 gpd
- ☐ BRP WS 23B To Construct Facility = or > 40,000 gpd and < 200,000 gpd
- ☐ BRP WS 23C To Construct Facility = or > 200,000 gpd and < 1 mgd
- ☐ BRP WS 24 To Construct Facility = or > 1 mgd
- ☐ BRP WS 25 Treatment Facility Modification
- ☐ BRP WS 29 Water Treatment: Chemical Addition Retrofits of Water Systems > 3,300 people
- ☐ BRP WS 30A Vending Installation Approval
- ☐ BRP WS 30B POU/POE Installation Approval
- ☐ BRP WS 34 Water Treatment: Chemical Addition Retrofits of Water Systems = or < 3,300 people
- ☐ BRP WS 35A Multiple Vending Installation Approval
- ☐ BRP WS 35B Multiple POU/POE Installation Approval

Water Quality Assurance
- ☐ BRP WS 26 Sale or Acquisition of Land for Water Source
- ☐ BRP WS 36 Abandonment of Water Source

Distribution System Modifications
- ☐ BRP WS 32 Systems > 3,300 people
- ☐ BRP WS 33 Systems = or < 3,300 people

C. Certification

"I certify, under penalty of law, that this application and all attachments were prepared under my supervision, in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted in this application, the information submitted is, to the best of my knowledge and belief, true, accurate and complete."

David G. Harwood
Print Name

Authorized Signature

Project Manager
Position/Title

06/18/2018
Date

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FIGURES

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SOURCE FINAL REPORT
BEAVER BROOK WELLS
LITTLETON, MASSACHUSETTS

1.0 INTRODUCTION

The Beaver Brook Wells are an existing source that has been in service since 1977. A new pumping test has been performed to allow an increase in the permitted daily volume to maximize the potential of the source within the limits of the existing iron and manganese treatment plant.

The original Well 2 was constructed in 1977 and had an approved yield of 0.41 million gallons per day (MGD; 285 gallons per minute [GPM]). The source was replaced with three wells (Wells 2-1, 2-2, and 2-3) in 2011 and are now collectively called the "Beaver Brook Wells". The replacement wells are all within 100 feet of one another and the original well which was decommissioned in 2011. Well 2-1 is 49 feet deep with 10 feet of 140 slot screen. Well 2-2 is 44 feet deep with 7.5 feet of 200 slot and Well 2-3 is 40 feet deep with 8 feet of 95 slot screen. Performance tests found that each of the three replacement wells could individually produce the permitted yield of 285 GPM for at least 24 hours. A site locus is given as Figure 1.

The iron and manganese treatment facility was constructed in 2014 and was designed for the original approved yield of 285 GPM with provisions for future treatment up to 500 GPM.
A performance test was conducted in 2017 at varying pumping rates to evaluate the existing equipment's ability to achieve adequate treatment at increased flows. The results of that test found that 450 GPM is the maximum flow the facility can support without upgrades and 450 GPM (0.65 MGD) is the rate sought for approval. Copies of relevant correspondence are provided in Attachment A. A site locus is provided as Figure 1.

1.1 ZONE I OWNERSHIP

The 400-foot Zone I radius around the original Well 2 is owned by the Littleton Water Department (see attached Site Plan, Figure 2) and the Department holds easements on the remaining areas of the 400-foot radii from the replacement wells. The Zone I radius is undeveloped and consists of woods and wetlands.

1.2 SURFACE WATER AND WETLANDS

The closest surface water body is Beaver Brook located approximately 550 feet to the southeast. The edge of wetlands associated with Beaver Brook is approximately 200 feet from the wellfield (see attached Site Plan, Figure 2). Another isolated wetland is located approximately 60 feet to the northwest of the production wells. The Natural Heritage and Endangered Species Program (NHESP), mapping shows this wetland as a potential vernal pool.

1.3 RARE WILDLIFE AND VERNAL POOLS

According to MassGIS data, two certified vernal pools are mapped within the one-half mile radius of the site. The closest of which is 840 feet northeast from the pumping wells. Priority and estimated wildlife habitats are mapped within the one-half mile radius in the vicinity of the pumping wells. This habitat area is shown on Figure 3.

1.4 OTHER WITHDRAWALS AND PRIVATE WELLS

Other registered groundwater withdrawals are not mapped within the one-half mile radius. Residences in the one-half mile radius in Littleton, Massachusetts are served by municipal water. A portion of the residences in the one-half mile radius in Westford, Massachusetts are served by private wells (see Figure 3).

2.0 FIELD INVESTIGATIONS

2.1 SITE GEOLOGY & CONCEPTUAL MODEL

The local aquifer is a valley-fill aquifer comprised of unconsolidated sands and gravels deposited by glacial meltwater. During the end of the last glacial period, approximately 10,000 to 15,000 years ago, streams of meltwater carried sediments from the retreating ice margin through existing valleys in the bedrock and glacial till. The streams deposited the coarse sand and gravel in stratified layers. The finer materials were transported farther away to be deposited in lakes where the water was calm. The sand and gravel deposits are thicker in the center of the valley and thin toward the valley walls where they contact impermeable boundaries of glacial till and/or bedrock.

The glacial outwash aquifer is fed by local recharge and by recharge and runoff from the neighboring hillsides. The brooks and other surface water courses are generally gaining streams into which groundwater discharges. Thus, in the absence of pumping, groundwater flows from the surrounding hills into Beaver Brook. In the vicinity of the well site, the aquifer generally trends northeast and southwest. Groundwater flow in the site vicinity is generally to the southeast toward Beaver Brook, which flows northward and empties into Forge Pond, which drains via Stony Brook to the Merrimack River in Chelmsford.

Test well logs show layers of fine to coarse grey and brown sand and gravel to depths from approximately 30 to 70 feet in the site vicinity. Well logs are given in Attachment D. Generalized geologic cross-section sketches are provided as Figures 4 and 5 and lines of cross section are shown on Figure 2.

2.2 PUMPING TEST

The pumping test began on Thursday April 26, 2018 at 8:25 AM. Due to operational limitations, the target pumping rate of 450 GPM was ramped up over a period of about 60 minutes. The individual wells 2-1, 2-2 and 2-3 were pumped at rates of 200, 200 and 50 GPM, respectively. The pumping rates were measured with the calibrated master meters and recorded with the SCADA system at the treatment facility. The pumped water was treated and fed into the distribution system per DEP approval of the BRPWS17 application.

Several factors made achieving the MADEP stabilization criteria of not more than one-half inch of drawdown change over 24-hours difficult. These included having three pumping wells each needing to meet the criteria, noise/scatter in the transducer data, and the lack of 2-foot observation wells. For these reasons, the pumping test was extended to 10-days so that the alternate MADEP stabilization criteria of extension of the drawdown to 180-days could be utilized. Details of the 180-day projection are discussed in Section 2.7.

The pumping rates remained steady throughout the test with the exception of a brief 20-minute shutdown in the morning of May 3 related to a low level chemical feed alarm. The pumps were shut down on Monday May 7, 2018 at 12:28 PM after 11-days of pumping.

The rate of recovery was moderate with the water level in the pumping wells returning to 95% of the original static in a little over 30 hours.

2.3 ANTECEDENT & AMBIENT TREND

Ambient groundwater levels and rainfall were measured throughout the test starting a week prior to pumping and for a week of recovery after pumping. The ambient well is located about 4,800 feet to the south of the well as shown on the Figure 1 Site Locus. Groundwater in this well was declining in the week prior to pumping until rainfall of about 1 inch that fell during the day prior to the start of pumping. After a brief rise of a few tenths of a foot, the groundwater level declined steadily a few tenths of a foot throughout the pumping period and continued to decline during recovery. A chart of ambient groundwater levels and rainfall is included in Appendix C.

2.4 PUMPING TEST ANALYSIS

Six observation wells and the pumping wells were used for measuring the aquifer response to pumping. Drawdown in the pumping wells was approximately 13 feet in Well 2-1 and approximately 11 feet in both wells 2-2 and 2-3 after 11 days of pumping. The farthest observation wells were PTS-1 and IP-5 which were both about 400 feet from the pumping wells. IP-5 showed about 2 feet of drawdown, but PTS-1 did not show clear influence from pumping. Static and end of pumping potentiometric surface maps are provided on Figures 6 and 7. Observation well and groundwater elevations are provided in Table 1. Static groundwater contours are shown on Figure 6 and pumping contours are shown on Figure 7.

2.5 AQUIFER CHARACTERISTICS

Drawdown data from five observation wells were analyzed using the time-drawdown, distance-drawdown and residual drawdown methods. Results from these methods varied and transmissivity is estimated at 62,000 GPD/Ft. This is comparable to the 53,000 GPD/ft result determined from the 1995 pumping test by D.L. Maher. Storativity averaged 0.282 which does not indicate confined conditions. The results of the pumping test analysis are summarized in Table 2. Pumping test data and charts are provided in Appendix C.

2.6 SURFACE WATER INFLUENCE

Piezometers were installed at two locations for evaluation of induced infiltration. These locations were at the isolated wetland (P1) closest to the pumping wells and in the wetlands associated with Beaver Brook (P2). These piezometers were constructed of a 2-foot length of 1 ¼ inch screen with a 5-foot steel riser. The piezometers were driven approximately 3 feet deep. Pressure transducers with dataloggers were installed inside the piezometers to measure groundwater head and outside to measure surface water level.

Groundwater and surface water in both piezometers were closely matched and did not show indication of influence by pumping. The overall trends were very similar to that of the ambient well. Further, a recharge boundary was not apparent in the drawdown curves indicating a lack of significant induced infiltration from surface water. These results are consistent with the findings reported by D.L. Maher from the results of the 1995 pumping test. Charts of water levels in the piezometers are provided in Appendix C.

2.7 APPROVABLE YIELD

The pumping rate maintained throughout the test was a combined 450 GPM (200 GPM from Well 2-1, 200 GPM from Well 2-2 and 50 GPM from Well 2-3). 180-day semi log projections (drawdown vs. log time) of the drawdown during days 7 through 11 of pumping result in water levels of 14.56, 12.40, and 7.62 feet over the pump intakes in wells 2-1, 2-2, and 2-3, respectively. Note that the transducers are located 3 feet over the pump intake in Well 2-1 and 1 foot over the pump intake in Wells 2-2 and 2-3. These water levels exceed the 5-foot minimum and are significantly more than 10% of the static water column as specified in the *Guidelines*. This demonstrates an approvable yield of 0.65 MGD. A chart of the projected drawdowns is given in Appendix C.

2.8 WATER QUALITY

Samples were collected from individual raw water taps in the treatment building after two hours of pumping, the approximate mid-point and after 5-days of pumping for laboratory analysis. Field testing was also performed on these events for pH, color, odor, temperature, conductivity and carbon dioxide. A summary of water quality testing results is provided in Table 3.

Laboratory testing indicates the Beaver Brook Wells yield water that meets primary drinking water quality standards. Secondary contaminants iron and manganese exceeded their respective standards in Wells 2-1 and 2-2 for iron and Wells 2-2 and 2-3 for manganese. Perchlorate, Bacteria, VOCs or SOCs were not detected. Inorganics were largely not detected and radionuclides were below their respective maximum contaminant levels (MCLs). Sodium exceeded the guideline concentration of 20 mg/L in all three wells. The low pH, alkalinity and hardness indicate the water to be aggressive. Complete laboratory results on state forms are provided in Appendix D.

3.0 ZONE II DELINEATION

The existing Zone II was delineated by D.L. Maher in 1995. The delineation was made using an analytical model to determine the downgradient stagnation point and the “lateral boundary limit was determined by the utilizing the stratified drift/till mapping” (Maher, 1995). The analytical model used was WHPA version 2.2 released in 1993. D.L. Maher reported the downgradient stagnation point was calculated to be 729 feet using a withdrawal rate of 410,000 gpd (285 GPM), a transmissivity of 53,000 GPD/ft, and a hydraulic gradient of 0.002.

The WHPA model is still available on the EPA website, but is not compatible with modern 64-bit computer operating systems. The Uniform Flow equations published by Todd (1980) also calculates the downgradient stagnation point using similar inputs.

The downgradient stagnation point X, is given by:

$$X = Q / 2 \pi T i$$

Where Q = the well withdrawal rate
T = aquifer transmissivity
i = hydraulic gradient

Using the following variables:

Q = 450 gpm or 86,631 cubic feet per day	Source: anticipated approved yield
T = 53,000 gpd/ft or 7,085 square feet per day	Source: 1993 D.L. Maher Zone II report[1]
i = 0.002	Source: 1993 D.L. Maher Zone II report

The downgradient stagnation point is calculated to be 973 feet. This is only about 33% larger than the previously calculated value despite an increase in pumping rate of about 58%.

---

[1] The lower transmissivity of 53,000 GPD/ft reported by D.L.Maher is used rather than the 62,000 GPD/ft determined from the 2018 pumping test because it results in a more conservative (larger) downgradient stagnation pint.

Increasing the originally calculated downgradient stagnation point of 729 feet by 58% gives 1,152 feet. This more conservative distance was used to revise the existing Zone II as shown on Figure 8. The other edges of the Zone II were based on the same hydrogeologic boundaries as the approved Zone II that D.L. Maher used, but slightly modified to match the most recent glacial till mapping in MassGIS. The southwestern boundary is a topographic surface water drainage divide to Mill Pond. A comparison of the existing and proposed Zone IIs are shown in Figure 8. The Zone II delineation is given in Figure 9.

The area of influence is larger than the downgradient stagnation point and was calculated by D.L. Maher 1995 as 1,100 to 1,500 feet for the withdrawal of 285 GPM. The distance drawdown of the data from the 2018 test gives the distance to zero influence at 534 feet at 11 days and 1,112 feet at a theoretical 180 days. This is expected to be overestimated to the north and west where the closest hydrogeologic boundary is located to the pumping wells. Notably, observation well PTS-1 only 370 feet to the north-northwest of the pumping wells did not show clear influence from pumping. An estimated area of influence in shown on Figure 10 based on the theoretical 180-day distance-drawdown and hydrogeologic boundaries.

4.0 CONCLUSIONS

4.1 POTENTIAL SOURCES OF CONTAMINATION

Review of the MADEP Bureau of Waste Site Cleanup Reportable Release On-Line Database updated January 19, 2018 revealed one open chemical release site known to exist within the one-half mile radius of the proposed well. On December 27, 2017 a tanker truck carrying #2 fuel oil rolled over onto the shoulder of Route 495 south near the Great Road/Route 119 exit. An estimated 1,000 gallons of product was released to the environment. LSP documents filed to date suggest a majority of this spill was contained and the impacts of this release have been mitigated. Response actions at this release are ongoing as of the date of this report. Available documents from the MADEP database are given in Attachment C.

4.2 GROUNDWATER MONITORING PROGRAM

As discussed above, the water quality testing results indicated the water produced at the site meets primary drinking water quality standards. Due to the lack of potential contaminant sources in the area, a groundwater monitoring system is not warranted at this time.
The pumped water will be sampled in accordance with MADEP and Environmental Protection Agency (EPA) Safe Drinking Water Act requirements.

4.3 AQUIFER PROTECTION BYLAWS

The Towns of Littleton and Westford have both adopted Aquifer Protection Bylaws which regulate the activities within the designated Aquifer Protection Districts. The revised Zone II area are already encompassed by the Aquifer Protection District. The Littleton bylaws are provided in Appendix A.

4.4 WATER MANAGEMENT ACT

The Littleton Water Department is registered for 0.83 MGD through registration number 2-13-158.03 and holds Water Management Act Permit number 9P-2-13-158.02 for an additional withdrawal of 0.63 MGD. In 2016, the average daily withdrawal was 0.90 MGD, but is expected to exceed 1.22 MGD by 2024. Unaccounted for water was 8.7 percent, which is less than the recommended 10 percent.

The Littleton Water Department practices extensive water conservation efforts including complete system leak detection surveys and water conservation information that is sent to all customers. A Water Management Act Permit Amendment will be submitted under separate cover to increase the daily permitted withdrawal, but there will not be an overall increase in the existing system-wide permitted volume.

5.0 REFERENCES

D.L. Maher Co., 1995, *The Zone II Delineation and the Impact of Pumping Upon Proximal Wetlands at Gravel Pack #2, Littleton Massachusetts*.

Todd, D.K., 1980. *Groundwater Hydrology* (2nd Edition), Wiley, New York.

TABLES

TABLE 1
SUMMARY OF GROUNDWATER ELEVATIONS
BEAVER BROOK PUMPING TEST APRIL/MAY 2018
LITTLETON WATER DEPARTMENT
LITTLETON, MASSACHUSETTS

Well Identification	Static Depth to Water	Pumping Depth to Water	Top of Casing Elevation	Static Elevation	Pumping Elevation	Change During Pumping
pumping well 2-1	7.92	21.05	213.80	205.88	192.75	13.13
pumping well 2-2	7.83	19.04	213.59	205.76	194.55	11.21
pumping well 2-3	7.30	19.06	214.01	206.71	194.95	11.76
50' Obs	9.29	20.56	216.04	206.75	195.48	11.27
100' Obs	3.03	7.87	209.52	206.49	201.65	4.84
2-95	6.28	9.39	212.38	206.10	202.99	3.11
1-95	3.50	5.35	209.60	206.10	204.25	1.85
IP-5	12.16	15.43	219.78	207.62	204.35	3.27
PTS-1	6.66	9.87	215.00	208.34	205.13	3.21
PZ-1 in	1.52	2.20	209.35	207.83	207.15	0.68
PZ-1 out	1.53	2.20	209.35	207.82	207.15	0.67
PZ-2 in	2.81	3.02	208.92	206.11	205.90	0.21
PZ-2 out	2.81	2.99	208.92	206.11	205.93	0.18
Ambient	9.07	9.17	220.00	210.93	210.83	0.10

NOTES:

1. Results reported in feet.
2. Elevation of measuring point estimated for the ambient well and IP-5.
3. Static measurements collected April 26, 2018 at 8:24 AM.
4. Pumping measurements collected May 7, 2018 at 12:18 PM.

TABLE 2
SUMMARY OF AQUIFER CHARACTERISTICS
BEAVER BROOK PUMPING TEST
LITTLETON WATER DEPARTMENT
LITTLETON, MASSACHUSETTS

TIME DRAWDOWN			
Well	**Distance from Pumping Well (feet)**	**Transmissivity (GPD/foot)**	**Storativity**
50' Obs	50	116,129 *	---
100' Obs	95	94,586 *	0.037 *
2-95	160	185,047 *	0.034 *
1-95	280	331,844 *	0.019 *
IP-5	360	162,517 *	0.045 *

DISTANCE DRAWDOWN			
Time (minutes)	**Direction**	**Transmissivity (GPD/foot)**	**Storativity**
1,000	Composite	68,384	0.095
7,200	Composite	44,384	0.312
15,840	Composite	38,021	0.440

RESIDUAL DRAWDOWN			
Well	**Distance from Pumping Well (feet)**	**Transmissivity (GPD/foot)**	**Storativity**
50' Obs	50	63,529	---
100' Obs	95	67,119	---
2-95	160	76,154	---
1-95	280	152,308 *	---
IP-5	360	77,647	---

	Transmissivity (GPD/foot)	**Storativity**
AVERAGE	62,000	0.282

NOTES:

1. GPD = gallons per day.
2. * = not included in average.

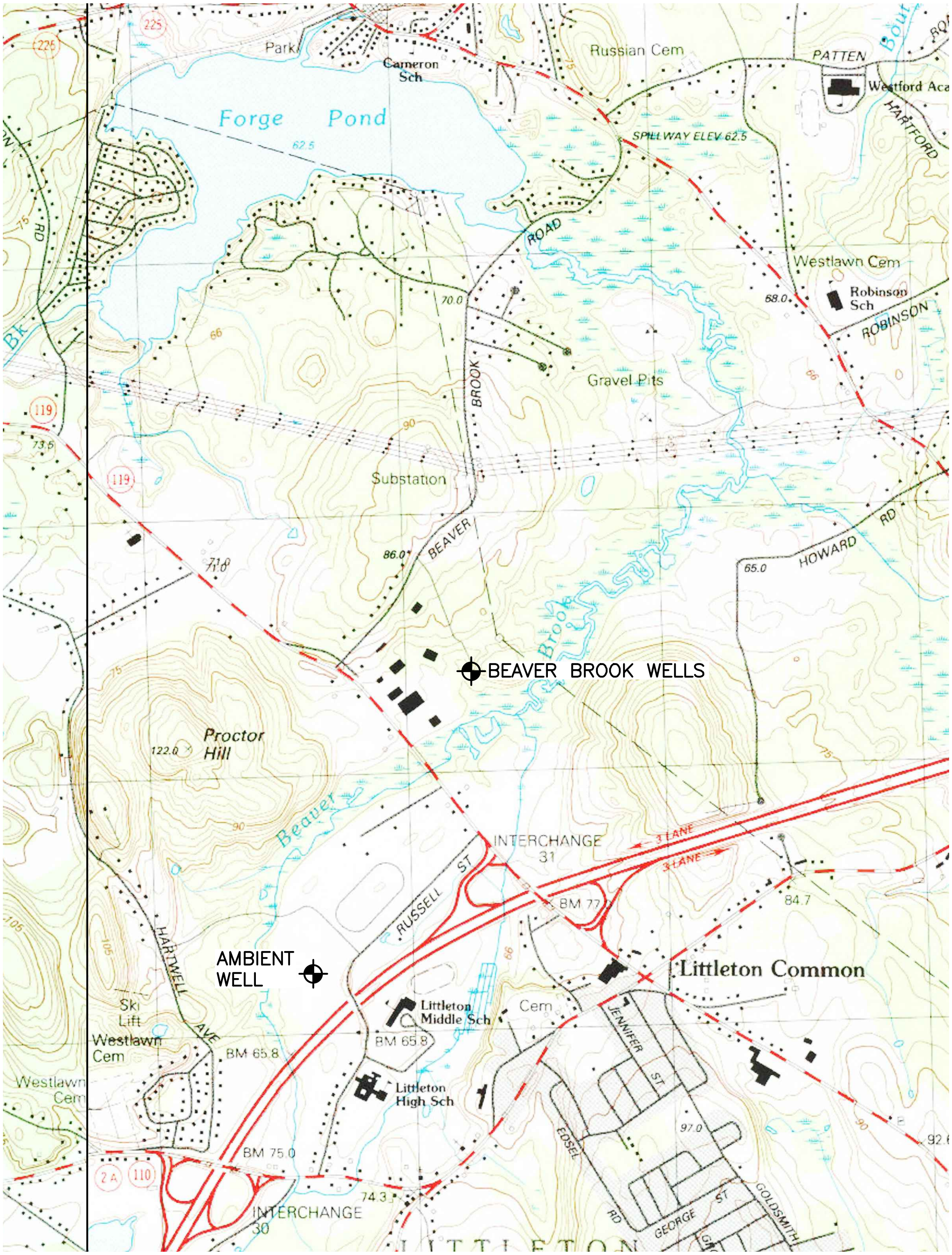
TABLE 3
SUMMARY OF LABORATORY WATER QUALITY RESULTS
APRIL/MAY 2018 PUMPING TEST
BEAVER BROOK WELLS
LITTLETON, MASSACHUSETTS

	Units	Standard	2 Hours 04/26/2018			Mid Point 04/29/2018			5 Days 05/01/2018		
			Well 2-1	**Well 2-2**	**Well 2-3**	**Well 2-1**	**Well 2-2**	**Well 2-3**	**Well 2-1**	**Well 2-2**	**Well 2-3**
Field Tests											
pH	SU	**NS**	5.77	5.96	5.93	5.30	5.48	5.34	5.11	5.78	5.60
Color	subjective	**NS**	clear	clear	clear	clear	clear	clear	clear	clear	clear
Odor	subjective	**NS**	none	none	none	none	none	none	none	none	none
Temperature	°F	**NS**	53	55.8	52.3	51.8	55.4	51.6	51.4	55.6	51.8
Specific conductance	mg/L	**NS**	243	571	393	252	696	220	253	681	216
Carbon dioxide	mg/L	**NS**	31.25	37.50	25.00	25.00	31.25	25.00	18.75	37.50	22.50
Bacteriological											
Total Coliform	count	**present**	---	---	---	---	---	---	absent	absent	absent
Secondaries											
Iron	mg/L	**0.30**	**0.998**	**0.492**	**0.161**	**0.353**	**0.316**	**0.094**	**0.387**	**0.337**	**0.1**
Magnesium	mg/L	**NS**	**2.3**	**4.0**	**3.3**	**2.3**	**5.0**	**2.5**	**2.4**	**5.2**	**2.4**
Odor	TON	**3**	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
Color	CU	**15**	**18**	**2**	ND (1)	ND (1)	ND (1)	**2**	**2**	ND (1)	ND (1)
Calcium	mg/L	**NS**	**8.7**	**20.8**	**16.0**	**9.2**	**26.8**	**11.8**	**9.6**	**27.4**	**11.4**
TDS	mg/L	**500**	**116**	**308**	**220**	**144**	**428**	**148**	**144**	**422**	**142**
Silver	mg/L	**0.1**	ND (0.001)	ND (0.001)	ND (0.001)	**0.045**	ND (0.001)	**0.047**	ND (0.001)	ND (0.001)	ND (0.001)
Hardness	mg $CaCO_3$/L	**NS**	**31**	**68**	**54**	**32**	**88**	**40**	**34**	**90**	**38**
Sulfate	mg/L	**250**	**14.1**	**15.6**	**10.6**	**14.1**	**15.4**	**7.7**	**14.6**	**16.1**	**7.9**
Potassium	mg/L	**NS**	**4.1**	**6.8**	**4**	**4.4**	**7.3**	**2.0**	**4.5**	**7.6**	**2.0**
Alkalinity	mg $CaCO_3$/L	**NS**	**8**	**24**	**9**	**7**	**29**	**8**	**7**	**30**	**8**
Manganese	mg/L	**0.05**	**0.028**	**1.1**	**0.178**	**0.041**	**1.520**	**0.088**	**0.043**	**1.590**	**0.080**
Zinc	mg/L	**5**	**0.039**	**0.045**	**0.041**	**0.054**	**0.057**	**0.039**	**0.013**	**0.030**	**0.011**
Turbidity	NTU	**5**	**4.9**	**1.2**	**0.3**	**0.2**	**0.3**	**0.2**	**0.3**	**0.2**	**0.2**
Copper	mg/L	**1**	**0.024**	**0.026**	**0.028**	**0.037**	**0.03**	**0.026**	**0.015**	**0.013**	**0.013**
pH	SU	**6.5-8.5**	**5.7**	**5.9**	**5.7**	**5.6**	**5.9**	**5.6**	**5.6**	**5.8**	**5.6**
Chloride	mg/L	**250**	**45.6**	**156**	**101**	**51**	**184**	**48.9**	**53.6**	**196.0**	**49.7**
Aluminum	mg/L	**NS**	**0.05**	**0.023**	**0.035**	**0.047**	**0.021**	**0.037**	**0.05**	**0.018**	**0.038**
Nitrate	mg/L	**10**	**0.83**	**1.1**	**0.3**	**0.81**	**0.57**	**0.06**	**0.88**	**0.59**	**0.07**
Nitrite	mg/L	**1**	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Inorganics											
Antimony	mg/L	**0.006**	---	---	---	---	---	---	ND (0.001)	ND (0.001)	ND (0.001)
Arsenic	mg/L	**0.010**	---	---	---	---	---	---	ND (0.001)	ND (0.001)	ND (0.001)
Barium	mg/L	**2**	---	---	---	---	---	---	**0.04**	**0.091**	**0.024**
Beryllium	mg/L	**0.004**	---	---	---	---	---	---	ND (0.001)	ND (0.001)	ND (0.001)
Cadmium	mg/L	**0.005**	---	---	---	---	---	---	ND (0.001)	ND (0.001)	ND (0.001)
Chromium	mg/L	**0.1**	---	---	---	---	---	---	ND (0.001)	ND (0.001)	ND (0.001)
Cyanide	mg/L	**0.2**	---	---	---	---	---	---	ND (0.01)	ND (0.01)	ND (0.01)
Fluoride	mg/L	**4**	---	---	---	---	---	---	ND (0.1)	ND (0.1)	ND (0.1)
Mercury	mg/L	**0.002**	---	---	---	---	---	---	ND (0.0009)	ND (0.0009)	ND (0.0009)
Nickel	mg/L	**0.1**	---	---	---	---	---	---	**0.004**	**0.001**	**0.002**
Selenium	mg/L	**0.05**	---	---	---	---	---	---	ND (0.05)	ND (0.05)	ND (0.05)
Sodium	mg/L	**20**	---	---	---	---	---	---	**32.2**	**101.3**	**24.2**
Thallium	mg/L	**0.002**	---	---	---	---	---	---	ND (0.001)	ND (0.001)	ND (0.001)
Lead	mg/L	**0.015**	---	---	---	---	---	---	**0.002**	**0.004**	**0.002**
Perchlorate	µg/L	**2**	---	---	---	---	---	---	ND (0.050)	ND (0.050)	ND (0.050)
Volatile Organic Compounds (VOCs) via EPA Method 524.2											
	µg/L	**(note 12)**	---	---	---	---	---	---		ND (note 17)	
Synthetic Organic Compounds (SOCs) via EPA Method 515.3, 505, 504.1, 525.2, 531.1											
	µg/L	**(note 12)**	---	---	---	---	---	---		ND (note 17)	
Radionuclides											
Gross Alpha	pCi/L	**15**	---	---	---	---	---	---		**3.2**	
Uranium	µg/L	**15**	---	---	---	---	---	---		ND (1)	
Radium 226	pCi/L	**5**	---	---	---	---	---	---		**3.1**	
Radium 228	pCi/L	**5**	---	---	---	---	---	---		**0.8**	
Radon	pCi/L	**10,000**	---	---	---	---	---	---		**975**	

NOTES:

1. TDS = total dissolved solids.
2. SU = standard units of hydrogen activity.
3. °F = degrees Fahrenheit
4. mg/L = milligrams per liter.
5. TON = threshold odor number.
6. CU = color units.
7. mg $CaCO_3$/L = milligrams per liter as calcium carbonate
8. NTU = national turbidity units.
9. µg/L = micrograms per liter.
10. pCi/L = picocuries per liter.
11. NS = standard not established.
12. Maximum Contaminant Levels vary for specific compounds.
13. --- = not tested.
14. Bold value exceeds laboratory practical quantitation limit (PQL).
15. Shading indicates value exceeds standards.
16. ND (x) = constituent not detected above laboratory PQL noted in parentheses.
17. PQLs vary for specific compounds.
18. VOCs, SOCs and Radionuclides samples were a composite.

FIGURES



SOURCE:

USGS AYER AND BILLERICA TOPOS DATED 1988 AND 1987.

CONTOUR INTERVAL: 3 METERS

0 2000 4000

APPROX. SCALE IN FEET

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PROJECT: BEAVER BROOK WELLS YIELD INCREASE			
TITLE: SITE LOCUS			
DESIGNED: DGH	DRAWN: DGH	CHECKED: DAM	APPROVED: DAM
SCALE: 1" = 2000'	DATE: 01/15/18	FILE NO.: 8541-LOCUS	PROJECT NO.: 8541

GeoInsight
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FIGURE NO.: 1

PLOT DATE: 1-22-18
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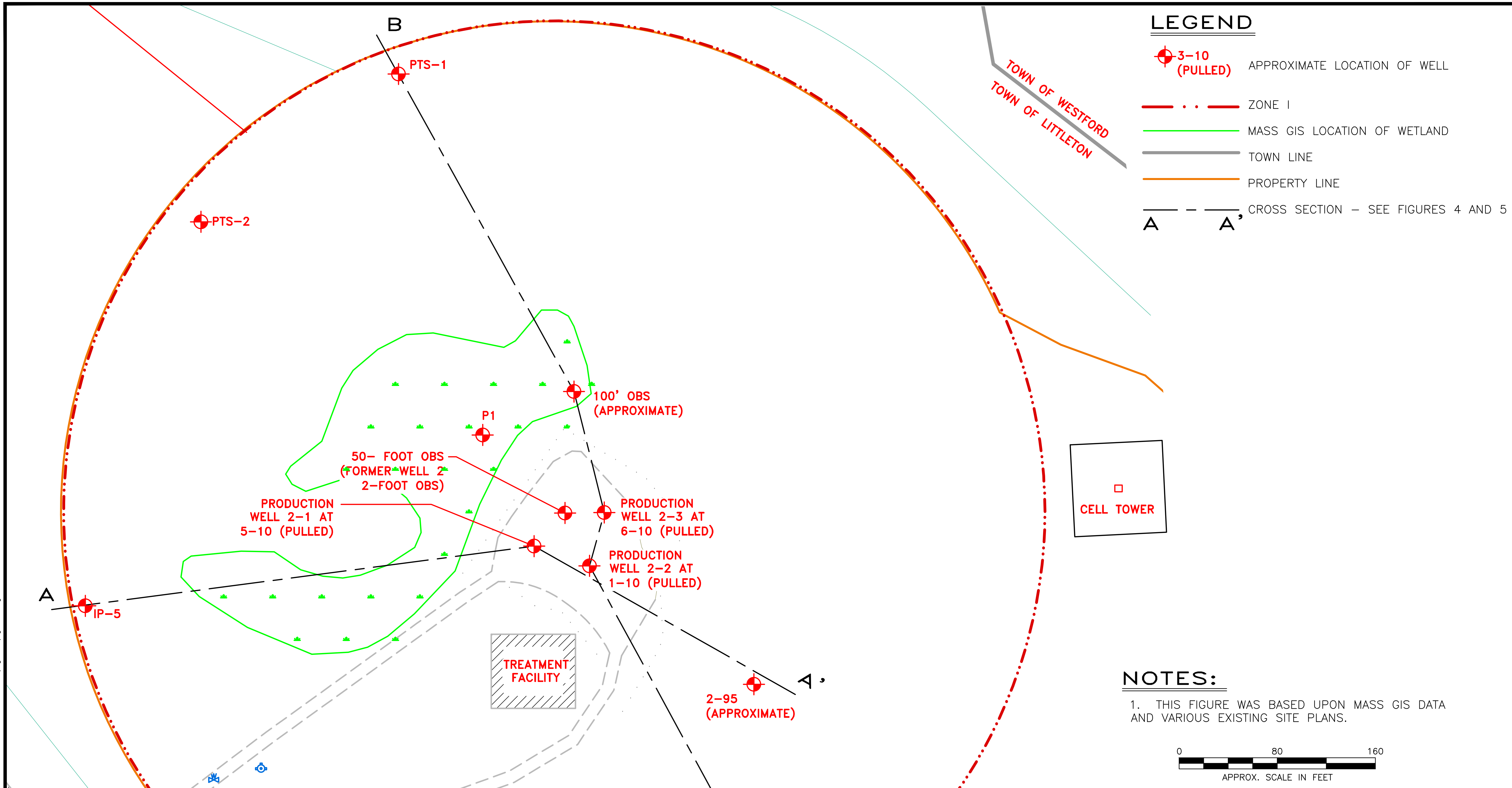

CLIENT:	LITTLETON WATER DEPARTMENT
PROJECT:	BEAVER BROOK WELLS YIELD INCREASE
TITLE:	SITE PLAN

DESIGNED:	DRAWN:	CHECKED:	APPROVED:
DGH	DGH	DAM	DAM

SCALE:	DATE:	FILE NO.:	PROJECT NO.:	FIGURE NO.:
1" = 80'	05/31/18	8541D001	8541	2

GeoInsight
Practical in Nature

PLOT DATE: 6-5-18
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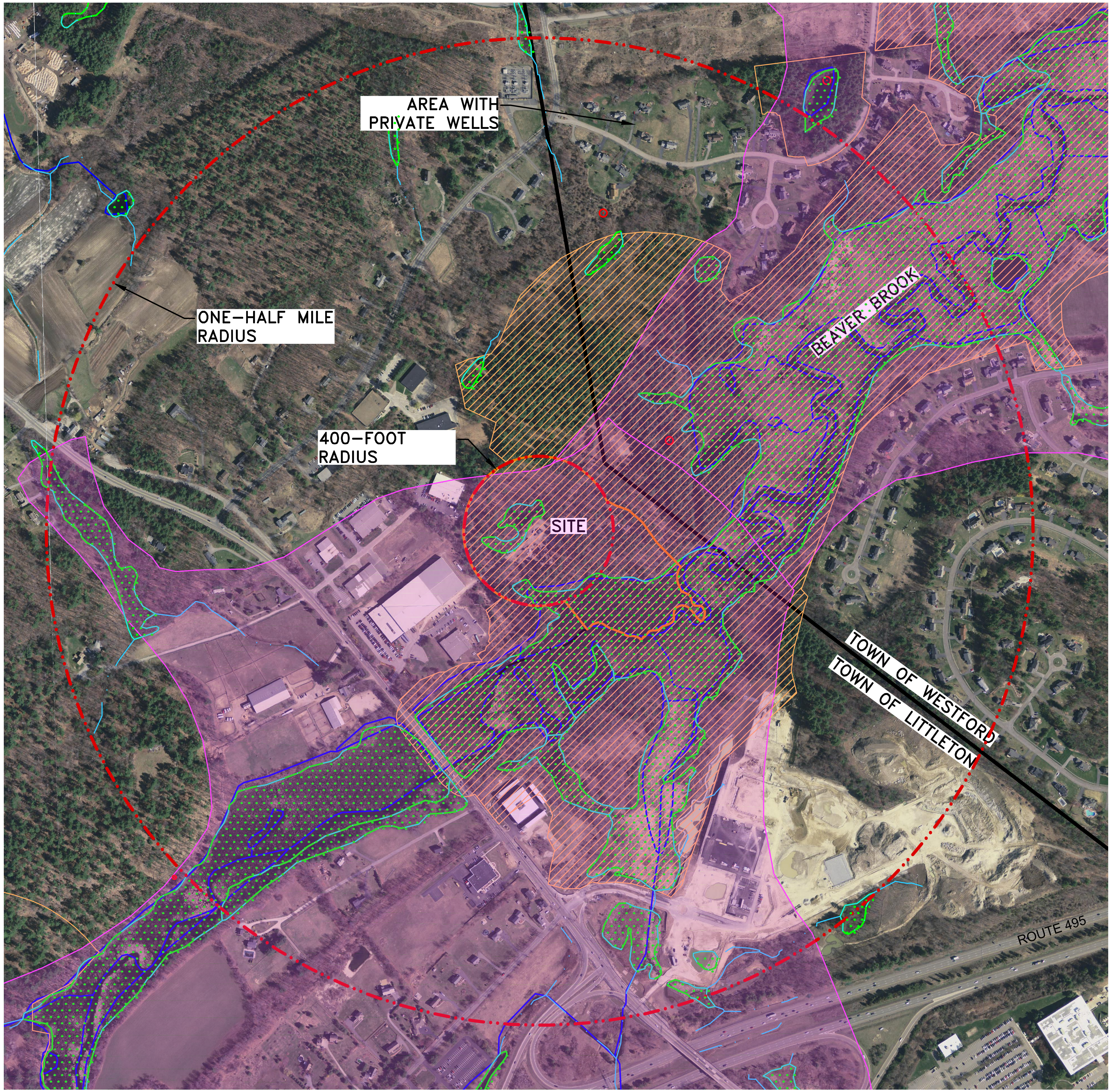

LEGEND

- ZONE II
- PRIMARY HABITAT
- VERNAL POOL
- APPROXIMATE LOCATION OF WETLAND
- APPROXIMATE LOCATION OF TOWN LINE
- APPROXIMATE LOCATION OF PROPERTY LINE

-N-

NOTES:

1. THIS FIGURE WAS BASED UPON MASS GIS DATA.

0 600 1200
APPROX. SCALE IN FEET

CLIENT: LITTLETON WATER DEPARTMENT				GeoInsight Practical in Nature
PROJECT: BEAVER BROOK WELLS YIELD INCREASE				
TITLE: ONE-HALF MILE RADIUS				
DESIGNED: DGH	DRAWN: DGH	CHECKED: DAM	APPROVED: DAM	
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PLOT DATE: 6-5-18
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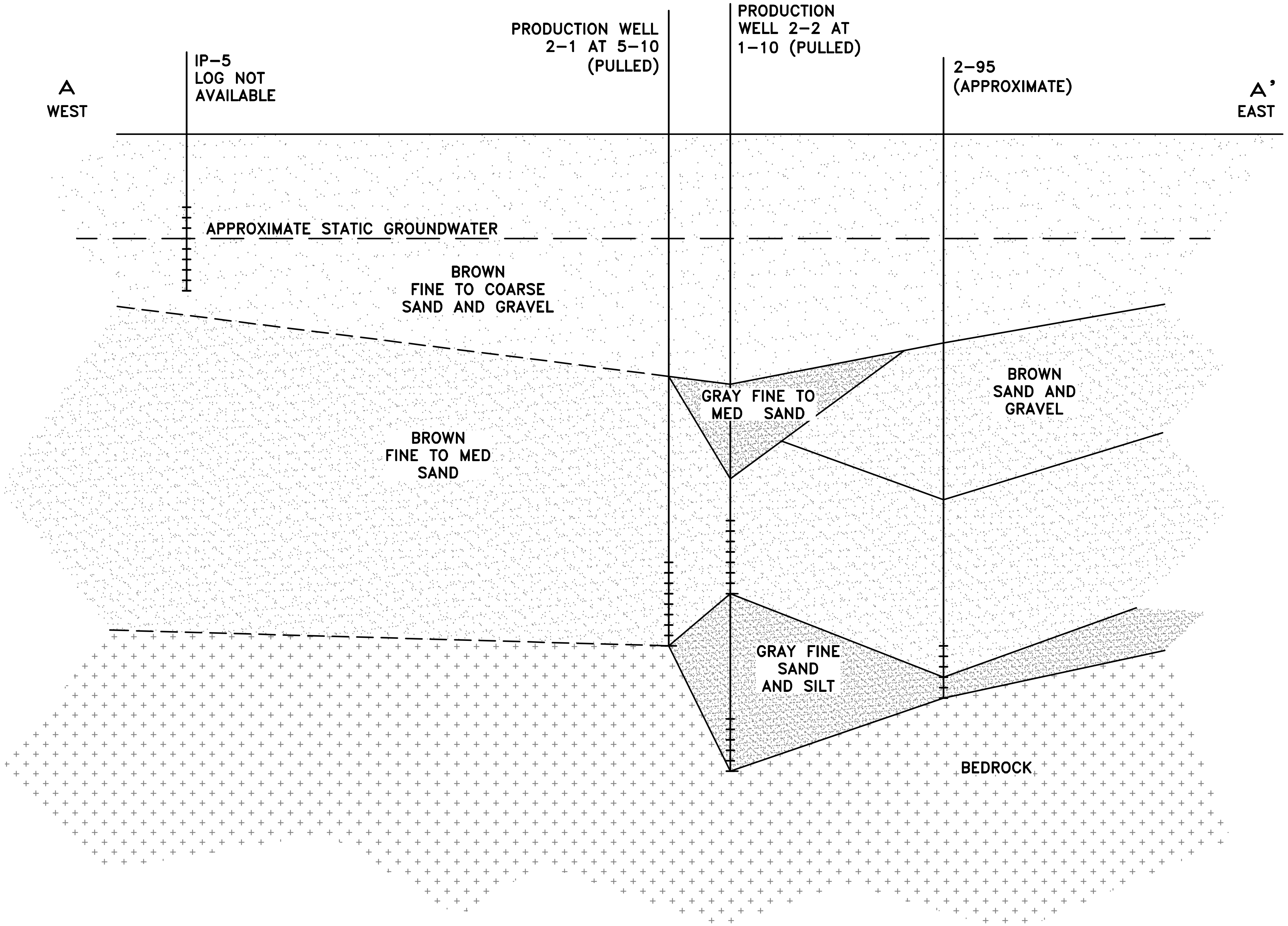

NOTES:

1. ASSUMED VERTICAL DATUM. SITE TOPOGRAPHY IGNORED.

0 100 200 HORZ

0 10 20 VERT

APPROX. SCALE IN FEET

CLIENT: LITTLETON WATER DEPARTMENT			
PROJECT: BEAVER BROOK WELLS YIELD INCREASE			
TITLE: CROSS SECTION A-A'			
DESIGNED: DGH	DRAWN: DGH	CHECKED: DAM	APPROVED: DAM
SCALE: AS SHOWN	DATE: 01/15/18	FILE NO.: 8541D001	PROJECT NO.: 8541

GeoInsight
Practical in Nature

FIGURE NO.: 4

PLOT DATE: 1-22-18
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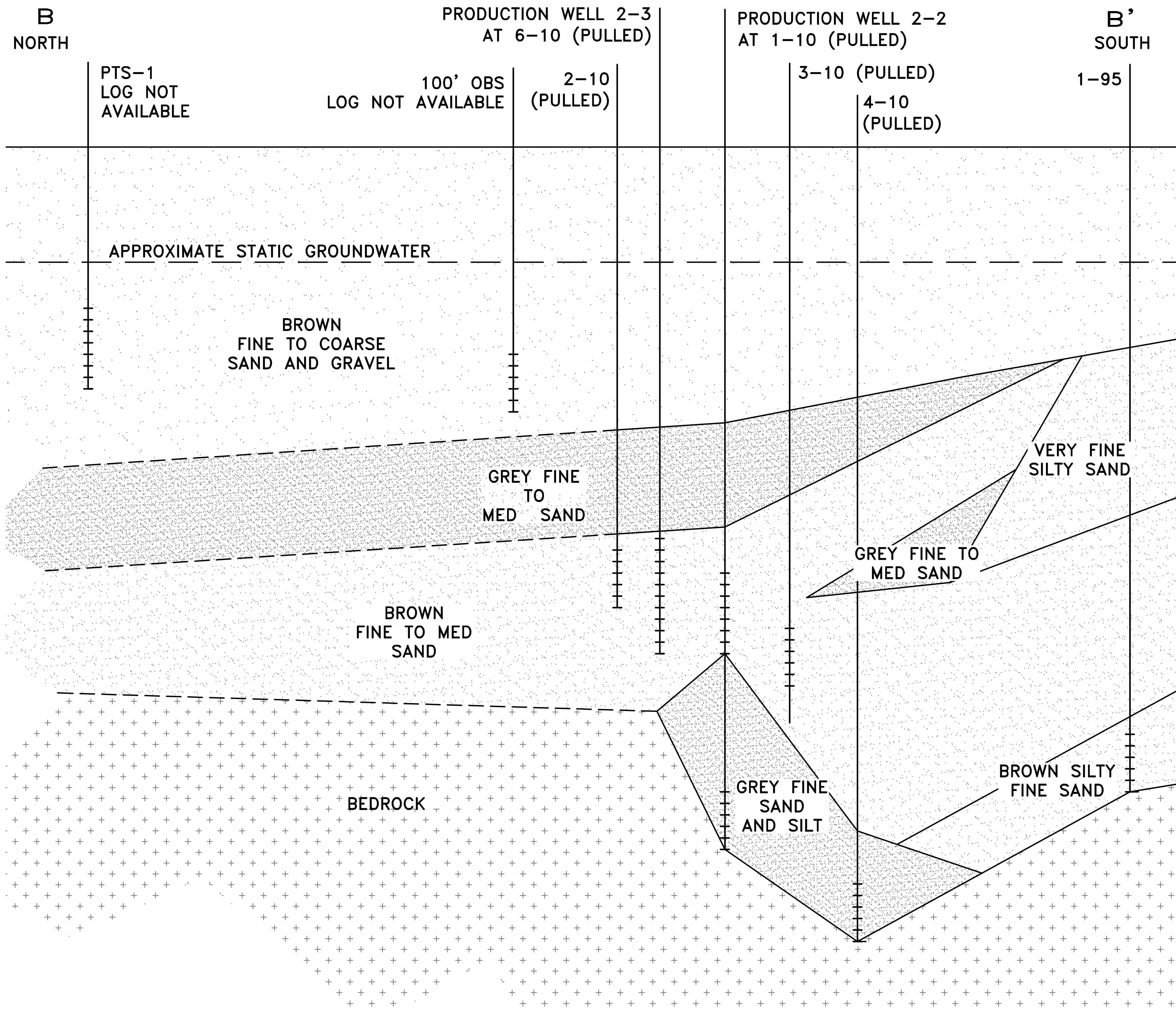


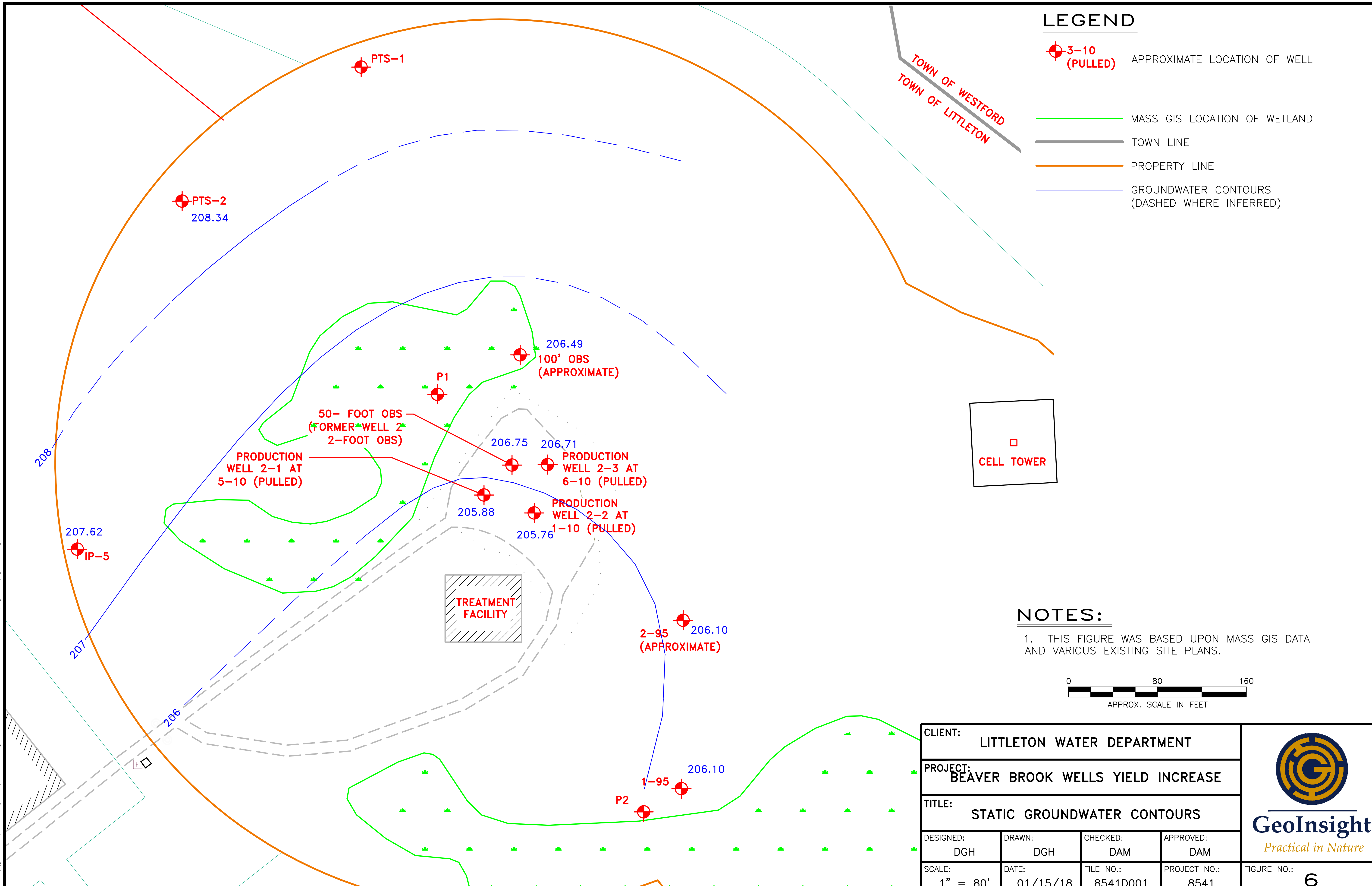
NOTES:

1. ASSUMED VERTICAL DATUM. SITE TOPOGRAPHY IGNORED

0 100 200 HORZ
0 10 20 VERT
APPROX. SCALE IN FEET

CLIENT: LITTLETON WATER DEPARTMENT				GeoInsight Practical in Nature
PROJECT: BEAVER BROOK WELLS YIELD INCREASE				
TITLE: CROSS SECTION B-B'				
DESIGNED: DGH	DRAWN: DGH	CHECKED: DAM	APPROVED: DAM	
SCALE: AS SHOWN	DATE: 01/15/18	FILE NO.: 8541D001	PROJECT NO.: 8541	FIGURE NO.: 5

PLOT DATE: 1-22-18
FILE: \\geomao\MAO_Projects\8541 - Tighe-Bond Beaver Brook Wells Littleton\Figures\figures.dwg



NOTES:

1. THIS FIGURE WAS BASED UPON MASS GIS DATA AND VARIOUS EXISTING SITE PLANS.

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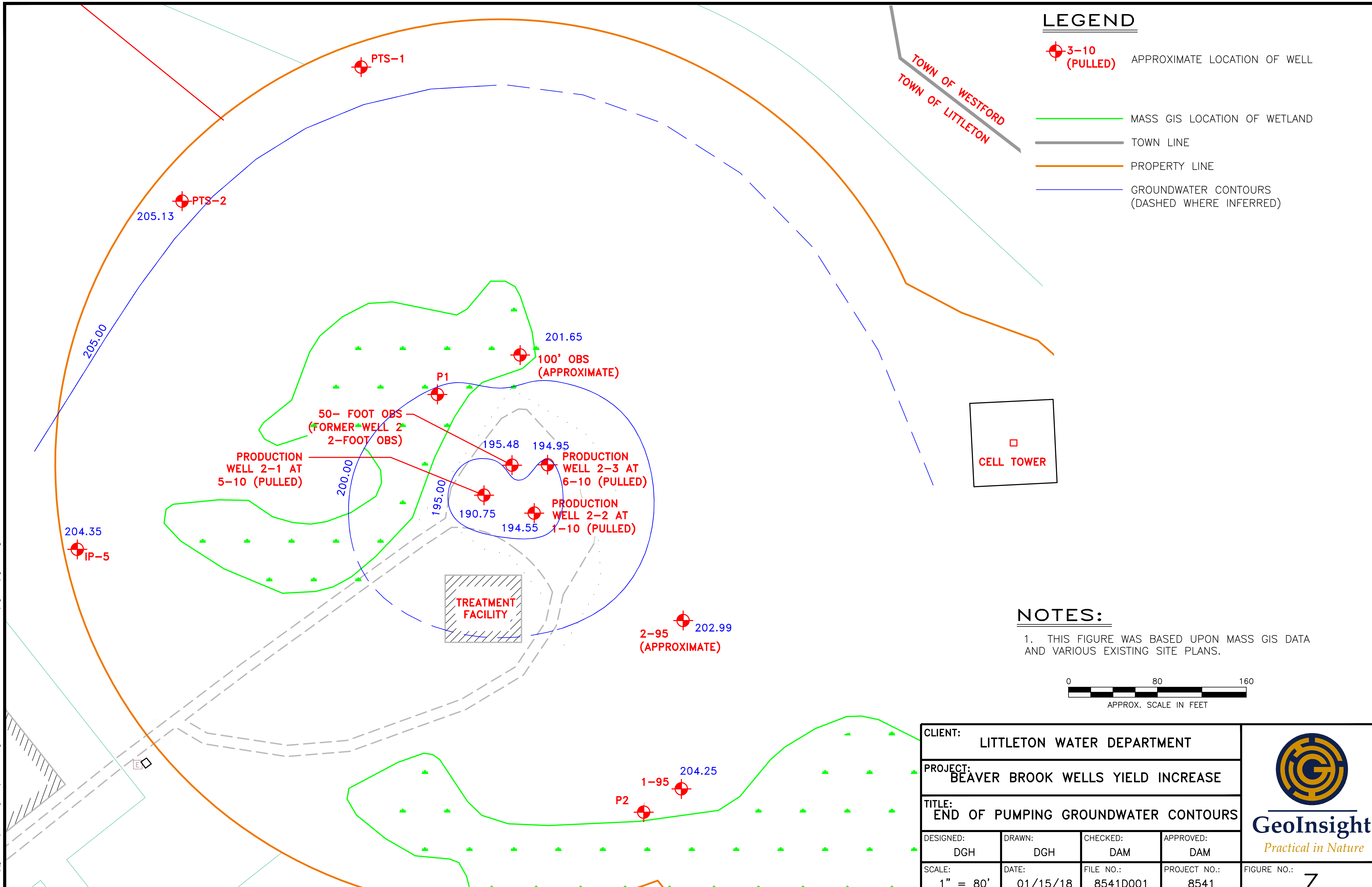
PROJECT:	BEAVER BROOK WELLS YIELD INCREASE
TITLE:	STATIC GROUNDWATER CONTOURS

DESIGNED:	DRAWN:	CHECKED:	APPROVED:
DGH	DGH	DAM	DAM

SCALE:	DATE:	FILE NO.:	PROJECT NO.:	FIGURE NO.:
1" = 80'	01/15/18	8541D001	8541	6

GeoInsight
Practical in Nature

PLOT DATE: 6-5-18
FILE: \\geomoo\MAO_Projects\8541 - Tighe-Bond Beaver Brook Wells Littleton\Figures\figures.dwg



PLOT DATE: 6-5-18
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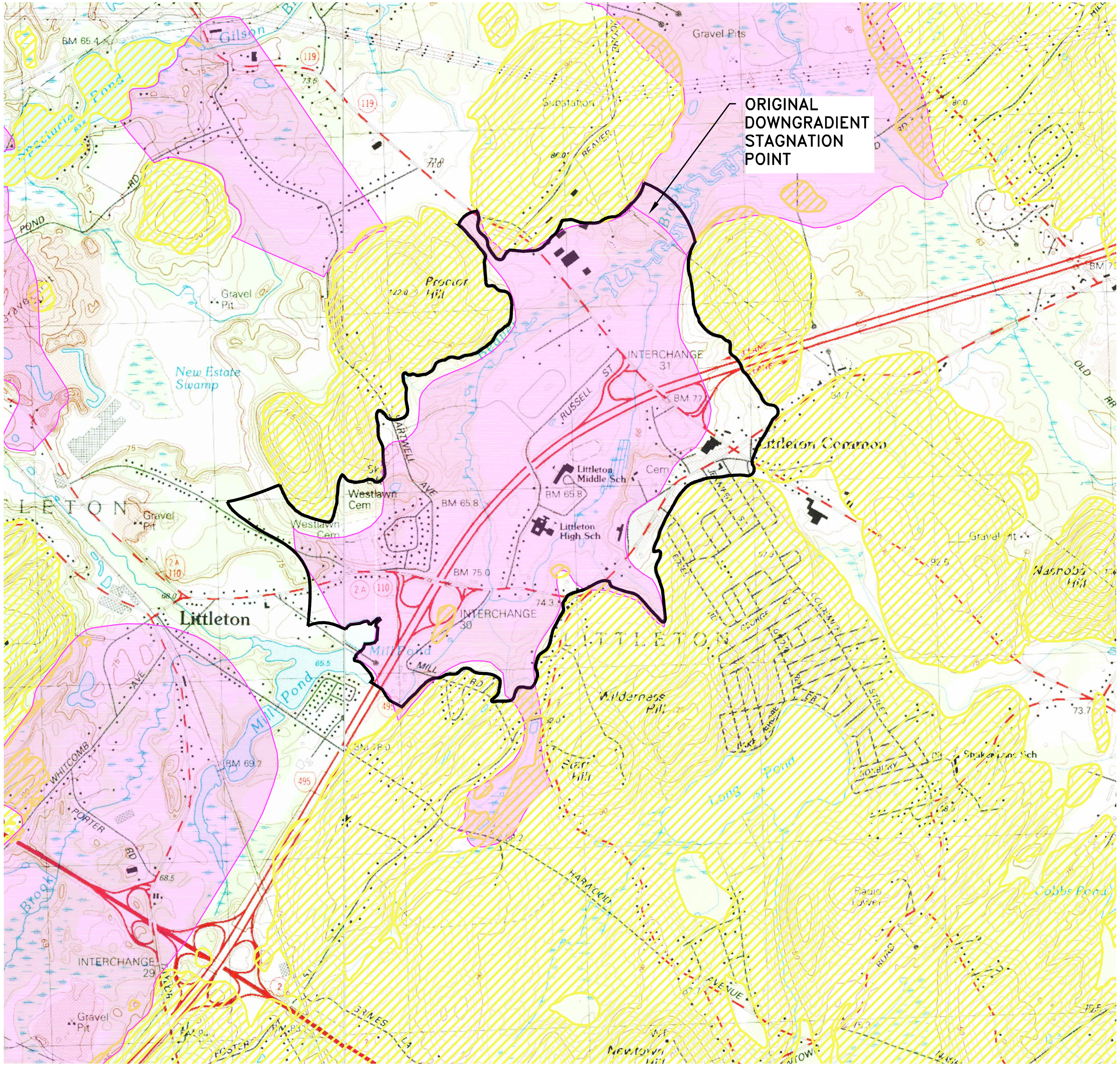


LEGEND

EXISTING ZONE II

NEW BEAVER BROOK ZONE II

GLACIAL TILL

NOTES:

1. THIS FIGURE WAS BASED UPON MASS GIS DATA. AND THE USGS AYER AND BILLERICA QUADS.

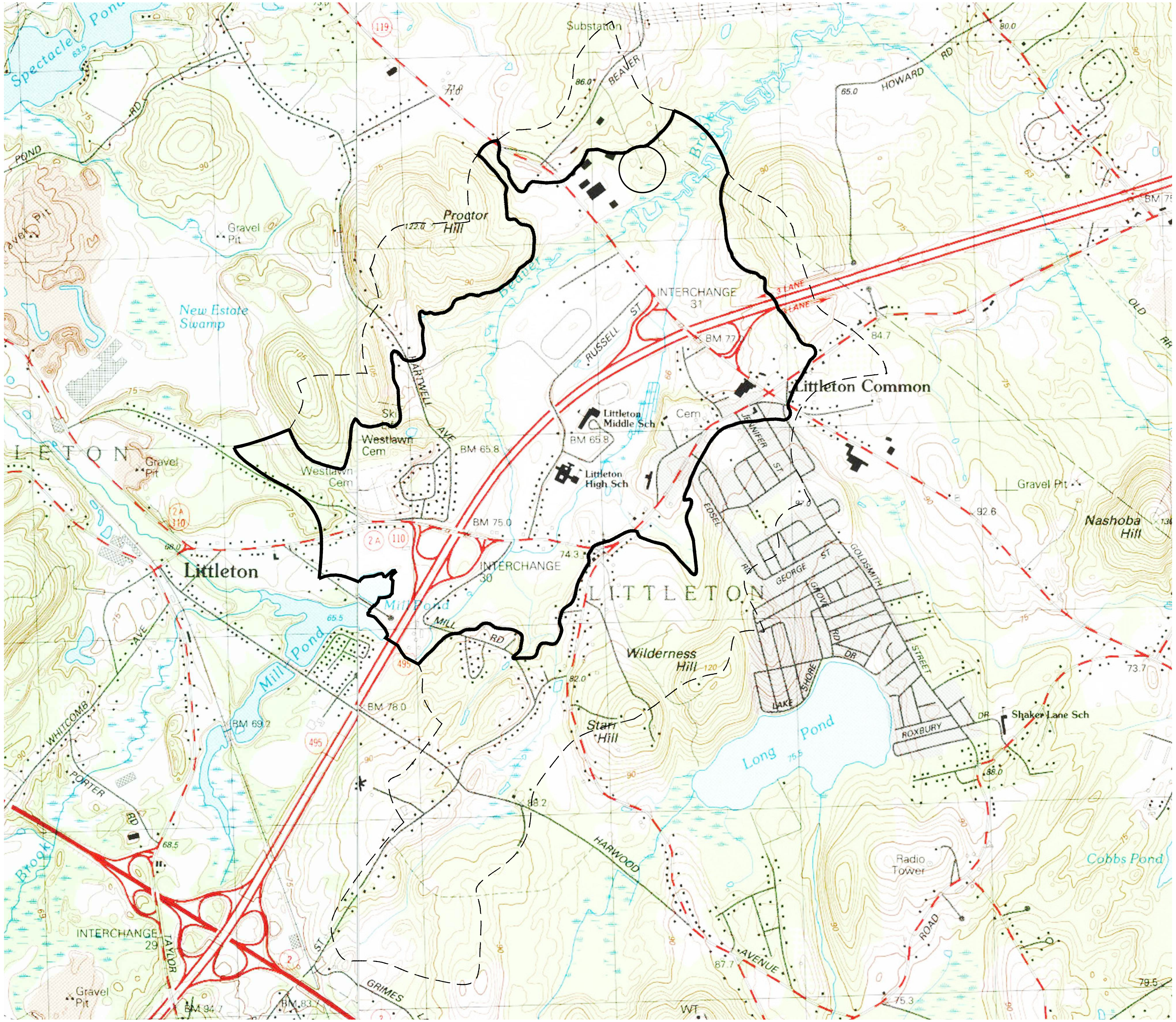
0 2000 4000

APPROX. SCALE IN FEET

CLIENT: LITTLETON WATER DEPARTMENT				
PROJECT: BEAVER BROOK WELLS YIELD INCREASE				
TITLE: ZONE II COMPARISON				
DESIGNED: DGH	DRAWN: DGH	CHECKED: DAM	APPROVED: DAM	
SCALE: 1" = 2000'	DATE: 05/30/18	FILE NO.: 8541D001	PROJECT NO.: 8541	FIGURE NO.: 8

GeoInsight
Practical in Nature

PLOT DATE: 6-5-18
FILE: \\geomao\MAO_Projects\8541 - Tighe-Bond Beaver Brook Wells Littleton\Figures\figures.dwg



PWS IDENTIFICATION #	2158000
NAME OF WATER SUPPLY/ SOURCE IDENTIFICATION #	BEAVER BROOK WELLS 05G, 06G & 07G
WATER PURVEYOR/ PROJECT PROPONENT:	LITTLETON WATER DEPARTMENT
TITLE OF STUDY:	ZONE II DELINEATION
USGS QUADRANGLE NAME:	AYER & BILLERICA
CONSULTANT:	GEOINSIGHT
DATE OF STUDY SUBMITTAL:	JUNE 2018

LATITUDE/LONGITUDE OF SOURCE:
42° 33' 25.29" N 71° 28' 53.13" W (05G)
42° 33' 25.15" N 71° 28' 52.50" W (06G)
42° 33' 25.58" N 71° 28' 52.37" W (07G)

DATE:___________________

SIGNATURES:

WATER PURVEYOR/
PROJECT PROPONENT ______________________________

CONSULTANT ______________________________

REGIONAL WATER
SUPPLY CHIEF ______________________________

LEGEND

ZONE I
ZONE II
ZONE III

NOTES:

1. THIS FIGURE WAS BASED UPON MASS GIS DATA. AND THE USGS AYER AND BILLERICA QUADS.

0 2000 4000
APPROX. SCALE IN FEET

CLIENT: LITTLETON WATER DEPARTMENT			
PROJECT: BEAVER BROOK WELLS YIELD INCREASE			
TITLE: ZONE II DELINEATION			
DESIGNED: DGH	DRAWN: DGH	CHECKED: DAM	APPROVED: DAM
SCALE: 1" = 2000'	DATE: 05/30/18	FILE NO.: 8541D001	PROJECT NO.: 8541

GeoInsight
Practical in Nature

FIGURE NO.: 9

PLOT DATE: 6-1-18
FILE: \\geomoo\MAO_Projects\8541 - Tighe-Bond Beaver Brook Wells Littleton\Figures\figures.dwg

LEGEND

N

(red line)	AREA OF INFLUENCE
(yellow line)	GLACIAL TILL
(black line)	APPROXIMATE LOCATION OF TOWN LINE

NOTES:

1. THIS FIGURE WAS BASED UPON MASS GIS DATA.

0 200 400
APPROX. SCALE IN FEET

CLIENT: LITTLETON WATER DEPARTMENT				GeoInsight Practical in Nature
PROJECT: BEAVER BROOK WELLS YIELD INCREASE				
TITLE: AREA OF INFLUENCE				
DESIGNED: DGH	DRAWN: DGH	CHECKED: DAM	APPROVED: DAM	
SCALE: 1" = 200'	DATE: 05/31/18	FILE NO.: 8541D001	PROJECT NO.: 8541	FIGURE NO.: 10

PLOT DATE: 6-1-18
FILE: \\geomoo\MAO_Projects\8541 - Tighe-Bond Beaver Brook Wells Littleton\Figures\figures.dwg

APPENDICES

APPENDIX A

AQUIFER PROTECTION BYLAWS

§ 173-58. Special permit conditions.

A special permit authorizing an accessory dwelling may be granted only if consistent with the following:

A. Either unit shall be occupied only by one (1) or more persons related by blood or marriage or functionally dependent (for medical or other reasons) on the occupant(s) of the other unit.

B. The Board of Health must have documented to the special permit granting authority that sewage disposal will be satisfactorily provided for, including provision for an appropriate reserve area on site.

C. Parking requirements. Two (2) parking spaces are required for the primary dwelling. Two (2) additional parking spaces are required for the accessory dwelling unless a lesser requirement is considered adequate by the special permit granting authority.

D. A certificate of occupancy for the accessory dwelling shall be issued for a period of no greater than three (3) years. Renewal of a certificate of occupancy shall be granted only upon documentation to the Building Inspector that the relationship satisfying Subsection A of this section is still in existence.

E. Termination of occupancy satisfying Subsection A of this section or change of ownership shall terminate the special permit and the certificate of occupancy as an accessory dwelling.

§§ 173-59 through 173-60. (Reserved)

ARTICLE XIV, Aquifer and Water Resource District

§ 173-61. Use regulations. [Amended 5-3-2004 ATM, Art. 23, 5-5-2007, Art. 16]

There is established within the town certain aquifer and water resource protection areas, consisting of aquifers or water resource areas which are delineated on a map entitled "Aquifer and Water Resource District, Town of Littleton," and dated March 2004. This map is hereby made a part of the Littleton Zoning Bylaws and is on file in the Office of the Town Clerk. Within the Aquifer and Water Resource Districts, the requirements of the underlying zoning districts continue to apply, except that uses are prohibited where indicated by "N" in the following schedule and require a special permit where indicated by "P," even where underlying district requirements are more permissive. Where there is no entry in this schedule, the underlying district requirements are controlling.

	District	
Uses	**Aquifer (A)**	**Water Resource (W.R.)**
Principal uses: manufacture, use, transport, storage or disposal of toxic or hazardous materials as a principal activity	N	N
Truck terminal	N	P

Sanitary landfill, junkyard, salvage yard, other solid waste disposal	N	P
Motor vehicle service or washing station	N	P[1]
Vehicular Retail Sales	N	N
Self-storage facility [Amended 5-2-2011 ATM, Art. 22]	P	P
Accessory uses or activities: manufacture, use, transport, storage or disposal of toxic or hazardous materials in excess of 5 gallons or 25 pounds dry weight of any substance or a total of all substances not to exceed 50 gallons or 250 pounds dry weight, on a site at any one time as an accessory activity for nonresidential and nonagricultural principal activities	P	P
Underground storage of gasoline or chemicals [Amended 5-9-1988 ATM, Art. 14]	N	P
Storage of heating oil or petroleum in quantities greater than 500 gallons [Amended 5-5-2007 ATM, Art. 16]	N	P
Storage of ice-control chemicals, commercial fertilizers or animal manure not stored in accordance with DEP 310 CMR 22.21(2)(b)(2), (b)(3), and (b)(4) [Amended 5-9-1994 ATM, Art. 29; 5-5-2007 ATM, Art. 16]	N	N
Storage of sludge and/or septage not stored in accordance with DEP 310 CMR 22.21(2)(b)(1) [Amended 5-5-2007 ATM, Art. 16]	N	P
Disposal of snow from outside the district	N	P

	District	
Uses	**Aquifer (A)**	**Water Resource (W.R.)**
Parking area with 100 or more spaces capacity [Amended 5-9-1988 ATM,	P	P

[1] Except that motor vehicle service or washing stations shall be an excluded/prohibited use (N) within the Littleton Village Overlay District West—Beaver Brook Area District. [Added 11-4-2013 STM, Art.10]

Art. 14]		
Waste characteristics: Hazardous waste generation, treatment, or storage inquantities not to exceed Very SmallQuantity Generators (VSQGs) as defined in DEP 310 CMR 22.21(2)(a)(7), or subsequent equivalent regulation(s) currently in effect [Amended 5-5-2007 ATM, Art. 16]	P	P
Waste generation in quantaties greater than VSQGs limits, or subsequent equivalent regulation(s) currently in effect [Amended 5-5-2007 ATM, Art. 16]	N	P
On-site disposal of industrial waste, as defined in DEP 310 CMR 22.21(2)(a)(6) [Amended 5-5-2007 ATM, Art. 16]	N	P
Use (other than single-family dwellings) if having estimated sewage flow or industrial wastewater flow exceeding 6 gallons per day combined flow per 1,000 square feet of lot area or exceeding 15,000 gallons per day combined flow regardless of lot area. Flows regulated by Title 5 shall be based on Title 5 [Amended 5-9-1988 ATM, Art. 14; 9-30-1991 STM, Art. 10]	P	P
Other characteristics: for use other than single-family dwellings, retention of less than 30% of lot area in its natural state with no more than minor removal of trees and ground vegetation [Amended 5-9-1988 ATM, Art. 14]	P	P
Rendering impervious more than 15% or 2500 square feet of any lot or parcel but less than 30%*[Amended 5-9-88 ATM, Art. 14; 5-5-2007 ATM, Art. 16]	P	Not Applicable
Rendering impervious more than 20% but less than 50% of any lot or parcel * [Amended 5-5-2007 ATM, Art 16]	Not Applicable	P

	District	
Uses	**Aquifer (A)**	**Water Resource (W.R.)**
Earth removal activities not in accordance with DEP 310 CMR 22.21(2)(b)(6), or	N	P

subsequent equivalent regulation(s) currently in effect [Amended 5-5-2007 ATM, Art. 16]

§ 173-62. Special permits.

A. Special permit granting authority. The special permit granting authority (SPGA) shall be the Planning Board. Such special permit shall be granted if the SPGA determines that the intent of this chapter, as well as the specific criteria of Subsection B of this section, are met. In making such determination, the SPGA shall give consideration to the simplicity, reliability and feasibility of the control measures proposed and the degree of threat to water quality which would result if the control measures were to fail. [Amended 5-8-1989 ATM, Art. 18]

B. Special permit criteria. Special permits for critical resource use shall be granted only if the SPGA determines that, at the boundaries of the premises, the groundwater quality resulting from on-site waste disposal, other on-site operations, natural recharge and background water quality will not fall below the standards established by the Department of Environmental Quality Engineering in Drinking Water Standards of Massachusetts, as most recently revised, or, for parameters where no Department of Environmental Quality Engineering standard exists, below current Environmental Protection Agency criteria as published in the Federal Register or, where no such criteria exists, below standards established by the Board of Health in consultation with the Board of Water Commissioners and, where existing groundwater quality is already below those standards, upon determination that the proposed activity will result in no further degradation.

C. Change of use. Changes in activities resulting in the necessity of obtaining an Environmental Protection Agency identification number as a waste generator, changes resulting in crossing the thresholds of § 173-61 or change of proprietorship for a use which exceeds the thresholds of § 173-61 shall constitute change of use and is allowed only under special permit provided under § 173-61 or as provided under § 173-10B for existing nonconforming uses.

D. Submittals. When applying for a special permit for critical resource use, the following shall be submitted to the SPGA in ten (10) copies by the date of first publication of the public hearing notices:

(1) A complete list of all chemicals, pesticides, fuels and other potentially toxic or hazardous materials to be used or stored on the premises, accompanied by a description of measures proposed to protect from vandalism, corrosion and leakage and to provide for spill prevention and countermeasures.

(2) A description of potentially toxic or hazardous wastes to be generated, indicating storage and disposal method.

(3) Evidence of approval by the Massachusetts Department of Environmental Quality Engineering (DEQE) of any industrial waste treatment or disposal system and of any wastewater treatment system over a capacity of fifteen thousand (15,000) gallons per day.

(4) For underground storage of toxic or hazardous materials, evidence of qualified professional supervision of system design and installation.

(5) Analysis by a qualified engineer experienced in ground-water evaluation and/or geohydrology, with an evaluation of the proposed use, including its probable effects or impact on surface and groundwater quality and quantity and natural flow patterns of watercourses.

§ 173-63. Design and operations guidelines.

Within Aquifer and Water Resource Districts, the following design and operations guidelines shall be observed, except for single-family dwellings:

A. Safeguards. Provision shall be made to protect against toxic or hazardous materials discharge or loss through corrosion, accidental damage, spillage or vandalism through such measures as provision for spill control in the vicinity of chemical or fuel delivery points, secure storage areas for toxic or hazardous materials and indoor storage provisions for corrodible or dissolvable materials.

B. Locations. Where the premises are partially outside of the Aquifer or Water Resource District, such potential pollution sources as on-site waste disposal systems shall, to the degree feasible, be located outside the district.

C. Disposal. Provisions shall be made to assure that any waste containing toxic or hazardous materials disposed on the site is within quantities specified in and in accordance with 310 CMR 30.353, regarding insignificant waste, or subsequent equivalent regulation(s) currently in effect.

(*) D. Drainage. Provision shall be made for on-site recharge of stormwater runoff from impervious surfaces unless without degradation to groundwater if a special permit is to be granted for greater than 15% coverage (but less than 30%) in the Auqifer District and for impervious cover greater than 20% (but less than 50%) in the Water Resource District. Such recharge shall include (but not be limited to) infiltration through methods as outlined in the *Town of Littleton Low Impact Design/Best Management Practices Manual (latest edition)* unless otherwise approved by the Planning Board during site plan review. Where dry wells or leaching basins are used, they shall be preceded by oil, grease and sediment traps. Drainage from loading areas for toxic or hazardous materials shall be separately collected for safe disposal. [Amended 5-5-2007 ATM, Art. 16; 5-5-2008 ATM, Art. 10]

E. Monitoring. Periodic monitoring shall be required by the SPGA, including sampling of wastewater disposed to on-site systems or dry wells and sampling from groundwater monitoring wells to be located and constructed as specified in the special permit, with reports to be submitted to the SPGA, the Board of Health and the Board of Water Commissioners. The costs of monitoring, including sampling and analysis, shall be borne by the owner of the premises.

F. Ice-control chemicals. Where allowed, storage of ice-control chemicals in quantities requiring state reporting shall be authorized only within a weatherproof shelter having an impervious floor and only if all loading and unloading will be done within that shelter, with provisions made for safe cleanup.

§ 173-64. Violations.

Written notice of any violation shall be provided by the Building Inspector to the owner of the premises, specifying the nature of the violation and specifying a time for compliance, including cleanup of any spilled materials. The time allowed shall be reasonable in relation to the public health hazard involved and the difficulty of compliance, but in no event shall more than thirty (30) days be allowed for either compliance or finalization of a plan for longer-term compliance. The costs of achieving compliance shall be borne by the owner of the premises or, if uncollectible from the owner, by the responsible occupant.

APPENDIX B

WELL LOGS

WELL LOG

D.L. MAHER CO.
GROUND WATER
CONSULTING - DRILLING SERVICES

71 CONCORD STREET, NORTH READING, MASSACHUSETTS 01864
617/933-3210 FAX: 508/664-3299

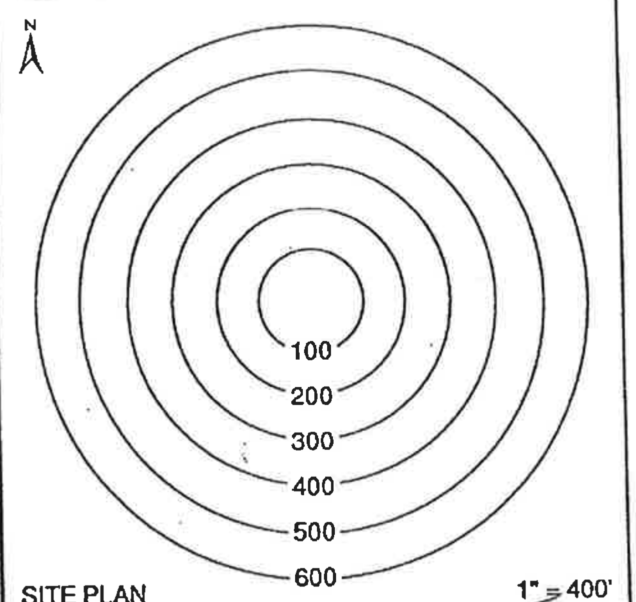
Well No. MW1-95 D.L.M. Job No. 95-159 T/HC
Driller Geo. E. Irvine Helper Geo. P. Irvine
Job Name Littleton Water Dept
Location Well Station #2.
Owner's Representative Town Eng
Date Started: 6-23-95 Date Finished: 6-23-95

DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0"	10'	Brown sand fine gravel	Yes.
10'	20'	Brown silty sand.	No
20'	40'	Very fine silty sand.	No
40'	47'	Brown fine sand	Some
47'	56'	Brown silty sand - layers of Brown clay on Bottom.	No
		Refusal 56'	

STATIC (From Top of Pipe) 2.86 / 9.82

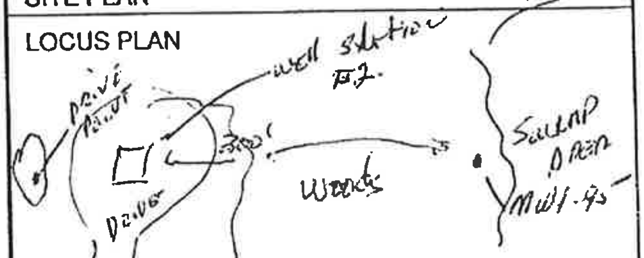
DEPTH COMPLETED — DEPTH TOTAL

SITE PLAN



1" = 400'

LOCUS PLAN



Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	SCREEN Length	SCREEN Exposed	SCREEN Material	SCREEN Slot Size	SCREEN Riser	Hours Dev.	Hours Pumped
MW1-95	2.5	56	47	42	6	6	GAV	10	5	2	½

Pump Test Data

Well #
Date

Time	G.P.M.	VAC	Water Levels Obs. No.	Obs. No.	Obs. No.
	Static				

REMARKS: well developed slowly Had to Back wash 2 times - very fine sand - Pumped 7 gpm 24" vac. slow to clear up.

Water Sample Collected
Date ______ Time ______
Sent To: ______

WELL LOG

D.L. MAHER CO. GROUND WATER CONSULTING • DRILLING SERVICES

71 CONCORD STREET, NORTH READING, MASSACHUSETTS 01864
617/933-3210 FAX: 508/664-3299

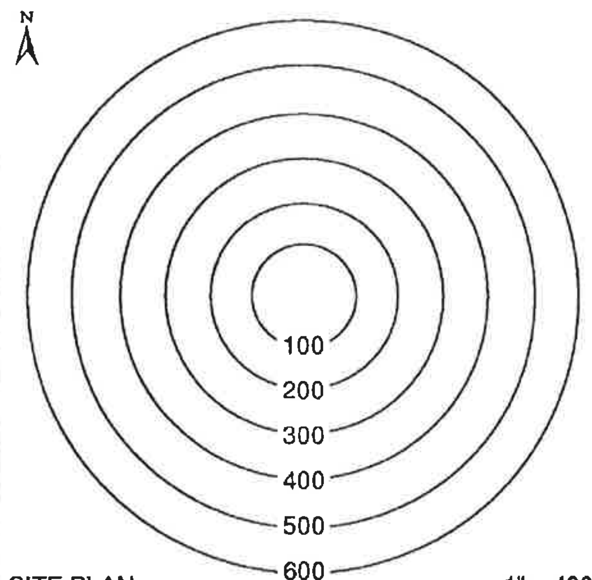
Well No.	MW 2-95
D.L.M. Job No.	95-159 T/HL
Driller	Geo. E. Irvine
Helper	Geo. P. Irvine
Job Name	Littleton Water Dept
Location	Well station #2
Owner's Representative	To SU
Date Started:	6-27-95
Date Finished:	6-28-95

DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0"	20'	Brown sand & gravel	Yes
20'	35'	Brown sand to very coarse gravel slightly angular.	Yes
35'	41'	Brown sand & coarse gravel	Yes
41'	52'	Brown fine silty sand.	No
52'	54'	Brown & gray sand & clay	No
		Refusal 54'	

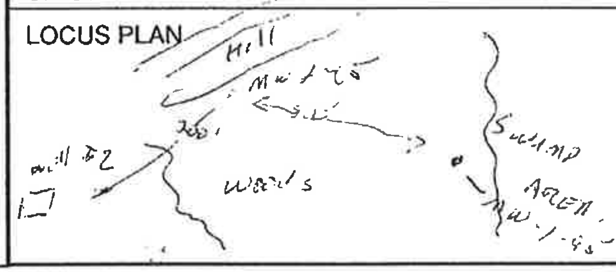
STATIC (From Top of Pipe): 1,79 — 1052

COMPLETED DEPTH — TOTAL DEPTH

SITE PLAN 1" = 400'



LOCUS PLAN



Well No.	Diam.	Total Depth	Comp. Depth	Casing Left	SCREEN Length	Exposed	Material	Slot Size	Riser	Hours Dev.	Hours Pumped
MW 2-95	2.5	54	42	35	6	6	GAV	40	5	2	1/2

Pump Test Data

Well #			Water Levels		
Date			Obs. No.	Obs. No.	Obs. No.
Time	G.P.M.	VAC			
	Static				

REMARKS: Well developed slowly with High vac. Pumped 45 gpm at 28" vac. Well slow to clear up at first then developed at each breakage of section. Would only color up about 15 strokes on diaphragm pump after 1 hour.

Water Sample Collected

Date ______ Time ______

Sent To: ______

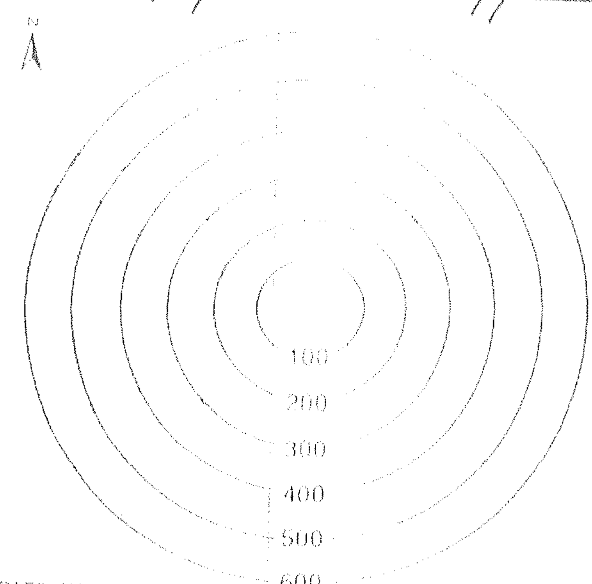
[illegible] L. Maher Company
[illegible] DenisLMaher.com
[illegible]@DenisLMaher.com
[illegible] Westford Rd PO Box 130
Ayer MA 01432-0130
Tel 9[illegible]8 615-4606
Fax 978 615-4607

WELL LOG

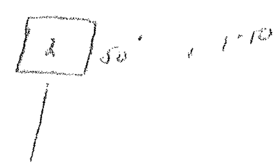
DENIS L. MAHER CO.
WELL DRILLING & PUMP SERVICES

Well No 1-10 2-06   D L M Job No 10[illegible]
Driller A Callahan   Helper Ray Kelly
Job Name Littleton MA
Location well #2
Owner's Representative
Date Started 7/30/10   Date Finished 8/11/10

DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water	STATIC (From Top of Pipe)	COMPLETED DEPTH	TOTAL DEPTH
				3'		
0	27'	Fine To coarse brown sand, gravel	Yes			
27'	33'	Fine To med grey sand some coarse sand	Yes			
33'	40	Fine To coarse brown sand, some gravel				
40'	45'	Fine To med brown sand, some coarse brown sand	Yes			
45'	54	Fine grey sand, some med grey sand		96"	45'	
54	61	Fine grey sand, Traces of silt				61'
	61'	Refusal				



SITE PLAN   1" = 400'
LOCUS PLAN



Well No	Diam	Total Depth	Comp Depth	Casing Left	SCREEN Length	SCREEN Exposed	SCREEN Material	SCREEN Slot Size	SCREEN Riser	Hours Dev	Hours Pumped
1-10	2.5"	61'	45'	42'	6'	6'	SS	60	5'	12	2 1/2
2-06	2.5"	45'	45'	42'	6	6	SS	80	5'	12	2 1/2

Pump Test Data

Well # 1-10
Date 8/4/10

Time	GPM	VAC	Water Levels Obs No	Water Levels Obs No	Water Levels Obs No
	Static				
9 40	65	15"			

REMARKS:

pulled The wells 8/11/10

Water Sample Collected
Date 8/4/10   Time 1500
Sent To Nashoba Lab

DENIS L. MAHER CO.
WELL DRILLING & PUMP SERVICES

Well No 1-10 2½"

Location well #2 Littleton MA

RECORD OF TEST

Contract:

How Q Measured 65' GAM

Date	Time	Elapsed	Pumping	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well	Remarks
8/4	(HHMM)	Time	Rate	2'	70' 2-10	50' 3-10								
Static				13.50	12.05	12.53								
1 min				14.36										
2				14.37										
3				14.39										
4				14.38										
5				14.38	12.19	12.97								
10				14.40	12.20	12.96								
20				14.50	12.21	12.96								
30				14.52	12.22	12.96								
Recovery's														
1 min				13.70										
5				13.52	12.10	12.50								

Denis L. Maher Company, LLC
www.DenisLMaher.com
DLMaher@DenisLMaher.com

Tel 978-615-4606 Fax 978-615-4607
19 Westford Rd PO Box 130
Ayer, MA 01432-0130

D. L. Maher Company
DenisLMaher.com
maher@DenisLMaher.com
71 Westford Rd · PO Box 130
Ayer MA 01432 0130
Tel 978 615 4606
Fax 978 615 4607

WELL LOG

DENIS L. MAHER CO
WELL DRILLING & PUMP SERVICES

2-06

Well No 2-10 D L M Job No 10

Driller B Callahan Helper Ray Kelly

Job Name Littleton MA

Location well #2

Owner's Representative

Date Started 8/2/10 Date Finished 8/11/10

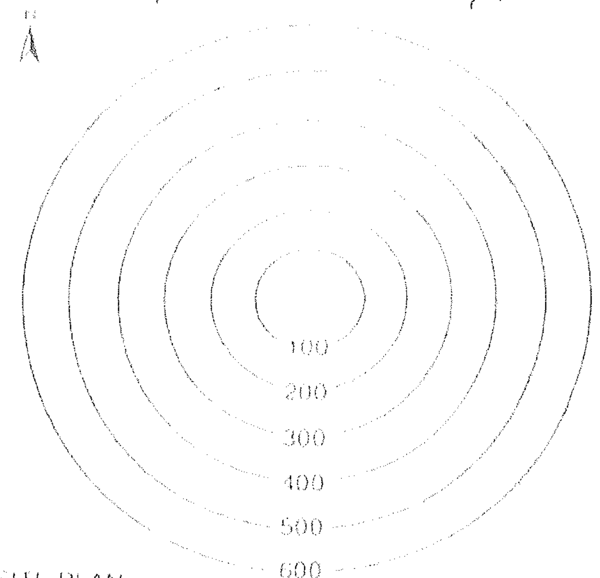
DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0	25'	Fine to coarse brown sand, gravel	
25	36'	Fine to med grey sand some coarse sand gravel, cobbles	70
36'	40'	Fine grey sand, traces of silt, some med grey sand	

STATIC (From Top of Pipe) 2'

10 00

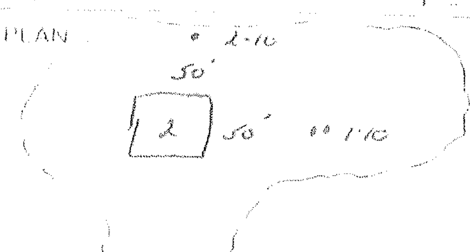
DEPTH COMPLETED 35'

DEPTH TOTAL 40'



SITE PLAN 1" = 400'

LOCUS PLAN



Well No	Diam	Total Depth	Comp Depth	Casing Left	SCREEN Length	SCREEN Exposed	SCREEN Material	SCREEN Slot Size	SCREEN Riser	Hours Dev	Hours Pumped
2-10	2.5	40'	35'	28'	6'	6	SS	80	5.3	2	2
2'	2.5	35'	35'	28'	6'	6	SS	80	5.3	2 1/2	2

Pump Test Data

Well # 2-10

Date 8/4/10

Time	GPM	VAC	Obs No	Obs No	Obs No
	Static				
10:00	60	18"			

REMARKS:

push a rock from 36' to 40', well drove very hard

material looks grey, develops out brown

pulled the 2'06 8/4/10
pulled 2-10 8/11/10

Water Sample Collected

Date 8/4/10 Time 1000

Sent to Analytical lab

DENIS L. MAHER CO.
WELL DRILLING & PUMP SERVICES

Well No 2-10 22"
Location Well #2 Littleton MA

RECORD OF TEST

Contract
How Q Measured 60 GPM

Date 8/4	Time (HHMM)	Elapsed Time	Pumping Rate	Well 2'	Well 70' 1-10	Well 50' GP 2	Well	Well	Well	Well	Well	Well	Well	Remarks
Static				11.85	13.43	8.85								
1 Min				15.05										
2				15.10										
3				15.15										
4				15.15										
5				15.15	13.45									
10				15.18	13.49									
20				15.21	13.52									
30				15.24	13.52	9.00								
40				15.25	13.52	9.05								
50				15.25	13.52	9.05								
60				15.25	13.52	9.05								
12				15.28	13.54	9.10								
2				15.29	13.54	9.10		Took a water sample						
recovery														GP #2 pumping 170 GPM
1 min				12.18										
3				12.11										
5				12.06	13.43	8.90								
10				12.04	13.43	8.85								
20				12.00	13.43	8.85								
30				11.94	13.43	8.85								

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WELL LOG

DENIS L. MAHER CO.
WELL DRILLING & PUMP SERVICES

Well No 3-10 D.L.M. Job No

Driller A Callahan Helper Roy Kelly

Job Name Littleton MA

Location well #2

Owner's Representative

Date Started 8/4/10 Date Finished 8/11/10

DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0	24'	Fine to coarse brown sand, some gravel	
24'	30'	Fine gray sand	
30'	35'	Fine to med brown sand	
35'	40'	Fine to med brown sand, some coarse sand	70s
40'	48'	Fine to med, brown sand, some coarse brown sand, some gravel	70s
48'	50'	Fine brown sand some med brown sand	
	50'	Not Refusal	

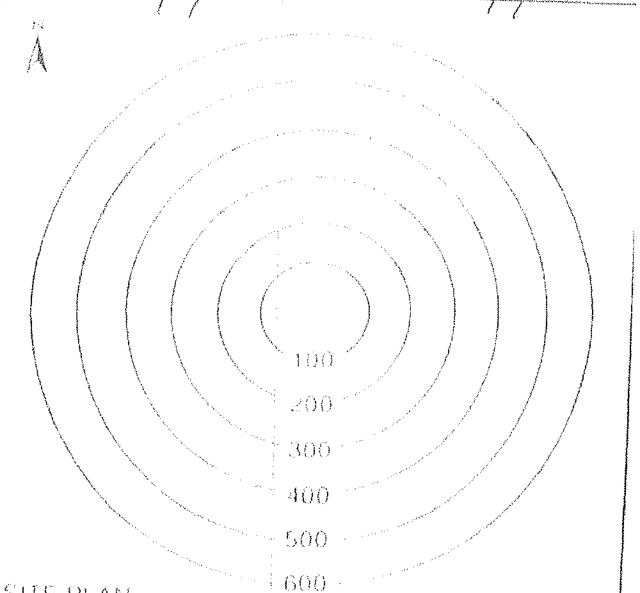
STATIC (From Top of Pipe) 2'

10.60

COMPLETED DEPTH 48'

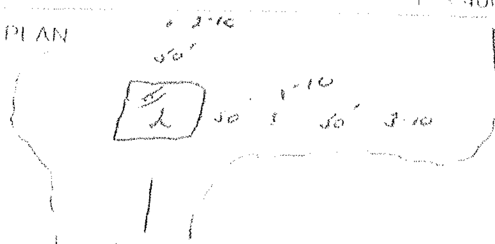
TOTAL DEPTH 45'

N



SITE PLAN 1" = 400'

LOCUS PLAN



Well No	Diam	Total Depth	Comp Depth	Casing Left	SCREEN Length	SCREEN Exposed	SCREEN Material	SCREEN Slot Size	SCREEN Riser	Hours Dev	Hours Pumped
3-10	2.5	50'	48'	42'	6	6'	SS	80	5'	2	1
3-10	2.5		42'	35'	6	6'	SS	80	5'	1	1

Pump Test Data

Well #			Water Levels		
Date			Obs	Obs	Obs
Time	G.P.M.	VAC	No	No.	No
	Static				
10.60	70	14"			
	60	20"			
	30	27"			

REMARKS:

pulled the screen at 48', reset a 80 slot screen at 42'

pulled the screen, reset a 30 slot screen at 35'

pulled the well 8/12/10

Water Sample Collected

Date 8/4/10 8/5/10 ~~8/11/10~~ Time 1100 0900 1100

Sent To Alpha lab

Denis L. Maher Company
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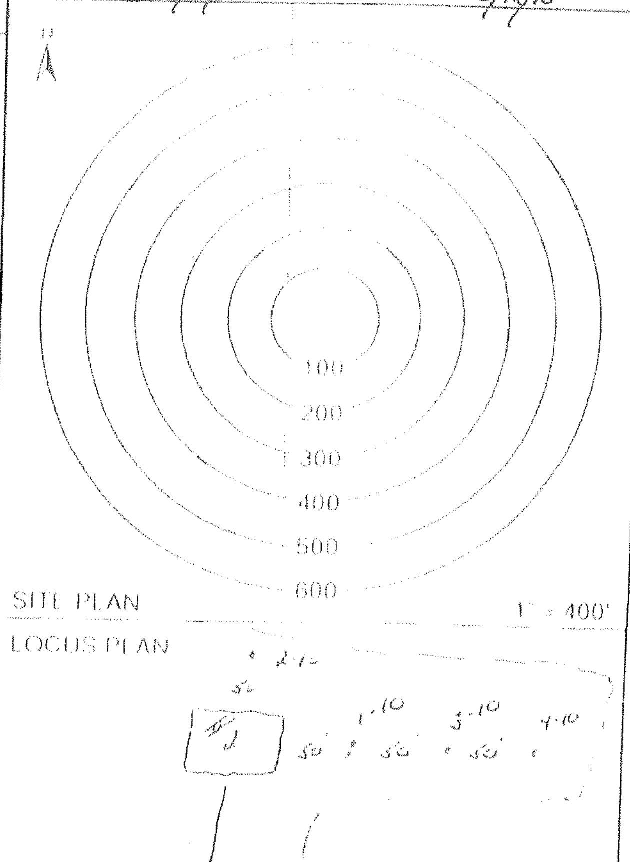
WELL LOG

DENIS L. MAHER CO.
WELL DRILLING & PUMP SERVICES

2 ch

Well No 4-10 D.L.M. Job No
Driller B Callahan Helper Ray Kelly
Job Name Littleton MA
Location well #2
Owner's Representative
Date Started 8/5/10 Date Finished 8/11/10

DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water	STATIC (From Top of Pipe)	COMPLETED DEPTH	TOTAL DEPTH
0	20'	Fine To coarse brown sand, some gravel				
20	25'	Fine brown sand, some med brown sand	Yes			
25'	28	Fine grey sand				
28'	32'	Fine To med brown sand, some coarse brown sand				
32'	38'	Fine grey sand, some med grey sand	Yes	9.80	62'	
38'	41'	Fine to med grey sand some coarse grey sand				69'
41'	65'	Fine brown sand, some med brown sand				
65'	66'	Fine To med reddish brown sand				
66	69'	Fine grey sand, mixed with grey silt and clay				
	69'	Refusal				



Well No	Diam	Total Depth	Comp Depth	Casing Left	SCREEN Length	Exposed	Material	Slot Size	Riser	Hours Dev	Hours Pumped
4-10	2.5'	69'	62'	56'	6'	6'	SS	60	5'3	2	1.2
2'	2.5'	62'	62'	56'	6'	6'	SS	80	5'3	2	2

Pump Test Data

Well #			Water Levels		
Date			Obs No	Obs No	Obs No
Time	GPM	VAC			
Static					
9.60	60	18"			
	65	18"			

REMARKS:

pulled the screens and wells 8/12/10

Water Sample Collected
Date 8/6/10 Time 0900
Sent To Nashoba lab

DENIS L. MAHER Co.
WELL DRILLING & PUMP SERVICES

Well No.: 1-10 2'6h 4-10 2'6h

Location: wells Littleton MA

RECORD OF TEST

Contract:

How Q Measured: 164 GPM

Date 8/10	Time (HHMM)	Elapsed Time	Pumping Rate	Well 3-10	Well 2-10	Well 6P 2	Well Ex 22	Well	Well	Well	Well	Well	Well	Remarks
Static				11.65'	11.95'	8.80	8.72							
5 min				13.10	12.20									
10				13.17	12.25									
15				13.20	12.27	10.46								Littleton well
20				13.22	12.29									#2 Pumping
25				13.22	12.32									175 GPM
30				13.23	12.35'	10.23	8.94							
35				13.25	12.35'									
40				13.26	12.36									Ex 22" well
45				13.28	12.37									in The woods
50				13.28	12.37									is 125' East
55				13.29	12.38									of 3-10
60				13.30	12.38	10.85	8.96		Took a water sample					
0930				13.38	12.42	10.94	9.00							
1000				13.36	12.46	10.95	9.00							
1030				13.38	12.48	10.96	9.00							
1100				13.40	12.52	10.97	9.00							
1130				13.38	12.52	10.99	9.00							
1200				13.38	12.52	10.98	9.01		Took a water sample					
1230				13.38	12.53	10.97	9.01							
1300				13.38	12.54	10.96	9.01							
1330				13.39	12.55	10.98	9.02							
1400				13.40	12.56	11.00	9.04							
1430				13.41	12.57	11.00	9.03							
1500				13.42	12.58	11.01	9.02							

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DENIS L. MAHER CO.
WELL DRILLING & PUMP SERVICES

Well No: 1-10 2'06 4-10 2'06
Location: Well 2 Littleton MA

RECORD OF TEST

Contract:
How Q Measured: 16.4 GPM

Date	Time (HHMM)	Elapsed Time	Pumping Rate	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well	Remarks
8/10				3-10	2-10	6R2	Ex22							
Static				11.65	11.95	8.80	8.22							
1530				13.73	12.59	11.01	9.04							
1600				13.43	12.59	11.02	9.03							Took a water sample
recovery!														
1 min				12.50										
3				12.13										
5				12.00	12.40	9.28								
10				11.90	12.38	9.25								
15				11.90	12.36	9.24								
20				11.90	12.35	9.22	8.60							
25				11.90	12.35	9.19								
30				11.90	12.35	9.14	8.78							
40				11.86	12.33	9.16	8.77							
50				11.83	12.30	9.10	8.76							
60				11.80	12.28	9.09	8.76							
8/11														
0630				11.70	12.10	8.80	8.70							

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WELL LOG

DENIS L. MAHER CO.
WELL DRILLING & PUMP SERVICES

Well No. 5-10 D.L.M. Job No.
Driller B Callahan Helper B Kelly
Job Name Littleton water
Location well #2
Owner's Representative Wright-Pierce
Date Started: 10/14/10 Date Finished: 10/19/10

DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0	23'	Fine To coarse brown sand, gravel	Yes
23'	38'	Fine To coarse brown sand, Some gravel	Yes
38'	49'	Fine To med brown sand, Some coarse brown sand, Gravel	Yes
	49	Refusal	

STATIC (From Top of Pipe) 2'
5.30
COMPLETED DEPTH 49'
TOTAL DEPTH 49

SITE PLAN 1" = 400'
100
200
300
400
500
600

LOCUS PLAN #2-10
2
#1-10
5-10

Well No	Diam.	Total Depth	Comp. Depth	Casing Left	SCREEN Length	SCREEN Exposed	SCREEN Material	SCREEN Slot Size	SCREEN Riser	Hours Dev.	Hours Pumped
5-10	2.5	49'	49'	42'	6'	6'	SS	60	5'3	12	2
2	2.5	48'	48'	42'	6	6'	SS	80	5'3	12	2

Pump Test Data

Well # 5-10 2-06
Date 10/18/10

Time	G.P.M.	VAC	Obs. No.	Obs. No.	Obs. No.
	Static				
8.43	70	20"			
	70	13"			

REMARKS:

pulled the screens, reset the screens AT 35'
pulled the well 10/21/10

Water Sample Collected
Date 10/18/10 Time 11:00
Sent To: Nashoba Lab

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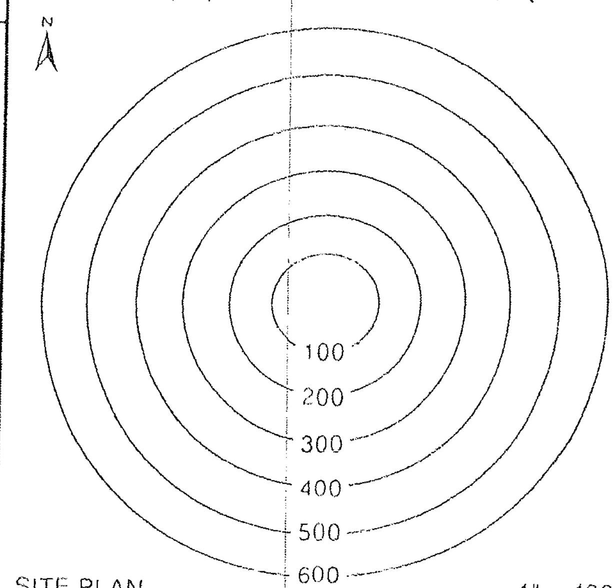
WELL LOG

DENIS L. MAHER CO.
WELL DRILLING & PUMP SERVICES

Well No. 5-10 D.L.M. Job No.
Driller B Callahan Helper A Kelly
Job Name Littleton water
Location well 2
Owner's Representative
Date Started: 10/18/10 Date Finished: 10/28/10

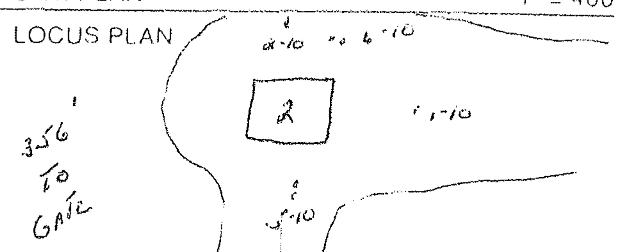
DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0	25'	Fine To coarse brown	
		sand, gravel	
25'	35'	Fine To coarse brown	
		sand, Some gravel	
	35'	not Refusal	
		PART 2	

STATIC (From Top of Pipe) 2' 8.43
COMPLETED DEPTH 35'
TOTAL DEPTH 35'



SITE PLAN 1" = 400

LOCUS PLAN



Well No.	Diam.	Total Depth	Comp Depth	Casing Left	SCREEN Length	SCREEN Exposed	SCREEN Material	SCREEN Slot Size	SCREEN Riser	Hours Dev.	Hours Pumped
5-10	2.5'	35'	35'	28'	6'	6'	SS	60	5'	1	4
2'	2.5'	35'	35'	28'	6'	6'	SS	80	5'	1	2

Pump Test Data

Well # 5-10
Date 10/20/10

Time	G.P.M.	VAC	Water Levels Obs. No.	Obs. No.	Obs. No.
	Static				
8.43	70	18"			

REMARKS:

pulled The well 10/21/10

Water Sample Collected
Date 10/20/10 Time 10:00
Sent To: Nashoba Lab

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WELL LOG

DENIS L. MAHER CO.
WELL DRILLING & PUMP SERVICES

Well No. 6-10 D.L.M. Job No.
Driller B Callahan Helper A Kelly
Job Name Littleton water
Location well #2
Owner's Representative Wright - Pierce
Date Started: 10/20/10 Date Finished: 10/21/10

DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0	25'	Fine brown sand, some med to coarse sand some gravel, traces of silt	Yes
25'	40'	Fine to med brown sand, some coarse brown sand, gravel, cobbles	Yes
		Refusal	

STATIC (From Top of Pipe): 2' ; 8.80
COMPLETED DEPTH: 40'
TOTAL DEPTH: 40'

SITE PLAN 1" = 400

100
200
300
400
500
600

LOCUS PLAN

2-10
6-10
2
1-10
5-10

Well No.	Diam	Total Depth	Comp. Depth	Casing Left	SCREEN Length	Exposed	Material	Slot Size	Riser	Hours Dev.	Hours Pumped
6-10	2.5	40'	40'	35'	6'	6'	SS	60	5'	1/2	2
2'	2.5'	40'	40'	35'	6'	6'	SS	80	5'	1/2	2

Pump Test Data

Well # 6-10 2'06
Date 10/19/10

Time	G.P.M.	VAC	Water Levels Obs. No.	Obs. No.	Obs. No.
	Static				
8.80	65	17"			

REMARKS:

well drew very hard from 25'

pulled the wells 10/21/10

Water Sample Collected
Date 10/19/10 Time 1300
Sent To: Nashoba lab

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WELL LOG

DENIS L. MAHER CO.
WELL DRILLING & PUMP SERVICES

Well No. 6-10 D.L.M. Job No.

Driller B Callahan Helper R Kelly

Job Name Littleton water

Location well #2

Owner's Representative wright - Pierce

Date Started: 10/20/10 Date Finished: 10/21/10

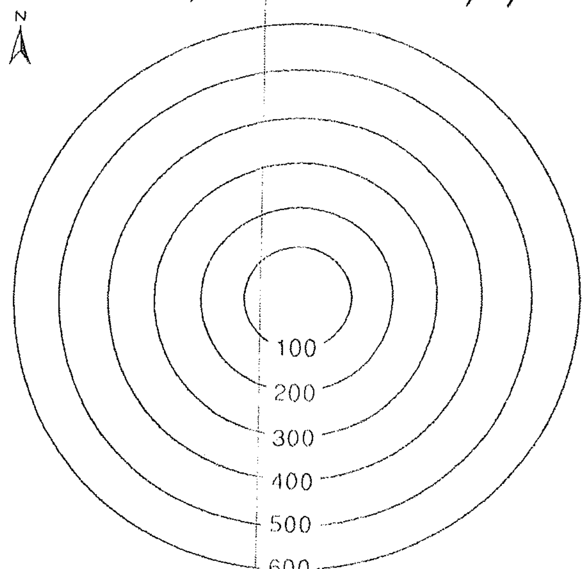
DEPTH From	DEPTH To	Soil Classification	Loss of Wash Water
0	25'	Fine brown sand, some med to coarse sand some gravel, Traces of silt	yes
25'	28'	Fine to med brown sand, some coarse brown sand, gravel cobbles	yes
	28'	Not Refusal	
		PACT 1	

2' ↕

STATIC (From Top of Pipe) 8.80

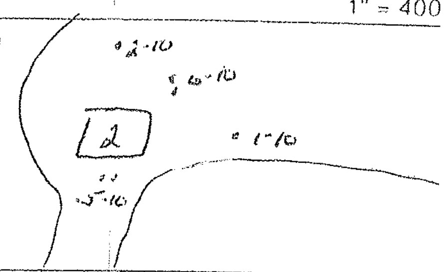
COMPLETED DEPTH 28'

TOTAL DEPTH 28'



SITE PLAN 1" = 400

LOCUS PLAN



Well No	Diam	Total Depth	Comp. Depth	Casing Left	SCREEN Length	SCREEN Exposed	SCREEN Material	SCREEN Slot Size	Riser	Hours Dev.	Hours Pumped
6-10	2.5	28'	28'	21'	6	6'	SS	60	5.3	1½	2
2'	2.5	28'	28'	21'	6'	6'	SS	50	5.3	1½	2

Pump Test Data

Well # 6-10
Date 10/20/10

Time	G.P.M.	VAC	Water Levels Obs. No.	Obs. No.	Obs No.
	Static				
8.80	42	26"			

REMARKS:

well draws hard from 25'

Pulled the well 10/21/10

Water Sample Collected

Date 10/20/10 Time 15:30

Sent To: Nashoba lab

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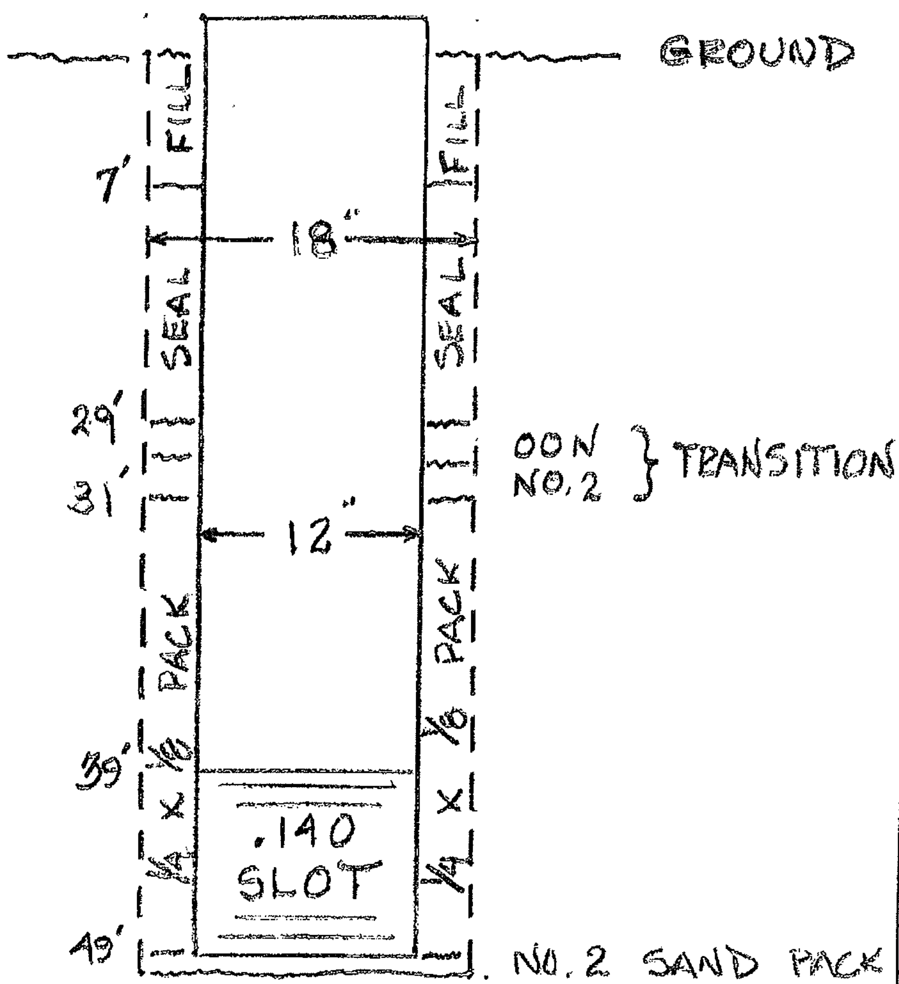
PRODUCTION WELL REPORT

Contract: Littleton Water Dept
Address
Date Started 6-2-11 Completed 7-13-11

Well No. 2-1 @ 5-10
Location @ Well # 2 off Great Rd
D.L.Maher Co. Job No. 11-042-W

FORMATION | SKETCH OF WELL | REMARKS



Design of Well.

Gravel Developed
Gravel Packed 18" x 12"
Bedrock
Total Depth 49'

Material Set

Length of Blank Pipe 39'
Size 12"
Screen
Type S.S.
Size 12"
Slot .140
Length 10'
Screen Fitting
Top Welder Ring
Bottom Plate

Temporary Casing Used

Inch	From	To
18"	0	49.5

Gravel Used

	Grade	Yds. Used
1/4 x 1/8		

Type of Seal

Cement / Bentonite Yds. Used
Set From 29' To 7'
Size of Seal Casing
Length of Seal Casing

Did Well Clear Up How Soon
Length of Surging Time 63.5 Hrs
Static Level 10' Date 7-4-11
Capacity 293 Pumping Level 15.18

COMMENTS

Transition Sand 31' To 29'

Driller George Burns
Helper

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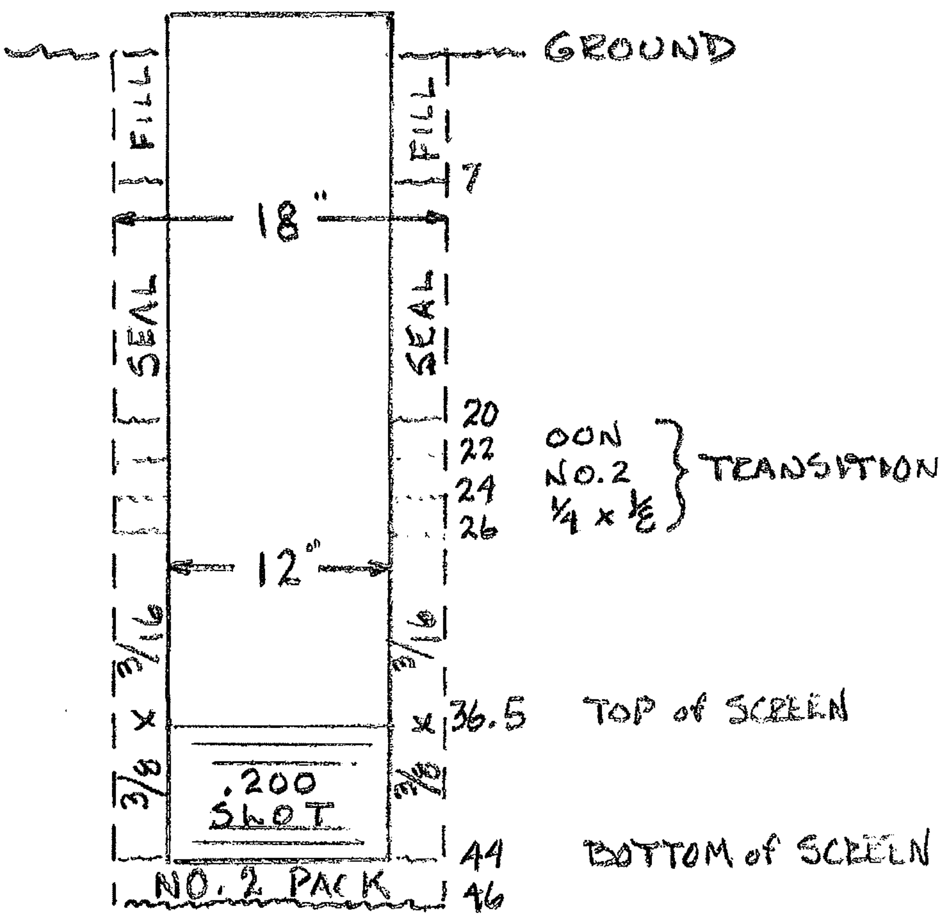
PRODUCTION WELL REPORT

Contract: Littleton Water Dept
Well No. 2-2 @ 1-10
Address
Location @ well #2 off Great Rd.
Date Started 6-10-11 Completed 8-4-11
D.L.Maher Co. Job No. 11-042-W

FORMATION | SKETCH OF WELL | REMARKS



Design of Well.

Gravel Developed
Gravel Packed 18" x 12"
Bedrock
Total Depth 44'

Material Set

Length of Blank Pipe
Size 12"
Screen
Type S.S.
Size 12"
Slot .200
Length 7.5'
Screen Fitting
Top Welded Ring
Bottom Plate

Temporary Casing Used

18" Inch From 0 To 46'
Inch From To
Inch From To
Inch From To
Inch From To

Gravel Used

3/8 x 3/16 Grade Yds. Used
Grade Yds. Used
Grade Yds. Used
Grade Yds. Used
Grade Yds. Used

Type of Seal

Cement / Bentonite Yds. Used
Set From 20 To 7'
Size of Seal Casing
Length of Seal Casing

Did Well Clear Up How Soon
Length of Surging Time 26.5
Static Level 9.9 Date 8-3-11
Capacity 280 Pumping Level 15.2

COMMENTS

Total Depth 46'
Transition Sand 26 To 20

Driller G. Burns / S. Kelly JR
Helper

DENIS L. MAHER CO.
WELL DRILLING & PUMP SERVICES

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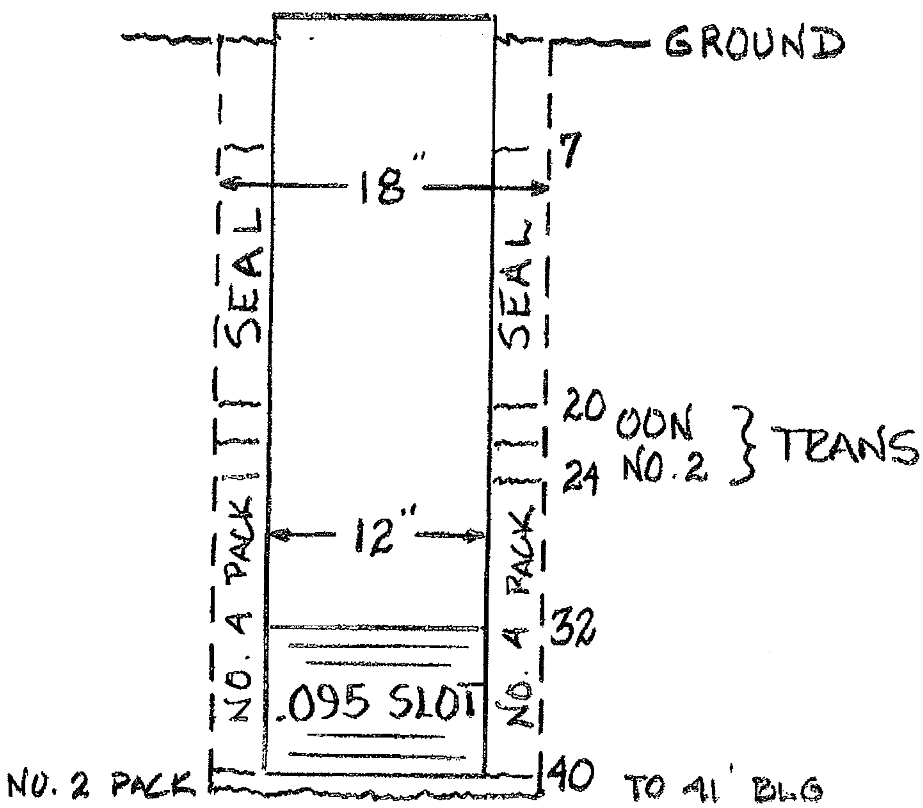
PRODUCTION WELL REPORT

Contract: Littleton Water Dept
Address
Date Started 6-15-11 Completed 8-18-11

Well No. 2-3 @ 6-10
Location @ GPW #2 off Great Rd
D.L.Maher Co. Job No. 11-042-W

FORMATION | SKETCH OF WELL | REMARKS



Design of Well

Gravel Developed
Gravel Packed 18 X 12
Bedrock
Total Depth 40'

Material Set

Length of Blank Pipe
Size 12"
Screen
Type SS.
Size 12"
Slot .095
Length 8
Screen Fitting
Top Weld Ring
Bottom Plate

Temporary Casing Used

18" Inch – From 0 To 41
Inch – From To
Inch – From To
Inch – From To
Inch – From To

Gravel Used

#4 Grade Yds. Used
Grade Yds. Used
Grade Yds. Used
Grade Yds. Used
Grade Yds. Used

Type of Seal

Cement / Bentonite Yds. Used
Set From 20' To 7'
Size of Seal Casing
Length of Seal Casing

Did Well Clear Up How Soon
Length of Surging Time 47 Hrs
Static Level 10 Date 8-17-11
Capacity 430 Pumping Level 19.4

COMMENTS

Driller G. Burns / S. Kelly JR
Helper

METCALF & EDDY
ENGINEERS

REPORT OF EXPLORATION

INSPECTOR: S. PIERCE	HOLE NO.: TW-4
DRILL CONTRACTOR: F. G. SULLIVAN DRILLING CO. INC.	ACCT. ABBR.: LITTLETON AQUIFER PROT. STDY
DRILLER: FRANK SULLIVAN, JR.	ACCT. NO.: J-6776
TYPE DRILL: BUCYRUS ERIE (DRIVE & WASH)	LOCATION: RUSSELL ST. CORNFIELD
SIZE & TYPE OF CASING: 2-1/2-inch	ELEVATION: 215 (APPROX)
	DATE START: 10-7-80
	DATE COMPLETE: 10-8-80
DRILLING FLUID: WATER	WEATHER: CLOUDY, 50's

SAMPLE DATA

NO.	TYPE OF SAMPLE	DEPTH OF SAMPLE FROM	DEPTH OF SAMPLE TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH DRIVEN	RECOVERY IN. OR %	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
1	WASH	0	10					F SAND, tr. GRAVEL
2	↓	10	15					SILTY VF-F SAND
3		15	20					SILTY VF SAND
4		20	25					SILTY VF SAND
5		25	30					SILT and VF SAND
6		30	35					SILT and VF SAND
7		35	40					GR. SILT and VF SAND
8		40	45					GR. SILT and VF SAND
9		45	50					GR. SILT AND VF SAND
10	↓	50	55					GR. VF SAND, SILT, CLAY

FIELD LOG OF BORING

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING
0	2	DK BR SILTY F SAND, little GRAVEL
2	(12)	BR F SAND, tr. GRAVEL
(12)	35	BR SILTY F-VF SAND
35	55	GR SILT and VF SAND
55	62	GR SILT and CLAY, VF SAND
62	65	GR SILTY F-M SAND, little CLAY
65	70	BR/GR SILTY F-C SAND, tr. CLAY
		V. DENSE
		REFUSAL AT 70'
		NO WELL

GROUNDWATER DATA

	DATE	TIME	DEPTH
AT COMPLETION	10-8-80	4:30	~10'

WORK COMPLETED

DRILL TYPE	NO. FEET	DIA.	SAMPLE TYPE	NO.	DIA.
CASE					

TIME DISTRIBUTION

DRILLING ______ MOVING ON ______

REPAIRING ______ STAND BY ______

TOTAL ______

SHEET 1 OF 2 SHEETS

FORM 295

HOLE NO. TW-4

METCALF & EDDY
ENGINEERS

REPORT OF EXPLORATION

INSPECTOR: S. PIERCE
DRILL CONTRACTOR: F. G. SULLIVAN DRILLING CO. INC.
DRILLER: FRANK SULLIVAN, JR.
TYPE DRILL: BUCYRUS ERIE (DRIVE & WASH)
SIZE & TYPE OF CASING: 2-1/2-inch
DRILLING FLUID: WATER

HOLE NO.: TW-4
ACCT. ABBR.: LITTLETON AQUIFER PROT. STDY
ACCT. NO.: J-6776
LOCATION:
ELEVATION:
DATE START:
DATE COMPLETE:
WEATHER:

SAMPLE DATA								FIELD CLASSIFICATION AND REMARKS
NO.	TYPE OF SAMPLE	DEPTH OF SAMPLE FROM	DEPTH OF SAMPLE TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH DRIVEN	RECOVERY IN. OR %	SAMPLE NO.	
11	WASH	55	60					GR. SILT and CLAY, tr. VF SAND
12	WASH	60	65					GR. SILTY F-M SAND, little CLAY
13	WASH	65	70					GR/BR F-C SAND, SILT, Tr. CLAY = TILL

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING

GROUNDWATER DATA

	DATE	TIME	DEPTH
AT COMPLETION			

WORK COMPLETED

DRILL TYPE	NO. FEET	DIA.	SAMPLE TYPE	NO.	DIA.
CASE					

TIME DISTRIBUTION

DRILLING: MOVING ON:
REPAIRING: STAND BY:
TOTAL:

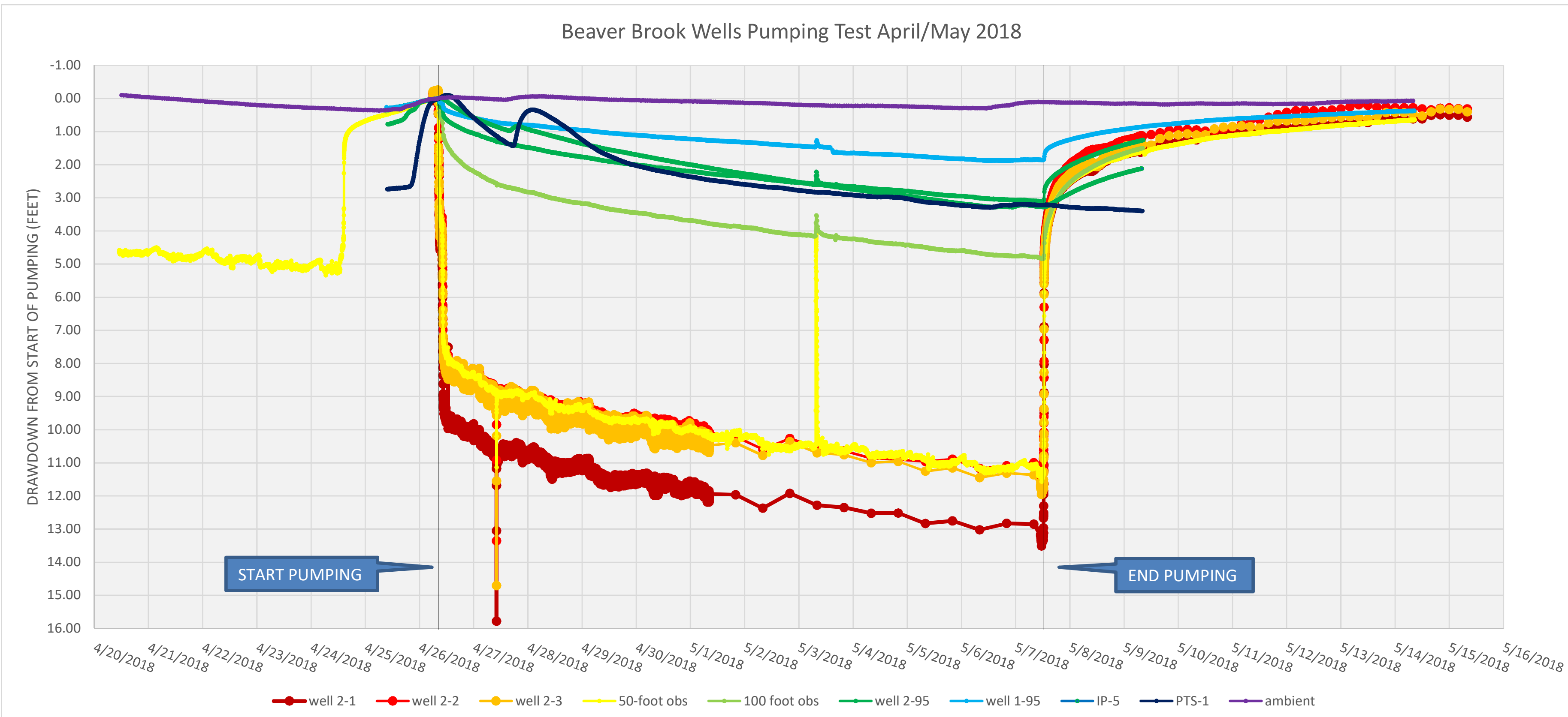
SHEET 2 OF 2 SHEETS

FORM 295

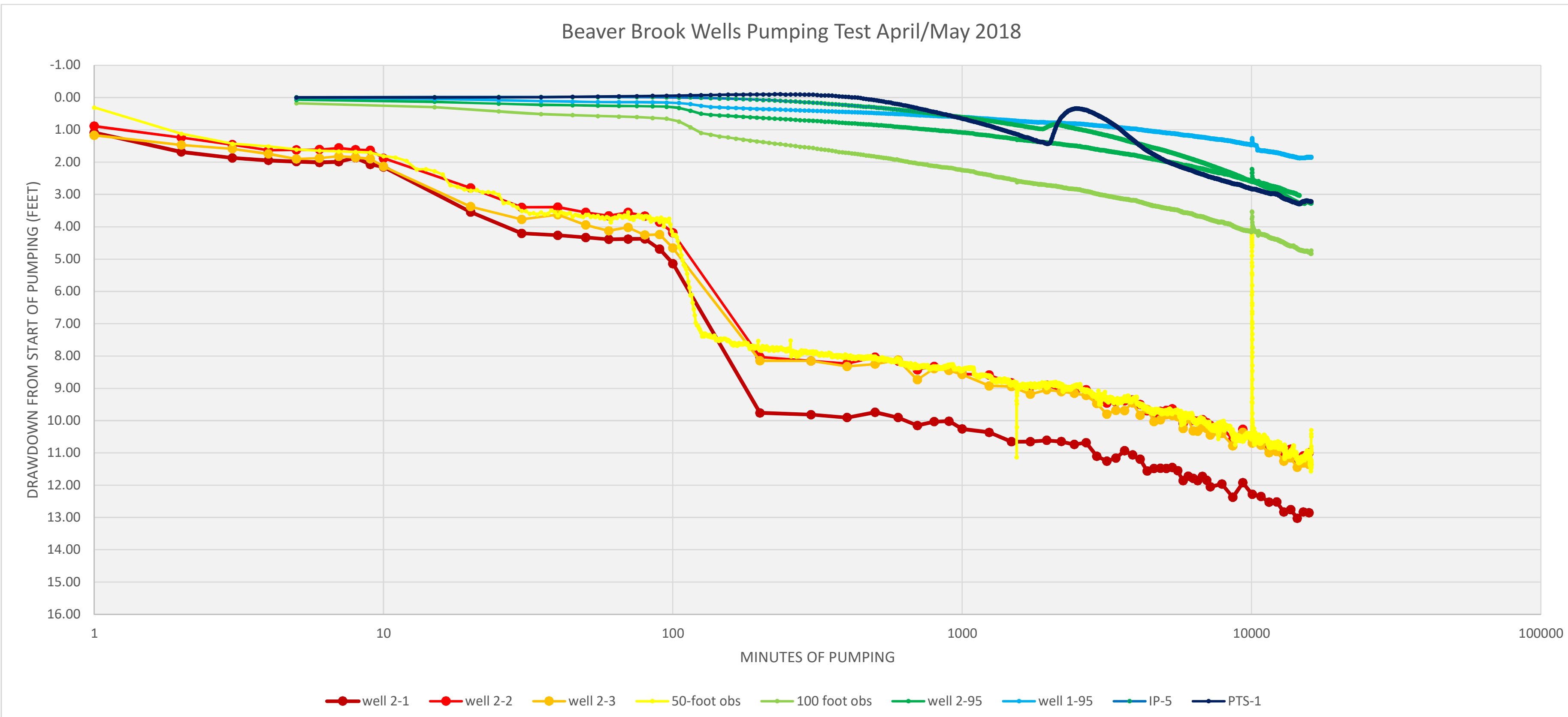
HOLE NO. TW-4

APPENDIX C

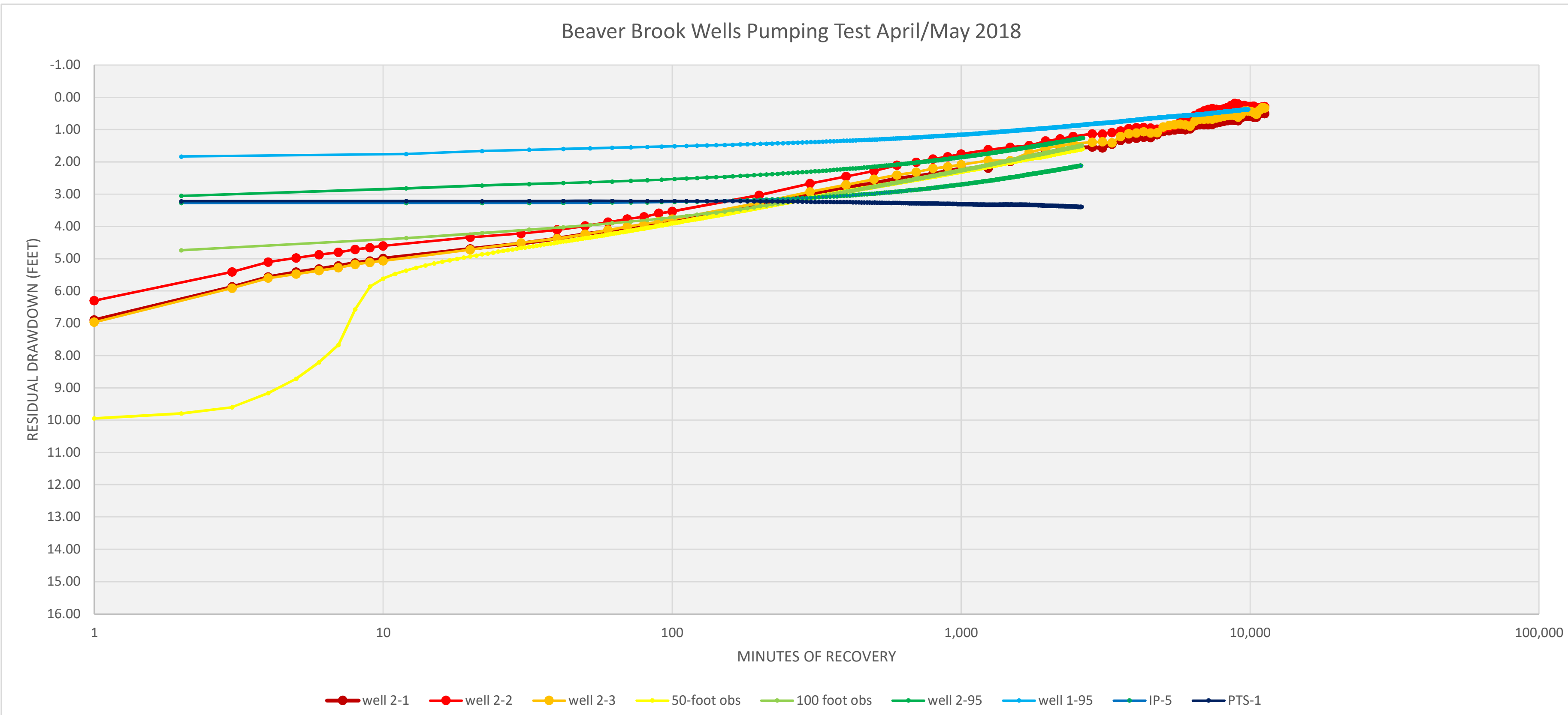
PUMPING TEST LOGS, CHARTS AND ANALYSIS



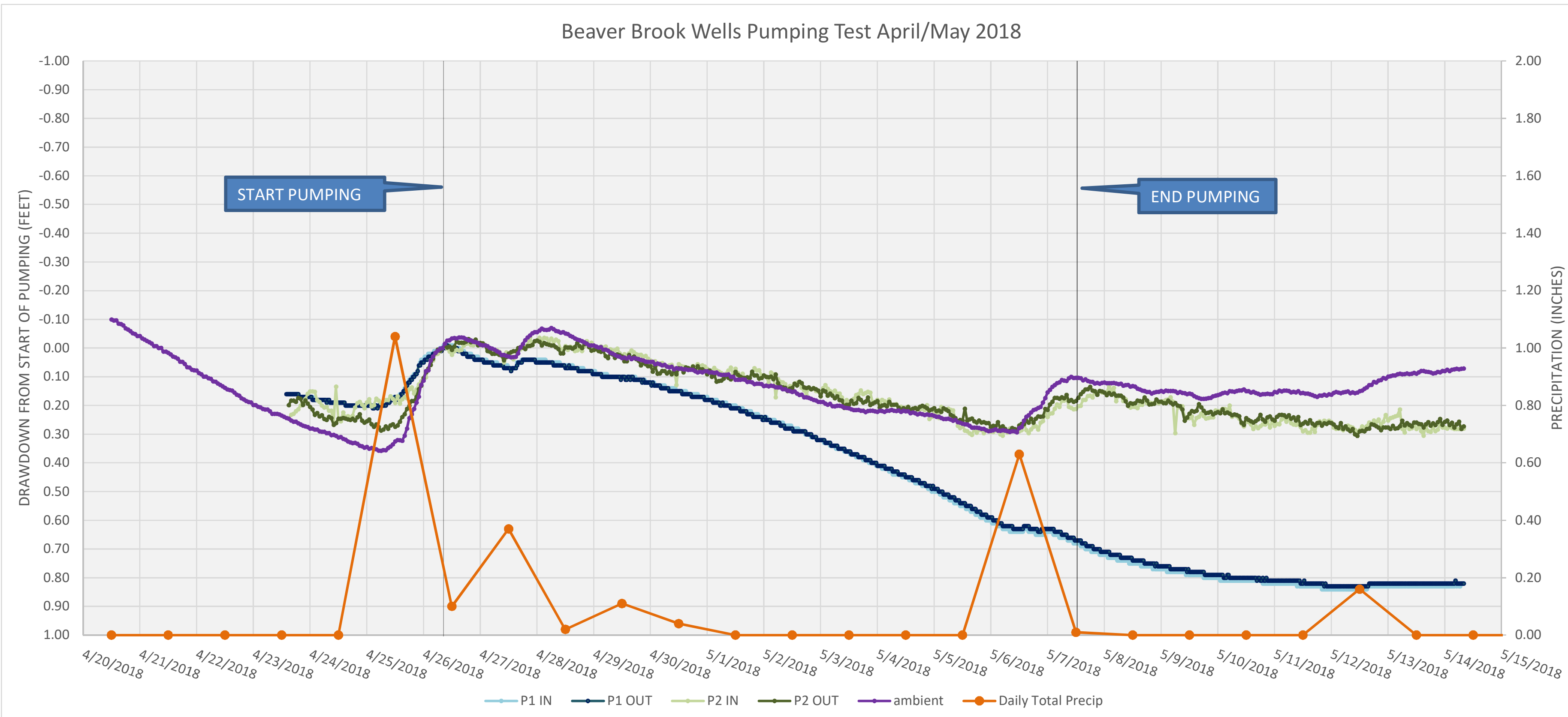
Beaver Brook Wells Pumping Test April/May 2018
DRAWDOWN FROM START OF PUMPING (FEET)
-1.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
16.00
START PUMPING
END PUMPING
4/20/2018
4/21/2018
4/22/2018
4/23/2018
4/24/2018
4/25/2018
4/26/2018
4/27/2018
4/28/2018
4/29/2018
4/30/2018
5/1/2018
5/2/2018
5/3/2018
5/4/2018
5/5/2018
5/6/2018
5/7/2018
5/8/2018
5/9/2018
5/10/2018
5/11/2018
5/12/2018
5/13/2018
5/14/2018
5/15/2018
5/16/2018
well 2-1
well 2-2
well 2-3
50-foot obs
100 foot obs
well 2-95
well 1-95
IP-5
PTS-1
ambient



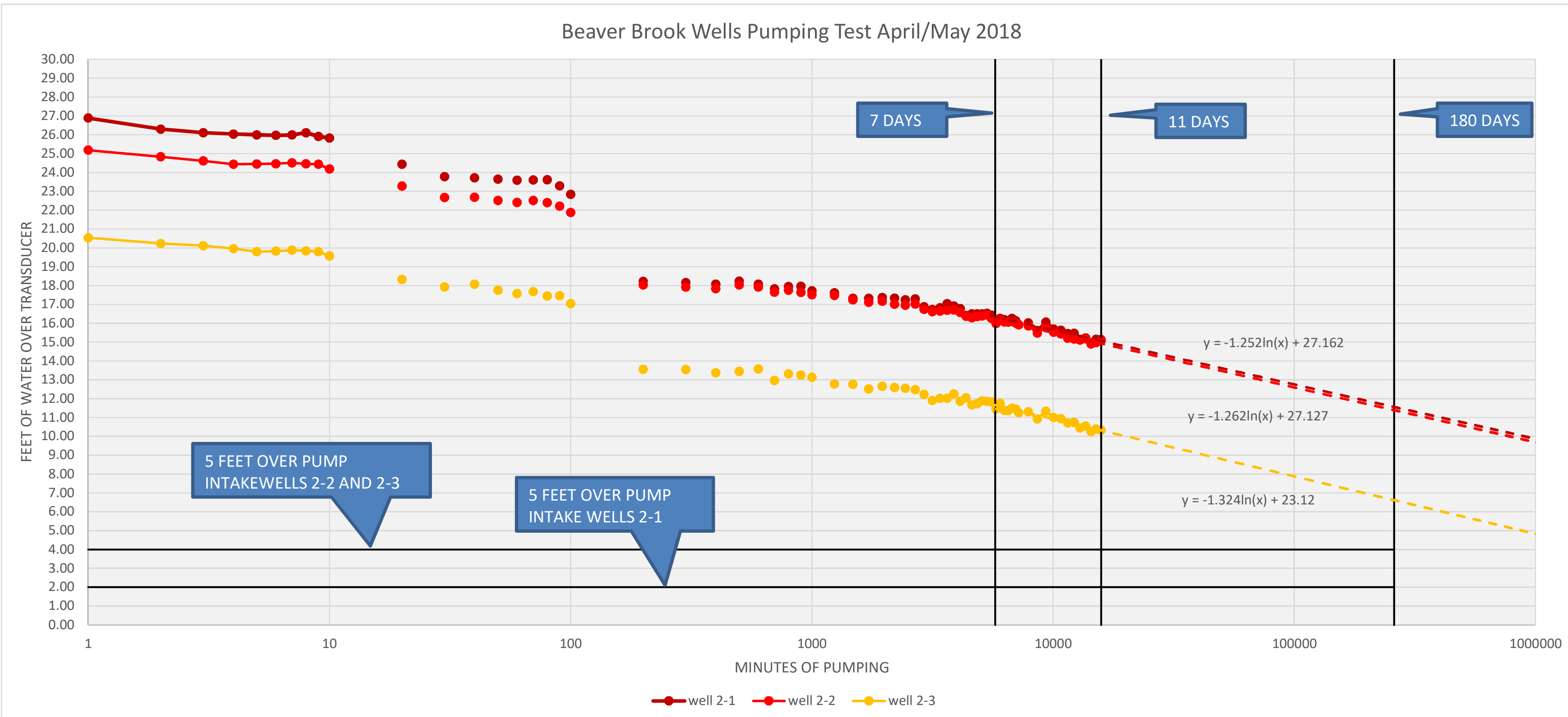
Beaver Brook Wells Pumping Test April/May 2018
DRAWDOWN FROM START OF PUMPING (FEET)
-1.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
16.00
1
10
100
1000
10000
100000
MINUTES OF PUMPING
well 2-1
well 2-2
well 2-3
50-foot obs
100 foot obs
well 2-95
well 1-95
IP-5
PTS-1



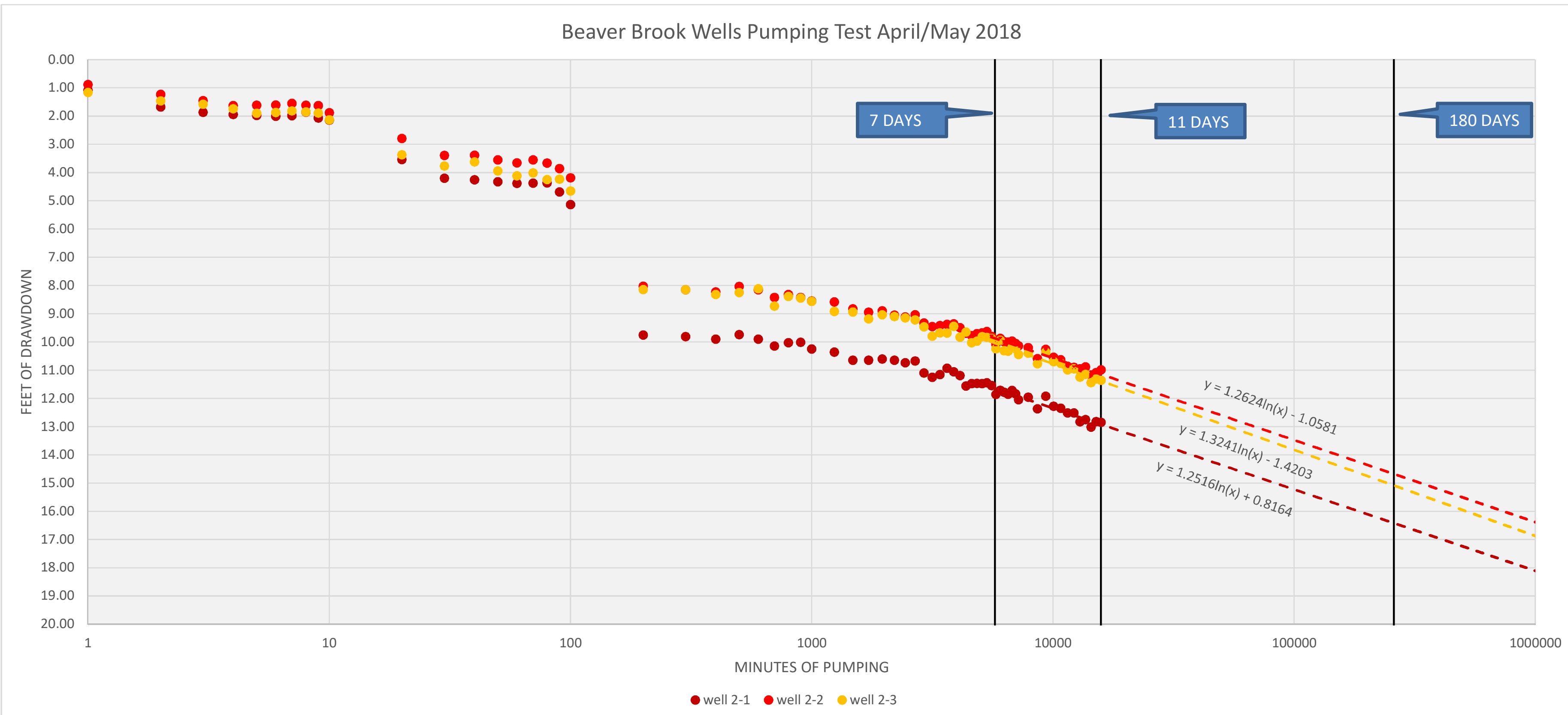
Beaver Brook Wells Pumping Test April/May 2018
RESIDUAL DRAWDOWN (FEET)
-1.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
16.00
1
10
100
1,000
10,000
100,000
MINUTES OF RECOVERY
well 2-1
well 2-2
well 2-3
50-foot obs
100 foot obs
well 2-95
well 1-95
IP-5
PTS-1



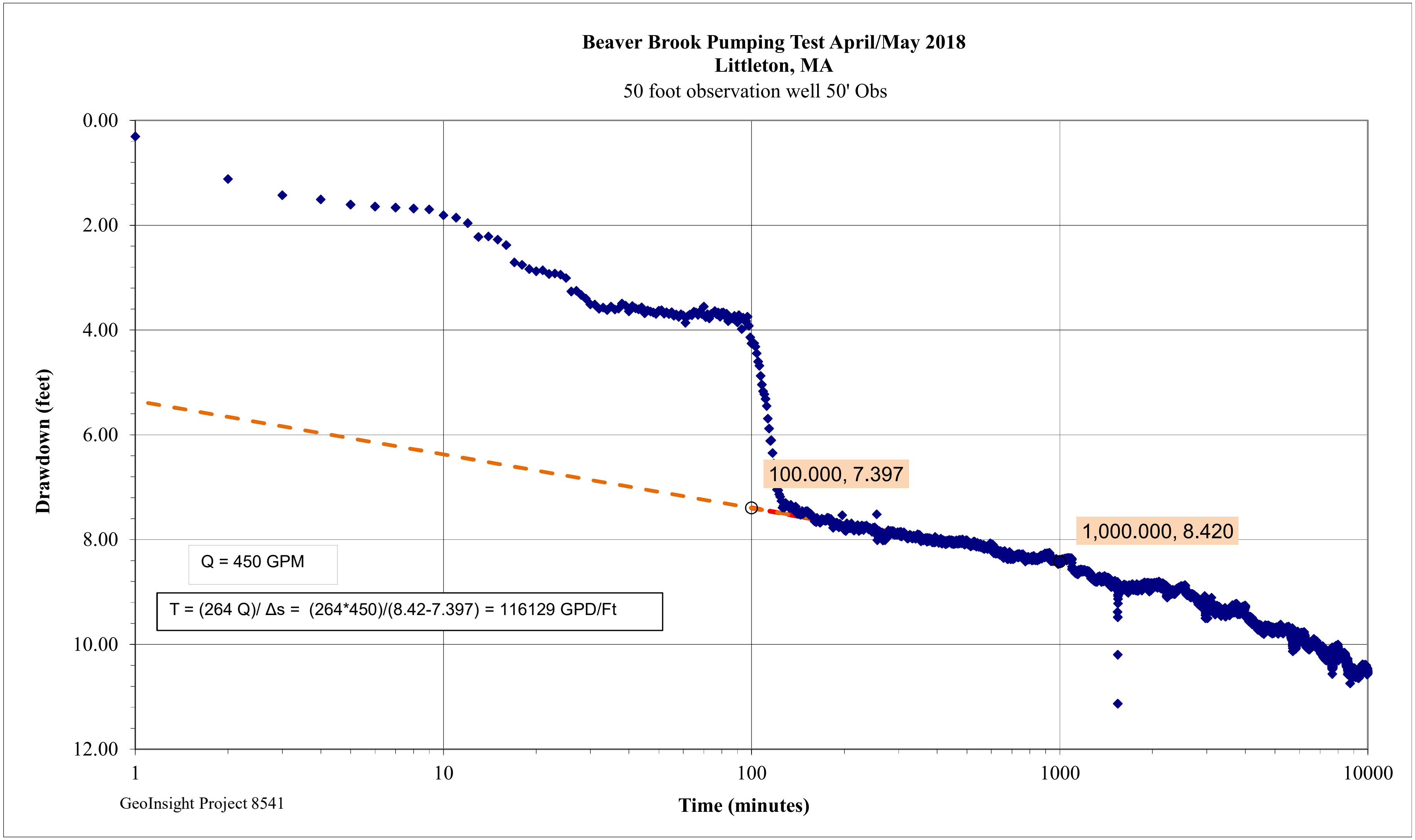
Beaver Brook Wells Pumping Test April/May 2018
START PUMPING
END PUMPING
DRAWDOWN FROM START OF PUMPING (FEET)
PRECIPITATION (INCHES)
-1.00
-0.90
-0.80
-0.70
-0.60
-0.50
-0.40
-0.30
-0.20
-0.10
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
4/20/2018
4/21/2018
4/22/2018
4/23/2018
4/24/2018
4/25/2018
4/26/2018
4/27/2018
4/28/2018
4/29/2018
4/30/2018
5/1/2018
5/2/2018
5/3/2018
5/4/2018
5/5/2018
5/6/2018
5/7/2018
5/8/2018
5/9/2018
5/10/2018
5/11/2018
5/12/2018
5/13/2018
5/14/2018
5/15/2018
P1 IN
P1 OUT
P2 IN
P2 OUT
ambient
Daily Total Precip



Beaver Brook Wells Pumping Test April/May 2018
FEET OF WATER OVER TRANSDUCER
MINUTES OF PUMPING
7 DAYS
11 DAYS
180 DAYS
y = -1.252ln(x) + 27.162
y = -1.262ln(x) + 27.127
y = -1.324ln(x) + 23.12
5 FEET OVER PUMP INTAKEWELLS 2-2 AND 2-3
5 FEET OVER PUMP INTAKE WELLS 2-1
well 2-1
well 2-2
well 2-3



Beaver Brook Wells Pumping Test April/May 2018
FEET OF DRAWDOWN
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
16.00
17.00
18.00
19.00
20.00
1
10
100
1000
10000
100000
1000000
MINUTES OF PUMPING
7 DAYS
11 DAYS
180 DAYS
y = 1.2624ln(x) - 1.0581
y = 1.3241ln(x) - 1.4203
y = 1.2516ln(x) + 0.8164
well 2-1
well 2-2
well 2-3



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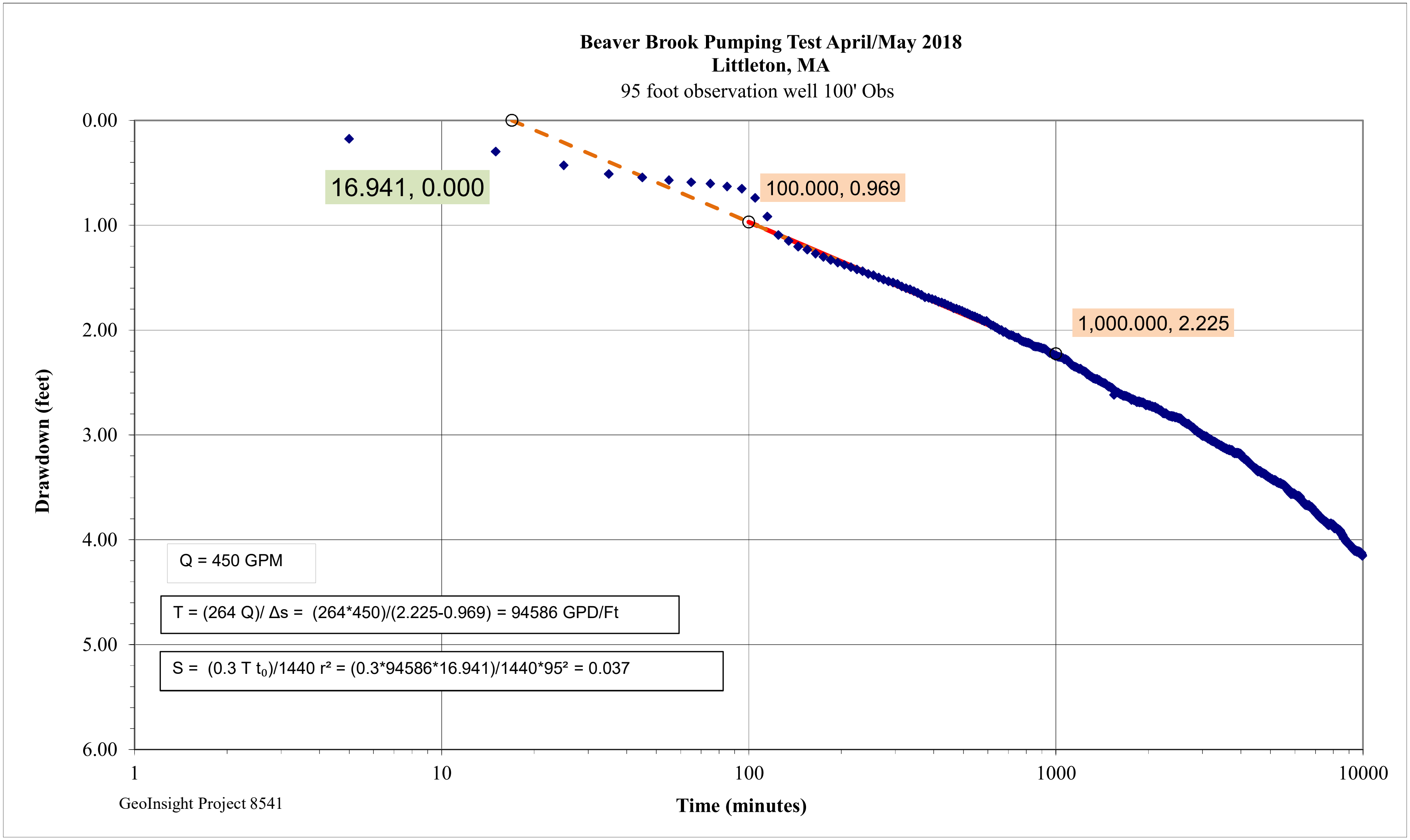
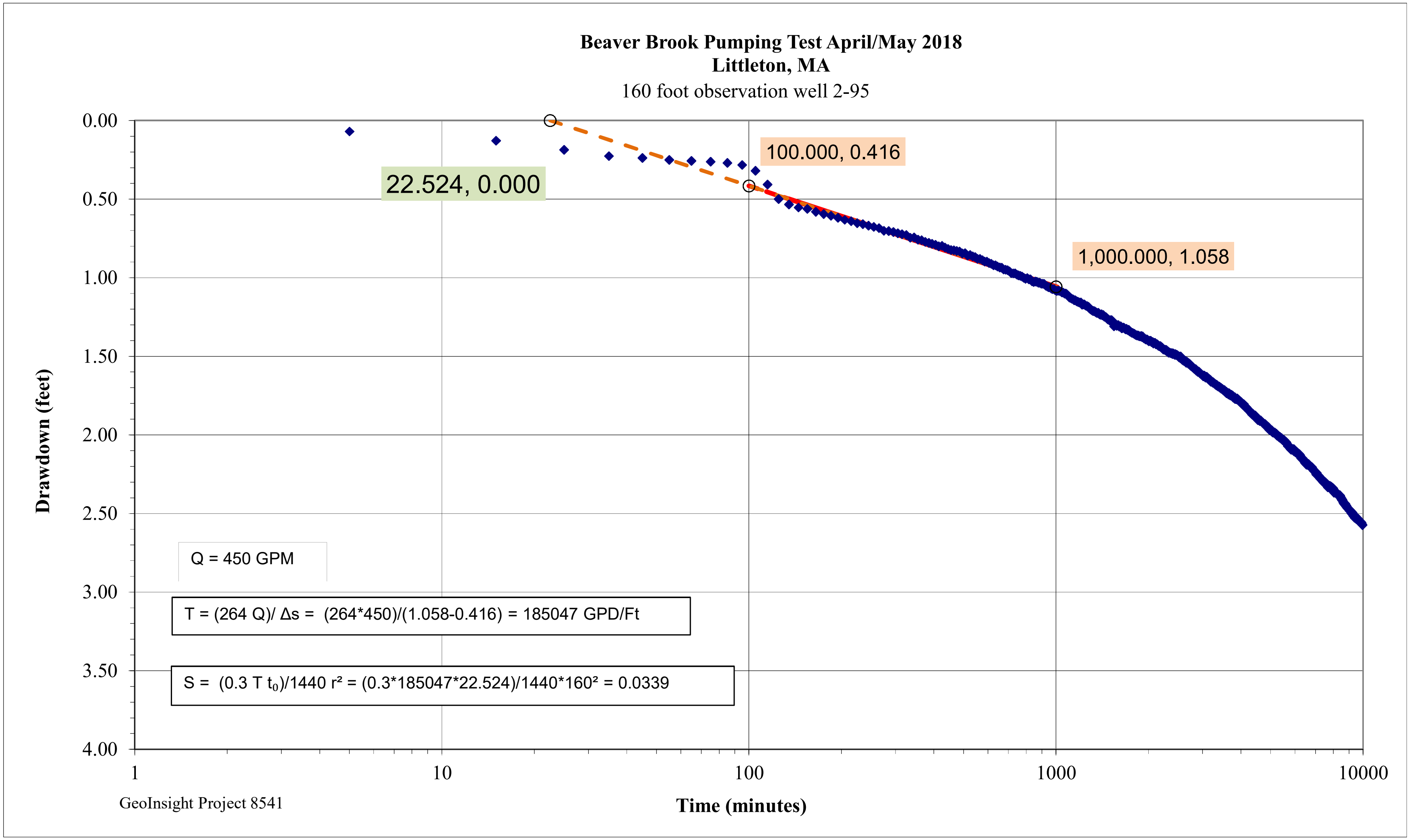


GeoInsight®
Environmental Strategy & Engineering
Practical in Nature



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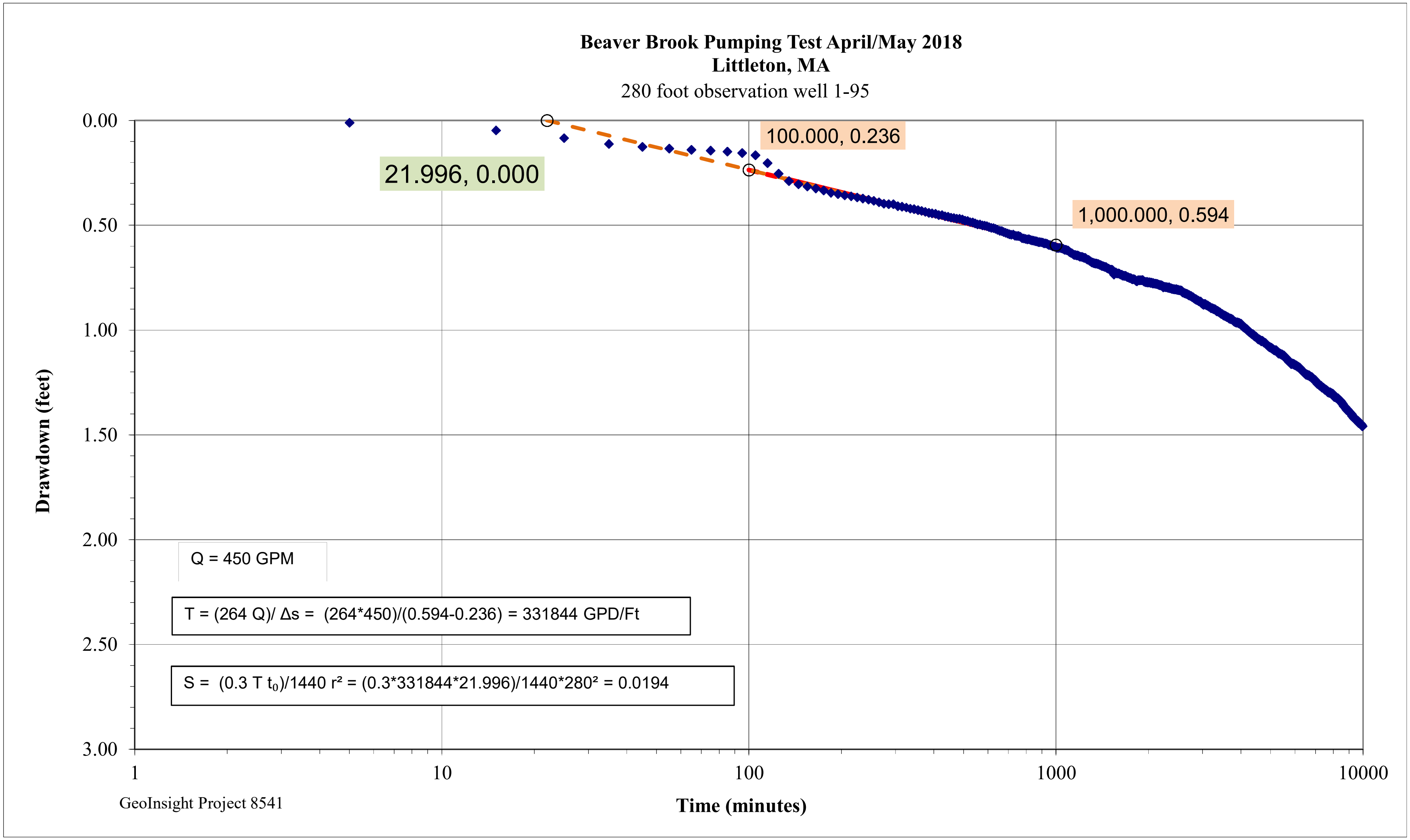
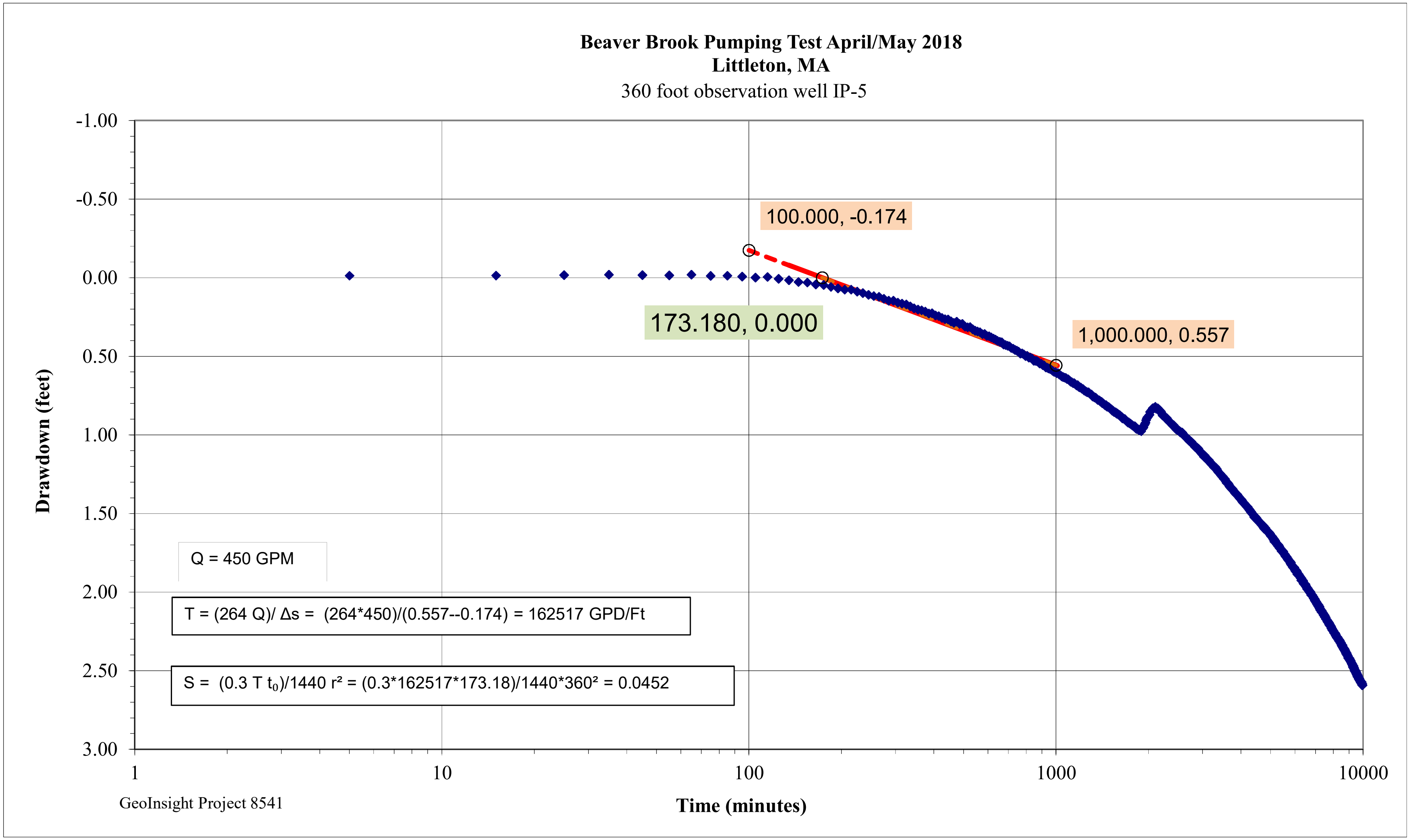


GeoInsight®
Environmental Strategy & Engineering
Practical in Nature



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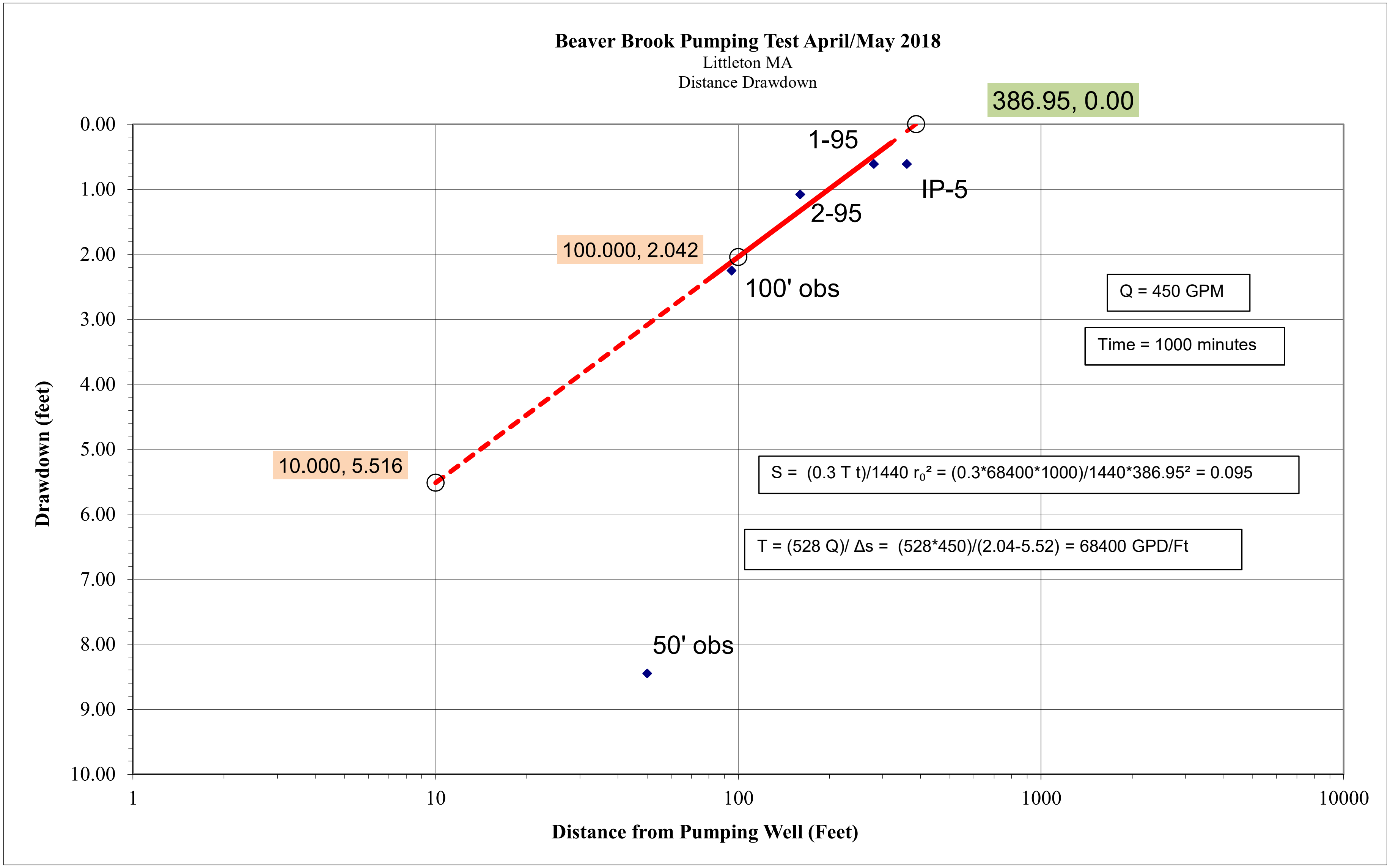

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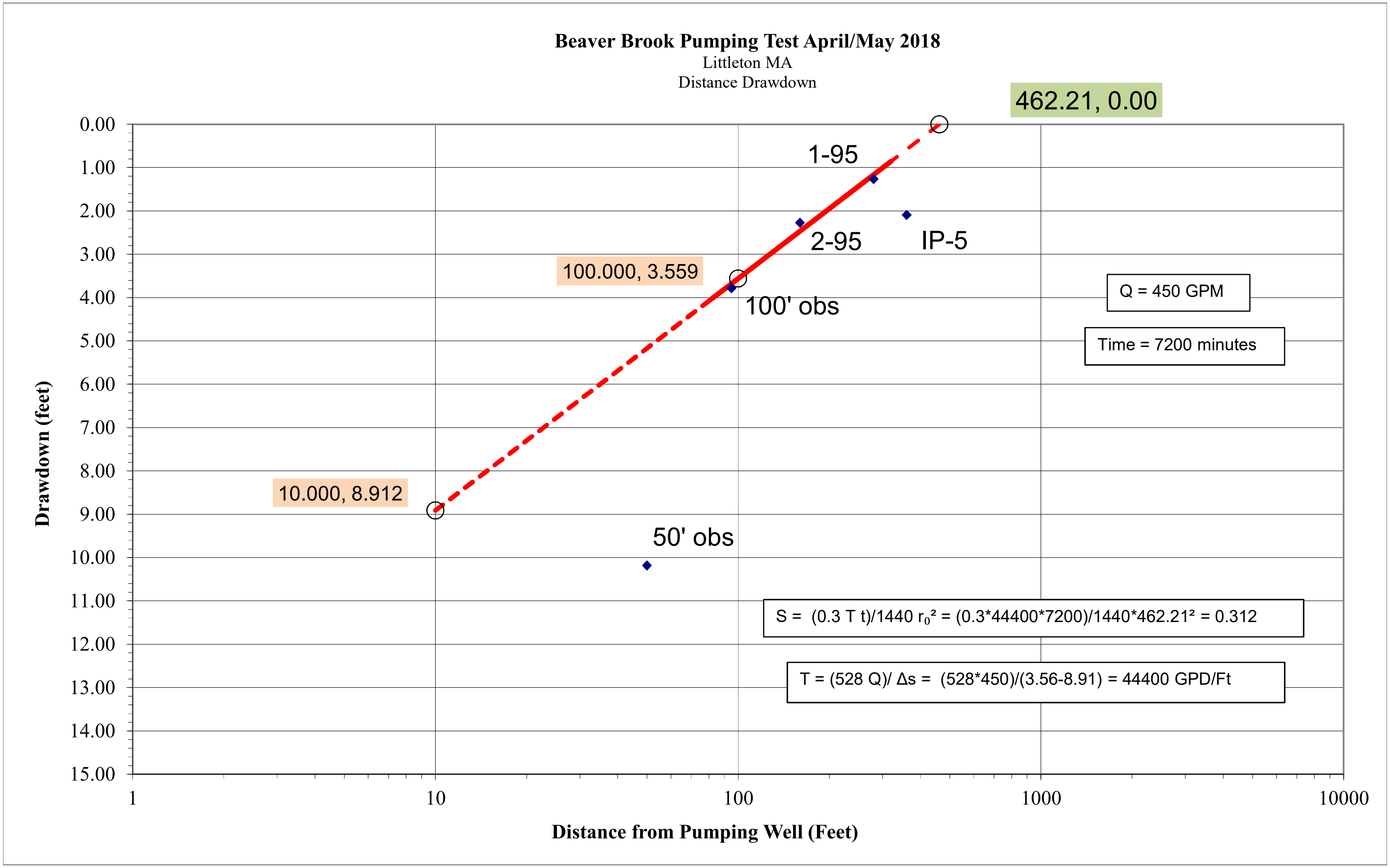
Practical in Nature



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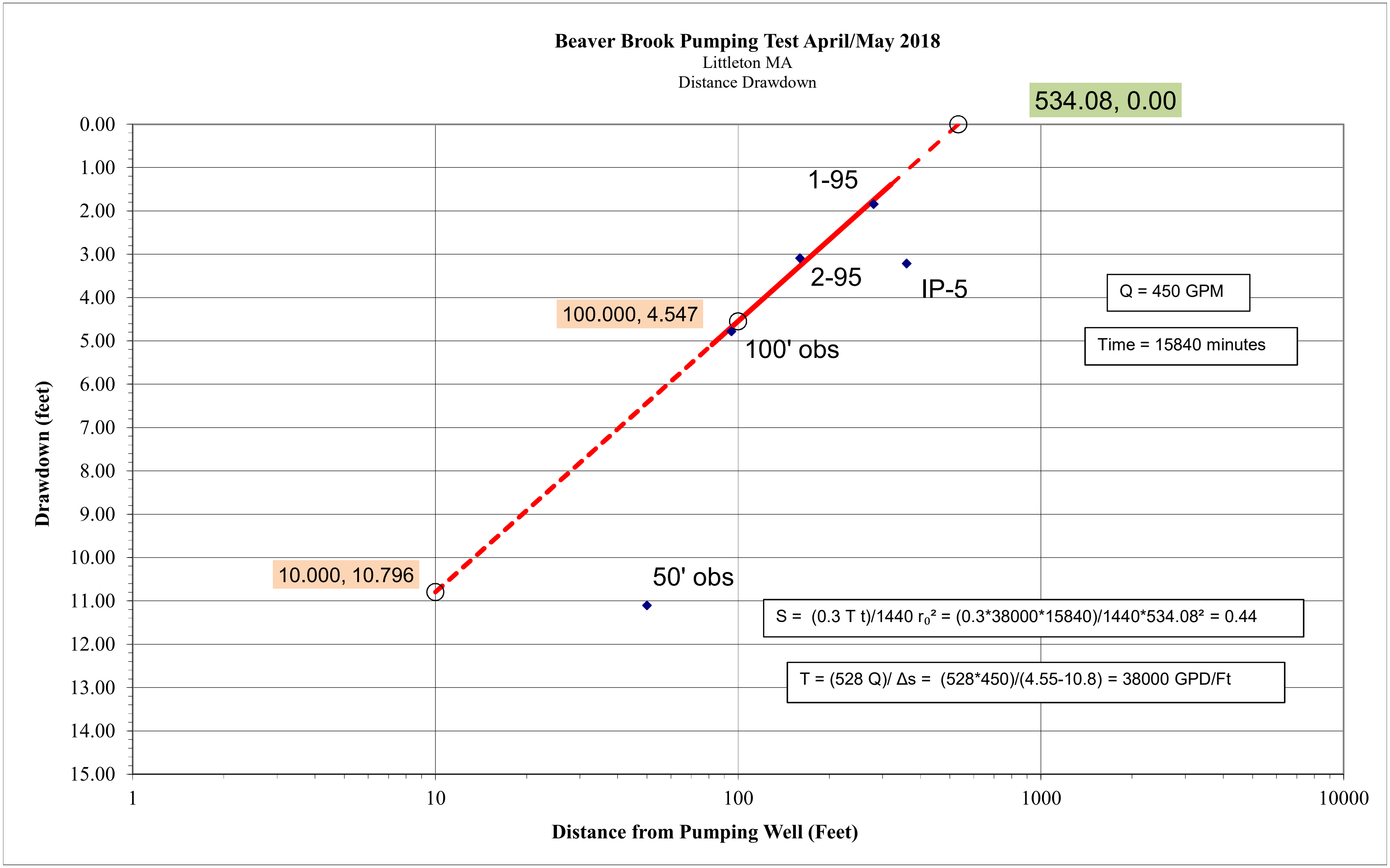

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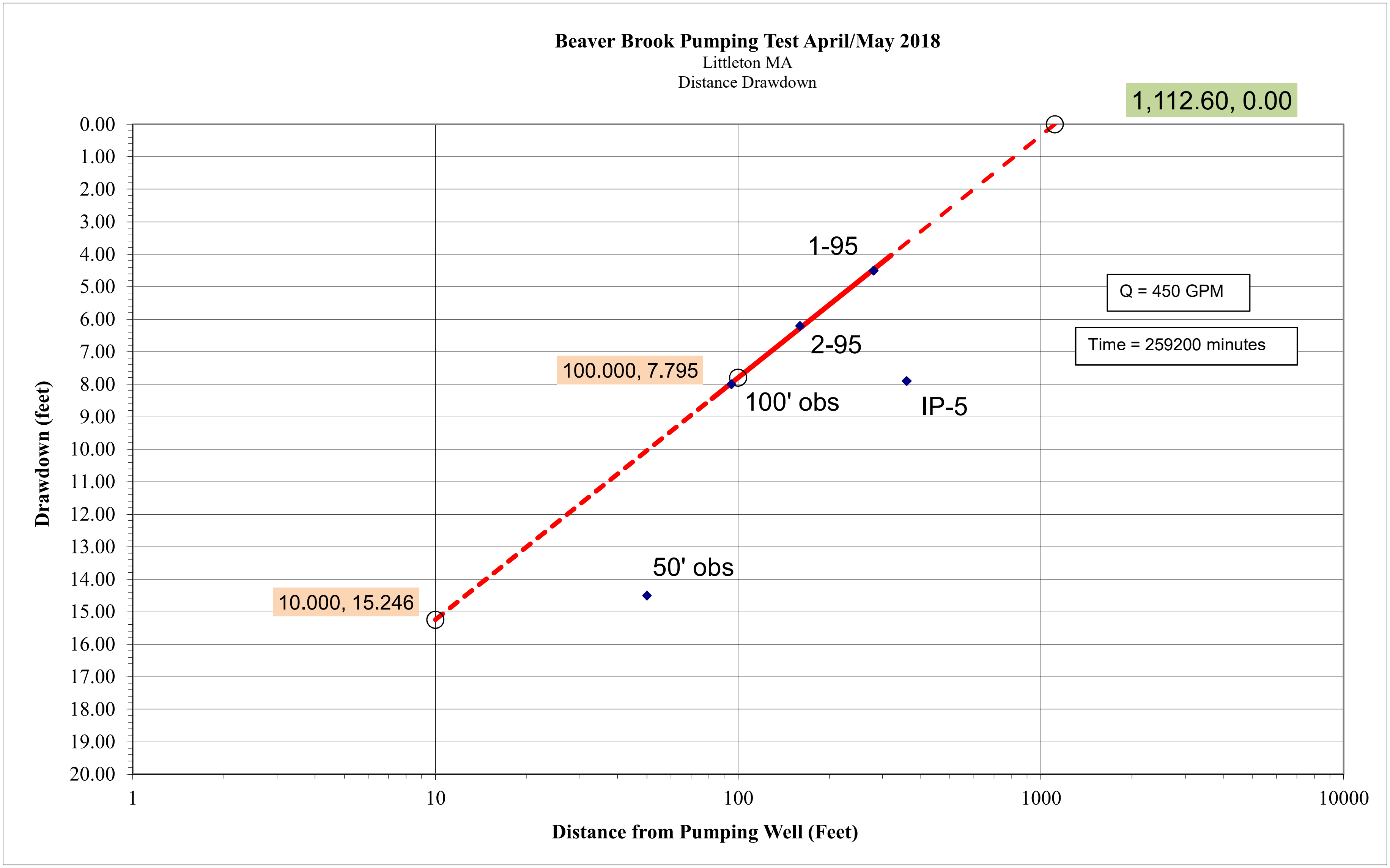
Practical in Nature



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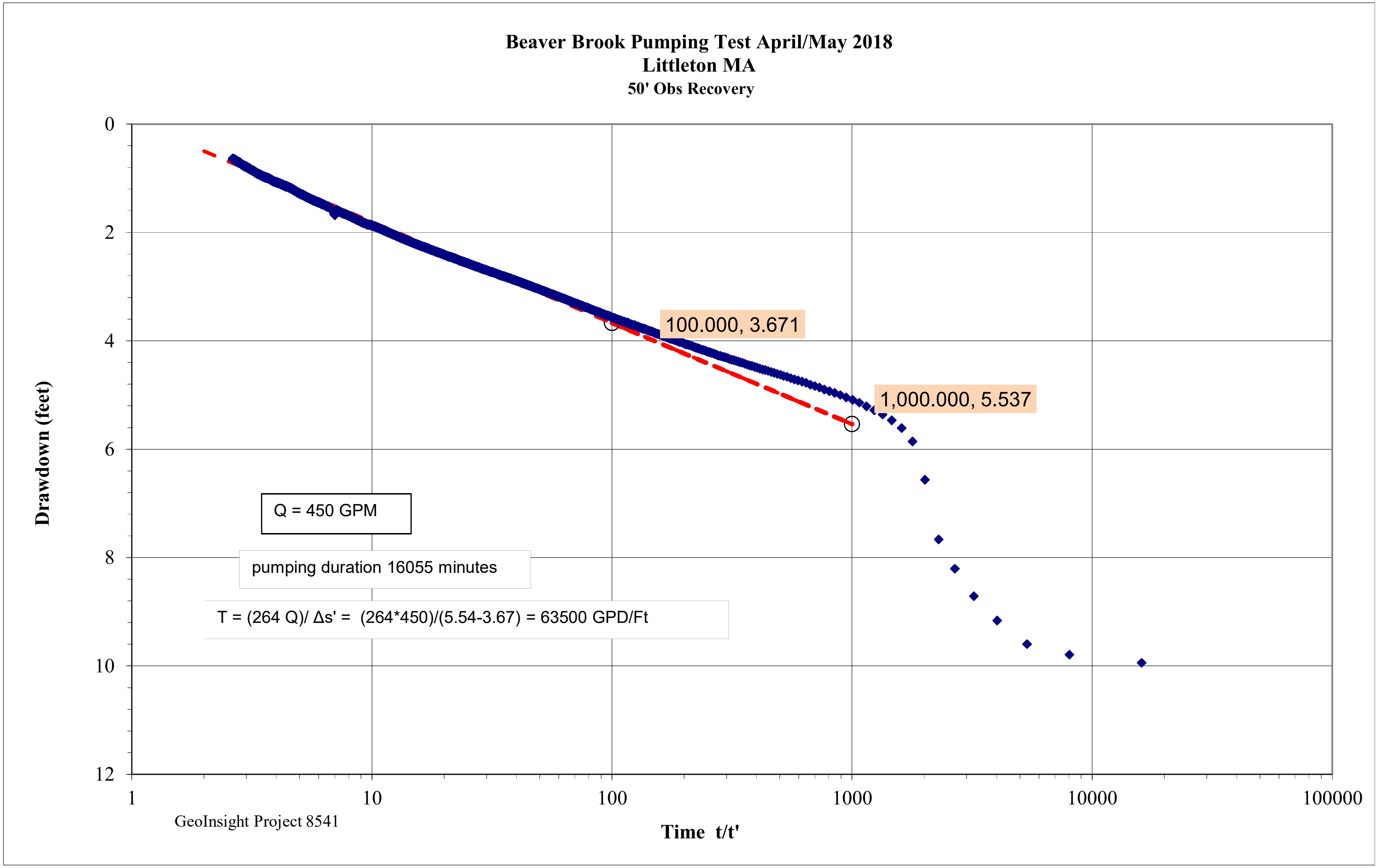

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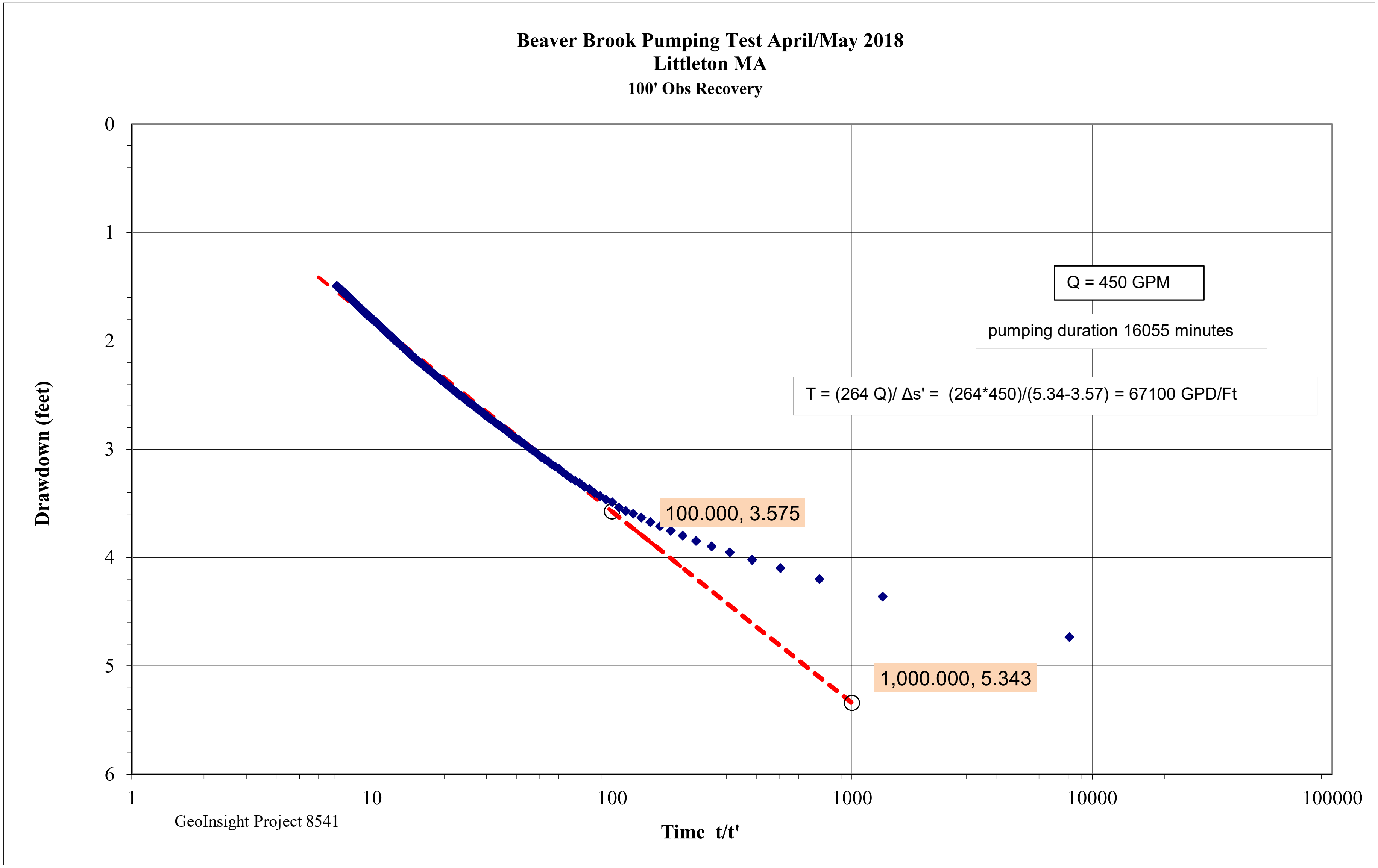

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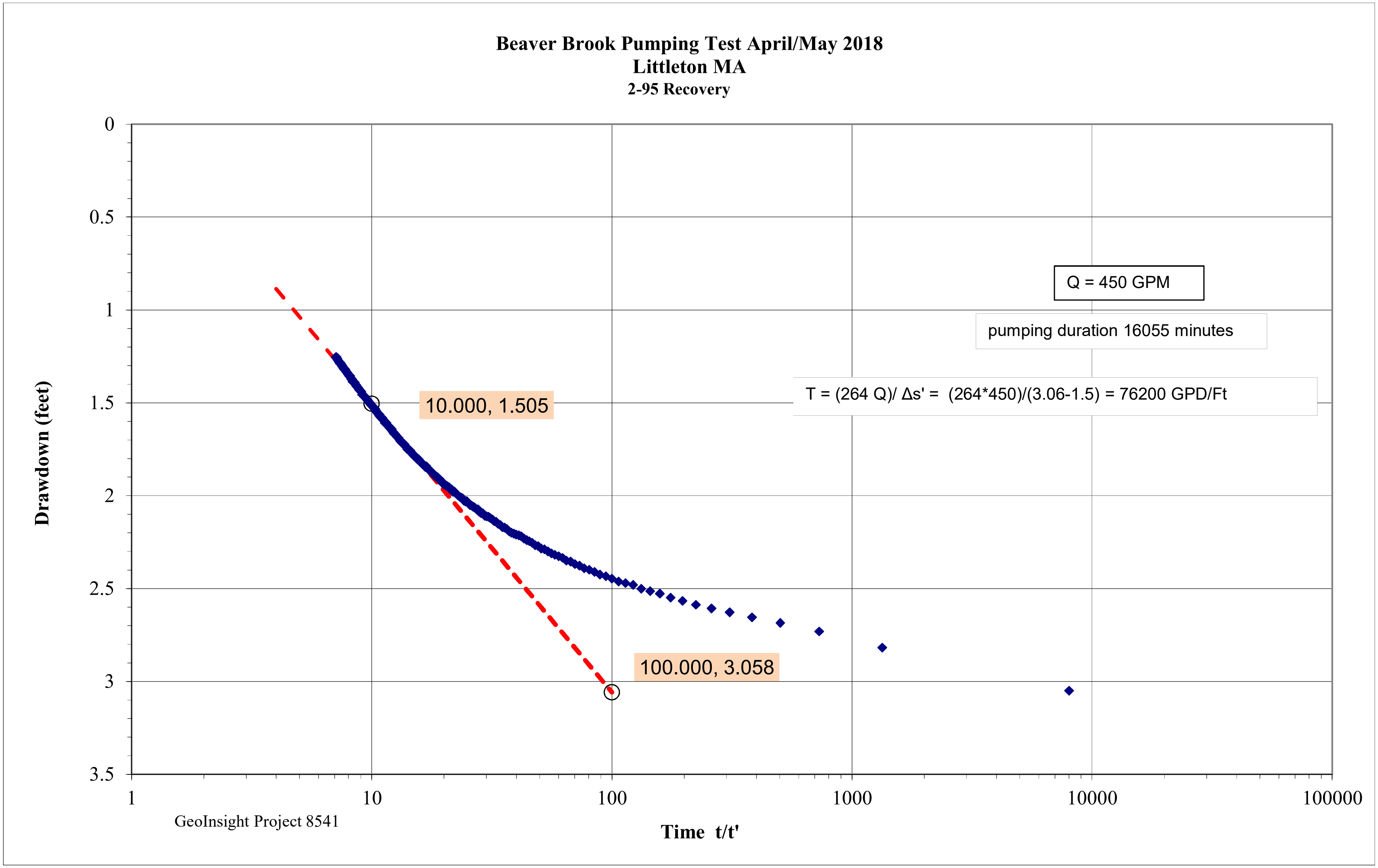
Practical in Nature



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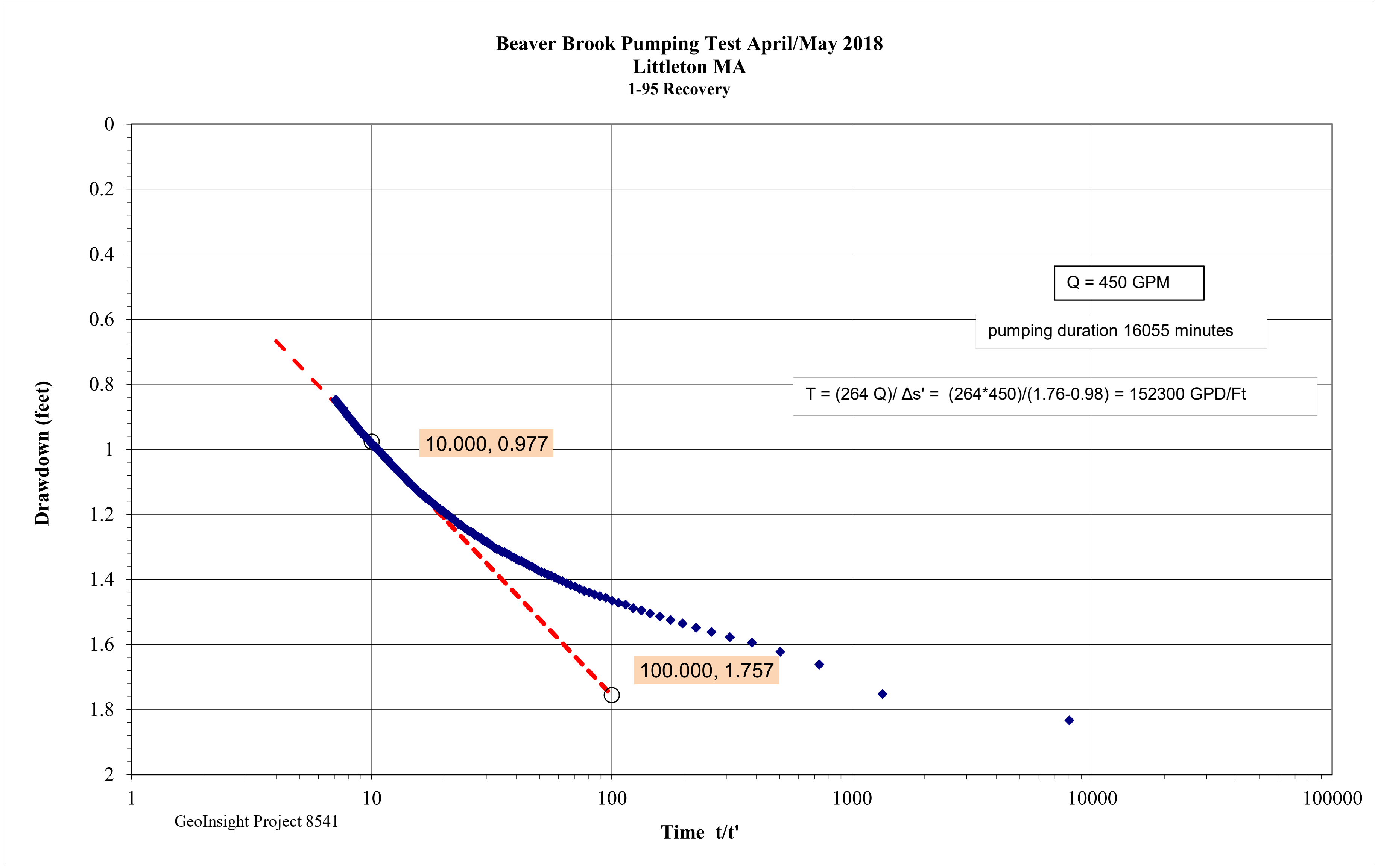
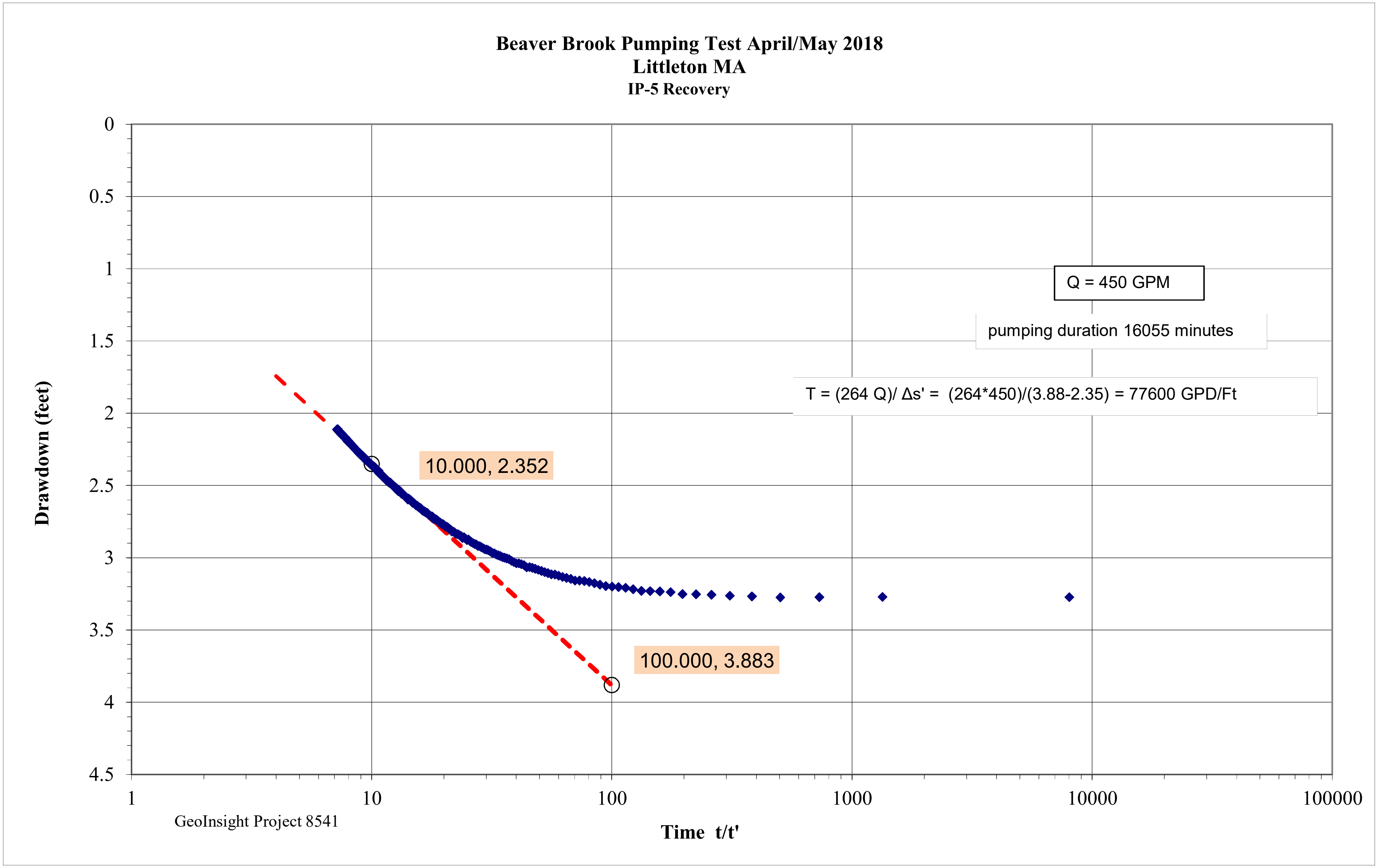
Practical in Nature



Beaver Brook Pumping Test April/May 2018
Littleton MA
1-95 Recovery
Drawdown (feet)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
1
10
100
1000
10000
100000
Time t/t'
GeoInsight Project 8541
Q = 450 GPM
pumping duration 16055 minutes
T = (264 Q)/ Δs' = (264*450)/(1.76-0.98) = 152300 GPD/Ft
10.000, 0.977
100.000, 1.757



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SUMMARY OF DATA
APRIL/MAY 2018 BEAVER BROOK PUMPING TEST
LITTLETON MA

Date and Time	Pumping Minutes	Recovery Minutes	Well 2-1 Flow GPM	Well 2-2 Flow GPM	Well 2-3 Flow GPM	Well 2-1 Depth to Water (ft)	Well 2-2 Depth to Water (ft)	Well 2-3 Depth to Water (ft)	50 ft obs Depth to Water (ft)	100 ft obs Depth to Water (ft)	Well 2-95 Depth to Water (ft)	Well 1-95 Depth to Water (ft)	Well PTS-1 Depth to Water (ft)	Well IP-5 Depth to Water (ft)	Ambient Depth to Water (ft)	P1 IN Depth to Water (ft)	P1 OUT Depth to Water (ft)	P2 IN Depth to Water (ft)	P2 OUT Depth to Water (ft)
04/20/2018 12:00									13.93						8.97				
04/21/2018 00:00									13.96						9.02				
04/21/2018 12:00									14.13						9.08				
04/22/2018 00:00									13.93						9.14				
04/22/2018 12:00									14.04						9.20				
04/23/2018 00:00									14.07						9.26				
04/23/2018 12:00									14.31						9.30				
04/24/2018 00:00									14.33						9.35	1.69	1.70	2.96	3.01
04/24/2018 12:00									14.55						9.38	1.71	1.72	3.05	3.06
04/25/2018 00:00									9.96						9.41	1.72	1.73	2.99	3.06
04/25/2018 12:00									9.71	3.35	6.57	3.78	9.38	12.90	9.39	1.69	1.70	3.00	3.08
04/26/2018 00:00									9.42	3.14	6.39	3.60	7.92	12.30	9.18	1.56	1.58	2.91	2.91
04/26/2018 06:00			0	0	0	7.94	7.69	7.10	9.31	3.05	6.30	3.52	6.72	12.19	9.08	1.53	1.54	2.83	2.81
04/26/2018 07:00			0	0	0	7.93	7.67	7.09	9.30	3.04	6.30	3.51	6.70	12.18	9.07	1.52	1.54	2.82	2.82
04/26/2018 08:00			0	0	0	7.82	7.60	7.10	9.28	3.03	6.27	3.50	6.67	12.17	9.07	1.52	1.53	2.81	2.81
04/26/2018 08:20			0	0	0	7.96	7.82	7.38	9.32	3.03	6.28	3.50	6.66	12.16					
04/26/2018 08:21			0	0	0	8.00	7.70	7.17	9.31										
04/26/2018 08:22			0	0	0	7.88	7.68	7.28	9.30										
04/26/2018 08:23			0	0	0	7.87	7.87	7.43	9.30										
04/26/2018 08:24			0	0	0	7.92	7.83	7.30	9.29										
04/26/2018 08:25			27	43	38	9.01	8.72	8.47	9.60										
04/26/2018 08:26	1		42	43	38	9.60	9.07	8.77	10.41										
04/26/2018 08:27	2		40	41	35	9.79	9.29	8.88	10.72										
04/26/2018 08:28	3		41	42	38	9.87	9.46	9.04	10.80										
04/26/2018 08:29	4		39	41	36	9.90	9.45	9.20	10.90										
04/26/2018 08:30	5		41	43	38	9.93	9.44	9.17	10.94	3.21	6.35	3.51	6.65	12.15					
04/26/2018 08:31	6		40	42	36	9.91	9.39	9.12	10.96										
04/26/2018 08:32	7		39	41	37	9.79	9.45	9.16	10.98										
04/26/2018 08:33	8		38	39	39	9.99	9.46	9.20	10.99										
04/26/2018 08:34	9		36	36	40	10.07	9.71	9.43	11.11										
04/26/2018 08:35	10		37	37	52	10.17	9.65	9.44	11.15										
04/26/2018 08:40	15		68	69	52	11.00	10.35	10.09	11.67	3.33	6.41	3.55	6.65	12.15					
04/26/2018 08:45	20		70	71	53	11.35	10.81	10.55	12.16										
04/26/2018 08:50	25		79	81	51	11.80	11.18	11.00	12.56	3.46	6.47	3.58	6.65	12.14					
04/26/2018 08:55	30		90	89	47	12.27	11.27	11.00	12.81										
04/26/2018 09:00	35		90	89	47	12.12	11.31	11.21	12.90	3.55	6.51	3.61	6.64	12.14	9.05	1.51	1.53	2.80	2.80
04/26/2018 09:05	40		84	85	54	12.07	11.32	11.28	12.84										
04/26/2018 09:10	45		86	92	53	12.50	11.63	11.38	12.92	3.58	6.52	3.63	6.63	12.14					
04/26/2018 09:15	50		85	91	50	12.21	11.48	11.39	12.92										
04/26/2018 09:20	55		84	90	49	12.18	11.40	11.31	13.02	3.60	6.53	3.63	6.63	12.14					
04/26/2018 09:25	60		89	89	47	12.41	11.58	11.42	13.16										
04/26/2018 09:30	65		89	88	55	12.27	11.48	11.31	12.96	3.62	6.54	3.64	6.62	12.14					
04/26/2018 09:35	70		84	91	53	12.36	11.49	11.31	13.05										
04/26/2018 09:40	75		84	91	53	12.23	11.50	11.33	12.93	3.64	6.54	3.64	6.61	12.15					
04/26/2018 09:45	80		85	92	53	12.27	11.59	11.49	12.96										
04/26/2018 09:50	85		89	97	51	12.59	11.66	11.28	13.07	3.66	6.55	3.65	6.60	12.15					
04/26/2018 09:55	90		88	87	58	12.45	11.67	11.73	13.01										
04/26/2018 10:00	95		84	85	48	12.24	11.41	11.35	13.13	3.69	6.56	3.66	6.60	12.15	9.04	1.51	1.52	2.81	2.81
04/26/2018 10:05	100		101	99	40	12.99	11.97	11.73	13.54										
04/26/2018 11:00	155		197	197	45	17.30	15.55	15.03	16.81	4.27	6.84	3.82	6.57	12.19	9.04	1.51	1.53	2.82	2.80
04/26/2018 12:00	215		199	198	51	17.57	15.80	15.42	17.07	4.43	6.92	3.86	6.56	12.24	9.03	1.51	1.53	2.83	2.82
04/26/2018 13:00	275		201	200	46	17.62	15.81	15.54	17.17	4.55	6.98	3.90	6.56	12.29	9.03	1.52	1.53	2.82	2.80
04/26/2018 14:00	335		200	198	49	17.60	15.97	15.55	17.22	4.64	7.03	3.92	6.59	12.34	9.03	1.52	1.53	2.81	2.79
04/26/2018 15:05	400		200	198	52	17.69	15.91	15.47	17.29	4.74	7.07	3.94	6.63	12.39	9.03	1.52	1.54	2.81	2.79

SUMMARY OF DATA
APRIL/MAY 2018 BEAVER BROOK PUMPING TEST
LITTLETON MA

Date and Time	Pumping Minutes	Recovery Minutes	Well 2-1 Flow GPM	Well 2-2 Flow GPM	Well 2-3 Flow GPM	Well 2-1 Depth to Water (ft)	Well 2-2 Depth to Water (ft)	Well 2-3 Depth to Water (ft)	50 ft obs Depth to Water (ft)	100 ft obs Depth to Water (ft)	Well 2-95 Depth to Water (ft)	Well 1-95 Depth to Water (ft)	Well PTS-1 Depth to Water (ft)	Well IP-5 Depth to Water (ft)	Ambient Depth to Water (ft)	P1 IN Depth to Water (ft)	P1 OUT Depth to Water (ft)	P2 IN Depth to Water (ft)	P2 OUT Depth to Water (ft)
04/26/2018 16:00	455		198	195	47	17.84	16.03	15.60	17.38	4.81	7.11	3.96	6.68	12.44	9.03	1.53	1.54	2.81	2.79
04/26/2018 17:00	515		196	193	45	17.83	16.05	15.58	17.42	4.87	7.14	3.98	6.75	12.48	9.03	1.53	1.55	2.80	2.79
04/26/2018 18:00	575		198	195	46	17.72	16.01	15.56	17.42	4.94	7.17	4.00	6.83	12.52	9.04	1.54	1.55	2.79	2.79
04/26/2018 19:00	635		195	200	44	17.76	16.11	15.62	17.54	5.00	7.20	4.02	6.90	12.55	9.04	1.54	1.56	2.79	2.78
04/26/2018 20:05	700		197	202	52	17.91	16.20	15.77	17.62	5.07	7.23	4.04	6.97	12.59	9.04	1.54	1.56	2.79	2.79
04/26/2018 21:00	755		196	201	49	18.02	16.15	15.68	17.58	5.11	7.27	4.05	7.04	12.63	9.04	1.55	1.56	2.80	2.79
04/26/2018 22:00	815		194	198	50	17.93	16.13	15.76	17.66	5.16	7.29	4.07	7.11	12.67	9.05	1.55	1.57	2.78	2.78
04/26/2018 23:00	875		193	197	45	17.84	16.03	15.64	17.61	5.19	7.31	4.08	7.18	12.70	9.05	1.55	1.57	2.79	2.80
04/27/2018 00:00	935		200	193	48	18.19	16.22	15.91	17.66	5.23	7.34	4.09	7.24	12.73	9.05	1.56	1.57	2.80	2.79
04/27/2018 01:05	1000		199	193	47	18.08	16.26	15.81	17.73	5.28	7.36	4.10	7.30	12.76	9.06	1.56	1.57	2.79	2.79
04/27/2018 05:05	1240		196	199	49	18.31	16.52	16.07	17.90	5.43	7.45	4.16	7.52	12.88	9.07	1.57	1.58	2.81	2.83
04/27/2018 09:05	1480		198	199	47	18.65	16.72	16.43	18.19	5.57	7.55	4.21	7.73	12.98	9.09	1.58	1.59	2.83	2.83
04/27/2018 13:05	1720		200	201	51	18.64	16.83	16.39	18.17	5.67	7.62	4.25	7.92	13.08	9.10	1.59	1.61	2.84	2.82
04/27/2018 17:05	1960		196	194	44	18.56	16.79	16.26	18.19	5.74	7.67	4.27	8.08	13.08	9.06	1.57	1.58	2.81	2.81
04/27/2018 21:05	2200		193	199	46	18.51	16.78	16.40	18.18	5.81	7.72	4.29	7.28	13.01	9.02	1.56	1.57	2.77	2.80
04/28/2018 01:05	2440		197	194	44	18.69	16.85	16.32	18.23	5.86	7.77	4.31	7.00	13.11	9.01	1.56	1.58	2.77	2.79
04/28/2018 05:05	2680		193	199	46	18.67	17.07	16.62	18.35	5.93	7.82	4.33	7.04	13.18	9.00	1.57	1.58	2.78	2.80
04/28/2018 09:05	2920		195	201	52	18.94	17.19	16.97	18.53	6.01	7.88	4.36	7.19	13.26	9.01	1.57	1.59	2.78	2.81
04/28/2018 13:05	3160		199	199	51	19.13	17.36	17.15	18.63	6.07	7.93	4.39	7.35	13.33	9.02	1.58	1.60	2.81	2.81
04/28/2018 17:05	3400		198	197	50	18.94	17.23	16.82	18.65	6.13	7.97	4.42	7.53	13.40	9.04	1.59	1.60	2.81	2.79
04/28/2018 21:05	3640		196	194	55	19.08	17.29	16.89	18.62	6.17	8.01	4.44	7.75	13.47	9.05	1.60	1.61	2.78	2.79
04/29/2018 01:05	3880		192	198	46	18.99	17.12	16.72	18.60	6.21	8.05	4.46	7.95	13.54	9.06	1.61	1.62	2.81	2.81
04/29/2018 05:05	4120		199	194	51	19.16	17.42	17.01	18.80	6.26	8.10	4.49	8.13	13.60	9.07	1.61	1.63	2.80	2.84
04/29/2018 09:05	4360		202	197	46	19.25	17.41	17.10	18.92	6.32	8.15	4.52	8.30	13.66	9.09	1.62	1.63	2.81	2.84
04/29/2018 13:05	4600		202	196	43	19.42	17.56	17.04	19.09	6.38	8.19	4.54	8.42	13.72	9.10	1.62	1.63	2.83	2.86
04/29/2018 17:05	4840		202	197	48	19.46	17.48	17.23	19.02	6.41	8.23	4.57	8.53	13.76	9.10	1.62	1.64	2.82	2.84
04/29/2018 21:05	5080		200	195	46	19.39	17.52	17.13	19.00	6.46	8.27	4.59	8.62	13.81	9.11	1.63	1.64	2.83	2.86
04/30/2018 01:05	5320		197	200	46	19.35	17.57	17.21	19.04	6.49	8.29	4.61	8.70	13.86	9.11	1.64	1.65	2.87	2.89
04/30/2018 05:05	5560		197	199	45	19.40	17.54	17.16	19.00	6.51	8.32	4.63	8.76	13.92	9.13	1.65	1.67	2.86	2.89
04/30/2018 09:05	5800		202	201	52	19.78	17.88	17.72	19.28	6.59	8.37	4.66	8.83	13.97	9.13	1.66	1.68	2.86	2.90
04/30/2018 13:05	6040		197	196	46	19.53	17.57	17.25	19.12	6.60	8.39	4.67	8.87	14.03	9.14	1.67	1.68	2.87	2.88
04/30/2018 17:05	6280		200	199	50	19.61	17.79	17.57	19.24	6.65	8.43	4.69	8.93	14.07	9.14	1.68	1.69	2.88	2.88
04/30/2018 21:05	6520		199	198	47	19.62	17.73	17.31	19.32	6.70	8.45	4.71	8.99	14.12	9.15	1.69	1.70	2.87	2.88
05/01/2018 01:05	6760		196	194	51	19.60	17.72	17.37	19.31	6.73	8.48	4.72	9.03	14.17	9.15	1.70	1.71	2.88	2.89
05/01/2018 05:05	7000		197	195	54	19.81	17.89	17.69	19.37	6.77	8.52	4.74	9.08	14.22	9.16	1.71	1.72	2.89	2.92
05/01/2018 08:25	7200		199	201	46	19.86	17.92	17.77	19.51	6.81	8.55	4.76	9.11	14.25	9.16	1.72	1.73	2.89	2.90
05/01/2018 20:00	7895		196	198	48	19.88	18.04	17.70	19.41	6.88	8.62	4.80	9.22	14.39	9.19	1.75	1.77	2.88	2.90
05/02/2018 08:00	8615		201	201	50	20.29	18.42	18.08	19.70	7.00	8.71	4.86	9.32	14.51	9.21	1.78	1.80	2.92	2.95
05/02/2018 20:00	9335		190	188	48	19.84	18.10	17.66	19.85	7.13	8.80	4.92	9.39	14.64	9.24	1.83	1.83	2.95	2.95
05/03/2018 08:00	10055		197	199	48	20.20	18.37	18.00	16.78	6.72	8.60	4.80	9.48	14.76	9.27	1.87	1.88	2.96	2.99
05/03/2018 20:00	10775		195	198	48	20.27	18.47	18.06	19.91	7.26	8.92	5.14	9.55	14.86	9.29	1.91	1.92	2.96	2.98
05/04/2018 08:00	11495		195	200	49	20.44	18.69	18.29	20.07	7.35	9.00	5.17	9.62	14.97	9.29	1.96	1.96	3.00	3.01
05/04/2018 20:00	12215		195	197	49	20.44	18.74	18.26	19.99	7.42	9.05	5.20	9.64	15.07	9.30	2.00	2.00	3.02	3.01
05/05/2018 08:00	12935		199	199	49	20.75	18.79	18.55	20.19	7.52	9.13	5.25	9.78	15.18	9.32	2.05	2.05	3.02	3.05
05/05/2018 20:00	13655		198	195	47	20.68	18.72	18.45	20.32	7.62	9.22	5.31	9.86	15.29	9.35	2.11	2.11	3.09	3.07
05/06/2018 08:00	14375		200	196	50	20.94	19.00	18.75	20.45	7.71	9.28	5.36	9.93	15.40	9.36	2.16	2.15	3.09	3.10
05/06/2018 20:00	15095		195	194	48	20.75	18.92	18.61	20.44	7.78	9.34	5.37	9.87	15.42	9.27	2.17	2.17	3.09	3.05
05/07/2018 08:00	15815		194	194	49	20.77	18.82	18.66	20.42	7.82	9.37	5.34	9.86	15.40	9.18	2.18	2.18	2.98	2.97
05/07/2018 12:00	16055		201	194	51	21.10	19.05	19.04	20.62	7.86	9.40	5.35	9.87	15.42	9.17	2.20	2.20	3.02	2.99
05/07/2018 12:35	16090		14	14	14	14.82	14.13	14.26	16.96										

SUMMARY OF DATA
APRIL/MAY 2018 BEAVER BROOK PUMPING TEST
LITTLETON MA

Date and Time	Pumping Minutes	Recovery Minutes	Well 2-1 Flow GPM	Well 2-2 Flow GPM	Well 2-3 Flow GPM	Well 2-1 Depth to Water (ft)	Well 2-2 Depth to Water (ft)	Well 2-3 Depth to Water (ft)	50 ft obs Depth to Water (ft)	100 ft obs Depth to Water (ft)	Well 2-95 Depth to Water (ft)	Well 1-95 Depth to Water (ft)	Well PTS-1 Depth to Water (ft)	Well IP-5 Depth to Water (ft)	Ambient Depth to Water (ft)	P1 IN Depth to Water (ft)	P1 OUT Depth to Water (ft)	P2 IN Depth to Water (ft)	P2 OUT Depth to Water (ft)
05/07/2018 12:36		1	0	0	0	13.80	13.24	13.21	15.86										
05/07/2018 12:37		2	0	0	0	13.49	12.93	12.90	15.15										
05/07/2018 12:38		3	0	0	0	13.34	12.80	12.77	14.91										
05/07/2018 12:39		4	0	0	0	13.23	12.71	12.67	14.76										
05/07/2018 12:40		5	0	0	0	13.15	12.63	12.58	14.66	7.39	9.10	5.25	9.87	15.43					
05/07/2018 12:41		6	0	0	0	13.05	12.54	12.47	14.57										
05/07/2018 12:42		7	0	0	0	12.99	12.49	12.41	14.50										
05/07/2018 12:43		8	0	0	0	12.91	12.43	12.36	14.44										
05/07/2018 12:44		9	0	0	0	12.89	12.41	12.33	14.38										
05/07/2018 12:45		10	0	0	0	12.83	12.35	12.27	14.34										
05/07/2018 12:50		15	0	0	0	12.68	12.22	12.10	14.15	7.23	9.01	5.16	9.87	15.43					
05/07/2018 12:55		20	0	0	0	12.56	12.13	11.97	14.02										
05/07/2018 13:00		25	0	0	0	12.49	12.09	11.87	13.92	7.13	8.97	5.12	9.86	15.43	9.17	2.20	2.20	3.01	2.98
05/07/2018 13:05		30	0	0	0	12.41	12.04	11.81	13.84										
05/07/2018 13:10		35	0	0	0	12.32	11.98	11.76	13.76	7.05	8.94	5.10	9.87	15.43					
05/07/2018 13:15		40	0	0	0	12.26	11.90	11.62	13.69										
05/07/2018 13:20		45	0	0	0	12.18	11.85	11.58	13.63	6.99	8.91	5.08	9.87	15.42					
05/07/2018 13:25		50	0	0	0	12.13	11.80	11.53	13.57										
05/07/2018 13:30		55	0	0	0	12.08	11.73	11.47	13.52	6.93	8.89	5.06	9.86	15.42					
05/07/2018 13:35		60	0	0	0	12.04	11.67	11.37	13.46										
05/07/2018 13:40		65	0	0	0	11.99	11.64	11.34	13.42	6.88	8.87	5.05	9.87	15.41					
05/07/2018 13:45		70	0	0	0	11.97	11.61	11.30	13.37										
05/07/2018 13:50		75	0	0	0	11.90	11.56	11.29	13.33	6.83	8.85	5.04	9.87	15.41					
05/07/2018 13:55		80	0	0	0	11.88	11.52	11.21	13.29										
05/07/2018 14:00		85	0	0	0	11.81	11.47	11.21	13.25	6.79	8.83	5.03	9.87	15.40	9.17	2.21	2.20	3.01	2.97
05/07/2018 14:05		90	0	0	0	11.79	11.44	11.16	13.22										
05/07/2018 14:10		95	0	0	0	11.77	11.41	11.11	13.18	6.74	8.81	5.01	9.87	15.39					
05/07/2018 14:15		100	0	0	0	11.72	11.36	11.05	13.14										
05/07/2018 14:20		105	0	0	0	11.69	11.32	11.01	13.11	6.71	8.80	5.01	9.87	15.39					
05/07/2018 15:00		145	0	0	0	11.49	11.10	10.80	12.91	6.57	8.74	4.97	9.87	15.36	9.18	2.21	2.21	2.99	2.96
05/07/2018 16:00		205	0	0	0	11.23	10.82	10.51	12.67	6.38	8.67	4.94	9.88	15.32	9.18	2.22	2.21	2.99	2.95
05/07/2018 17:00		265	0	0	0	11.02	10.62	10.33	12.48	6.22	8.61	4.90	9.88	15.28	9.18	2.22	2.22	2.97	2.95
05/07/2018 18:00		325	0	0	0	10.86	10.44	10.16	12.34	6.09	8.55	4.87	9.89	15.24	9.18	2.22	2.22	2.97	2.94
05/07/2018 19:00		385	0	0	0	10.74	10.31	10.01	12.22	5.97	8.50	4.84	9.90	15.20	9.18	2.23	2.22	2.98	2.96
05/07/2018 20:00		445	0	0	0	10.64	10.19	9.91	12.12	5.87	8.46	4.82	9.91	15.17	9.19	2.23	2.23	2.96	2.96
05/07/2018 21:00		505	0	0	0	10.58	10.10	9.83	12.04	5.78	8.42	4.80	9.91	15.13	9.19	2.23	2.23	2.97	2.97
05/07/2018 22:00		565	0	0	0	10.49	9.99	9.74	11.97	5.70	8.38	4.78	9.93	15.09	9.19	2.24	2.23	2.96	2.96
05/07/2018 23:00		625	0	0	0	10.44	9.92	9.70	11.90	5.63	8.34	4.76	9.93	15.06	9.19	2.24	2.24	2.96	2.96
05/08/2018 00:00		685	0	0	0	10.37	9.85	9.63	11.84	5.56	8.31	4.74	9.93	15.02	9.19	2.24	2.24	2.96	2.96
05/08/2018 01:00		745	0	0	0	10.33	9.79	9.57	11.79	5.50	8.27	4.72	9.94	14.99	9.19	2.24	2.24	2.96	2.97
05/08/2018 02:00		805	0	0	0	10.29	9.75	9.51	11.73	5.45	8.23	4.70	9.94	14.95	9.19	2.25	2.24	2.94	2.97
05/08/2018 03:00		865	0	0	0	10.23	9.70	9.48	11.68	5.40	8.20	4.69	9.95	14.92	9.19	2.25	2.25	2.95	2.97
05/08/2018 04:00		925	0	0	0	10.19	9.64	9.41	11.64	5.35	8.17	4.67	9.95	14.89	9.19	2.25	2.25	2.94	2.97
05/08/2018 05:00		985	0	0	0	10.16	9.62	9.40	11.60	5.30	8.14	4.66	9.96	14.86	9.19	2.25	2.25	2.99	2.98
05/08/2018 09:00		1225	0	0	0	10.08	9.42	9.23	11.44	5.13	8.03	4.60	9.98	14.75	9.20	2.26	2.26	2.98	2.99
05/08/2018 13:15		1480	0	0	0	9.90	9.38	9.25	11.30	4.98	7.91	4.54	9.98	14.64	9.20	2.27	2.27	3.01	3.00
05/08/2018 17:15		1720	0	0	0	9.74	9.34	9.03	11.19	4.86	7.82	4.49	9.98	14.55	9.22	2.28	2.28	2.98	2.98
05/08/2018 21:15		1960	0	0	0	9.65	9.20	8.88	11.12	4.76	7.74	4.46	10.01	14.46	9.22	2.28	2.28	3.00	3.00
05/09/2018 01:15		2200	0	0	0	9.55	9.10	8.77	11.02	4.66	7.67	4.41	10.02	14.39	9.22	2.29	2.29	2.99	3.00
05/09/2018 05:15		2440	0	0	0	9.48	9.05	8.73	10.94	4.58	7.59	4.38	10.03	14.31	9.22	2.30	2.30	2.99	3.01
05/09/2018 12:00		2845	0	0	0	9.37	8.92	8.71	10.83			4.32			9.22	2.31	2.31	3.05	3.04
05/09/2018 16:00		3085	0	0	0	9.26	8.87	8.51	10.76			4.30			9.24	2.31	2.31	3.04	3.00
05/09/2018 20:00		3325	0	0	0	9.21	8.80	8.43	10.72			4.27			9.24	2.32	2.32	3.05	3.03
05/10/2018 00:00		3565	0	0	0	9.19	8.77	8.40	10.67			4.25			9.23	2.32	2.32	3.02	3.03

SUMMARY OF DATA
APRIL/MAY 2018 BEAVER BROOK PUMPING TEST
LITTLETON MA

Date and Time	Pumping Minutes	Recovery Minutes	Well 2-1 Flow GPM	Well 2-2 Flow GPM	Well 2-3 Flow GPM	Well 2-1 Depth to Water (ft)	Well 2-2 Depth to Water (ft)	Well 2-3 Depth to Water (ft)	50 ft obs Depth to Water (ft)	100 ft obs Depth to Water (ft)	Well 2-95 Depth to Water (ft)	Well 1-95 Depth to Water (ft)	Well PTS-1 Depth to Water (ft)	Well IP-5 Depth to Water (ft)	Ambient Depth to Water (ft)	P1 IN Depth to Water (ft)	P1 OUT Depth to Water (ft)	P2 IN Depth to Water (ft)	P2 OUT Depth to Water (ft)
05/10/2018 04:00		3805	0	0	0	9.16	8.77	8.37	10.61			4.22			9.22	2.33	2.32	3.03	3.03
05/10/2018 08:00		4045	0	0	0	9.17	8.78	8.40	10.57			4.20			9.22	2.33	2.33	3.04	3.04
05/10/2018 12:00		4285	0	0	0	9.08	8.82	8.40	10.51			4.17			9.22	2.33	2.33	3.06	3.05
05/10/2018 16:00		4525	0	0	0	8.98	8.80	8.22	10.47			4.15			9.22	2.33	2.33	3.08	3.06
05/10/2018 20:00		4765	0	0	0	8.96	8.75	8.17	10.43			4.13			9.23	2.34	2.34	3.07	3.07
05/11/2018 00:00		5005	0	0	0	8.93	8.70	8.15	10.40			4.11			9.22	2.34	2.34	3.08	3.06
05/11/2018 04:00		5245	0	0	0	8.91	8.60	8.13	10.38			4.10			9.21	2.34	2.34	3.05	3.04
05/11/2018 08:00		5485	0	0	0	8.93	8.49	8.15	10.35			4.08			9.22	2.34	2.34	3.07	3.05
05/11/2018 12:00		5725	0	0	0	8.90	8.47	8.19	10.33			4.07			9.22	2.35	2.35	3.10	3.07
05/11/2018 16:00		5965	0	0	0	8.80	8.39	8.04	10.29			4.06			9.23	2.35	2.35	3.08	3.07
05/11/2018 20:00		6205	0	0	0	8.77	8.32	7.98	10.27			4.05			9.23	2.36	2.35	3.07	3.08
05/12/2018 00:00		6445	0	0	0	8.77	8.25	7.97	10.25			4.04			9.23	2.36	2.36	3.06	3.07
05/12/2018 04:00		6685	0	0	0	8.77	8.21	7.97	10.22			4.03			9.22	2.36	2.36	3.09	3.07
05/12/2018 08:00		6925	0	0	0	8.76	8.18	7.98	10.20			4.02			9.22	2.36	2.36	3.08	3.10
05/12/2018 12:00		7165	0	0	0	8.71	8.21	7.94	10.16			4.00			9.22	2.36	2.36	3.09	3.10
05/12/2018 16:00		7405	0	0	0	8.69	8.21	7.91	10.15			3.99			9.20	2.35	2.35	3.06	3.09
05/12/2018 20:00		7645	0	0	0	8.66	8.18	7.88	10.12			3.98			9.18	2.35	2.35	3.05	3.09
05/13/2018 00:00		7885	0	0	0	8.64	8.14	7.86	10.10			3.96			9.17	2.35	2.35	3.06	3.09
05/13/2018 04:00		8125	0	0	0	8.63	8.08	7.85	10.07			3.95			9.16	2.35	2.35	3.04	3.09
05/13/2018 08:00		8365	0	0	0	8.63	8.02	7.86	10.05			3.94			9.15	2.35	2.35	3.07	3.07
05/13/2018 12:00		8605	0	0	0	8.65	8.04	7.91	10.04			3.92			9.16	2.35	2.35	3.09	3.07
05/13/2018 16:00		8845	0	0	0	8.55	8.10	7.83	10.01			3.91			9.15	2.35	2.35	3.08	3.07
05/13/2018 20:00		9085	0	0	0	8.52	8.08	7.73	9.99			3.90			9.15	2.35	2.35	3.09	3.08
05/14/2018 00:00		9325	0	0	0	8.51	8.11	7.72	9.97			3.89			9.15	2.35	2.35	3.08	3.07
05/14/2018 04:00		9565	0	0	0	8.52	8.11	7.73	9.95			3.88			9.14	2.35	2.35	3.09	3.09
05/14/2018 08:00		9805	0	0	0	8.54	8.11	7.77	9.94			3.87			9.14	2.34	2.35	3.09	3.08
05/14/2018 12:00		10045	0	0	0	8.54	8.14	7.83											
05/14/2018 16:00		10285	0	0	0	8.43	8.17	7.70											
05/14/2018 20:00		10525	0	0	0	8.41	8.13	7.62											
05/15/2018 00:00		10765	0	0	0	8.43	8.11	7.63											
05/15/2018 04:00		11005	0	0	0	8.43	8.14	7.63											
05/15/2018 08:00		11245	0	0	0	8.48	8.15	7.70											

APPENDIX D

LABORATORY WATER QUALITY TESTING REPORTS

Massachusetts Department of Environmental Protection - Drinking Water Program

Secondary Contaminant Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S		RS	C Godfrey	4/26/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188748 1	N	

Contaminant:	Result:	UOM:	SMCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
IRON	0.998	MG/L	0.3	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MAGNESIUM	2.3	MG/L	None	0.100	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ODOR	ND	TON	3	1.000	SM 2150B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COLOR	18	CU	15	1.000	SM 2120B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CALCIUM	8.7	MG/L	None	0.200	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TOTAL DISSOLVED SOLIDS	116	MG/L	500	1.000	SM 2540C	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SILVER	ND	MG/L	0.10	0.001	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
HARDNESS (CACO3), TOTAL	31	MG/L	None	1.000	SM 2340B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SULFATE	14.1	MG/L	250	1.000	EPA 300.0	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
POTASSIUM	4.1	MG/L	None	0.100	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALKALINITY (CACO3), TOTAL	8	MG/L	None	1.000	SM 2320B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MANGANESE	0.028	MG/L	0.05*	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ZINC	0.039	MG/L	5	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TURBIDITY	4.9	NTU	None	0.100	EPA 180.1	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COPPER	0.024	MG/L	1	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
PH	5.7	PH AT 25C	6.5-8.5	NA	SM 4500-H-B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHLORIDE	45.6	MG/L	250	1.000	EPA 300.0	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALUMINUM	0.05	MG/L	0.2	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S		RS	C Godfrey	4/26/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188748 2	N	

Secondary Contaminant Report

Submitted - Signed

Contaminant:	Result:	UOM:	SMCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
IRON	0.492	MG/L	0.3	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MAGNESIUM	4	MG/L	None	0.100	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ODOR	ND	TON	3	1.000	SM 2150B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COLOR	2	CU	15	1.000	SM 2120B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CALCIUM	20.8	MG/L	None	0.200	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TOTAL DISSOLVED SOLIDS	308	MG/L	500	1.000	SM 2540C	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SILVER	ND	MG/L	0.10	0.001	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
HARDNESS (CACO3), TOTAL	68	MG/L	None	1.000	SM 2340B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SULFATE	15.6	MG/L	250	1.000	EPA 300.0	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
POTASSIUM	6.8	MG/L	None	0.100	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALKALINITY (CACO3), TOTAL	24	MG/L	None	1.000	SM 2320B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MANGANESE	1.1	MG/L	0.05*	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ZINC	0.045	MG/L	5	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TURBIDITY	1.2	NTU	None	0.100	EPA 180.1	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COPPER	0.026	MG/L	1	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
PH	5.9	PH AT 25C	6.5-8.5	NA	SM 4500-H-B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHLORIDE	156	MG/L	250	1.000	EPA 300.0	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALUMINUM	0.023	MG/L	0.2	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S		RS	C Godfrey	4/26/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188748 3	N	

Contaminant:	Result:	UOM:	SMCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
IRON	0.161	MG/L	0.3	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MAGNESIUM	3.3	MG/L	None	0.100	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ODOR	ND	TON	3	1.000	SM 2150B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COLOR	ND	CU	15	1.000	SM 2120B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CALCIUM	16	MG/L	None	0.200	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TOTAL DISSOLVED SOLIDS	220	MG/L	500	1.000	SM 2540C	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SILVER	ND	MG/L	0.10	0.001	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
HARDNESS (CACO3),	54	MG/L	None	1.000	SM 2340B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Secondary Contaminant Report

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TOTAL SULFATE	10.6	MG/L	250	1.000	EPA 300.0	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
POTASSIUM	4	MG/L	None	0.100	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALKALINITY (CACO3), TOTAL	9	MG/L	None	1.000	SM 2320B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MANGANESE	0.178	MG/L	0.05*	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ZINC	0.041	MG/L	5	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TURBIDITY	0.3	NTU	None	0.100	EPA 180.1	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COPPER	0.028	MG/L	1	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
PH	5.7	PH AT 25C	6.5-8.5	NA	SM 4500-H-B	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHLORIDE	101	MG/L	250	1.000	EPA 300.0	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALUMINUM	0.035	MG/L	0.2	0.004	EPA 200.7	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Primary Lab Signature: Laura B Lajoie

Date: 5/2/2018

EDEP Transaction ID: 1013201

Certified Signer User Name: DRDOOM

Massachusetts Department of Environmental Protection - Drinking Water Program

Nitrate Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S	R	RS	C Godfrey	4/26/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Sample Acidified:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRATE	0.83	MG/L	0.05	EPA 300.0	4/26/2018	N	M-MA1118	NASHOBA ANALYTICAL LLC	188748 1

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S	R	RS	C Godfrey	4/26/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Sample Acidified:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRATE	1.1	MG/L	0.05	EPA 300.0	4/26/2018	N	M-MA1118	NASHOBA ANALYTICAL LLC	188748 2

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S	R	RS	C Godfrey	4/26/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Sample Acidified:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRATE	0.3	MG/L	0.05	EPA 300.0	4/26/2018	N	M-MA1118	NASHOBA ANALYTICAL LLC	188748 3

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Primary Lab Signature: Laura B Lajoie

5/2/2018 9:21:14 AM

M/S = Multiple or Single sources represented in sample site.
D/S = Distribution or Source sample site.
R/F = Raw or Finished water sample site.
MDL = Method Detection Limit.
UOM = Unit of Measurement.
O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

Massachusetts Department of Environmental Protection - Drinking Water Program

Nitrate Report

Submitted - Signed

Date: 5/2/2018

EDEP Transaction ID: 1013201

Certified Signer User Name: DRDOOM

M/S = Multiple or Single sources represented in sample site.
D/S = Distribution or Source sample site.
R/F = Raw or Finished water sample site.
MDL = Method Detection Limit.
UOM = Unit of Measurement.
O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

PWS ID #: 2158000

PWS Name: LITTLETON WATER DEPARTMENT

Massachusetts Department of Environmental Protection - Drinking Water Program

Nitrite Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S	R	RS	C Godfrey	4/26/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRITE	ND	MG/L	0.02	EPA 300.0	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC	188748 1

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S	R	RS	C Godfrey	4/26/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRITE	ND	MG/L	0.02	EPA 300.0	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC	188748 2

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S	R	RS	C Godfrey	4/26/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRITE	ND	MG/L	0.02	EPA 300.0	4/26/2018	M-MA1118	NASHOBA ANALYTICAL LLC	188748 3

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Primary Lab Signature: Laura B Lajoie

Date: 5/2/2018

M/S = Multiple or Single sources represented in sample site.
D/S = Distribution or Source sample site.
R/F = Raw or Finished water sample site.
MDL = Method Detection Limit.
UOM = Unit of Measurement.
O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

Nitrite Report

Submitted - Signed

EDEP Transaction ID: 1013201

Certified Signer User Name: DRDOOM

M/S = Multiple or Single sources represented in sample site.
D/S = Distribution or Source sample site.
R/F = Raw or Finished water sample site.
MDL = Method Detection Limit.
UOM = Unit of Measurement.
O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

Massachusetts Department of Environmental Protection - Drinking Water Program

Secondary Contaminant Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S		RS	Corey Godfrey	4/29/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188800 1	N	

Contaminant:	Result:	UOM:	SMCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
IRON	0.353	MG/L	0.3	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MAGNESIUM	2.3	MG/L	None	0.100	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ODOR	ND	TON	3	1.000	SM 2150B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COLOR	ND	CU	15	1.000	SM 2120B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CALCIUM	9.2	MG/L	None	0.200	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TOTAL DISSOLVED SOLIDS	144	MG/L	500	1.000	SM 2540C	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SILVER	0.045	MG/L	0.10	0.001	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
HARDNESS (CACO3), TOTAL	32	MG/L	None	1.000	SM 2340B	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SULFATE	14.1	MG/L	250	1.000	EPA 300.0	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
POTASSIUM	4.4	MG/L	None	0.100	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALKALINITY (CACO3), TOTAL	7	MG/L	None	1.000	SM 2320B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MANGANESE	0.041	MG/L	0.05*	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ZINC	0.054	MG/L	5	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TURBIDITY	0.2	NTU	None	0.100	EPA 180.1	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COPPER	0.037	MG/L	1	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
PH	5.6	PH AT 25C	6.5-8.5	NA	SM 4500-H-B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHLORIDE	51	MG/L	250	1.000	EPA 300.0	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALUMINUM	0.047	MG/L	0.2	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S		RS	Corey Godfrey	4/29/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188800 2	N	

Massachusetts Department of Environmental Protection - Drinking Water Program

Secondary Contaminant Report

Submitted - Signed

Contaminant:	Result:	UOM:	SMCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
IRON	0.316	MG/L	0.3	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MAGNESIUM	5	MG/L	None	0.100	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ODOR	ND	TON	3	1.000	SM 2150B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COLOR	ND	CU	15	1.000	SM 2120B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CALCIUM	26.8	MG/L	None	0.200	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TOTAL DISSOLVED SOLIDS	428	MG/L	500	1.000	SM 2540C	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SILVER	ND	MG/L	0.10	0.001	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
HARDNESS (CACO3), TOTAL	88	MG/L	None	1.000	SM 2340B	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SULFATE	15.4	MG/L	250	1.000	EPA 300.0	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
POTASSIUM	7.3	MG/L	None	0.100	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALKALINITY (CACO3), TOTAL	29	MG/L	None	1.000	SM 2320B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MANGANESE	1.52	MG/L	0.05*	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ZINC	0.057	MG/L	5	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TURBIDITY	0.3	NTU	None	0.100	EPA 180.1	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COPPER	0.03	MG/L	1	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
PH	5.9	PH AT 25C	6.5-8.5	NA	SM 4500-H-B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHLORIDE	184	MG/L	250	1.000	EPA 300.0	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALUMINUM	0.021	MG/L	0.2	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S		RS	Corey Godfrey	4/29/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188800 3	N	

Contaminant:	Result:	UOM:	SMCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
IRON	0.094	MG/L	0.3	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MAGNESIUM	2.5	MG/L	None	0.100	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ODOR	ND	TON	3	1.000	SM 2150B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COLOR	2	CU	15	1.000	SM 2120B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CALCIUM	11.8	MG/L	None	0.200	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TOTAL DISSOLVED SOLIDS	148	MG/L	500	1.000	SM 2540C	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SILVER	0.047	MG/L	0.10	0.001	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
HARDNESS (CACO3),	40	MG/L	None	1.000	SM 2340B	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC

M/S = Multiple or Single sources represented in sample site.
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R/F = Raw or Finished water sample site.
MDL = Method Detection Limit.
UOM = Unit of Measurement.
O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

PWS ID #: 2158000
PWS Name: LITTLETON WATER DEPARTMENT

Secondary Contaminant Report

Submitted - Signed

TOTAL SULFATE	7.7	MG/L	250	1.000	EPA 300.0	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
POTASSIUM	2	MG/L	None	0.100	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALKALINITY (CACO3), TOTAL	8	MG/L	None	1.000	SM 2320B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MANGANESE	0.088	MG/L	0.05*	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ZINC	0.039	MG/L	5	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TURBIDITY	0.2	NTU	None	0.100	EPA 180.1	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COPPER	0.026	MG/L	1	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
PH	5.6	PH AT 25C	6.5-8.5	NA	SM 4500-H-B	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHLORIDE	48.9	MG/L	250	1.000	EPA 300.0	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALUMINUM	0.037	MG/L	0.2	0.004	EPA 200.7	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Primary Lab Signature: Laura B Lajoie

Date: 5/4/2018

EDEP Transaction ID: 1013841

Certified Signer User Name: DRDOOM

M/S = Multiple or Single sources represented in sample site.
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PWS ID #: 2158000
PWS Name: LITTLETON WATER DEPARTMENT

Massachusetts Department of Environmental Protection - Drinking Water Program

Nitrate Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S	R	RS	Corey Godfrey	4/29/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Sample Acidified:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRATE	0.81	MG/L	0.05	EPA 300.0	4/30/2018	N	M-MA1118	NASHOBA ANALYTICAL LLC	188800 1

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S	R	RS	Corey Godfrey	4/29/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Sample Acidified:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRATE	0.57	MG/L	0.05	EPA 300.0	4/30/2018	N	M-MA1118	NASHOBA ANALYTICAL LLC	188800 2

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S	R	RS	Corey Godfrey	4/29/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Sample Acidified:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRATE	0.06	MG/L	0.05	EPA 300.0	4/30/2018	N	M-MA1118	NASHOBA ANALYTICAL LLC	188800 3

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Primary Lab Signature: Laura B Lajoie

PWS ID #: 2158000

5/4/2018 9:59:07 AM

PWS Name: LITTLETON WATER DEPARTMENT

M/S = Multiple or Single sources represented in sample site.
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O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

Massachusetts Department of Environmental Protection - Drinking Water Program

Nitrate Report

Submitted - Signed

Date: 5/4/2018

EDEP Transaction ID: 1013841

Certified Signer User Name: DRDOOM

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R/F = Raw or Finished water sample site.
MDL = Method Detection Limit.
UOM = Unit of Measurement.
O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

PWS ID #: 2158000

PWS Name: LITTLETON WATER DEPARTMENT

Massachusetts Department of Environmental Protection - Drinking Water Program

Nitrite Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S	R	RS	Corey Godfrey	4/29/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRITE	ND	MG/L	0.02	EPA 300.0	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC	188800 1

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S	R	RS	Corey Godfrey	4/29/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRITE	ND	MG/L	0.02	EPA 300.0	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC	188800 2

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S	R	RS	Corey Godfrey	4/29/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRITE	ND	MG/L	0.02	EPA 300.0	4/30/2018	M-MA1118	NASHOBA ANALYTICAL LLC	188800 3

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Primary Lab Signature: Laura B Lajoie

Date: 5/4/2018

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Massachusetts Department of Environmental Protection - Drinking Water Program

Nitrite Report

Submitted - Signed

EDEP Transaction ID: 1013841

Certified Signer User Name: DRDOOM

M/S = Multiple or Single sources represented in sample site.
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R/F = Raw or Finished water sample site.
MDL = Method Detection Limit.
UOM = Unit of Measurement.
O/R/C = Original submittal or Resubmittal submittal or Confirmation sample.

PWS ID #: 2158000

PWS Name: LITTLETON WATER DEPARTMENT

5/4/2018 9:59:07 AM

Massachusetts Department of Environmental Protection - Drinking Water Program

Bacteria Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:
05G	Beaver Brook Well 2.1 (Raw)	RW	C. Godfrey	5/1/2018 12:30:00	O	

Sample Comments:	Analysis Comments:	Lab Sample ID:	TCR(T) or SWTR(S)	Original Collection:
		188870 1	T	

Contaminant:	Result:	UOM:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
TOTAL COLIFORM	A	/100ml	ENZ. SUB. SM9223	5/1/2018 14:20:00	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:
06G	Beaver Brook Well 2.2 (Raw)	RW	C. Godfrey	5/1/2018 12:30:00	O	

Sample Comments:	Analysis Comments:	Lab Sample ID:	TCR(T) or SWTR(S)	Original Collection:
		188870 2	T	

Contaminant:	Result:	UOM:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
TOTAL COLIFORM	A	/100ml	ENZ. SUB. SM9223	5/1/2018 14:20:00	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:
07G	Beaver Brook Well 2.3 (Raw)	RW	C. Godfrey	5/1/2018 12:30:00	O	

Sample Comments:	Analysis Comments:	Lab Sample ID:	TCR(T) or SWTR(S)	Original Collection:
		188870 3	T	

Contaminant:	Result:	UOM:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
TOTAL COLIFORM	A	/100ml	ENZ. SUB. SM9223	5/1/2018 14:20:00	M-MA1118	NASHOBA ANALYTICAL LLC

Primary Lab Signature: Laura B Lajoie

Date: 5/3/2018

EDEP Transaction ID: 1013545

Certified Signer User Name: DRDOOM

AR = Add. Repeat (dist System)
DR = Downstream Repeat
PT = Plant Tap Sample
RO = Original Site Repeat
RS = Routine Sample
RW = Raw Water
SS = Special Sample
UR = Upstream Repeat

Massachusetts Department of Environmental Protection - Drinking Water Program

Secondary Contaminant Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S		RS	C Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188868 1	N	

Contaminant:	Result:	UOM:	SMCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
IRON	0.387	MG/L	0.3	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MAGNESIUM	2.4	MG/L	None	0.100	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ODOR	ND	TON	3	1.000	SM 2150B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COLOR	2	CU	15	1.000	SM 2120B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CALCIUM	9.6	MG/L	None	0.200	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TOTAL DISSOLVED SOLIDS	144	MG/L	500	1.000	SM 2540C	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SILVER	ND	MG/L	0.10	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
HARDNESS (CACO3), TOTAL	34	MG/L	None	1.000	SM 2340B	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SULFATE	14.6	MG/L	250	1.000	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
POTASSIUM	4.5	MG/L	None	0.100	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALKALINITY (CACO3), TOTAL	7	MG/L	None	1.000	SM 2320B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MANGANESE	0.043	MG/L	0.05*	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ZINC	0.013	MG/L	5	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TURBIDITY	0.3	NTU	None	0.100	EPA 180.1	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COPPER	0.015	MG/L	1	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
PH	5.6	PH AT 25C	6.5-8.5		SM 4500-H-B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHLORIDE	53.6	MG/L	250	1.000	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALUMINUM	0.05	MG/L	0.2	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S		RS	C Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188868 2	N	

Secondary Contaminant Report

Submitted - Signed

Contaminant:	Result:	UOM:	SMCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
IRON	0.337	MG/L	0.3	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MAGNESIUM	5.2	MG/L	None	0.100	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ODOR	ND	TON	3	1.000	SM 2150B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COLOR	ND	CU	15	1.000	SM 2120B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CALCIUM	27.4	MG/L	None	0.200	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TOTAL DISSOLVED SOLIDS	422	MG/L	500	1.000	SM 2540C	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SILVER	ND	MG/L	0.10	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
HARDNESS (CACO3), TOTAL	90	MG/L	None	1.000	SM 2340B	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SULFATE	16.1	MG/L	250	1.000	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
POTASSIUM	7.6	MG/L	None	0.100	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALKALINITY (CACO3), TOTAL	30	MG/L	None	1.000	SM 2320B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MANGANESE	1.59	MG/L	0.05*	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ZINC	0.03	MG/L	5	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TURBIDITY	0.15	NTU	None	0.100	EPA 180.1	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COPPER	0.013	MG/L	1	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
PH	5.8	PH AT 25C	6.5-8.5		SM 4500-H-B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHLORIDE	196	MG/L	250	1.000	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALUMINUM	0.018	MG/L	0.2	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S		RS	C Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188868 3	N	

Contaminant:	Result:	UOM:	SMCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
IRON	0.1	MG/L	0.3	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MAGNESIUM	2.4	MG/L	None	0.100	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ODOR	ND	TON	3	1.000	SM 2150B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COLOR	ND	CU	15	1.000	SM 2120B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CALCIUM	11.4	MG/L	None	0.200	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TOTAL DISSOLVED SOLIDS	142	MG/L	500	1.000	SM 2540C	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SILVER	ND	MG/L	0.10	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
HARDNESS (CACO3),	38	MG/L	None	1.000	SM 2340B	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC

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UOM = Unit of Measurement.
O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

Massachusetts Department of Environmental Protection - Drinking Water Program

Secondary Contaminant Report

Submitted - Signed

TOTAL SULFATE	7.9	MG/L	250	1.000	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
POTASSIUM	2	MG/L	None	0.100	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALKALINITY (CACO3), TOTAL	8	MG/L	None	1.000	SM 2320B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MANGANESE	0.08	MG/L	0.05*	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ZINC	0.011	MG/L	5	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
TURBIDITY	0.15	NTU	None	0.100	EPA 180.1	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
COPPER	0.013	MG/L	1	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
PH	5.6	PH AT 25C	6.5-8.5		SM 4500-H-B	5/1/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHLORIDE	49.7	MG/L	250	1.000	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
ALUMINUM	0.038	MG/L	0.2	0.004	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Primary Lab Signature: David L. Knowlton

Date: 5/15/2018

EDEP Transaction ID: 1016536

Certified Signer User Name: DRDOOM

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UOM = Unit of Measurement.
O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

PWS ID #: 2158000

PWS Name: LITTLETON WATER DEPARTMENT

Massachusetts Department of Environmental Protection - Drinking Water Program

Nitrate Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S	R	RS	C Godfrey	5/1/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Sample Acidified:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRATE	0.88	MG/L	0.05	EPA 300.0	5/2/2018	N	M-MA1118	NASHOBA ANALYTICAL LLC	188868 1

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S	R	RS	C Godfrey	5/1/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Sample Acidified:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRATE	0.59	MG/L	0.05	EPA 300.0	5/2/2018	N	M-MA1118	NASHOBA ANALYTICAL LLC	188868 2

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S	R	RS	C Godfrey	5/1/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Sample Acidified:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRATE	0.07	MG/L	0.05	EPA 300.0	5/2/2018	N	M-MA1118	NASHOBA ANALYTICAL LLC	188868 3

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Primary Lab Signature: David L. Knowlton

5/15/2018 2:23:38 PM

PWS ID #: 2158000

PWS Name: LITTLETON WATER DEPARTMENT

M/S = Multiple or Single sources represented in sample site.
D/S = Distribution or Source sample site.
R/F = Raw or Finished water sample site.
MDL = Method Detection Limit.
UOM = Unit of Measurement.
O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

Massachusetts Department of Environmental Protection - Drinking Water Program

Nitrate Report

Submitted - Signed

Date: 5/15/2018

EDEP Transaction ID: 1016536

Certified Signer User Name: DRDOOM

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Massachusetts Department of Environmental Protection - Drinking Water Program

Nitrite Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S	R	RS	C Godfrey	5/1/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRITE	ND	MG/L	0.02	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC	188868 1

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S	R	RS	C Godfrey	5/1/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRITE	ND	MG/L	0.02	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC	188868 2

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S	R	RS	C Godfrey	5/1/2018	O		

Analyte:	Result:	UOM:	MDL:	Lab Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab Name:	Lab Sample ID:
NITRITE	ND	MG/L	0.02	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC	188868 3

Composite Indicator:	Composite Comments:	Sample Comments:	Analysis Comments:

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:

Primary Lab Signature: David L. Knowlton

Date: 5/15/2018

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O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

Massachusetts Department of Environmental Protection - Drinking Water Program

Nitrite Report

Submitted - Signed

EDEP Transaction ID: 1016536

Certified Signer User Name: DRDOOM

Massachusetts Department of Environmental Protection - Drinking Water Program

Inorganic Contaminant Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S		RS	C Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188868 1	N	

Contaminant:	Result:	UOM:	MCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
ANTIMONY	ND	MG/L	0.006	0.001	EPA 200.8	5/3/2018	M-CT008	MICROBAC LABORATORIES INC
ARSENIC	ND	MG/L	0.010	0.001	EPA 200.9	5/7/2018	M-MA1118	NASHOBA ANALYTICAL LLC
BARIUM	0.04	MG/L	2	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
BERYLLIUM	ND	MG/L	0.004	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CADMIUM	ND	MG/L	0.005	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHROMIUM	ND	MG/L	0.1	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CYANIDE	ND	MG/L	0.2	0.010	SM 4500-CN-C,E	5/3/2018	M-CT008	MICROBAC LABORATORIES INC
FLUORIDE	ND	MG/L	4.0	0.100	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MERCURY	ND	MG/L	0.002	0.000	EPA 245.2	5/3/2018	M-CT008	MICROBAC LABORATORIES INC
NICKEL	0.004	MG/L	0.1	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SELENIUM	ND	MG/L	0.05	0.005	EPA 200.8	5/3/2018	M-CT008	MICROBAC LABORATORIES INC
SODIUM	32.2	MG/L	20	0.200	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
THALLIUM	ND	MG/L	0.002	0.001	EPA 200.9	5/14/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S		RS	C Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188868 2	N	

Contaminant:	Result:	UOM:	MCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
ANTIMONY	ND	MG/L	0.006	0.001	EPA 200.8	5/3/2018	M-CT008	MICROBAC LABORATORIES INC
ARSENIC	ND	MG/L	0.010	0.001	EPA 200.9	5/7/2018	M-MA1118	NASHOBA ANALYTICAL LLC
BARIUM	0.091	MG/L	2	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
BERYLLIUM	ND	MG/L	0.004	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CADMIUM	ND	MG/L	0.005	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHROMIUM	ND	MG/L	0.1	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CYANIDE	ND	MG/L	0.2	0.010	SM 4500-CN-C,E	5/3/2018	M-CT008	MICROBAC LABORATORIES INC

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Inorganic Contaminant Report

Submitted - Signed

FLUORIDE	ND	MG/L	4.0	0.100	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MERCURY	ND	MG/L	0.002	0.000	EPA 245.2	5/3/2018	M-CT008	MICROBAC LABORATORIES INC
NICKEL	0.001	MG/L	0.1	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SELENIUM	ND	MG/L	0.05	0.005	EPA 200.8	5/3/2018	M-CT008	MICROBAC LABORATORIES INC
SODIUM	101.3	MG/L	20	0.200	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
THALLIUM	ND	MG/L	0.002	0.001	EPA 200.9	5/14/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S		RS	C Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188868 3	N	

Contaminant:	Result:	UOM:	MCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
ANTIMONY	ND	MG/L	0.006	0.001	EPA 200.8	5/3/2018	M-CT008	MICROBAC LABORATORIES INC
ARSENIC	ND	MG/L	0.010	0.001	EPA 200.9	5/7/2018	M-MA1118	NASHOBA ANALYTICAL LLC
BARIUM	0.024	MG/L	2	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
BERYLLIUM	ND	MG/L	0.004	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CADMIUM	ND	MG/L	0.005	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CHROMIUM	ND	MG/L	0.1	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
CYANIDE	ND	MG/L	0.2	0.010	SM 4500-CN-C,E	5/3/2018	M-CT008	MICROBAC LABORATORIES INC
FLUORIDE	ND	MG/L	4.0	0.100	EPA 300.0	5/2/2018	M-MA1118	NASHOBA ANALYTICAL LLC
MERCURY	ND	MG/L	0.002	0.000	EPA 245.2	5/3/2018	M-CT008	MICROBAC LABORATORIES INC
NICKEL	0.002	MG/L	0.1	0.001	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
SELENIUM	ND	MG/L	0.05	0.005	EPA 200.8	5/3/2018	M-CT008	MICROBAC LABORATORIES INC
SODIUM	24.2	MG/L	20	0.200	EPA 200.7	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC
THALLIUM	ND	MG/L	0.002	0.001	EPA 200.9	5/14/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Primary Lab Signature: David L. Knowlton

Date: 5/15/2018

EDEP Transaction ID: 1016536

Certified Signer User Name: DRDOOM

M/S = Multiple or Single sources represented in sample site.
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O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

Massachusetts Department of Environmental Protection - Drinking Water Program

(LCR) Lead And Copper Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON
PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM
Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	Raw: Replacement Well 2.1	RS	C Godfrey	5/1/2018 12:30:00	O		

Sample Comments: **Analysis Comments:** **Lab Sample ID:** 188868 1

Contaminant:	Result:	UOM:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
LEAD	0.002	MG/L	0.001	EPA 200.9	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	Raw: Replacement Well 2.2	RS	C Godfrey	5/1/2018 12:30:00	O		

Sample Comments: **Analysis Comments:** **Lab Sample ID:** 188868 2

Contaminant:	Result:	UOM:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
LEAD	0.004	MG/L	0.001	EPA 200.9	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Location ID	Location	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	Raw: Replacement Well 2.3	RS	C Godfrey	5/1/2018 12:30:00	O		

Sample Comments: **Analysis Comments:** **Lab Sample ID:** 188868 3

Contaminant:	Result:	UOM:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
LEAD	0.002	MG/L	0.001	EPA 200.9	5/3/2018	M-MA1118	NASHOBA ANALYTICAL LLC

Primary Lab Signature: David L. Knowlton
Date: 5/15/2018
EDEP Transaction ID: 1016536
Certified Signer User Name: DRDOOM

MDL = Method Detection Limit.
UOM = Unit of Measurement.
O/R/C = Original submittal or Resubmitted submittal or Confirmation sample.

Massachusetts Department of Environmental Protection - Drinking Water Program

Volatile Organic Contaminant Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S		RS	C. Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188868-1	N	

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:
BROMOFLUOROBENZENE	85	1,2-DICHLOROBENZENE-D4	94

CAS #	Contaminant:	Result:	UOM:	MCL:	MDL:	Analytical Method:	Date of Extraction:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
Regulated Contaminants										
71-55-6	1,1,1-TRICHLOROETHANE	ND	UG/L	200.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
79-00-5	1,1,2-TRICHLOROETHANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-35-4	1,1-DICHLOROETHYLENE	ND	UG/L	7.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
120-82-1	1,2,4-TRICHLOROBENZENE	ND	UG/L	70.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
107-06-2	1,2-DICHLOROETHANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
78-87-5	1,2-DICHLOROPROPANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
71-43-2	BENZENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
56-23-5	CARBON TETRACHLORIDE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
156-59-2	CIS-1,2-DICHLOROETHYLENE	ND	UG/L	70.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-09-2	DICHLOROMETHANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
100-41-4	ETHYLBENZENE	ND	UG/L	700.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-90-7	MONOCHLOROBENZENE	ND	UG/L	100.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
95-50-1	O-DICHLOROBENZENE	ND	UG/L	600.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL

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									SERVICES LLC
106-46-7 PARA-DICHLOROBENZENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
100-42-5 STYRENE	ND	UG/L	100.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
127-18-4 TETRACHLOROETHYLENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-88-3 TOLUENE	ND	UG/L	1,000.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
156-60-5 TRANS-1,2-DICHLOROETHYLENE	ND	UG/L	100.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
79-01-6 TRICHLOROETHYLENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-01-4 VINYL CHLORIDE	ND	UG/L	2.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1330-20-7 XYLENES (TOTAL)	ND	UG/L	10,000.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
Unregulated Contaminants									
630-20-6 1,1,1,2-TETRACHLOROETHANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
79-34-5 1,1,2,2-TETRACHLOROETHANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-34-3 1,1-DICHLOROETHANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
563-58-6 1,1-DICHLOROPROPENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
87-61-6 1,2,3-TRICHLOROBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
96-18-4 1,2,3-TRICHLOROPROPANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
95-63-6 1,2,4-TRIMETHYLBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-67-8 1,3,5-TRIMETHYLBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
142-28-9 1,3-DICHLOROPROPANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
542-75-6 1,3-DICHLOROPROPENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
594-20-7 2,2-DICHLOROPROPANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-86-1 BROMOBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

Volatile Organic Contaminant Report

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74-97-5	BROMOCHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-27-4	BROMODICHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-25-2	BROMOFORM	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
74-83-9	BROMOMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
124-48-1	CHLORODIBROMOMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-00-3	CHLOROETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
67-66-3	CHLOROFORM	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
74-87-3	CHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
74-95-3	DIBROMOMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-71-8	DICHLORODIFLUOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-20-3	DIISOPROPYL ETHER	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
637-92-3	ETHYL TERT-BUTYL ETHER	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-69-4	FLUOROTRICHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
87-68-3	HEXACHLOROBUTADIENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
98-82-8	ISOPROPYLBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
541-73-1	M-DICHLOROBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1634-04-4	METHYL TERTIARY BUTYL ETHER	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
91-20-3	NAPHTHALENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
104-51-8	N-BUTYLBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
103-65-1	N-PROPYLBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
95-49-8	O-CHLOROTOLUENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

106-43-4	P-CHLOROTOLUENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
99-87-6	P-ISOPROPYLTOLUENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
135-98-8	SEC-BUTYLBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
994-05-8	TERT-AMYL METHYL ETHER	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-65-0	TERT-BUTYL ALCOHOL	ND	UG/L		10.00	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
98-06-6	TERT-BUTYLBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S		RS	C. Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188868-2	N	

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:
BROMOFLUOROBENZENE	84	1,2-DICHLOROBENZENE-D4	93

CAS #	Contaminant:	Result:	UOM:	MCL:	MDL:	Analytical Method:	Date of Extraction:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
Regulated Contaminants										
71-55-6	1,1,1-TRICHLOROETHANE	ND	UG/L	200.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
79-00-5	1,1,2-TRICHLOROETHANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-35-4	1,1-DICHLOROETHYLENE	ND	UG/L	7.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
120-82-1	1,2,4-TRICHLOROBENZENE	ND	UG/L	70.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
107-06-2	1,2-DICHLOROETHANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
78-87-5	1,2-DICHLOROPROPANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
71-43-2	BENZENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
56-23-5	CARBON TETRACHLORIDE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
156-59-2	CIS-1,2-DICHLOROETHYLENE	ND	UG/L	70.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL

									SERVICES LLC
75-09-2 DICHLOROMETHANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
100-41-4 ETHYLBENZENE	ND	UG/L	700.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-90-7 MONOCHLOROBENZENE	ND	UG/L	100.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
95-50-1 O-DICHLOROBENZENE	ND	UG/L	600.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
106-46-7 PARA-DICHLOROBENZENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
100-42-5 STYRENE	ND	UG/L	100.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
127-18-4 TETRACHLOROETHYLENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-88-3 TOLUENE	ND	UG/L	1,000.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
156-60-5 TRANS-1,2-DICHLOROETHYLENE	ND	UG/L	100.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
79-01-6 TRICHLOROETHYLENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-01-4 VINYL CHLORIDE	ND	UG/L	2.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1330-20-7 XYLENES (TOTAL)	ND	UG/L	10,000.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
Unregulated Contaminants									
630-20-6 1,1,1,2-TETRACHLOROETHANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
79-34-5 1,1,2,2-TETRACHLOROETHANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-34-3 1,1-DICHLOROETHANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
563-58-6 1,1-DICHLOROPROPENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
87-61-6 1,2,3-TRICHLOROBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
96-18-4 1,2,3-TRICHLOROPROPANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
95-63-6 1,2,4-TRIMETHYLBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-67-8 1,3,5-TRIMETHYLBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

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142-28-9	1,3-DICHLOROPROPANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
542-75-6	1,3-DICHLOROPROPENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
594-20-7	2,2-DICHLOROPROPANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-86-1	BROMOBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
74-97-5	BROMOCHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-27-4	BROMODICHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-25-2	BROMOFORM	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
74-83-9	BROMOMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
124-48-1	CHLORODIBROMOMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-00-3	CHLOROETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
67-66-3	CHLOROFORM	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
74-87-3	CHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
74-95-3	DIBROMOMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-71-8	DICHLORODIFLUOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-20-3	DIISOPROPYL ETHER	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
637-92-3	ETHYL TERT-BUTYL ETHER	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-69-4	FLUOROTRICHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
87-68-3	HEXACHLOROBUTADIENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
98-82-8	ISOPROPYLBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
541-73-1	M-DICHLOROBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1634-04-4	METHYL TERTIARY BUTYL ETHER	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

91-20-3	NAPHTHALENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
104-51-8	N-BUTYLBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
103-65-1	N-PROPYLBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
95-49-8	O-CHLOROTOLUENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
106-43-4	P-CHLOROTOLUENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
99-87-6	P-ISOPROPYLTOLUENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
135-98-8	SEC-BUTYLBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
994-05-8	TERT-AMYL METHYL ETHER	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-65-0	TERT-BUTYL ALCOHOL	ND	UG/L		10.00	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
98-06-6	TERT-BUTYLBENZENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S		RS	C. Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188868-3	N	

QA/QC Method 1:	QA/QC Result 1:	QA/QC Method 2:	QA/QC Result 2:
BROMOFLUOROBENZENE	86	1,2-DICHLOROBENZENE-D4	96

CAS #	Contaminant:	Result:	UOM:	MCL:	MDL:	Analytical Method:	Date of Extraction:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
Regulated Contaminants										
71-55-6	1,1,1-TRICHLOROETHANE	ND	UG/L	200.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
79-00-5	1,1,2-TRICHLOROETHANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-35-4	1,1-DICHLOROETHYLENE	ND	UG/L	7.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
120-82-1	1,2,4-TRICHLOROBENZENE	ND	UG/L	70.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
107-06-2	1,2-DICHLOROETHANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL

									SERVICES LLC
78-87-5 1,2-DICHLOROPROPANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
71-43-2 BENZENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
56-23-5 CARBON TETRACHLORIDE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
156-59-2 CIS-1,2-DICHLOROETHYLENE	ND	UG/L	70.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-09-2 DICHLOROMETHANE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
100-41-4 ETHYLBENZENE	ND	UG/L	700.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-90-7 MONOCHLOROBENZENE	ND	UG/L	100.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
95-50-1 O-DICHLOROBENZENE	ND	UG/L	600.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
106-46-7 PARA-DICHLOROBENZENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
100-42-5 STYRENE	ND	UG/L	100.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
127-18-4 TETRACHLOROETHYLENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-88-3 TOLUENE	ND	UG/L	1,000.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
156-60-5 TRANS-1,2-DICHLOROETHYLENE	ND	UG/L	100.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
79-01-6 TRICHLOROETHYLENE	ND	UG/L	5.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-01-4 VINYL CHLORIDE	ND	UG/L	2.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1330-20-7 XYLENES (TOTAL)	ND	UG/L	10,000.00	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
Unregulated Contaminants									
630-20-6 1,1,1,2-TETRACHLOROETHANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
79-34-5 1,1,2,2-TETRACHLOROETHANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-34-3 1,1-DICHLOROETHANE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
563-58-6 1,1-DICHLOROPROPENE	ND	UG/L		0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

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87-61-6 1,2,3-TRICHLOROBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
96-18-4 1,2,3-TRICHLOROPROPANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
95-63-6 1,2,4-TRIMETHYLBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-67-8 1,3,5-TRIMETHYLBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
142-28-9 1,3-DICHLOROPROPANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
542-75-6 1,3-DICHLOROPROPENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
594-20-7 2,2-DICHLOROPROPANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-86-1 BROMOBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
74-97-5 BROMOCHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-27-4 BROMODICHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-25-2 BROMOFORM	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
74-83-9 BROMOMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
124-48-1 CHLORODIBROMOMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-00-3 CHLOROETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
67-66-3 CHLOROFORM	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
74-87-3 CHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
74-95-3 DIBROMOMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-71-8 DICHLORODIFLUOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
108-20-3 DIISOPROPYL ETHER	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
637-92-3 ETHYL TERT-BUTYL ETHER	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-69-4 FLUOROTRICHLOROMETHANE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

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PWS ID #: 2158000
PWS Name: LITTLETON WATER DEPARTMENT

87-68-3	HEXACHLOROBUTADIENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
98-82-8	ISOPROPYLBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
541-73-1	M-DICHLOROBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1634-04-4	METHYL TERTIARY BUTYL ETHER	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
91-20-3	NAPHTHALENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
104-51-8	N-BUTYLBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
103-65-1	N-PROPYLBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
95-49-8	O-CHLOROTOLUENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
106-43-4	P-CHLOROTOLUENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
99-87-6	P-ISOPROPYLTOLUENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
135-98-8	SEC-BUTYLBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
994-05-8	TERT-AMYL METHYL ETHER	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-65-0	TERT-BUTYL ALCOHOL	ND	UG/L	10.00	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
98-06-6	TERT-BUTYLBENZENE	ND	UG/L	0.50	EPA 524.2	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

Primary Lab Signature: David L. Knowlton

Date: 5/15/2018

EDEP Transaction ID: 1016536

Certified Signer User Name: DRDOOM

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Massachusetts Department of Environmental Protection - Drinking Water Program

Synthetic Organic Contaminant Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection
MULT 1	BEAVER BROOK WTP	M	S		RS	C. Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188873	N	

CAS #	Contaminant:	Result:	UOM:	MCL:	MDL:	Analytical Method:	Date of Extraction:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
Regulated Contaminants										
93-72-1	2,4,5-TP (SILVEX)	ND	UG/L	50.00	0.25	EPA 515.3	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
94-75-7	2,4-D	ND	UG/L	70.00	1.00	EPA 515.3	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
116-06-3	ALDICARB	ND	UG/L	---	1.00	EPA 531.1	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1912-24-9	ATRAZINE	ND	UG/L	3.00	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
50-32-8	BENZO(A)PYRENE	ND	UG/L	0.20	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1563-66-2	CARBOFURAN	ND	UG/L	40.00	0.90	EPA 531.1	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
57-74-9	CHLORDANE	ND	UG/L	2.00	0.20	EPA 505	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
75-99-0	DALAPON	ND	UG/L	200.00	1.00	EPA 515.3	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
103-23-1	DI(2-ETHYLHEXYL)ADIPATE	ND	UG/L	400.00	0.60	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
117-81-7	DI(2-ETHYLHEXYL)PHTHALATE	ND	UG/L	6.00	3.00	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
96-12-8	DIBROMOCHLOROPROPANE	ND	UG/L	0.20	0.02	EPA 504.1	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
88-85-7	DINOSEB	ND	UG/L	7.00	0.50	EPA 515.3	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
72-20-8	ENDRIN	ND	UG/L	2.00	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
106-93-4	ETHYLENE DIBROMIDE (EDB)	ND	UG/L	0.02	0.02	EPA 504.1	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

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76-44-8	HEPTACHLOR	ND	UG/L	0.04	0.04	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1024-57-3	HEPTACHLOR EPOXIDE	ND	UG/L	0.20	0.06	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
118-74-1	HEXACHLOROBENZENE	ND	UG/L	1.00	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
77-47-4	HEXACHLOROCYCLOPENTADIENE	ND	UG/L	50.00	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
58-89-9	LINDANE	ND	UG/L	0.20	0.07	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
72-43-5	METHOXYCHLOR	ND	UG/L	40.00	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
23135-22-0	OXAMYL (VYDATE)	ND	UG/L	200.00	1.00	EPA 531.1	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
12674-11-2	PCB AROCLOR 1016	ND	UG/L	---	0.20	EPA 505	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
11104-28-2	PCB AROCLOR 1221	ND	UG/L	---	0.20	EPA 505	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
11141-16-5	PCB AROCLOR 1232	ND	UG/L	---	0.20	EPA 505	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
53469-21-9	PCB AROCLOR 1242	ND	UG/L	---	0.20	EPA 505	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
12672-29-6	PCB AROCLOR 1248	ND	UG/L	---	0.20	EPA 505	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
11097-69-1	PCB AROCLOR 1254	ND	UG/L	---	0.20	EPA 505	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
11096-82-5	PCB AROCLOR 1260	ND	UG/L	---	0.20	EPA 505	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
87-86-5	PENTACHLOROPHENOL	ND	UG/L	1.00	0.10	EPA 515.3	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1918-02-1	PICLORAM	ND	UG/L	500.00	1.30	EPA 515.3	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
122-34-9	SIMAZINE	ND	UG/L	4.00	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
8001-35-2	TOXAPHENE	ND	UG/L	3.00	1.00	EPA 505	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
Unregulated Contaminants										
16655-82-6	3-HYDROXYCARBOFURAN	ND	UG/L	---	1.00	EPA 531.1	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
15972-60-8	ALACHLOR	ND	UG/L	3*	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1646-88-4	ALDICARB SULFONE	ND	UG/L	2*	1.00	EPA 531.1	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

Synthetic Organic Contaminant Report

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1646-87-3	ALDICARB SULFOXIDE	ND	UG/L	4*	1.00	EPA 531.1	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
309-00-2	ALDRIN	ND	UG/L	---	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
23184-66-9	BUTACHLOR	ND	UG/L	---	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
63-25-2	CARBARYL	ND	UG/L	---	1.00	EPA 531.1	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1918-00-9	DICAMBA	ND	UG/L	---	0.18	EPA 515.3	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
60-57-1	DIELDRIN	ND	UG/L	---	0.04	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
16752-77-5	METHOMYL	ND	UG/L	---	1.00	EPA 531.1	5/4/2018	5/4/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
51218-45-2	METOLACHLOR	ND	UG/L	---	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
21087-64-9	METRIBUZIN	ND	UG/L	100*	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
1918-16-7	PROPACHLOR	ND	UG/L	---	0.10	EPA 525.2	5/8/2018	5/8/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC

Primary Lab Signature: David L. Knowlton

Date: 5/10/2018

EDEP Transaction ID: 1015418

Certified Signer User Name: DRDOOM

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PWS ID #: 2158000
PWS Name: LITTLETON WATER DEPARTMENT

Massachusetts Department of Environmental Protection - Drinking Water Program

Inorganic Contaminant Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-05G	RAW: REPLACEMENT WELL 2.1	S	S		RS	C. Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188871 1	N	

Contaminant:	Result:	UOM:	MCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
PERCHLORATE	ND	UG/L	2	0.050	EPA 314.0	5/9/2018	M-MA009	BARNSTABLE COUNTY HEALTH & ENV DEPT

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-06G	RAW: REPLACEMENT WELL 2.2	S	S		RS	C. Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188871 2	N	

Contaminant:	Result:	UOM:	MCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
PERCHLORATE	ND	UG/L	2	0.050	EPA 314.0	5/9/2018	M-MA009	BARNSTABLE COUNTY HEALTH & ENV DEPT

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
RW-07G	RAW: REPLACEMENT WELL 2.3	S	S		RS	C. Godfrey	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
		188871 3	N	

Contaminant:	Result:	UOM:	MCL:	MDL:	Analytical Method:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
PERCHLORATE	ND	UG/L	2	0.050	EPA 314.0	5/9/2018	M-MA009	BARNSTABLE COUNTY HEALTH & ENV DEPT

Primary Lab Signature: Laura B Lajoie

Date: 5/18/2018

EDEP Transaction ID: 1017466

Certified Signer User Name: DRDOOM

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Massachusetts Department of Environmental Protection - Drinking Water Program

Radionuclide Report

Submitted - Signed

PWS ID #: 2158000 City/Town: LITTLETON

PWS Name: LITTLETON WATER DEPARTMENT PWS Class: COM

Primary Lab MA Cert #: M-MA1118 Primary Lab Name: NASHOBA ANALYTICAL LLC

Location ID	Location	M/S:	D/S:	R/F:	Routine/ Special:	Collected By:	Collection Date:	O/R/C:	Resubmit Reason:	Original Collection:
MULT 1	BEAVER BROOK WTP	M	S		RS	Client	5/1/2018	O		

Sample Comments:	Analysis Comments:	Lab Sample ID:	Sample Composited:	Composite Sample Comments:
	3.2 +/- 1.0	188874	N	

Contaminant:	Result:	UOM:	Std Dev (+/-):	MCL:	MDL:	Analytical Method:	Date of Extraction:	Analysis Date:	Analytical Lab ID:	Analytical Lab:
RADON	975	PCI/L		**	100.00	EPA 913.0	5/2/2018	5/2/2018	M-MA072	NEW ENGLAND CHROMACHEM INC
GROSS ALPHA PARTICLE ACTIVITY (INCLUDING RN AND U)	3.2	PCI/L	1.00	15.00	2.10	EPA 900.0	5/18/2018	5/18/2018	EPA05	KNL LABORATORY SERVICES
URANIUM	ND	UG/L		30.00	1.00	EPA 200.8	5/3/2018	5/3/2018	M-NH003	GRANITE STATE ANALYTICAL SERVICES LLC
RADIUM - 226	3.1	PCI/L	0.60		0.60	EPA 903.1	5/17/2018	5/17/2018	EPA05	KNL LABORATORY SERVICES
RADIUM - 228	0.8	PCI/L	0.50		0.70	EPA RA-05	5/22/2018	5/22/2018	EPA05	KNL LABORATORY SERVICES

Primary Lab Signature: David L. Knowlton

Date: 6/1/2018

EDEP Transaction ID: 1021063

Certified Signer User Name: DRDOOM

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APPENDIX H

Climate Resilience Design Standards Tool Project Report

Littleton Water Supply Connection

Date Created: 5/24/2023 11:55:12 AM
Created By: a.gaspar
Date Report Generated: 6/8/2023 8:16:38 AM
Tool Version: Version 1.2
Project Contact Information: Corey Godfrey (cgodfrey@lelwd.com)

Project Summary

Link to Project

Estimated Capital Cost: $19078000.00
End of Useful Life Year: 2074
Project within mapped Environmental Justice neighborhood: Yes

Ecosystem Service Benefits	Scores
Project Score	Low

Exposure	Scores
Sea Level Rise/Storm Surge	Not Exposed
Extreme Precipitation - Urban Flooding	High Exposure
Extreme Precipitation - Riverine Flooding	High Exposure
Extreme Heat	High Exposure

Asset Preliminary Climate Risk Rating Summary

Number of Assets: 3

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Urban Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat
Pump Station	Low Risk	High Risk	High Risk	High Risk
Finished Water Main	Low Risk	High Risk	High Risk	High Risk
Raw Water Main	Low Risk	High Risk	High Risk	High Risk

Climate Resilience Design Standards Summary

	Target Planning Horizon	Intermediate Planning Horizon	Percentile	Return Period	Tier
Sea Level Rise/Storm Surge					
Pump Station					
Finished Water Main					
Raw Water Main					
Extreme Precipitation					
Pump Station	2070			50-yr (2%)	Tier 3
Finished Water Main	2070			50-yr (2%)	Tier 3
Raw Water Main	2070			25-yr (4%)	Tier 3
Extreme Heat					
Pump Station	2070		90th		Tier 3

Finished Water Main	2070	90th	Tier 3
Raw Water Main	2070	90th	Tier 3

Scoring Rationale - Project Exposure Score

The purpose of the Exposure Score output is to provide a preliminary assessment of whether the overall project site and subsequent assets are exposed to impacts of natural hazard events and/or future impacts of climate change. For each climate parameter, the Tool will calculate one of the following exposure ratings: Not Exposed, Low Exposure, Moderate Exposure, or High Exposure. The rationale behind the exposure rating is provided below.

Sea Level Rise/Storm Surge

This project received a "Not Exposed" because of the following:

- Not located within the predicted mean high water shoreline by 2030
- No historic coastal flooding at project site
- Not located within the Massachusetts Coast Flood Risk Model (MC-FRM)

Extreme Precipitation - Urban Flooding

This project received a "High Exposure" because of the following:

- Increased impervious area
- Maximum annual daily rainfall exceeds 10 inches within the overall project's useful life
- Existing impervious area of the project site is greater than 50%
- No historic flooding at project site

Extreme Precipitation - Riverine Flooding

This project received a "High Exposure" because of the following:

- Part of the project is within a mapped FEMA floodplain, outside of the Massachusetts Coast Flood Risk Model (MC-FRM)
- Part of the project is within 200ft of a waterbody and less than 30ft above the waterbody
- No historic riverine flooding at project site
- Project is not likely susceptible to riverine erosion

Extreme Heat

This project received a "High Exposure" because of the following:

- 30+ days increase in days over 90 deg. F within project's useful life
- Increased impervious area
- Existing trees are being removed as part of the proposed project
- Existing impervious area of the project site is greater than 50%
- Located within 100 ft of existing water body

Scoring Rationale - Asset Preliminary Climate Risk Rating

A Preliminary Climate Risk Rating is determined for each infrastructure and building asset by considering the overall project Exposure Score and responses to Step 4 questions provided by the user in the Tool. Natural Resource assets do not receive a risk rating. The following factors are what influenced the risk ratings for each asset.

Asset - Pump Station
Primary asset criticality factors influencing risk ratings for this asset:

- Asset must be operable at all times, even during natural hazard event
- Loss/inoperability of the asset would have regional impacts
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would result in moderate or severe injuries or moderate or severe impacts to chronic illnesses
- Inoperability is likely to significantly impact other facilities, assets, or buildings and will likely affect their ability to operate
- Spills and/or releases of hazardous materials would be relatively easy to clean up

Asset - Finished Water Main
Primary asset criticality factors influencing risk ratings for this asset:

- Asset must be operable at all times, even during natural hazard event
- Loss/inoperability of the asset would have regional impacts
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would result in moderate or severe injuries or moderate or severe impacts to chronic illnesses
- Cost to replace is between $10 million and $30 million
- There are no hazardous materials in the asset

Asset - Raw Water Main
Primary asset criticality factors influencing risk ratings for this asset:

- Asset must be operable at all times, even during natural hazard event
- Loss/inoperability of the asset would have regional impacts
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would be expected to result in minor impacts to people’s health, including minor injuries or minor impacts to chronic illnesses
- Inoperability may moderately impact other facilities, assets, or buildings, but is not expected to affect their ability to operate
- There are no hazardous materials in the asset

Project Climate Resilience Design Standards Output

Climate Resilience Design Standards and Guidance are recommended for each asset and climate parameter. The Design Standards for each climate parameter include the following: recommended planning horizon (target and/or intermediate), recommended return period (Sea Level Rise/Storm Surge and Precipitation) or percentile (Heat), and a list of applicable design criteria that are likely to be affected by climate change. Some design criteria have numerical values associated with the recommended return period and planning horizon, while others have tiered methodologies with step-by-step instructions on how to estimate design values given the other recommended design standards.

Asset: Pump Station — Building/Facility

Sea Level Rise/Storm Surge — Low Risk

Applicable Design Criteria

Projected Tidal Datums: NOT APPLICABLE

Projected Water Surface Elevation: NOT APPLICABLE

Projected Wave Action Water Elevation: NOT APPLICABLE

Projected Wave Heights: NOT APPLICABLE

Projected Duration of Flooding: NOT APPLICABLE

Projected Design Flood Velocity: NOT APPLICABLE

Projected Scour & Erosion: NOT APPLICABLE

Extreme Precipitation — High Risk

Target Planning Horizon: 2070
Return Period: 50-yr (2%)

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

The projected values, standards, and guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Pump Station	2070	50-Year (2%)	9.2	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Extreme Heat High Risk

Target Planning Horizon: 2070
Percentile: 90th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Asset: Finished Water Main Infrastructure

Sea Level Rise/Storm Surge Low Risk

Applicable Design Criteria

Projected Tidal Datums: NOT APPLICABLE

Projected Water Surface Elevation: NOT APPLICABLE

Projected Wave Action Water Elevation: NOT APPLICABLE

Projected Wave Heights: NOT APPLICABLE

Projected Duration of Flooding: NOT APPLICABLE

Projected Design Flood Velocity: NOT APPLICABLE

Projected Scour & Erosion: NOT APPLICABLE

Extreme Precipitation High Risk

Target Planning Horizon: 2070
Return Period: 50-yr (2%)

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

The projected values, standards, and guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Finished Water Main	2070	50-Year (2%)	9.2	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Extreme Heat High Risk

Target Planning Horizon: 2070
Percentile: 90th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): NOT APPLICABLE

Asset: Raw Water Main Infrastructure

Sea Level Rise/Storm Surge Low Risk

Applicable Design Criteria

Projected Tidal Datums: NOT APPLICABLE

Projected Water Surface Elevation: NOT APPLICABLE

Projected Wave Action Water Elevation: NOT APPLICABLE

Projected Wave Heights: NOT APPLICABLE

Projected Duration of Flooding: NOT APPLICABLE

Projected Design Flood Velocity: NOT APPLICABLE

Projected Scour & Erosion: NOT APPLICABLE

Extreme Precipitation High Risk

Target Planning Horizon: 2070
Return Period: 25-yr (4%)

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic

Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

The projected values, standards, and guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Raw Water Main	2070	25-Year (4%)	8.2	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Extreme Heat High Risk

Target Planning Horizon: 2070
Percentile: 90th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE
Methodology to Estimate Projected Values : Tier 3

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): NOT APPLICABLE

Project Inputs

Core Project Information

Name:	Littleton Water Supply Connection
Given the expected useful life of the project, through what year do you estimate the project to last (i.e. before a major reconstruction/renovation)?	2074
Location of Project:	Boxborough, Harvard, Littleton
Estimated Capital Cost:	$19,078,000
Who is the Submitting Entity?	City/Town Littleton Corey Godfrey (cgodfrey@lelwd.com)
Is this project identified as a priority project in the Municipal Vulnerability Preparedness (MVP) plan or the local or regional Hazard Mitigation Plan (HMP)?	No
Is this project being submitted as part of a state grant application?	No
Which grant program?	
What stage are you in your project lifecycle?	Permitting
Is climate resiliency a core objective of this project?	No
Is this project being submitted as part of the state capital planning process?	No
Is this project being submitted as part of a regulatory review process or permitting?	Yes
Brief Project Description:	The Littleton Electric Light & Water Departments (LELWD) is in the process of developing a new water supply well at 153 Taylor Street which during an 8-hour pump test, saw PFAS 6 levels of approximately 14 parts per trillion (ppt). The LELWD is currently constructing a new 3 MGD water treatment plant (WTP) at 15 Whitcomb Avenue funded under DWSRF-6906 to treat for per- and polyfluoroalkyl substances (PFAS) found in their existing raw water sources. Under this proposed project, water from the proposed new well will be pumped to the WTP and will provide additional water to the existing customers of Littleton and is proposed to provide water to up to 18 public water systems (PWS) in Boxborough that are impacted by PFAS, sodium, chloride, and/or perchlorate. Work under this project includes drilling and construction of a new groundwater well source and associated pump station, a new raw water main to convey water from the new well to the new WTP, and a new finished water main extending from the existing Littleton water main in Whitcomb Avenue and continuing south approximately 4.5 miles to the Codman Hill Condominiums (PWS #2037001) in Boxborough.
Project Submission Comments:	

Project Ecosystem Service Benefits

Factors Influencing Output

✓ Project protects public water supply

Factors to Improve Output

✓ Incorporate nature-based solutions that may provide flood protection
✓ Incorporate nature-based solutions that may reduce storm damage
✓ Incorporate strategies that reduce carbon emissions
✓ Incorporate green infrastructure or nature-based solutions that recharge groundwater
✓ Incorporate green infrastructure to filter stormwater
✓ Incorporate nature-based solutions that improve water quality
✓ Incorporate nature-based solutions that sequester carbon carbon
✓ Increase biodiversity, protect critical habitat for species, manage invasive populations, and/or provide connectivity to other habitats
✓ Preserve, enhance, and/or restore coastal shellfish habitats
✓ Incorporate vegetation that provides pollinator habitat
✓ Identify opportunities to remediate existing sources of pollution
✓ Provide opportunities for passive and/or active recreation through open space
✓ Increase plants, trees, and/or other vegetation to provide oxygen production
✓ Mitigate atmospheric greenhouse gas concentrations and other toxic air pollutants through nature-based solutions
✓ Identify opportunities to prevent pollutants from impacting ecosystems
✓ Incorporate education and/or protect cultural resources as part of your project

Is the primary purpose of this project ecological restoration?

No

Project Benefits

Provides flood protection through nature-based solutions	No
Reduces storm damage	No
Recharges groundwater	No
Protects public water supply	Yes
Filters stormwater using green infrastructure	No
Improves water quality	No
Promotes decarbonization	No
Enables carbon sequestration	No
Provides oxygen production	No
Improves air quality	No
Prevents pollution	No
Remediates existing sources of pollution	No
Protects fisheries, wildlife, and plant habitat	No
Protects land containing shellfish	No
Provides pollinator habitat	No
Provides recreation	No
Provides cultural resources/education	No

Project Climate Exposure

Is the primary purpose of this project ecological restoration?	No
Does the project site have a history of coastal flooding?	No
Does the project site have a history of flooding during extreme precipitation events (unrelated to water/sewer damages)?	No
Does the project site have a history of riverine flooding?	No
Does the project result in a net increase in impervious area of the site?	Yes
Are existing trees being removed as part of the proposed project?	Yes

Project Assets

Asset: Pump Station
Asset Type: Typically Unoccupied
Asset Sub-Type: Other
Construction Type: New Construction
Construction Year: 2024
Useful Life: 50

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Building must be accessible/operable at all times, even during natural hazard event

Identify the geographic area directly affected by permanent loss or significant inoperability of the building/facility.
Impacts would be regional (more than one municipality and/or surrounding region)

Identify the population directly served that would be affected by the permanent loss of use or inoperability of the building/facility.
Less than 10,000 people

Identify if the building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

If the building/facility became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the building/facility would result in moderate or severe injuries or moderate or severe impacts to chronic illnesses

If there are hazardous materials in your building/facility, what are the extent of impacts related to spills/releases of these materials?
Spills and/or releases of hazardous materials would be relatively easy to clean up

If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Significant – Inoperability is likely to impact other facilities, assets, or buildings and will likely affect their ability to operate

If this building/facility was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million

Is this a recreational facility which can be vacated during a natural hazard event?
No

If the building/facility became inoperable for longer than acceptable in Question 1, what are the public and/or social services impacts?
Some alternative programs and/or services are available to support the community

If the building/facility became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
No impact on surrounding natural resources is expected

If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the building is not able to serve or operate its intended users or function)?
Loss of building may reduce the ability to maintain some government services, while a majority of services will still exist.

If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts to loss of confidence in government (i.e. the building is not able to serve or operate its intended users or function)?
Loss of confidence in government agency

Asset: Finished Water Main
Asset Type: Utility Infrastructure

Asset Sub-Type: Water
Construction Type: New Construction
Construction Year: 2024
Useful Life: 50
Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure must be accessible/operable at all times, even during natural hazard event.
Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts would be regional (more than one municipality and/or surrounding region)
Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 5,000 people
Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
Will the infrastructure reduce the risk of flooding?
No
If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would result in moderate or severe injuries or moderate or severe impacts to chronic illnesses
If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
There are no hazardous materials in the infrastructure
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Moderate – Inoperability may impact other facilities, assets, or buildings, but cascading impacts do not affect the ability of other facilities, assets, or buildings to operate
If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Between $10 million and $30 million
Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
No impact on surrounding natural resources is expected
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure may reduce the ability to maintain some government services, while a majority of services will still exist
What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Loss of confidence in government agency
Asset: Raw Water Main
Asset Type: Utility Infrastructure
Asset Sub-Type: Water
Construction Type: New Construction
Construction Year: 2024
Useful Life: 50
Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure must be accessible/operable at all times, even during natural hazard event.
Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts would be regional (more than one municipality and/or surrounding region)
Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 10,000 people
Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
Will the infrastructure reduce the risk of flooding?
No
If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would be expected to result in minor impacts to people's health, including minor injuries or minor impacts to chronic illnesses
If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
There are no hazardous materials in the infrastructure
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Moderate – Inoperability may impact other facilities, assets, or buildings, but cascading impacts do not affect the ability of other facilities, assets, or buildings to operate
If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million
Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.

No

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?

No impact on surrounding natural resources is expected

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?

Loss of infrastructure may reduce the ability to maintain some government services, while a majority of services will still exist

What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?

Loss of confidence in government agency

Report Comments

N/A

APPENDIX I

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

December 15, 2023

Littleton Electric Light and Water Department
39 Ayer Road
Littleton, Massachusetts 01460

RE: Applicant: Littleton Electric Light and Water Department
Project Location: Multiple Streets
Project Description: Water source- raw water and finished water main
NHESP File No.: 23-4202

Dear Applicant:

The Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife (the "Division") received the MESA Project Review Checklist and supporting documentation for review pursuant to the Massachusetts Endangered Species Act (MESA) (MGL c.131A) and its implementing regulations (321 CMR 10.00). The filing submitted to the Division in May 2023 described the construction of a raw and finished water main extension. In August 2023, the Applicants submitted an Environmental Notification Form (ENF) for the project, which described the project to be the construction of a raw and finished water main extension, and the development of a new municipal well referred to as the Taylor Street Well. The ENF also described that the project will need an Interbasin Transfer Act approval and has filed for an "Interbasin Transfer Act - Request for Determination of Insignificance".

In response to the MESA filing and MEPA filing, the Division required the submission of additional information related to both aspects of the proposed project. At this time, the Division has received information satisfying our requests for the water main, but our review of the Taylor Street Well remains ongoing. Notwithstanding the anti-segmentation provisions of the MESA (321 CMR 10.16), the Division elects to allow the water main work, as described herein, to proceed in advance of completing our review of the Taylor Street Well. MESA Review of the Taylor Street Well's installation and utilization has not yet been completed. This determination letter's approval applies only to the installation of the water main extension. The Division reserves the right to consider any impacts from the water main project cumulatively with the Taylor Street Well.

The MESA is administered by the Division, and prohibits the Take of state-listed species. The Take of state-listed species is defined as "in reference to animals…harm…kill…disrupt the nesting, breeding, feeding or migratory activity…and in reference to plants…collect, pick, kill, transplant, cut or process…Disruption of nesting, breeding, feeding, or migratory activity may result from, but is not limited to, the modification, degradation, or destruction of Habitat" of state-listed species (321 CMR 10.02).

The Division has determined that this Project, as currently proposed, will occur **within** the actual habitat of the following species:

Scientific Name	**Common Name**	**Taxonomic Group**	**State Status**
Sturnella magna	Eastern Meadowlark	Bird	Special Concern
Emydoidea blandingii	Blanding's Turtle	Reptile	Threatened
Ambystoma laterale pop. 1	Blue-spotted Salamander	Amphibian	Special Concern

These species and their habitats are protected in accordance with the MESA.

Based on the information provided and the information contained in our database, the Division finds that installation of the water mains, as currently proposed, **must be conditioned** to avoid a prohibited Take of state-listed species (321 CMR 10.18(2)(a)). **To avoid a prohibited Take of state-listed species, the conditions attached to this letter must be met.**

Provided the attached conditions are fully implemented and there are no changes to the project plans, this project will not result in a Take of state-listed species. We note that all work is subject to the anti-segmentation provisions (321 CMR 10.16) of the MESA. This determination is a final decision of the Division of Fisheries and Wildlife pursuant to 321 CMR 10.18. Any changes to the proposed project or any additional work beyond that shown on the site plans may require an additional filing with the Division pursuant to the MESA. This project may be subject to further review if no physical work is commenced within five years from the date of issuance of this determination, or if there is a change to the project.

Please note that this determination addresses only the matter of state-listed species and their habitats. If you have any questions regarding this letter please contact Tim McGuire, Endangered Species Review Biologist at (508) 389-6366 or timothy.mcguire2@mass.gov.

Sincerely,

Everose Schlüter, Ph.D.
Assistant Director

cc:

Attachment: List of Conditions

List of Conditions

Applicant: Littleton Electric Light and Water Department
Project Location: Multiple Streets
Project Description: Water source- raw water and finished water main
NHESP File No.: 23-4202
Heritage Hub Form ID: RC-60246
Approved Plan: Raw Water Plan Cross Country

Plans:
(1) Raw Water Plan Cross Country
(2) Beaver Brook Directional Drill
(3) Frac-Out Contingency Plan for Horizontal Directional Drilling
(1-3, collectively, the Site Plans)

To avoid a prohibited Take of state-listed species, the following condition(s) must be met:

1. **Turtle Protection Plan:** Prior to the start of work (including vegetation clearing or soil disturbance), the Applicant shall submit a Blanding's Turtle Protection Plan to the Division for review and written approval. Said Plan shall detail procedures for protecting state-listed turtles during construction, and be prepared and implemented by a qualified, Division-approved wildlife biologist. The Division is available for consultation on Plan development and can provide contact information for qualified biologists. The Division-approved Plan shall be implemented as written; any proposed changes to the Plan must be submitted to the Division for review and written approval prior to implementation of said changes. By December 31st of any year in which work occurs, the qualified biologist shall submit: a) a summary report to the Division detailing project status and compliance with the Plan; and b) any observations of state-listed turtles at https://www.mass.gov/how-to/report-rare-species-vernal-pool-observations.
2. **Authorization Duration:** This authorization is valid for 5 years from the date of issuance. Work may be completed at any time during this 5-year period in compliance with the conditions herein. Thereafter, the Applicant must re-file pursuant to the MESA.
3. **Use of Native Species:** Unless otherwise approved in writing by the Division, all seed and plantings not thereafter maintained as lawn shall be native to Middlesex County, Massachusetts, as provided in The Vascular Plants of Massachusetts: A County Checklist, First Revision (Dow Cullina, Connolly, Sorrie & Somers, 2011).
4. **Restoration or Stabilization:** The Division does not approve of the planting of state-listed species, even if the seeds are sourced outside of Massachusetts. Please carefully review seed mixes at the time of purchase as the specific composition and mixes change within a year (https://www.mass.gov/info-details/list-of-endangered-threatened-and-special-concern-species#plants).
5. **Limits of Work:** No work or alteration to the soil, surface, or vegetation shall occur outside of the limits of work shown on the Site Plans unless otherwise approved in writing in advance by the Division.
6. **Drill Fluid Release or any impact to Resource Area:**
   a. The **Frac-Out Contingency Plan for Horizontal Directional Drilling** shall be implemented as described.

   b. The Contingency Plan shall be either modified to specifically list the Division and the qualified biologist as notified parties or a rider/addendum attached with a specific contact list including the Division, with relevant phone and emails (Timothy McGuire, 508-389-6366, timothy.mcguire2@mass.gov). The final document shall be included in the contractor's packet and made available onsite at all times during work.

c. Should the project result in direct Resource Area impacts beyond those already described in the Notice of Intent, the Division retains the right to require full restoration of impacted areas and, at the Division's sole discretion, an 'after-the-fact' Conservation & Management Permit pursuant to 321 CMR 10.23 (CMP). In such a circumstance, the Applicant will be required to meet the performance standard to achieve a long-term Net Benefit. Projects resulting in a Take of state-listed species may only be permitted if they meet the performance standards for a CMP. The proponent must demonstrate that the project has avoided, minimized and mitigated impacts to state-listed species consistent with the following performance standards: (a) the applicant has adequately assessed alternatives to both temporary and permanent impacts to state-listed species; (b) an insignificant portion of the local population would be impacted by the project; and (c) the applicant agrees to carry out a conservation and management plan that provides a long-term Net Benefit to the conservation of the state-listed species impacted.

APPENDIX J

55 Walkers Brook Drive, Suite 100, Reading, MA 01867
Tel: 978.532.1900

November 29, 2023

Vandana Rao
Executive Director
The Commonwealth of Massachusetts, Water Resources Commission

Re: Littleton-Boxborough Water Main
Interbasin Transfer Act- Request for Determination of Insignificance
Response to Comments

Dear Ms. Rao,

Weston & Sampson submitted a Request for Determination of Insignificance (RDI) Application on behalf of the Town of Littleton, Massachusetts on August 15, 2023 in support of a water main extension project to mitigate PFAS and chloride-contaminated public drinking water supply wells in Boxborough, Massachusetts. As described in the application, a proposed finished water main will be constructed from the existing Littleton water main at Nancy's Way in Littleton (near the Boxborough/Littleton Town Line), extending south along Beaver Brook Road and Swanson Road (Merrimack Basin) and terminating at 330 Codman Hill Road in Boxborough, Massachusetts (SuAsCo Basin). Several existing public drinking water supply wells in Boxborough within the Merrimack basin, which include PWS ID's 2037007- 01G, 2037007-02G, 2037007-03G, 2037018-01G, 2037018-02G, 2037022-01G, 2037024-01G, 2037024-02G and 2037034-01G as well as the SuAsCo basin, which include PWS ID's 2037021-01G, 2037002-02G, 2037019-01G, 2037023-01G, 2037001-01G and 2037035-01G, have been impacted by road salt and Per- and polyfluoroalkyl substances (PFAS) contamination. As a result of the proposed project, Boxborough's impacted public drinking water supplies will be able to connect to the Littleton water system to resolve these serious water quality challenges in this community.

The Littleton Electric Light & Water Department (LELWD) is also in the process of developing a new groundwater supply well at 153 Taylor Street (Proposed Taylor Street Well) to supplement the capacity of their existing water supply sources. Raw water from the proposed Taylor Street Well will be connected to the newly constructed 1.8 million gallon per day (MGD) water treatment plant (WTP) at 15 Whitcomb Avenue to treat Iron, Manganese, and PFAS found in their existing raw water sources. The existing sources that are being treated by the Whitcomb Ave WTP include the Spectacle Pond Well (2158000-04G) and the Whitcomb Ave Wells (215800-02G, -08G). This project includes the construction of a proposed raw water main that will connect the proposed Taylor Street well to the WTP. The treated sources will then be pumped into the finished water main to serve the existing distribution system within Littleton in addition to the proposed finish water main to be extended into Boxborough. The extension will begin in the Merrimack basin (at the Littleton / Boxborough Town line) and extend into the SuAsCo basin, serving the impacted PWS's and other benefitting parcels (if they choose to connect) in the Town of Boxborough. The requested maximum daily transfer volume for this extension from the Merrimack basin to the SuAsCo basin is 60,000 gallons per day (gpd).

Weston & Sampson has reviewed the October 2nd request for additional information letter submitted by the Water Resources Commission (WRC), Massachusetts Department of Environmental Protection (MassDEP) and Department of Fish and Game's Division of Fisheries and Wildlife (DFW) in response to Littleton's RDI Application for the proposed finished water main in Littleton and Boxborough, MA. The WRC's questions/comments are listed below, followed by our responses. This document is organized by comment in the order in which they were received. We hope that the additional clarification and supplementary information provided will address each of the comments listed below.

<u>Vandana Rao on the RDI Application for the Town of Littleton, MA – Request for Additional information dated 10/2/2023:</u>

1. *From prior discussions and as described in the RDI cover letter, it is WRC staff's understanding that multiple contaminated wells in Boxborough in both the Merrimack and SuAsCo/Concord River Basins are to be taken offline and replaced by the new water line service from Littleton. However, Figure 1 (Site Map) only depicts one impacted well in Boxborough in the Merrimack River Basin. If properties with contaminated wells in both basins are being served by the new water line, our review will require the volumes and proportion of water that will remain inbasin and the volumes and proportion of water that will be transferred to the SuAsCo/Concord River Basin. Please provide the total expected maximum day flow in gallons per day for the new water line, the expected maximum day flow that will remain in the Merrimack River Basin, and the expected maximum day flow that will be transferred to the SuAsCo/Concord River Basin. Also provide a revised Figure 1.*

   The total maximum daily flow for the proposed finished water main is limited by the recently (6/26/23) signed Intermunicipal Agreement (IMA) between Littleton and Boxborough of 65,000 gallons per day (gpd). This value does not include emergency fire flow conditions. A revised Figure 1 is included herein (Attachment A) which depicts the eleven (11) public water supplies (PWS) in Boxborough with contaminated wells which are anticipated to be served from the proposed finished water main. Table 1 below presents the 5-Year average usage and maximum day usage of these water supply sources based on the Annual Statistic Reports (ASR) from 2017 to 2021. As shown in Table 1, the average expected usage from the six (6) PWS's in the receiving SuAsCo basin is 25,482 gpd and the maximum day usage is 37,698. These values are considered extremely conservative given the maximum day flow values used for each well did not occur on the same day and the largest source of supply (Harvard Ridge Condominiums) consists of five wells, four of which are located in the donor basin (Merrimack). In addition, the groundwater discharge for the condo complex wastewater is also located in the donor basin (Merrimack). Using, the IMA limitation of 65,000 gpd and the conservative maximum daily flow presented in Table 1 for the receiving basin (SuAsCo) of 37,698 gpd, the remaining 23,302 gpd will remain in the donor basin (Merrimack).

Table 1:Town of Boxborough Contaminated PWS Water Usage 2017 to 2021

Basin	PWS ID#	PWS Name	PWS Address	2017 to 2021 5-Year Average Usage (gpd)	2017 to 2021 Maximum Day Usage (gpd)
SuAsCo	2037001	Codman Hill Condominiums	276 Codman Hill Road	9,709	11,660
	2037002	Harvard Ridge Condominiums	90 Swanson Road	12,694	20,970
	2037019	Boxborough Executive Center	1740 Mass Ave	271	319
	2037021	60&70 Codman Hill Road	60 Swanson Road	1,138	2,377
	2037023	330 Codman Hill Road	328-330 Swanson Road	620	1,053
	2037035	Bright Horizons Daycare	20 Codman Hill Road	1,051	1,319
SuAsCo TOTAL				25,482	37,698
Merrimack	2037007	Brook Village Condominiums	52 Swanson Road	14,777	17,421
	2037018	159 Swanson Road – Setra Systems	159 Swanson Road	5,741	8,134
	2037022	85 Swanson Road LLC	85 Swanson Road	2,522	3,430
	2037024	155 Swanson Road	155 Swanson Road	4,467	5,807
	2037034	Campanelli Development	200-500 Beaver Brook Road	4,070	5,849
Merrimack TOTAL				31,576	40,641
Town of Boxborough TOTAL				57,059	78,339

2. *There isn't any information provided in the RDI to establish the limiting factor of the interconnection. For the purpose of interbasin transfer review, the maximum hydraulic capacity (not to be confused with expected maximum day flow or demand) of the finished water main, in gallons per day as well as how the interbasin transfer will be limited to the 60,000 gpd that is being requested will be needed. Please describe in detail.*

   The finished water main will consist of a 12-inch ductile iron water main from Nancy's Way to Route 111 (Massachusetts Avenue) and an 8-inch ductile iron water main from Route 111 to 330 Codman Hill Road. The maximum hydraulic capacity of the proposed 8-inch finished water main is expected to be approximately 850 gpm to support potential fire flow demand as modeled at the southern terminus of the water main with a 20 pound per square inch (psi) residual pressure in the main. Fire flow would only occur during an emergency condition and is not anticipated to last for an entire day. A significant 4-hour, 850 gpm fire flow demand occurring at the southern terminus of the water main in Boxborough would be approximately 0.2 million gallons (mgd). However, typical fire events are far less than 4-hours in duration.

   The limiting factor of the interconnection is provided for in the Intermunicipal Agreement (IMA) between the Towns of Littleton and Boxborough (Attachment B). Section I(a)(iv) of the IMA allocates a maximum of 65,000 gpd to the benefited parcels for domestic uses, with specific gallonage identified for each property at the time of connection. Sections VII(b) and VII(c) of the IMA place restrictions on the benefitted properties and provide for cooperation between the communities in the event that benefitted properties exceed their allocation. Ultimately, the limiting factor of the interconnection will be the demand of the connected sources/properties which will be monitored by the Town of Littleton with individual meters (domestic and fire). The average day and maximum day demand are provided in Table 1 of this response to comment letter.

The Town of Littleton will directly bill benefited properties to which it supplies water. Therefore, the SuAsCo benefitted properties' individual meters will be monitored as to limit the total transfer volume to the 60,000 gpd. Any Boxborough parcels being served by the water main extension will be instructed to follow the Town of Littleton guidelines.

3. *The RDI application requests an interbasin transfer of 60,000 gpd (max day). WRC staff reviewed the Secretary's Certificate on the Expanded Environmental Notification Form filed with MEPA which contained a comment letter from MassDEP's Central Regional Office. The comment letter states that "Of the 529,900 gpd for the Project, 65,000 gpd will be directed to an area in Boxborough that includes 11 small public water systems (PWSs)". WRC staff followed up with MassDEP staff who confirmed that the 65,000 gpd value represents the volume in the Intermunicipal Agreement (IMA) between Littleton and Boxborough. Please provide a copy of the IMA, along with more details on the IMA volume and the amount that is anticipated to be transferred out of basin. Does the 65,000 gpd IMA volume represent an average day to properties in Boxborough in both basins, while the 60,000 gpd ITA request represents a maximum day transfer only to the SuAsCo/Concord River Basin?*

   The 65,000 gpd from the IMA (Attachment B) volume represents a maximum transfer volume from the Town of Littleton to the Town of Boxborough and includes Boxborough customers within both the Merrimack and SuAsCo Basins. This volume differs from the ITA request of 60,000 gpd, which is a maximum daily transfer from Littleton (Merrimack Basin) to Boxborough (SuAsCo Basin). For additional information, please see above response #1 for conservative maximum daily flow calculations and response #2 for IMA limiting factor and metering for ITA limit monitoring.

4. *Please confirm that the Beaver Brook wells will not be used to supply Boxborough since the new Whitcomb Ave. treatment plant will not treat water from the Beaver Brook wells. Also please confirm that the finished water main to Boxborough will only transport water from the new Whitcomb Ave. treatment plant.*

   The Town of Littleton has confirmed that the Beaver Brook Wells will not be treated at the new Whitcomb Avenue WTP. The Beaver Brook wells have their own separate treatment plant (approximate capacity of 0.388 MGD). There is only one distribution system, and all sources are on the same pressure zone. Hydraulic modeling indicates it is not likely that any water withdrawn from the Beaver Brook Wells will supply any of the connections within Boxborough due to the location of the Beaver Brook sources in the northern part of town and the distance of the WTP from the proposed finished water main extension into Boxborough. Modeling indicates the majority of water leaving the Whitcomb Avenue WTP (1.8 MGD capacity located in the southern part of the distribution system) will flow north along Whitcomb Avenue with a small portion of the volume flowing south to existing Littleton customers and the new Boxborough customers.

5. *Please include the MEPA file number for the EENF per question 2B on the RDI application.*

   The MEPA file number for the EENF is EEA#16736.

6. *In Section 3 of the RDI application, some responses only pertain to the Taylor St. Well. Please revise responses to accurately reflect the full scope of the project – i.e., that multiple Littleton sources will be used to supply water to Boxborough, plus the installation of the raw and finished water mains*

   See Attachment C.

7. *Please expand the responses regarding vernal pools (Section 3.A.6) and surface water features (Section 3.A.7) to describe any potential impacts to the variety of surface water features located in the entire project area stratified by wetland type/location to include all certified vernal pools.*

   See Attachment C. Additionally, a detailed impact assessment is provided in the Source Final Permit (BRP WS19) and the associated response to the Technical Deficiency Letter. The permit application and subsequent response letter were submitted to the DEP in January and March 2023 respectively. The permit documents were also provided to the WRC and NHESP on November 17, 2023.

8. *Please confirm that no water will be supplied to Harvard, although the finished water main will cross into Harvard for a short distance.*

   No water will be supplied to Harvard at this time. The Town of Littleton does not have an agreement with the Town of Harvard for the provision of water supply. Please note, however, that a tee connection with a gate valve and capped end will be installed in the water main at the intersection of Littleton County Road and Beaver Brook Road in the Town of Harvard prior to entering Boxborough for the potential of future connections.

9. *From prior communications, WRC staff understood that bleeding or flushing may take place but no information or volume for flushing was included in the RDI. Please describe any bleeding or flushing that may occur, including the associated volume and location(s) where this will take place. If there will be no bleeding or flushing as previously discussed, please state that.*

   The 8-inch finished water main installed in Boxborough within the SuAsCo/Concord River basin will be flushed biannually at locations determined by the LELWD for water quality purposes. The total flushing volume is anticipated to be 10,000 gallons during each flushing period, for a total of under 20,000 gallons per year. This water is considered for maintenance purposes and therefore is not included in the IMA 65,000 gpd allocated to properties in Boxborough for domestic purposes. Flushing is not anticipated to occur concurrent with peak demand periods. All flushing volume will be measured and recorded onsite at each hydrant by the LELWD staff.

   Bleeding is not anticipated to occur on an annual, planned basis but may take place if the LELWD determines it is necessary for water quality purposes. If bleeding occurs, water will be released from the southern terminus of the finished water main just north of 330 Codman Hill Road in Boxborough at an approximate flowrate of 10 – 20 gpm for roughly 8-hours per day (anticipated max volume of 9,600 gallons per day). Bleeding operation volumes will be measured onsite by the LELWD staff. Both bleeding and flushing volumes are included in the expected 60,000 gpd transfer volume requested.

10. *Please provide more information and details on the proposed directional drilling to install the pipe under Beaver Brook, including details about the depth of drilling, depth to bottom in Beaver Brook, and updated figures to show any data already collected that characterize the types and depth of substrate between the bottom of Beaver Brook and the directional drill.*

The horizontal directional drilling (HDD) cross-section and Frac-out plan were submitted to DFW on November 17, 2023. As shown on the cross section, entry and exit pits for the work will be stationed approximately 560 feet apart on either side of Beaver Brook. Due to a greater amount of available staging area on the western side of Beaver Brook, the western HDD pit is proposed to be the entry pit. HDD will occur to a depth of approximately 15 feet below the thalweg of Beaver Brook with the goal of preventing interference with river substrate material. Additional conditions of work, including time of year restrictions to protect sensitive species, are anticipated as conditions of approval by DFW.

11. *Please provide all available pump test data for the Taylor St. Well, including a map showing the location and type of all surface water monitoring.*

The Pumping Test Report (BRP WS 19) was submitted to WRC and DFW on November 17, 2023. Manual Data is provided in Appendix C of that report and pressure transducer datalogger data is available upon request. A site map is included in the report as Figure 2 that depicts all monitoring locations including those used for surface water monitoring.

<u>Weston & Sampson met with Vanessa Curran and Erin Graham (WRC) to discuss the RDI Application for the Town of Littleton, MA –11/21/2023:</u>

Weston & Sampson was made aware of an error in Section 4.C of the RDI Application. The statement read "Streamflow for Beaver Brook was simulated by multiplying streamflow at Nashoba Brook by 181%." The statement is revised as follows: Streamflow for *Stony* Brook was simulated by multiplying streamflow at Nashoba Brook by 181%.

We hope that the responses herein adequately address your concerns. If you have any questions or comments, please do not hesitate to call.

Sincerely,

WESTON & SAMPSON ENGINEERS, INC.

Kevin MacKinnon, PG, CG, PH-GW
Senior Technical Leader, Hydrogeology

Attachments:

Attachment A- Updated Site Map

Attachment B- Littleton and Boxborough IMA

Attachment C- Updated RDI Application Section 3

cc: Mr. Corey Godfrey, Water and Sewer Superintendent, LELWD

55 Walkers Brook Drive, Suite 100, Reading, MA 01867
Tel: 978.532.1900

ATTACHMENT A

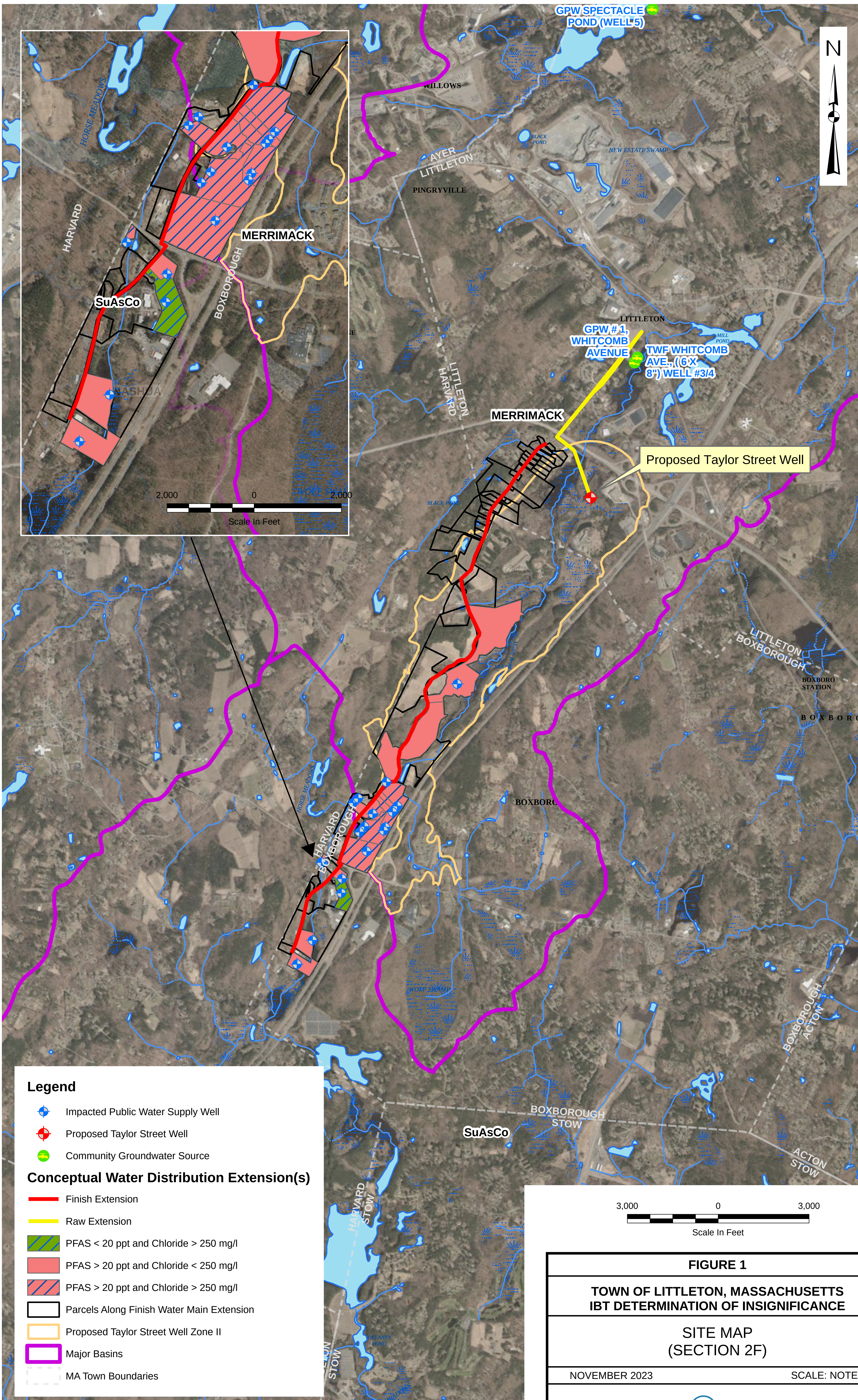

FIGURE 1

TOWN OF LITTLETON, MASSACHUSETTS
IBT DETERMINATION OF INSIGNIFICANCE

SITE MAP
(SECTION 2F)

NOVEMBER 2023 SCALE: NOTED

Weston & Sampson

55 Walkers Brook Drive, Suite 100, Reading, MA 01867
Tel: 978.532.1900

ATTACHMENT B

Intermunicipal Agreement
Between
The Town of Boxborough and the Town of Littleton
Regarding the Provision of Water

THIS AGREEMENT ("the Agreement") is entered into as of June 26, 2023 ("Effective Date") by and between the Town of Boxborough, acting through its Select Board ("Boxborough"), with offices at 49 Middle Road, Boxborough, MA 01719, and the Town of Littleton, acting through its Board of Water Commissioners ("Littleton"), with offices at 39 Ayer Road, Littleton, MA 01460 (together, the "Parties").

RECITALS

Whereas, the Town of Littleton intends to obtain a State Revolving Fund loan of $19,200,000 (nineteen million two hundred thousand dollars) at zero percent interest for the construction of the following:

1. A groundwater well at 153 Taylor Street in Littleton (the "Groundwater Well");
2. A transmission line connecting the Groundwater Well to the Town's existing treatment plant at 15 Whitcomb Avenue, Littleton (the "Transmission Line");
3. An extension of the Town's water distribution system along Whitcomb Avenue to the Town line with the Town of Harvard (the "Littleton Leg"); and
4. An extension of the Town's water distribution system from the Town line with Harvard to certain benefited parcels in Boxborough (the "Boxborough Extension")

(collectively, the "Project");

Whereas, the location of the Boxborough Extension is shown, more or less, on the plan entitled Proposed Finished Water Main Extension (the "Plan"), attached as Exhibit A, with the understanding that minor changes to the location of piping may occur;

Whereas, the properties to be benefited and served by the installation of the Boxborough Extension are listed on Exhibit B (hereinafter, the "Benefited Properties");

Whereas, the Groundwater Well is anticipated to produce 0.5 million gallons per day, a portion of which shall be available for use by the Benefited Properties;

Whereas, the estimated cost of construction for the Groundwater Well is $3,000,000, the Transmission line is $3,000,000, the Littleton Leg is $1,210,000, and the Boxborough Extension is $11,990,000;

Whereas, the Parties agree, that the Benefited Properties shall be assessed betterments, on the terms and conditions specified herein;

Whereas, on April 10, 2023, the Massachusetts Department of Transportation, Highway Division, expressed its desire to commit $6,500,000 (six million five hundred thousand dollars) towards the Project;

Whereas, Littleton intends to work with its legislation delegation to obtain general legislation authorizing (1) Littleton to supply the Benefited Properties with water for the purposes of providing water for the extinguishment of fires and for domestic, manufacturing, and other purposes, to take land by eminent domain for such purposes, and to charge rates for the supplying of water, and (2) Boxborough to assess and collect betterments for the construction of the Project, subject to an Intermunicipal Agreement between Littleton and Boxborough;

Whereas, the Parties, in furtherance of a public purpose, by this agreement seek to authorize Littleton to extend its public water distribution system to the Benefited Properties, provided that in such event, Boxborough shall assess and collect certain betterments and user charges for the construction and use of such system from benefited property owners and remit those collected funds to Littleton;

Whereas, the Parties intend for this Agreement to remain in full force and effect for 25 years, unless sooner terminated as provided in this Agreement or extended by any act of the Legislature;

Whereas, the Parties are authorized pursuant to G.L. c. 40, §4A to enter into the Agreement.

NOW, THEREFORE, in consideration of the mutual agreements and provisions set forth herein, and the payments and obligations hereunder, and for other good and valuable consideration, the receipt and adequacy of which consideration is hereby acknowledged, the Parties hereby agree as follows:

I. Supply of Water to the Inhabitants of Boxborough

a. Purposes

i. Littleton may construct, operate, maintain, and repair the Boxborough Extension, a water distribution system within Boxborough in the location depicted on the Plan, for the purpose of supplying water from its sources to the Benefited Properties.

ii. If Littleton elects to construct the Boxborough Extension, Boxborough shall assess and collect betterments on all Benefited Properties, as specified herein. Benefited Properties shall not be permitted to opt-out of the payment of any betterment.

iii. Benefited Properties choosing to connect to the Boxborough Extension shall pay such reasonable connection fees and water usage charges as may be established by Littleton, acting by and through its Board of Water Commissioners. Benefited Properties shall comply with the rules and regulations promulgated by Littleton, and to provide Littleton with full access to the property to inspect for such compliance, as a condition of connecting to the Boxborough Extension and continuing to receive water services thereafter.

iv. Littleton shall allocate 65,000 gallons per day of water in total to the Benefited Parcels for domestic uses. Benefited Properties shall be required to sign an agreement establishing the amount of water allocated to that parcel at the time of connecting. Such gallonage shall be determined based on (1) the actual current use for parcels with a public water supply permit from the Massachusetts Department of Environmental Protection, (2) septic permit volumes for those parcels without a public water supply permit, or (3) such other reasonable apportionment as Boxborough and Littleton may agree.

v. Littleton may increase the total water allocated to the Benefited Parcels specified in Section I.a.iv; provided, however, that the total volume of water supplied to the Benefited Parcels is deemed to be insignificant pursuant to the Interbasin Transfer Act, G.L. c.21, §§8B-8D, and 313 CMR 4.08.

b. <u>Extinguishment of Fires</u>

i. The Boxborough Extension shall include the provision of water for the extinguishment of fires. Such water may be accessed and used by Littleton, Boxborough, and any other Fire Department providing fire suppression assistance to the inhabitants of Boxborough.

II. Supply of Water to the Inhabitants of Littleton

a. <u>Extension and additional connections within Littleton</u>. Nothing herein shall constrain Littleton from authorizing connections to the Transmission Line or Littleton Leg or otherwise expanding its water distribution system, including the construction of water mains off of the Transmission Line or the Littleton Leg.

III. Construction, Operation, Maintenance and Repair of Boxborough Extension

a. Public and Private Ways. Littleton shall obtain all necessary approvals and interests in land, including but not limited to easements to use private right of ways, and requisite authorizations and approvals to use property owned by the Town of Boxborough and Boxborough public ways, as necessary, to construct and operate the Boxborough Extension.

b. Traffic Impacts. Littleton shall make reasonable efforts to minimize traffic impacts caused by the construction, operation, maintenance, and repair of the Boxborough Extension. Except in the case of an emergency, Littleton shall provide 24 hour notice to Boxborough where traffic may be diverted for longer than 4 hours.

c. Fire Hydrants. Littleton shall install fire hydrants along the Boxborough Extension at intervals determined to be reasonable by Littleton, such costs to be recovered as part of the betterment fee. The fire hydrants shall be owned and maintained by Littleton at its own cost and expense.

d. Ownership. All utilities within the Boxborough Extension shall be owned, operated, maintained and repaired by Littleton, or its agents, at its effort and expense as part of the Town's public water system.

IV. Betterments

a. Costs to Better the Benefited Properties. The Parties agree that the cost to better the Benefited Properties shall reflect the Benefited Parcels' actual share of costs to construct the Project, which shall include a proportionate share of the costs to construct the Groundwater Well, the Transmission line, and the Littleton Leg, and the entire cost to construct the Boxborough Extension, less the contribution received from MassDOT for the Project (collectively "Costs to Better the Benefited Properties").

b. Lien. Upon written notice from Littleton, Boxborough shall execute and record an Order and such other documents as may be required by General and Special Law to establish a lien upon the Benefited Properties for their share of the Costs to Better the Benefited Properties. Boxborough shall notify Littleton within 3 business days of recording said Order.

c. Calculation. Within 2 (two) months of completion of the Boxborough Extension, Littleton shall determine the value of such benefit or advantage to the Benefited Properties and the betterment to be assessed to each parcel, utilizing any method authorized by General or Special Law. Littleton shall thereafter certify to the Boxborough assessors the assessments to be made to each of the Benefited Properties for its share of Costs to Better the Benefited Properties.

d. Assessment.

i. Within 30 days from receipt of notice provided in Section IV.c, Boxborough shall commit such assessments to its Collector, in accordance with G.L. c.80, §4, and the Collector shall forthwith issue a notice of assessment and demand for payment to each Benefited Property in accordance therewith.

ii. The Boxborough Assessor may, and at the request of the owner of the land assessed shall, apportion all betterment assessments or unpaid balances thereof, into a number of equal annual payments. Such payments may be further apportioned and collected by Boxborough on quarterly tax bills over such term authorized by General or Special Law, or a single tax bill at the option of Boxborough.

iii. The Boxborough Assessor shall not extend the time for payment pursuant to G.L. c.80, §13A.

iv. An owner of land assessed may pay the total amount due without a prepayment penalty.

v. The Assessments may bear an interest rate of up to 5% per annum, or such other rate as may be determined by act of the General Court, at the discretion of Littleton. Littleton shall notify Boxborough of the rate of interest, if any, with the notice provided under Section IV.c.

e. Abatement and Deferral. As may be authorized by General or Special Law, the Boxborough Assessor shall not abate or defer an assessment without the review and approval of the Littleton Board of Water Commissioners. Boxborough shall defend appeals of its decisions on abatement requests and deferrals, and Littleton shall indemnify Boxborough for all costs thereof, including attorney's fees.

f. Non-Assessment. In the event that the Boxborough Assessor fails to assess a betterment or include the apportioned betterment on a Benefited Properties' tax bill, Boxborough shall pay the amount of the unpaid and non-collectable betterment to Littleton.

g. Non-payment. Pursuant to G.L. c. 80, §13 or any other applicable General or Special Law, the Boxborough assessors shall add unpaid assessments to the annual tax assessed to the respective Benefited Properties, with interest to the date when interest on taxes becomes due and payable. Boxborough shall have the same powers and be subject to the same duties with respect to such assessments as in the case of the annual taxes upon real estate, and the law in regard to the collection of the annual taxes, to the sale of land for the non-payment thereof and to redemption therefrom, so far as applicable. Upon written notice from Littleton, and as authorized by applicable law, Boxborough shall commence collection proceedings.

h. General Provisions. Sections 42G to 42K, inclusive, of chapter 40 of the General Laws and chapter 80 of the General Laws relative to the apportionment, division, reassessment and collection of assessments, and interest, shall apply to assessments levied, unless otherwise specified in any general or special legislation that may be adopted or obtained upon agreement of the Parties.

V. Water Connection and Usage Fees

a. Water Connection Fees and Water Usage Rates. Littleton shall directly bill Benefited Properties to which it supplies water in accordance with the fees and rates established by the Littleton Board of Water Commissioners. Said fees and rates shall not exceed those paid by the inhabitants of Littleton.

b. Collection. All water bills shall be paid directly by the Benefited Properties to Littleton. As authorized by the General Court pursuant to legislation proposed by agreement of the Parties, unpaid bills shall constitute a lien against the respective Benefited Properties, and upon the written request of Littleton Boxborough shall commit and collect such charges as a tax in accordance with G.L. c.40, §§42A-42F and G.L. c.60, §37. Sums collected by Boxborough pursuant to this authority shall be remitted to Littleton within 60 days of collection, unless otherwise agreed in writing by the Parties.

VI. Collection and Tax Foreclosure

a. Legal Fees. Prior to initiation of any court filing for the collection of betterments from Benefitted Properties, the Parties shall agree to divide legal fees and costs amongst themselves or, if they cannot agree, then Littleton's share of such legal fees shall equal the percentage of unpaid municipal liens attributable to the unpaid betterments or water usage fees; provided, however, if after judgement or settlement Boxborough obtains title to a Benefited Property and the appraised value of the Benefited Property at the time of acquisition exceeds the value of the outstanding municipal liens and Boxborough's legal fees and costs, and Boxborough is legally authorized to retain such additional value, Littleton shall not be responsible for any legal fees and costs and such amounts shall be remitted by Boxborough to Littleton within 60 days of acquisition of the Benefited Property. For example, if there is $90,000 in unpaid property taxes and $10,000 in unpaid betterments, Littleton shall pay 10% (ten percent) of all legal fees and costs. If the property is redeemed prior to Boxborough taking title, then Littleton shall be refunded all legal fees and costs that it has paid and shall not be responsible for any unpaid legal fees and costs.

b. Takings. In the event Boxborough acquires a Benefited Property through foreclosure of tax title, Boxborough shall remit payment of all unpaid betterments and user fees within two (2) calendar years of foreclosure or within 60 days of the sale of such property, whichever is earlier, unless otherwise agreed by the Parties.

VII. Water Use Restrictions

a. Restrictions on Littleton. The Parties recognize that at times, Littleton may be mandated by the federal or state law or the terms of its Water Management Act permits or registration to limit or restrict the volume of water it can withdraw. Littleton may also need to restrict water due to a drought emergency as declared by the Secretary of Energy and Environmental Affairs, or other operational issues. During such time, water may be limited or restricted to the Benefited Properties in the same manner and amount as it is limited or restricted to all users of Littleton's water, including limitations on how the Benefited Properties may use the water (i.e., limits on outdoor non-essential water use).

b. Restrictions on Benefited Properties. Littleton shall require the Benefited Property owners to comply with the Water Use Restriction Regulations of Littleton and to pay any and all fines for non-compliance to Littleton as a condition of connecting the Boxborough Extension. The Parties recognize that Boxborough will not play a role in the enforcement of such regulations, unless authorized by any general or special legislation that may be adopted or obtained.

c. Legislation. The Parties shall cooperate in seeking such general or special legislation as may be reasonably required by Littleton to limit the amount of water available to the Benefitted Properties beyond those restrictions equally applicable to all properties served by Littleton's public water system.

VIII. Billing

Within 30 days of collection, Boxborough shall remit betterment assessments collected pursuant to this Agreement to Littleton, including, but not limited, to the interest added for apportioned and/or unpaid assessments as provided above.

IX. Reporting

a. Annually, and within 10 business days of request, the Assessor shall furnish Littleton with a list of the owners of each Benefited Property, including the balance owed for the betterment assessment, the dates of any missed payments and any amounts in arrears.

b. Within 30 days of issuance of each quarterly tax bill, the Assessor shall provide a written certification to Littleton that the apportioned betterment was included on the tax bill for all Benefited Properties for which betterments are owed.

c. Whenever a Benefited Property has fully paid all assessed betterments, the Assessor shall send notice of such to Littleton.

X. Authorizing Legislation

The Parties shall cooperate in seeking such general or special legislation as may be required to effectuate the purposes of this Agreement, the terms of which shall be agreed upon by the Parties.

XI. Term

a. The Term of the Agreement is twenty-five years commencing on the Effective Date, unless otherwise extended by law.

b. If Littleton elects not to construct the Boxborough Extension, this Agreement shall become null and void upon notice to Boxborough of such decision. Littleton shall not proceed to construction without the expected contribution from MassDOT ($6.5 million), unless the parties otherwise agree.

c. If the General Court fails to enact legislation authorizing Boxborough to assess and collect such betterments prior to June 1, 2026, this Agreement shall become null and void.

XII. Other General Terms

a. Notices. All notices permitted or required by this Agreement shall be in writing and delivered by certified mail, return receipt requested, to such persons who may be specified from time to time by each Party and to the other Party's Town Clerk. No notice shall be effective until received by the other Party's Town Clerk.

b. Reliance. Nothing contained in the Agreement shall create a contractual relationship with, or a cause of action in favor of, a third party against either or both Parties.

c. Entire Agreement. This Agreement and the Attachment to this Agreement represent the entire agreement among the Parties pertaining to the subjects covered in this Agreement and expressly supersede all prior negotiations, representations and formal or informal agreements leading up to the final approval and execution of the Agreement respecting such subjects.

d. Amendments and Modifications. The Agreement may be amended or modified only by written instrument signed by all the Parties.

e. Invalidity or Unenforceability. The invalidity or unenforceability of any one or more phrases, sentences, clauses or sections herein contained by a Court of competent jurisdiction shall not affect the validity or enforceability of the remaining portions the Agreement.

f. Counterparts. This Agreement may be executed in any number of counterpart copies, all of which constitute one and the same agreement and each shall constitute an original.

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LITTLETON SELECT BOARD

Gary C. Wilson, Chair

LITTLETON BOARD OF WATER COMMISSIONERS

Nick Lawler, General Manager

BOXBOROUGH SELECT BOARD

Kristin Hilberg, Chair

Exhibit A
Plan

Exhibit B

List of Benefited Properties

Assessors Parcel No.	Street Address	Unit	Town
01-010-000	240 LITTLETON COUNTY ROAD	-	BOXBOROUGH
03-011-000	300 BEAVER BROOK ROAD	-	BOXBOROUGH
03-012-000	600 BEAVER BROOK ROAD	-	BOXBOROUGH
03-013-000	500 BEAVER BROOK ROAD	-	BOXBOROUGH
07-003-000	0 SWANSON ROAD	-	BOXBOROUGH
	196 SWANSON ROAD	501	BOXBOROUGH
		502	BOXBOROUGH
		503	BOXBOROUGH
		504	BOXBOROUGH
		505	BOXBOROUGH
		506	BOXBOROUGH
		507	BOXBOROUGH
		508	BOXBOROUGH
		509	BOXBOROUGH
		510	BOXBOROUGH
		511	BOXBOROUGH
		512	BOXBOROUGH
	202 SWANSON ROAD	513	BOXBOROUGH
		514	BOXBOROUGH
		515	BOXBOROUGH
		516	BOXBOROUGH
		517	BOXBOROUGH
		518	BOXBOROUGH
		519	BOXBOROUGH
		520	BOXBOROUGH
		521	BOXBOROUGH
		522	BOXBOROUGH
		523	BOXBOROUGH
		524	BOXBOROUGH
	208 SWANSON ROAD	525	BOXBOROUGH
		526	BOXBOROUGH
		527	BOXBOROUGH
		528	BOXBOROUGH
		529	BOXBOROUGH
		530	BOXBOROUGH
		531	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
		532	BOXBOROUGH
		533	BOXBOROUGH
		534	BOXBOROUGH
		535	BOXBOROUGH
		536	BOXBOROUGH
	220 SWANSON ROAD	601	BOXBOROUGH
		602	BOXBOROUGH
		603	BOXBOROUGH
		604	BOXBOROUGH
		605	BOXBOROUGH
		606	BOXBOROUGH
		607	BOXBOROUGH
		608	BOXBOROUGH
		609	BOXBOROUGH
		610	BOXBOROUGH
		611	BOXBOROUGH
		612	BOXBOROUGH
	226 SWANSON ROAD	613	BOXBOROUGH
		614	BOXBOROUGH
		615	BOXBOROUGH
		616	BOXBOROUGH
		617	BOXBOROUGH
		618	BOXBOROUGH
		619	BOXBOROUGH
		620	BOXBOROUGH
		621	BOXBOROUGH
		622	BOXBOROUGH
		623	BOXBOROUGH
		624	BOXBOROUGH
	232 SWANSON ROAD	625	BOXBOROUGH
		626	BOXBOROUGH
		627	BOXBOROUGH
		628	BOXBOROUGH
		629	BOXBOROUGH
		630	BOXBOROUGH
		631	BOXBOROUGH
		632	BOXBOROUGH
		633	BOXBOROUGH
		634	BOXBOROUGH
		635	BOXBOROUGH
		636	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
07-004-000	176 SWANSON ROAD	301	BOXBOROUGH
		302	BOXBOROUGH
		303	BOXBOROUGH
		304	BOXBOROUGH
		305	BOXBOROUGH
		306	BOXBOROUGH
		307	BOXBOROUGH
		308	BOXBOROUGH
		309	BOXBOROUGH
		310	BOXBOROUGH
		311	BOXBOROUGH
		312	BOXBOROUGH
	182 SWANSON ROAD	313	BOXBOROUGH
		314	BOXBOROUGH
		315	BOXBOROUGH
		316	BOXBOROUGH
		317	BOXBOROUGH
		318	BOXBOROUGH
		319	BOXBOROUGH
		320	BOXBOROUGH
		321	BOXBOROUGH
		322	BOXBOROUGH
		323	BOXBOROUGH
		324	BOXBOROUGH
	188 SWANSON ROAD	325	BOXBOROUGH
		326	BOXBOROUGH
		327	BOXBOROUGH
		328	BOXBOROUGH
		329	BOXBOROUGH
		330	BOXBOROUGH
		331	BOXBOROUGH
		332	BOXBOROUGH
		333	BOXBOROUGH
		334	BOXBOROUGH
		335	BOXBOROUGH
		336	BOXBOROUGH
07-005-000	140 SWANSON ROAD	413	BOXBOROUGH
		414	BOXBOROUGH
		415	BOXBOROUGH
		416	BOXBOROUGH
		417	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
		418	BOXBOROUGH
		419	BOXBOROUGH
		420	BOXBOROUGH
		421	BOXBOROUGH
		422	BOXBOROUGH
		423	BOXBOROUGH
		424	BOXBOROUGH
	146 SWANSON ROAD	401	BOXBOROUGH
		402	BOXBOROUGH
		403	BOXBOROUGH
		404	BOXBOROUGH
		405	BOXBOROUGH
		406	BOXBOROUGH
		407	BOXBOROUGH
		408	BOXBOROUGH
		409	BOXBOROUGH
		410	BOXBOROUGH
		411	BOXBOROUGH
		412	BOXBOROUGH
07-007-000	155 SWANSON ROAD	-	BOXBOROUGH
07-008-000	101 SWANSON ROAD	107	BOXBOROUGH
		108	BOXBOROUGH
		109	BOXBOROUGH
		110	BOXBOROUGH
		111	BOXBOROUGH
		112	BOXBOROUGH
		113	BOXBOROUGH
		114	BOXBOROUGH
		115	BOXBOROUGH
		116	BOXBOROUGH
		117	BOXBOROUGH
		118	BOXBOROUGH
	107 SWANSON ROAD	101	BOXBOROUGH
		102	BOXBOROUGH
		103	BOXBOROUGH
		104	BOXBOROUGH
		105	BOXBOROUGH
		106	BOXBOROUGH
	95 SWANSON ROAD	119	BOXBOROUGH
		120	BOXBOROUGH
		121	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
		122	BOXBOROUGH
		123	BOXBOROUGH
		124	BOXBOROUGH
07-009-000	85 SWANSON ROAD	-	BOXBOROUGH
	85 REAR SWANSON ROAD	-	BOXBOROUGH
07-013-000	1744 MASSACHUSETTS AVENUE	-	BOXBOROUGH
07-014-000	15 CODMAN HILL ROAD	-	BOXBOROUGH
07-015-000	20 CODMAN HILL ROAD	-	BOXBOROUGH
07-016-000	0 CODMAN HILL ROAD	-	BOXBOROUGH
	55 CODMAN HILL ROAD	D	BOXBOROUGH
	57 CODMAN HILL ROAD	C	BOXBOROUGH
	59 CODMAN HILL ROAD	B	BOXBOROUGH
	61 CODMAN HILL ROAD	A	BOXBOROUGH
08-002-000	288 SWANSON ROAD	201	BOXBOROUGH
		202	BOXBOROUGH
		203	BOXBOROUGH
		204	BOXBOROUGH
		205	BOXBOROUGH
		206	BOXBOROUGH
		207	BOXBOROUGH
	294 SWANSON ROAD	208	BOXBOROUGH
		209	BOXBOROUGH
		210	BOXBOROUGH
		211	BOXBOROUGH
		212	BOXBOROUGH
		213	BOXBOROUGH
	300 SWANSON ROAD	214	BOXBOROUGH
		215	BOXBOROUGH
		216	BOXBOROUGH
		217	BOXBOROUGH
		218	BOXBOROUGH
		219	BOXBOROUGH
		220	BOXBOROUGH
08-003-000	200 BEAVER BROOK ROAD	-	BOXBOROUGH
08-008-000	0 SPENCER ROAD	-	BOXBOROUGH
	15 SPENCER ROAD	12E	BOXBOROUGH
		14E	BOXBOROUGH
		16E	BOXBOROUGH
		18E	BOXBOROUGH
		20E	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
		22E	BOXBOROUGH
		24E	BOXBOROUGH
		26E	BOXBOROUGH
		30E	BOXBOROUGH
		32E	BOXBOROUGH
		34E	BOXBOROUGH
		36E	BOXBOROUGH
	23 SPENCER ROAD	12F	BOXBOROUGH
		14F	BOXBOROUGH
		16F	BOXBOROUGH
		18F	BOXBOROUGH
		20F	BOXBOROUGH
		22F	BOXBOROUGH
		24F	BOXBOROUGH
		26F	BOXBOROUGH
		30F	BOXBOROUGH
		32F	BOXBOROUGH
		34F	BOXBOROUGH
		36F	BOXBOROUGH
	24 SPENCER ROAD	12N	BOXBOROUGH
		14N	BOXBOROUGH
		16N	BOXBOROUGH
		18N	BOXBOROUGH
		20N	BOXBOROUGH
		22N	BOXBOROUGH
		24N	BOXBOROUGH
		26N	BOXBOROUGH
		30N	BOXBOROUGH
		32N	BOXBOROUGH
		34N	BOXBOROUGH
		36N	BOXBOROUGH
	32 SPENCER ROAD	12M	BOXBOROUGH
		14M	BOXBOROUGH
		16M	BOXBOROUGH
		18M	BOXBOROUGH
		20M	BOXBOROUGH
		22M	BOXBOROUGH
		24M	BOXBOROUGH
		26M	BOXBOROUGH
		30M	BOXBOROUGH
		32M	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
		34M	BOXBOROUGH
		36M	BOXBOROUGH
	41 SPENCER ROAD	12G	BOXBOROUGH
		14G	BOXBOROUGH
		16G	BOXBOROUGH
		18G	BOXBOROUGH
		20G	BOXBOROUGH
		22G	BOXBOROUGH
		24G	BOXBOROUGH
		26G	BOXBOROUGH
		30G	BOXBOROUGH
		32G	BOXBOROUGH
		34G	BOXBOROUGH
		36G	BOXBOROUGH
	49 SPENCER ROAD	12H	BOXBOROUGH
		14H	BOXBOROUGH
		16H	BOXBOROUGH
		18H	BOXBOROUGH
		20H	BOXBOROUGH
		22H	BOXBOROUGH
		24H	BOXBOROUGH
		26H	BOXBOROUGH
		30H	BOXBOROUGH
		32H	BOXBOROUGH
		34H	BOXBOROUGH
		36H	BOXBOROUGH
	50 SPENCER ROAD	12L	BOXBOROUGH
		14L	BOXBOROUGH
		16L	BOXBOROUGH
		18L	BOXBOROUGH
		20L	BOXBOROUGH
		22L	BOXBOROUGH
		24L	BOXBOROUGH
		26L	BOXBOROUGH
		30L	BOXBOROUGH
		32L	BOXBOROUGH
		34L	BOXBOROUGH
		36L	BOXBOROUGH
	58 SPENCER ROAD	12K	BOXBOROUGH
		14K	BOXBOROUGH
		16K	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
		18K	BOXBOROUGH
		20K	BOXBOROUGH
		22K	BOXBOROUGH
		24K	BOXBOROUGH
		26K	BOXBOROUGH
		30K	BOXBOROUGH
		32K	BOXBOROUGH
		34K	BOXBOROUGH
		36K	BOXBOROUGH
	61 SPENCER ROAD	12I	BOXBOROUGH
		14I	BOXBOROUGH
		16I	BOXBOROUGH
		18I	BOXBOROUGH
		20I	BOXBOROUGH
		22I	BOXBOROUGH
		24I	BOXBOROUGH
		26I	BOXBOROUGH
		30I	BOXBOROUGH
		32I	BOXBOROUGH
		34I	BOXBOROUGH
		36I	BOXBOROUGH
	69 SPENCER ROAD	12J	BOXBOROUGH
		14J	BOXBOROUGH
		16J	BOXBOROUGH
		18J	BOXBOROUGH
		20J	BOXBOROUGH
		22J	BOXBOROUGH
		24J	BOXBOROUGH
		26J	BOXBOROUGH
		30J	BOXBOROUGH
		32J	BOXBOROUGH
		34J	BOXBOROUGH
		36J	BOXBOROUGH
08-009-000	42 SWANSON COURT	11A	BOXBOROUGH
		12A	BOXBOROUGH
		13A	BOXBOROUGH
		14A	BOXBOROUGH
		15A	BOXBOROUGH
		16A	BOXBOROUGH
		21A	BOXBOROUGH
		22A	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
		23A	BOXBOROUGH
		24A	BOXBOROUGH
		25A	BOXBOROUGH
		26A	BOXBOROUGH
		31A	BOXBOROUGH
		32A	BOXBOROUGH
		33A	BOXBOROUGH
		34A	BOXBOROUGH
		35A	BOXBOROUGH
		36A	BOXBOROUGH
	52 SWANSON COURT	11B	BOXBOROUGH
		12B	BOXBOROUGH
		13B	BOXBOROUGH
		14B	BOXBOROUGH
		15B	BOXBOROUGH
		16B	BOXBOROUGH
		21B	BOXBOROUGH
		22B	BOXBOROUGH
		23B	BOXBOROUGH
		24B	BOXBOROUGH
		25B	BOXBOROUGH
		26B	BOXBOROUGH
		31B	BOXBOROUGH
		32B	BOXBOROUGH
		33B	BOXBOROUGH
		34B	BOXBOROUGH
		35B	BOXBOROUGH
		36B	BOXBOROUGH
08-010-000	35 SWANSON COURT	11D	BOXBOROUGH
		12D	BOXBOROUGH
		13D	BOXBOROUGH
		14D	BOXBOROUGH
		15D	BOXBOROUGH
		16D	BOXBOROUGH
		21D	BOXBOROUGH
		22D	BOXBOROUGH
		23D	BOXBOROUGH
		24D	BOXBOROUGH
		25D	BOXBOROUGH
		26D	BOXBOROUGH
		31D	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
		32D	BOXBOROUGH
		33D	BOXBOROUGH
		34D	BOXBOROUGH
		35D	BOXBOROUGH
		36D	BOXBOROUGH
	53 SWANSON COURT	11C	BOXBOROUGH
		12C	BOXBOROUGH
		13C	BOXBOROUGH
		14C	BOXBOROUGH
		15C	BOXBOROUGH
		16C	BOXBOROUGH
		21C	BOXBOROUGH
		22C	BOXBOROUGH
		23C	BOXBOROUGH
		24C	BOXBOROUGH
		25C	BOXBOROUGH
		26C	BOXBOROUGH
		31C	BOXBOROUGH
		32C	BOXBOROUGH
		33C	BOXBOROUGH
		34C	BOXBOROUGH
		35C	BOXBOROUGH
		36C	BOXBOROUGH
08-011-000	159 SWANSON ROAD	-	BOXBOROUGH
08-090-000	0 SWANSON ROAD	-	BOXBOROUGH
12-003-000	70 CODMAN HILL ROAD	-	BOXBOROUGH
12-004-000	60 CODMAN HILL ROAD	-	BOXBOROUGH
12-006-000	165 CODMAN HILL ROAD	-	BOXBOROUGH
12-007-000	278 CODMAN HILL ROAD	-	BOXBOROUGH
12-009-000	200 CODMAN HILL ROAD	-	BOXBOROUGH
12-010-000	0 CODMAN HILL ROAD	-	BOXBOROUGH
	276 CODMAN HILL ROAD	1A	BOXBOROUGH
		21A	BOXBOROUGH
		22A	BOXBOROUGH
		23A	BOXBOROUGH
		24A	BOXBOROUGH
		25A	BOXBOROUGH
		26A	BOXBOROUGH
		2A	BOXBOROUGH
		31A	BOXBOROUGH
		32A	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
		33A	BOXBOROUGH
		34A	BOXBOROUGH
		35A	BOXBOROUGH
		36A	BOXBOROUGH
		3A	BOXBOROUGH
		4A	BOXBOROUGH
		5A	BOXBOROUGH
		6A	BOXBOROUGH
	284 CODMAN HILL ROAD	1B	BOXBOROUGH
		21B	BOXBOROUGH
		22B	BOXBOROUGH
		23B	BOXBOROUGH
		24B	BOXBOROUGH
		25B	BOXBOROUGH
		26B	BOXBOROUGH
		2B	BOXBOROUGH
		31B	BOXBOROUGH
		32B	BOXBOROUGH
		33B	BOXBOROUGH
		34B	BOXBOROUGH
		35B	BOXBOROUGH
		36B	BOXBOROUGH
		3B	BOXBOROUGH
		4B	BOXBOROUGH
		5B	BOXBOROUGH
		6B	BOXBOROUGH
	294 CODMAN HILL ROAD	1F	BOXBOROUGH
		21F	BOXBOROUGH
		22F	BOXBOROUGH
		23F	BOXBOROUGH
		24F	BOXBOROUGH
		25F	BOXBOROUGH
		26F	BOXBOROUGH
		2F	BOXBOROUGH
		31F	BOXBOROUGH
		32F	BOXBOROUGH
		33F	BOXBOROUGH
		34F	BOXBOROUGH
		35F	BOXBOROUGH
		36F	BOXBOROUGH
		3F	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
		4F	BOXBOROUGH
		5F	BOXBOROUGH
		6F	BOXBOROUGH
	300 CODMAN HILL ROAD	1C	BOXBOROUGH
		21C	BOXBOROUGH
		22C	BOXBOROUGH
		23C	BOXBOROUGH
		24C	BOXBOROUGH
		25C	BOXBOROUGH
		26C	BOXBOROUGH
		2C	BOXBOROUGH
		31C	BOXBOROUGH
		32C	BOXBOROUGH
		33C	BOXBOROUGH
		34C	BOXBOROUGH
		35C	BOXBOROUGH
		36C	BOXBOROUGH
		3C	BOXBOROUGH
		4C	BOXBOROUGH
		5C	BOXBOROUGH
		6C	BOXBOROUGH
	310 CODMAN HILL ROAD	1D	BOXBOROUGH
		21D	BOXBOROUGH
		22D	BOXBOROUGH
		23D	BOXBOROUGH
		24D	BOXBOROUGH
		25D	BOXBOROUGH
		26D	BOXBOROUGH
		2D	BOXBOROUGH
		31D	BOXBOROUGH
		32D	BOXBOROUGH
		33D	BOXBOROUGH
		34D	BOXBOROUGH
		35D	BOXBOROUGH
		36D	BOXBOROUGH
		3D	BOXBOROUGH
		4D	BOXBOROUGH
		5D	BOXBOROUGH
		6D	BOXBOROUGH
	318 CODMAN HILL ROAD	1E	BOXBOROUGH
		21E	BOXBOROUGH

Assessors Parcel No.	Street Address	Unit	Town
		22E	BOXBOROUGH
		23E	BOXBOROUGH
		24E	BOXBOROUGH
		25E	BOXBOROUGH
		26E	BOXBOROUGH
		2E	BOXBOROUGH
		31E	BOXBOROUGH
		32E	BOXBOROUGH
		33E	BOXBOROUGH
		34E	BOXBOROUGH
		35E	BOXBOROUGH
		36E	BOXBOROUGH
		3E	BOXBOROUGH
		4E	BOXBOROUGH
		5E	BOXBOROUGH
		6E	BOXBOROUGH
12-011-000	316 CODMAN HILL ROAD	-	BOXBOROUGH
12-012-000	330 CODMAN HILL ROAD	-	BOXBOROUGH
12-033-000	0 CODMAN HILL ROAD	-	BOXBOROUGH

55 Walkers Brook Drive, Suite 100, Reading, MA 01867
Tel: 978.532.1900

ATTACHMENT C

Special Resource	Agency	Source	Raw Water Main	Finished Water Main	Existing Littleton Water Supply Sources (PWS ID 2158000-08G, 2158000-01G, and 2158000-04G)	Proposed Taylor Street Well
Endangered species of plants and animals or their habitats	Department of Fish and Game's Natural Heritage and Endangered Species Program	MassGIS Data	The limit of work will be lined with proper erosion and sediment controls. In addition, a large amount of the work occurring in NHESP habitat is temporary or occurring within roadway, which will minimize permanent impacts to NHESP habitat	The limit of work will be lined with proper erosion and sediment controls. In addition, a large amount of the work occurring in NHESP habitat is temporary or occurring within roadway, which will minimize permanent impacts to NHESP habitat	Not applicable. These wells were permitted and active prior to this application and impacts are not expected to change.	The proposed Taylor Street Well is located within the Blanding's Turtle Habitat. Approval from the Massachusetts Division of Fisheries and Wildlife for access through the NHESP habitat was required prior to conducting the pumping test in August 2022. A turtle protection plan had been prepared by a qualified Wildlife Biologist and submitted to the NHESP for review and approval. The BRP WS 19 (Source Final Permit) for the Taylor Street Well is currently under review by MassDEP and will be reviewed by a Wildlife Biologist as well to confirm the Blanding's Turtle Habitat will not be adversely impacted by the withdrawal. The impacts to wetlands and streamflow are documented in the BRP WS19 which was submitted to WRC and DFW on November 17, 2023.
Fisheries Resources (Coldwater fisheries [CWF], river herring, eelgrass and shellfish beds	Department of Fish and Game's Divisions of Fisheries and Wildlife and Division of Marine Fisheries	Department of Fish and Game	CWF, river herring, eelgrass and shellfish beds do not exist within the receiving or donor basin according to Department of Fish and Game's mapping. Therefore, the proposed action is not expected to have any adverse effects on these special resources.	CWF, river herring, eelgrass and shellfish beds do not exist within the receiving or donor basin according to Department of Fish and Game's mapping. Therefore, the proposed action is not expected to have any adverse effects on these special resources.	CWF, river herring, eelgrass and shellfish beds do not exist within the receiving or donor basin according to Department of Fish and Game's mapping. Therefore, the proposed action is not expected to have any adverse effects on these special resources.	CWF, river herring, eelgrass and shellfish beds do not exist within the receiving or donor basin according to Department of Fish and Game's mapping. Therefore, the proposed action is not expected to have any adverse effects on these special resources.
Areas of Critical Environmental Concern (ACEC)	Department of Conservation and Recreation's ACEC program	MassGIS Data	Areas of Critical Environmental Concern (ACEC) do not exist within donor basin based on data provided by MassGIS. The proposed action is not expected to have any adverse effects on ACEC's.	Areas of Critical Environmental Concern (ACEC) do not exist within donor basin based on data provided by MassGIS. The proposed action is not expected to have any adverse effects on ACEC's.	Areas of Critical Environmental Concern (ACEC) do not exist within donor basin based on data provided by MassGIS. The proposed action is not expected to have any adverse effects on ACEC's.	Areas of Critical Environmental Concern (ACEC) do not exist within donor basin based on data provided by MassGIS. The proposed action is not expected to have any adverse effects on ACEC's.
Designated State or Federal Scenic River	Department of Conservation and Recreation's Scenic Rivers Program and the Federal Wild and Scenic River Program	National Park Service	Designated State or Federal Scenic Rivers do not exist within the donor basin based on data provided by the National Park Service. Therefore, the proposed action is not expected to have any adverse effects on this.	Designated State or Federal Scenic Rivers do not exist within the donor basin based on data provided by the National Park Service. Therefore, the proposed action is not expected to have any adverse effects on this.	Designated State or Federal Scenic Rivers do not exist within the donor basin based on data provided by the National Park Service. Therefore, the proposed action is not expected to have any adverse effects on this.	Designated State or Federal Scenic Rivers do not exist within the donor basin based on data provided by the National Park Service. Therefore, the proposed action is not expected to have any adverse effects on this.
Geographic Areas (Parks, Conservation Lands) protected by Article 97 of the Massachusetts Constitution	–	MassGIS Data	Geographic areas protected by Article 97 of the Massachusetts Constitution that fall within the donor basin are not expected to be affected by the proposed transfer.	Geographic areas protected by Article 97 of the Massachusetts Constitution that fall within the donor basin are not expected to be affected by the proposed transfer.	Geographic areas protected by Article 97 of the Massachusetts Constitution that fall within the donor basin are not expected to be affected by the proposed transfer.	Geographic areas protected by Article 97 of the Massachusetts Constitution that fall within the donor basin are not expected to be affected by the proposed transfer.
Vernal Pools	Department of Fish and Game's Natural Heritage and Endangered Species Program	MassGIS Data	To minimize impacts to water resource areas, directional drilling will be used within wetland areas and under Beaver Brook. Compensatory flood storage will be provided to mitigate for impacts .	To minimize impacts to water resource areas, directional drilling will be used within wetland areas and under Beaver Brook. Compensatory flood storage will be provided to mitigate for impacts .	Not applicable. These wells were permitted and active prior to this application and impacts are not expected to change.	The Pumping Test Report (BRP WS 19) as well as the Technical Deficiency Response Letter was submitted to DCR and DFW on November 17, 2023. Information regarding impacts to the surrounding vernal pools can be found in the Technical Deficiency Response Letter.
Lakes, ponds, wetlands or other surface water features	–	MassGIS Data	To minimize impacts to water resource areas, directional drilling will be used within wetland areas and under Beaver Brook. Compensatory flood storage will be provided to mitigate for impacts .	To minimize impacts to water resource areas, directional drilling will be used within wetland areas and under Beaver Brook. Compensatory flood storage will be provided to mitigate for impacts .	Not applicable. These wells were permitted and active prior to this application and impacts are not expected to change.	Surface water features within the donor basin are not expected to be adversely affected by the proposed transfer. The impact evaluation described in the BRP WS19 provides a discussion and calculations from the 15-day pumping test. A conservative estimate of the potential contribution of induced infiltration and/or captured baseflow to the pumping well was calculated to equate to approximately 1.5% of the groundwater pumping rate during the 15-day pumping test. Based on the estimated potential contribution from pumping-induced infiltration and/or captured groundwater baseflow associated with the pumping test conducted at a rate of 184 gpm, the corresponding contribution for the proposed withdrawal rate of 368 gpm is estimated to be approximately 5.62 gpm. This provides additional support for the conclusion that pumping-induced impacts to streamflow in Beaver Brook are minimal. More information can be found in the BRP WS 19.

Appendix K

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

and the Boxborough Wetland Bylaw

Provided by MassDEP:
113-0583
MassDEP File #

eDEP Transaction #
Boxborough
City/Town

A. General Information

Please note: this form has been modified with added space to accommodate the Registry of Deeds Requirements

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

1. From: Boxborough
Conservation Commission

2. This issuance is for (check one): a. ☒ Order of Conditions b. ☐ Amended Order of Conditions

3. To: Applicant:

Corey
a. First Name

Godfrey
b. Last Name

Littleton Electric Light & Water Department
c. Organization

39 Ayer Road PO Box 2406
d. Mailing Address

Littleton
e. City/Town

MA
f. State

01460
g. Zip Code

4. Property Owner (if different from applicant):

a. First Name

b. Last Name

Town of Boxborough
c. Organization

29 Middle Road
d. Mailing Address

Boxborough
e. City/Town

MA
f. State

01719
g. Zip Code

5. Project Location:

Beaver Brook, Swanson & Codman Hill Roads

Boxborough
b. City/Town

n/a within the right-of-way
c. Assessors Map/Plat Number

d. Parcel/Lot Number

Latitude and Longitude, if known: d m s
d. Latitude

d m s
e. Longitude

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
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Boxborough
City/Town

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

Middlesex South
a. County

b. Certificate Number (if registered land)

within roadway
c. Book

d. Page

7. Dates:

Sept. 5, 2023
a. Date Notice of Intent Filed

Oct. 18, 2023
b. Date Public Hearing Closed

Oct. 23, 2023
c. Date of Issuance

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

Water Supply Main Extension Littleton / Boxborough
a. Plan Title

Weston & Sampson
b. Prepared By

Tara E. McManus
c. Signed and Stamped by

August 2023
d. Final Revision Date

1" = 40'
e. Scale

f. Additional Plan or Document Title

g. Date

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

a. ☒ Public Water Supply
b. ☐ Land Containing Shellfish
c. ☒ Prevention of Pollution
d. ☒ Private Water Supply
e. ☐ Fisheries
f. ☒ Protection of Wildlife Habitat
g. ☒ Groundwater Supply
h. ☒ Storm Damage Prevention
i. ☒ Flood Control

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

a. ☒ the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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B. Findings (cont.)

Denied because:

b. ☐ the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**

c. ☐ the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**

3. ☐ Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) ______ a. linear feet

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. ☐ Bank	a. linear feet	b. linear feet	c. linear feet	d. linear feet
5. ☐ Bordering Vegetated Wetland	a. square feet	b. square feet	c. square feet	d. square feet
6. ☐ Land Under Waterbodies and Waterways	a. square feet	b. square feet	c. square feet	d. square feet
	e. c/y dredged	f. c/y dredged		
7. ☒ Bordering Land Subject to Flooding	4300 a. square feet	b. square feet	4300 c. square feet	d. square feet
Cubic Feet Flood Storage	e. cubic feet	f. cubic feet	g. cubic feet	h. cubic feet
8. ☐ Isolated Land Subject to Flooding	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. ☒ Riverfront Area	8100 a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	3800 c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	4300 g. square feet	h. square feet	i. square feet	j. square feet

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B. Findings (cont.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. ☐ Land Under the Ocean	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. ☐ Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. ☐ Coastal Beaches	a. square feet	b. square feet	cu yd c. nourishment	cu yd d. nourishment
14. ☐ Coastal Dunes	a. square feet	b. square feet	cu yd c. nourishment	cu yd d. nourishment
15. ☐ Coastal Banks	a. linear feet	b. linear feet		
16. ☐ Rocky Intertidal Shores	a. square feet	b. square feet		
17. ☐ Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. ☐ Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. ☐ Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. ☐ Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. ☐ Land Subject to Coastal Storm Flowage	a. square feet	b. square feet		
22. ☐ Riverfront Area	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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B. Findings (cont.)

* **#23**. If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

23. ☐ Restoration/Enhancement *:

a. square feet of BVW

b. square feet of salt marsh

24. ☐ Stream Crossing(s):

a. number of new stream crossings

b. number of replacement stream crossings

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
   a. The work is a maintenance dredging project as provided for in the Act; or
   b. The time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
   c. If the work is for a Test Project, this Order of Conditions shall be valid for no more than one year.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order. An Order of Conditions for a Test Project may be extended for one additional year only upon written application by the applicant, subject to the provisions of 310 CMR 10.05(11)(f).
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on _____ unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.

C. General Conditions Under Massachusetts Wetlands Protection Act

8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.

9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.

10. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words,

    "Massachusetts Department of Environmental Protection" [or, "MassDEP"]

    "File Number 113-0583 "

11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.

12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.

13. The work shall conform to the plans and special conditions referenced in this order.

14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.

15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.

18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

19. The work associated with this Order (the "Project")
    (1) ☒ is subject to the Massachusetts Stormwater Standards
    (2) ☐ is NOT subject to the Massachusetts Stormwater Standards

    If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:

    a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.

    b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
    i. all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
    ii. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
    iii. any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;

v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement) for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following:

i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and

ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 19(f) through 19(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 19(f) through 19(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.

h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.
i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.
j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.
k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.

l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):

Refer to attached Additional Conditions.

20. For Test Projects subject to 310 CMR 10.05(11), the applicant shall also implement the monitoring plan and the restoration plan submitted with the Notice of Intent. If the conservation commission or Department determines that the Test Project threatens the public health, safety or the environment, the applicant shall implement the removal plan submitted with the Notice of Intent or modify the project as directed by the conservation commission or the Department.

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D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? ☒ Yes ☐ No

2. The Boxborough (Conservation Commission) hereby finds (check one that applies):

   a. ☐ that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

   1. Municipal Ordinance or Bylaw ______ 2. Citation ______

   Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

   b. ☒ that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

   Boxborough Wetland Bylaw
   1. Municipal Ordinance or Bylaw ______ 2. Citation ______

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

   The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):

   Refer to attached Additional Conditons.

ADDITIONAL CONDITIONS

Preamble

This project entails the construction of a finished water main from the Littleton Electric Light & Water Department to the Town of Boxborough, primarily within the existing roadway of Beaver Brook, Swanson, and Codman Hill Roads.

The proposed work impacts 4,300 sq. ft. of Bordering Land Subject to Flooding and 8,100 sq. ft. of Riverfront Area.

The proposed work is considered to have (potential) impact to the following interests of the Bylaw: protection of public and private water supply, protection of groundwater, flood control, erosion control, storm damage protection, prevention of pollution, protection of land containing wildlife (wildlife habitat), recreation, protection of aesthetics.

This project is approved by the Conservation Commission because there is no other suitable location and it can be conditioned to meet the performance standards of the Wetlands Protection Act and (or) Town of Boxborough Wetland By-Law. The following conditions shall apply.

Additional General Conditions

20. In accordance with the Boxborough Wetland Bylaw, this Order of Conditions (Order) expires three years from date of issuance and may be extended for one year upon written request from the applicant at least 30 days prior to expiration of the Order.

21. After the expiration of the 10-day appeal period, and, if no request for appeal has been filed with the Department of Environmental Protection, record this Order at the Registry of Deeds and return a copy (proof) of recorded front page to the Commission.

**** <u>No work shall start until this Order of Conditions is recorded and a copy is received by the Commission.</u> ****

22. This Order shall apply to any successor in control or successor in interest of the property described in the Notice of Intent and accompanying plans. These obligations shall be expressed in covenants in all deeds to succeeding owners of portions of the property.

23. The Commission shall be notified in writing of all transfers of title of any portion of property that takes place prior to issuance of the Certificate of Compliance.

24. All proposed work shall be performed in accordance with the Notice of Intent filed on September 5, 2023 and the Plans dated August 2023 and filed on September 5, 2023.

25. The Conservation Commission, the Boxborough Building Inspector, arborists, consultants, or conservation experts, as agents of the Commission, or the Department of Environmental Protection reserves the right to enter and inspect the property at all reasonable times, until a Certificate of Compliance is issued to evaluate compliance with this Order of Conditions, the Act, the Boxborough Wetland Bylaw, 310 CMR 10.00 and Boxborough wetland regulations, and may acquire any information, measurements, photographs, observations, and/or materials, or may require the submittal of any data or information deemed necessary by the Commission for that evaluation. Further, work shall be halted on the site if the Commission, agent or DEP determines that any of the work is not in compliance with this Order of Conditions. Work shall not resume until the Commission is satisfied that the work will comply, and has so notified the applicant in writing.

26. The Commission reserves the right to amend this Order of Conditions after a legally advertised public hearing if plans or circumstances are changed or if new conditions or information so warrant.

    Upon completion of this project, the applicant shall submit the following to the Conservation Commission to receive a Certificate of Compliance:

    1. DEP WPA Form 8A Request for Certificate of Compliance
    2. a. A written statement from the applicant certifying that the work has been conducted as shown on the plan(s) and documents referenced above, and as conditioned by the Commission.
       b. A written statement from a registered professional engineer of the Commonwealth certifying that the work has been conducted as shown on the plan(s) and documents referenced above, and as conditioned by the Commission.
    3. An "as-built" plan prepared and signed and stamped by a registered professional engineer or land surveyor of the Commonwealth for the public record.

27. The Perpetual Conditions listed on page 7-F of 10 shall continue in force beyond the Certificate of Compliance in perpetuity and shall be referred to in all future deeds to this property.

Pre-Construction Requirements

28. If there are any changes to the plans as submitted, the applicant shall have the responsibility to submit revised plans showing all changes to the Commission for review. This includes changes required by the Commission, other Town and/or State agencies as well as those introduced by the applicant. No work may start until the Commission has completed its review and notified the applicant in writing.

29. A complete copy of this Order, including its drawings, Special Conditions, and any amendments shall be maintained at the work site whenever work is being performed. The Applicant shall assure that all contractors, subcontractors and other personnel performing work in the resource area are fully aware of the terms and conditions of the Order. A complete

copy of this Order and the project plans shall be given to every contractor and subcontractor performing the work defined and described here.

30. Prior to the start of any activity, the applicant shall schedule a pre-construction conference to be held on the site, involving the Contractor conducting the work, the Applicant or its authorized representative, and a member or agent of the Conservation Commission, to ensure that the requirements of this Order are understood by all parties. A reasonable period of time shall be provided as notice of the pre-construction meeting.

31. A set of plans for this project shall be submitted to the building inspector who may act as the Commission's agent.

32. The applicant shall inform the Commission in writing of the name, mailing address, e-mail address, business and home telephone number of the project supervisor who will be responsible for ensuring on-site compliance with this Order. The applicant will also supply the names and contact information for all the contractors and subcontractors.

33. All contractors working in the resource area shall be required to read this Order of Conditions and sign a document acknowledging their reading and understanding the Order of Conditions. This 'acknowledgement document' shall contain the printed name of the contractor/subcontractor, address, phone number, date and signature. One copy of the signed acknowledgement document shall be kept on site and a second copy shall be forwarded to the Conservation Commission before site clearing and excavation.

Erosion Controls

34. Before the start of any site work (e.g. earth disturbance, clearing of vegetation, etc.), appropriate sedimentation and erosion control devices shall be installed as shown on the plans referenced in the General Conditions Section. Sedimentation and erosion control devices may be installed in tranches, as work progresses along the length of the site. Notification and inspection pursuant to additional condition number 38 shall be performed for each installation.

35. On slopes of 25% (4:1) or less gradient, wire-reinforced silt fencing, staggered straw bales with a six- inch overlap or butted straw bales backed by silt fence may be used.

36. Slopes greater than 25% (4:1) require butting double staked straw bales backed by a silt fence dug-in 6 inches into the ground.

37. All silt fencing will be dug-in 6 inches into the ground. Space stakes a maximum of 8 feet if wire-reinforced fencing is used and a maximum of 6 feet if the fencing is not reinforced. All straw bales will be double staked into the ground. Straw bales shall be dry, tight, consistent "stalk" material and free of seeds.

38. **Following the installation of the sedimentation and erosion control devices but prior to the**

start of any other construction activity, the Commission shall be notified in writing and shall have five (5) working days to inspect this installation before any site work starts. If the applicant is not otherwise notified by the Commission of the acceptance or rejection of the installation, construction may begin at the end of the 5 working days.

39. Prior to any work on site, for areas of the worksite that are in an ALRA, 5-foot high stakes spray painted bright orange shall be placed every 25 feet at the edges of the sidewalk or road shoulder, with attached signs clearly displaying **"NO ACTIVITY BEYOND THIS POINT PER ORDER OF THE CONSERVATION COMMISSION"**. Workers shall be informed that no use of machinery, storage of machinery or materials, stockpiling of soil or construction activity is to occur beyond this line at any time.

Construction Management

Erosion Control

40. An adequate stockpile of erosion control materials shall be on site at all times for emergency or routine replacement and shall include materials to repair silt fences, straw bales, stone rip-rap filter dikes or any other devices planned for use during construction.

41. The Conservation Commission reserves the right to impose additional conditions on portions of this project to mitigate any impacts which could result from site erosion, or any noticeable degradation of surface water quality discharging from the site.

42. Erosion control devices may be modified based on experience at the site. All such devices shall be inspected, cleaned, and/or replaced during construction and shall remain in place until such time stabilization of all areas that may impact resource areas is permanent. These devices shall be inspected to assure maximum control has been provided after any rainfall.

43. Any straw bales that deteriorate during the activity period are to be replaced immediately. At the close of each construction day, and especially prior to weekends, the applicant shall assume responsibility for monitoring all erosion and sedimentation barriers to insure that all barriers are in place, secured, reinforced and properly maintained at day's end. In the event that an uncontrollable emergency occurs, such as a heavy rainstorm, causing erosion and sedimentation breakout, the applicant shall restore such barriers to the standards outlined in the Order and the satisfaction of the Commission. The straw bales shall be in place until revegetation takes place.

44. All erosion control and sedimentation prevention measures shall remain in place and be maintained for the purpose for which they were installed until the area upgradient is permanently stabilized, inspected and approved by the Commission. The applicant shall remove the erosion control and sedimentation devices by the end of construction, before applying for the Certificate of Compliance.

45. Site grading and construction shall be scheduled to avoid periods of high surface water. Once begun,

grading and construction shall move uninterrupted to completion to avoid erosion and siltation of the wetlands.

Stabilization

46. As soon as grading and/or construction in the buffer zone is completed, all disturbed areas other than those under road surface must be permanently stabilized with vegetative cover. No disturbed areas or stockpiled material in portions of the roadway inside an ALRA will be left unprotected or unstabilized during times when work is not being performed.

47. After erosion control devices are removed as permitted by the Conservation Commission, the areas covered by the erosion control measures shall be restored to match adjacent condition.

Equipment and Storage

48. To the extent practicable given the nature of the site, motorized equipment, well drilling equipment, or any other machinery involved in the work shall be permitted in the buffer zone and/or wetlands only when actually engaged in that work and must be removed from the buffer zone and/or wetlands for overnight or weekend storage. No maintenance or refueling shall take place in the buffer zone and/or wetlands. This includes, but is not limited to fueling, lubricating and fluid replacement.

49. Equipment for fuel storage and refueling operations shall be located in an upland area greater than 100 feet from the limits of wetland areas.

50. Under no conditions shall operation of equipment, storage materials, stockpiling of soil or other temporary site disturbance take place on the wetland side of the limit of work line.

51. All equipment used in this project shall work from upland areas and shall not enter the wetlands at any time.

Other

52. There shall be no construction refuse buried within the 100-foot wetland buffer zone on the project site.

53. No work or activity including the cutting of vegetation shall take place in a wetland area or buffer zone other than that specifically allowed under this Order of Conditions.

54. No trash dumpsters will be allowed within the 100-foot wetland buffer zone or banks during construction.

Wildlife

Where erosion controls have been placed in areas between upland and vernal pools, exposed soils shall be stabilized, and silt fencing or other devices that could block migration of amphibians to and from the pools shall be removed, no later than March 1 if construction has been occurring during the winter, and no later than September 1 if construction has been occurring during the summer. If soils will not be stabilized by these dates, temporary stabilization measures shall be emplaced and sedimentation barriers shall be designed to provide a gradual slope or berm over which amphibians may pass. Erosion control devices shall not block passage between uplands and vernal pools between the dates of March 1 and June 1, nor between September 1 and October 15.

Perpetual Conditions

55. No further permanent structure of any kind shall ever be permitted within the 100-foot wetland buffer zone. No additional alterations of any kind within the wetlands and the buffer zone will be permitted without prior approval of the Conservation Commission.

56. Fertilization and liming of soils on this site shall not take place within the 100-foot wetland buffer zone.

ꞁ, MASSACHUSETTS
VATER DEPARTMENTS

ON LITTLETON / BOXBOROUGH
lo. 12397

NERAL MANAGER
ANT GENERAL MANAGER
TER SUPERINTENDENT

RECEIVED

SEP - 5 2023

Conservation Commission
Town of Boxborough

113-0583

DRAWING INDEX

SHEET	TITLE
G000	COVER AND SHEET LIST
G001	ABBREVIATIONS, NOTES, AND LEGEND
C107	FINISH WATER PLAN LITTLETON COUNTY ROAD AND BEAVER BROOK ROAD
C108	FINISH WATER PLAN BEAVER BROOK ROAD
C109	FINISH WATER PLAN BEAVER BROOK ROAD
C110	FINISH WATER PLAN BEAVER BROOK ROAD
C111	FINISH WATER PLAN SWANSON ROAD
C112	FINISH WATER PLAN SWANSON ROAD AND CODMAN HILL ROAD
C113	FINISH WATER PLAN CODMAN HILL ROAD
C501	DETAILS
C502	DETAILS

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

Issued Date:

AUGUST 2023

Know what's below. Call before you dig.

Seal:

COMMONWEALTH OF MASSACHUSETTS
TARA E. MCMANUS
No. 57127
REGISTERED PROFESSIONAL ENGINEER

Issued For:

FOR PERMIT REVIEW

ILLE, SC | JACKSONVILLE, FL | FORT MYERS, FL

FILE NO.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
113-0583
MassDEP File #

eDEP Transaction #
Boxborough
City/Town

E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

10/23/2023
1. Date of Issuance

Please indicate the number of members who will sign this form.
This Order must be signed by a majority of the Conservation Commission.

3
2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

Boxborough Conservation Commission

Signature	Printed Name
[signature]	Sam Anderson
[signature]	Lucy Indge
	David Koonce
	Elizabeth Markiewicz
[signature]	Steve Schmitt

☐ by hand delivery on

Date

☒ by certified mail, return receipt requested, on

Date 10/23/2023

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
113-0583
MassDEP File #

eDEP Transaction #
Boxborough
City/Town

F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request for Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
113-0583
MassDEP File #

eDEP Transaction #
Boxborough
City/Town

G. Recording Information

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Project Location | MassDEP File Number

Has been recorded at the Registry of Deeds of:

County | Book | Page

for: Property Owner

and has been noted in the chain of title of the affected property in:

Book | Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

Appendix L

LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

WATER SUPPLY FROM LITTLETON TO BOXBOROUGH

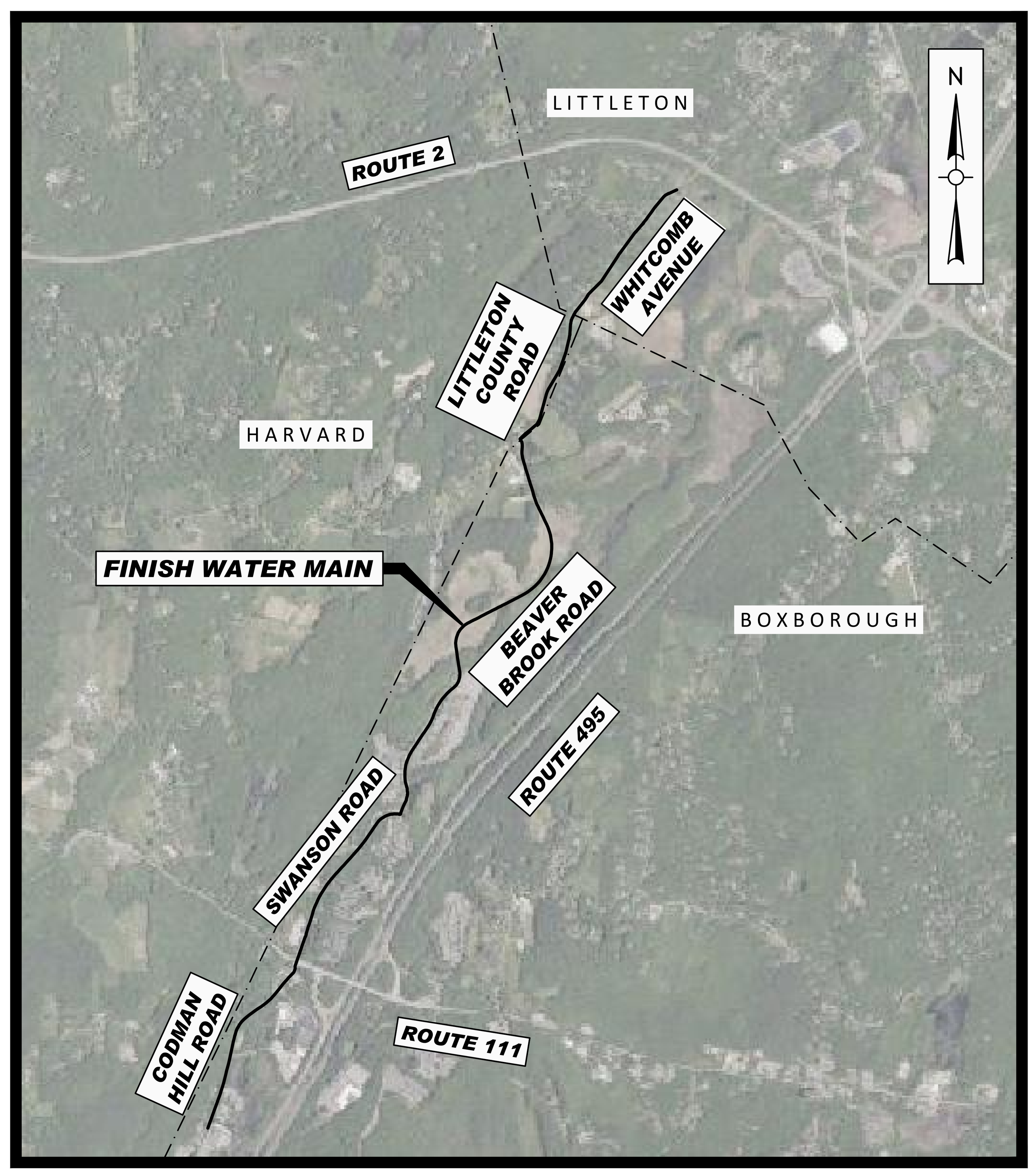
TOWN CONTRACT NO. IFB-2024

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
C103	FINISH WATER PLAN LITTLETON COUNTY ROAD AND BEAVER BROOK ROAD
C104	FINISH WATER PLAN BEAVER BROOK ROAD
C105	FINISH WATER PLAN BEAVER BROOK ROAD
C106	FINISH WATER PLAN BEAVER BROOK ROAD
C107	FINISH WATER PLAN SWANSON ROAD
C108	FINISH WATER PLAN SWANSON ROAD AND CODMAN HILL ROAD
C109	FINISH WATER PLAN CODMAN HILL ROAD
C110	CONSTRUCTION ZONE SAFETY PLAN
C501	DETAILS
C502	DETAILS

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

Issued Date:

DECEMBER 2023

Seal:

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

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READING, MA | BOSTON, MA | FOXBOROUGH, MA | WORCESTER, MA | PORTSMOUTH, NH | MANCHESTER, NH | WATERBURY, VT | ROCKY HILL, CT | ALBANY, NY | RHINEBECK, NY | NEWPORT NEWS, VA I VIRGINIA BEACH, VA I APEX, NC | NORTH CHARLESTON, SC | COLUMBIA, SC | GREENVILLE, SC | JACKSONVILLE, FL | FORT MYERS, FL

FILE NO. __-__

LEGEND

DESCRIPTION	EXISTING	PROPOSED
SANITARY SEWER	S	S
FORCE MAIN	FM	FM
WATER MAIN	W	W
TEMPORARY WATER		TW
STORM DRAIN	D	D
GAS	G	G
ELECTRIC	E	E
OVERHEAD WIRE	OHW	OHW
TELEPHONE	T	T
CABLE TELEVISION	CATV	CATV
GRINDER PUMP		GP
SANITARY SEWER MANHOLE	Ⓢ	SMH
STORM DRAIN MANHOLE	Ⓓ	DMH
ELECTRICAL MANHOLE	Ⓔ	EMH
TELEPHONE MANHOLE	Ⓣ	TMH
AIR RELEASE VALVE MANHOLE		ARMH
FORCE MAIN CLEANOUT MANHOLE		FMCO
CLEANOUT		CO
CATCH BASIN		CB
CATCH BASIN (CURB INLET)		
HYDRANT		
TEMPORARY HYDRANT		Ⓗ
GATE VALVE	WV	
CHECK VALVE		
CURB STOP	WS	
BUTTERFLY VALVE		
BALL VALVE		
REDUCER		
CAP OR PLUG		
GAS GATE VALVE	GV	
UTILITY POLE		
GUY POLE		
LIGHT POST		
EDGE OF PAVEMENT		
EDGE OF UNPAVED ROAD		
CURB		
SIDEWALK		
RAILROAD		
STONE WALL		
RETAINING WALL	RET WALL	RET WALL
FENCE	x x	x x
INDIVIDUAL DECIDUOUS TREE		
INDIVIDUAL EVERGREEN TREE		
TREE LINE		
SURVEY MARKER		
PROPERTY LINE	⅊	
EASEMENT LINE		
LIMIT OF WORK		
APPROX. LIMIT OF REFUSE		
SPOT ELEVATIONS	x100.5	x100.5
CONTOUR LINES	56	56
DEPRESSION CONTOUR LINES		
HOUSE NUMBER	#35	
FLOOR ELEVATION	FL=56.7	
SILL ELEVATION	S=56.7	
WETLAND		
WETLAND FLAGS		WF-7 WF-8
RIP RAP		
DRAINAGE DITCH / SWALE		
STATE HIGHWAY STATION	10	
GUARD POST		
BOLLARD	B	B
SIGN		
BENCH MARK		
PERCOLATION TEST	PT 1	PT-1
TEST PIT	TP 1	TP-1
BORING	B-1	B-1
PROBE	P-1	P-1
GROUNDWATER MONITORING WELL	WS-1	WS-1
GAS MONITORING WELL	GMW-1	GMW-1
GAS VENT	GV	GV
COMPOST FILTER TUBES		
ROCK OUTCROP		

NOTE: ITEMS SHOWN IN THE LEGEND MAY NOT BE PRESENT IN THESE PLANS

ABBREVIATIONS

AC	ASBESTOS CEMENT PIPE
ACCMP	ASPHALT COATED CORRUGATED METAL PIPE
ARV	AIR RELEASE VALVE
ASTM	ASTM INTERNATIONAL
BC	BITUMINOUS CONCRETE
BIT	BITUMINOUS
BLDG	BUILDING
BM	BENCH MARK
BO	BLOW OFF
BV	BUTTERFLY VALVE
CATV	CABLE TELEVISION
CB	CATCH BASIN
CC	CONCRETE CURB
CI	CAST IRON
℄	CENTERLINE
CL	CEMENT LINED
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
CU FT	CUBIC FEET
CY	CUBIC YARD
D	STORM DRAIN, DEPTH FROM RIM TO INVERT
DI	DROP INLET, DUCTILE IRON
DIA	DIAMETER
DMH	DRAIN MANHOLE
DWG	DRAWING
E	EAST, ELECTRIC
EA	EACH
EF	EACH FACE
ELEV	ELEVATION
EOP	EDGE OF PAVEMENT
EW	EACH WAY
EXIST	EXISTING
FLG	FLANGE
FT	FEET, FOOT
G	NATURAL GAS
GALV	GALVANIZED
GC	GRANITE CURB
GR	GRANITE
HC	HOUSE CONNECTION
HORIZ	HORIZONTAL
HP	HIGH PRESSURE
HYD	FIRE HYDRANT
I	INVERT
INV	INVERT
ID	INSIDE DIAMETER
IP	IRON PIPE
LB	POUND
LF	LINEAR FEET
LS	LUMP SUM
MAX	MAXIMUM
MB	MAIL BOX
MECH	MECHANICAL
MH	MANHOLE
MassDOT	MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MWRA	MASSACHUSETTS WATER RESOURCES AUTHORITY
N	NORTH
NE	NORTH EAST
NW	NORTH WEST
NF	NOT FOUND
NO OR #	NUMBER
OD	OUTSIDE DIAMETER
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE
PE	PLAIN END, POLYETHYLENE
⅊	PROPERTY LINE
PL	PLATE
PVC	POLYVINYL CHLORIDE
PVCO	MOLECULARLY ORIENTED POLYVINYL CHLORIDE
PVMT	PAVEMENT
RCP	REINFORCED CONCRETE PIPE
ROW	RIGHT-OF-WAY
RQD	ROCK QUALITY
S	SEWER, SOUTH
SE	SOUTH EAST
SECT	SECTION
SF	SQUARE FEET
SHT	SHEET
SPEC	SPECIFICATIONS
SQ FT	SQUARE FEET
SS	SEWER SERVICE, STAINLESS STEEL
STA	STATION
STL	STEEL
SW	SIDEWALK, SOUTH WEST
T	HYDROSTATIC THRUST, TELEPHONE
TBM	TEMPORARY BENCH MARK
THK	THICK (NESS)
TYP	TYPICAL
UP	UTILITY POLE
VC	VITRIFIED CLAY
VERT	VERTICAL
W	WATER, WEST
W/	WITH
W/O	WITHOUT

CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL CALL DIGSAFE AT 1-888-344-7233 AND CITY/TOWN DEPARTMENTS AS APPROPRIATE AT LEAST 72 HOURS, SATURDAYS, SUNDAYS, AND HOLIDAYS EXCLUDED, PRIOR TO EXCAVATING AT ANY LOCATION. A COPY OF THE DIGSAFE PROJECT REFERENCE NUMBER(S) SHALL BE GIVEN TO THE OWNER PRIOR TO EXCAVATION.

2. LOCATIONS OF EXISTING PIPES, CONDUITS, UTILITIES, FOUNDATIONS AND OTHER UNDERGROUND OBJECTS ARE NOT WARRANTED TO BE CORRECT AND THE CONTRACTOR SHALL HAVE NO CLAIM ON THAT ACCOUNT SHOULD THEY BE OTHER THAN SHOWN.

3. TEST PITS TO LOCATE EXISTING UTILITIES MAY BE ORDERED BY THE ENGINEER TO DETERMINE WHETHER TO RAISE OR LOWER THE PROPOSED WATER MAIN TO CLEAR EXISTING UTILITIES OR VERIFY EXISTING UTILITY LOCATION, SIZE AND TYPE.

4. STONE WALLS, FENCES, MAIL BOXES, SIGNS, CURBS, LIGHT POLES, ETC. SHALL BE REMOVED AS NECESSARY TO PERFORM THE WORK AND REPLACED TO A CONDITION AT LEAST EQUAL TO THAT BEFORE CONSTRUCTION BEGAN. UNLESS OTHERWISE INDICATED, ALL SUCH WORK SHALL BE INCIDENTAL TO CONSTRUCTION OF THE PROJECT.

5. ALL PAVEMENT DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED IN ACCORDANCE WITH THE SPECIFICATIONS AND AS SHOWN ON THE DRAWINGS.

6. ALL AREAS DISTURBED BY THE CONTRACTOR BEYOND PAYMENT LIMITS SHALL BE RESTORED AT NO ADDITIONAL COST TO THE OWNER.

7. UNLESS OTHERWISE INDICATED, CONCRETE USED FOR PIPE ANCHOR BLOCKS, BACKING, PIPE CRADLES, ARCHES, AND FILL SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS.

8. APPROVED JOINT RESTRAINT METHODS SHALL BE PROVIDED FOR WATER MAINS WHERE ANY BENDS, TEES, PLUGS, OR WYES ARE INSTALLED. CONCRETE THRUST BLOCKS, ANCHOR BLOCKS AND TIE RODS MAY BE USED FOR 6-INCH AND 8-INCH PIPE WHERE JOINT RESTRAINT IS NOT FEASIBLE UPON APPROVAL OF THE ENGINEER. SEE TABLE 1 DETAIL FOR REQUIRED RESTRAINING LENGTHS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

9. THE CONTRACTOR SHALL NOT STORE ANY APPARATUS, MATERIALS, SUPPLIES, OR EQUIPMENT ON DRAINAGE STRUCTURES OR WITHIN 100 FEET OF WETLANDS.

10. NEW WATER MAINS AND SERVICES SHALL BE INSTALLED AT THE MINIMUM DEPTH FROM FINISH GRADE TO TOP OF PIPE AS SHOWN ON THE DRAWINGS. WHERE NECESSARY, NEW WATER MAINS SHALL BE INSTALLED AT A GREATER DEPTH TO CLEAR OBSTACLES SHOWN ON THE DRAWINGS AT NO ADDITIONAL COST TO THE OWNER. MINIMUM CLEARANCES TO UTILITIES, AS SHOWN ON THE DRAWINGS SHALL BE MAINTAINED.

11. EXISTING SERVICES SHALL NOT BE CONNECTED TO THE PROPOSED WATER MAIN UNTIL THAT MAIN HAS PASSED PRESSURE TEST AND DISINFECTION REQUIREMENTS.

12. EXISTING WATER MAINS OR SERVICES SHALL NOT BE ABANDONED WITHOUT THE APPROVAL OF THE OWNER. WATER SERVICE SHALL NOT BE INTERRUPTED MORE THAN 4 HOURS WITHOUT PRIOR APPROVAL OF THE OWNER.

13. ALL HYDRANTS REMOVED SHALL BE SALVAGED AND DELIVERED TO A LOCATION TO BE DETERMINED BY THE OWNER. SURFACE RESTORATION SHALL BE IN KIND UNLESS OTHERWISE NOTED.

14. ANY HYDRANT WHICH IS NOT IN SERVICE SHALL BE COVERED WITH A SECURELY FASTENED AND APPROVED BAG.

15. THE LOCATION OF PIPES, CAPS, REDUCERS, BENDS, AND OTHER FITTINGS AT POINTS OF CONNECTIONS TO EXISTING MAINS IS APPROXIMATE. CONTRACTOR SHALL DIG A TEST PIT AT EACH LOCATION TO DETERMINE THE DIAMETER AND MATERIAL OF THE EXISTING PIPE AND THE LOCATION OF THE TIE-IN POINT.

16. ALL CATCH BASINS WITHIN PROJECT LIMITS SHALL BE PROTECTED AS SHOWN ON DETAIL SHEET.

17. THE CONTRACTOR SHALL NOTIFY THE MassDOT DISTRICT PERMITS ENGINEER AT 857-368-3000 TWO (2) DAYS PRIOR TO THE START OF WORK IN A STATE ROADWAY.

18. ALL STREET EXCAVATIONS SHALL BE COMPLETELY CLOSED AT THE END OF EACH WORKING DAY BY BACKFILLING. COVERING WITH STEEL PLATES MAY BE ALLOWED IF APPROVED BY THE ENGINEER.

19. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF MASSACHUSETTS GENERAL LAW CHAPTER 82A, TRENCH EXCAVATION AND SAFETY REQUIREMENTS, TO PREVENT THE GENERAL PUBLIC FROM UNAUTHORIZED ACCESS TO UNATTENDED TRENCHES.

20. THE CONTRACTOR SHALL NOT OPEN OR CLOSE ANY VALVES WHICH HOLD WATER IN THE SYSTEM. THE OWNER WILL, ON 72 HOURS NOTICE FROM THE CONTRACTOR, OPEN AND/OR CLOSE ANY VALVES REQUIRED FOR DRAINING OR ADMITTING WATER TO THE VARIOUS SECTIONS OF THE WATER MAINS. THE CONTRACTOR IS RESPONSIBLE TO NOTIFY IN WRITING 48 HOURS IN ADVANCE, ANY OCCUPANT THAT WILL BE WITHOUT WATER DUE TO A SHUTDOWN.

21. SOME WATER SERVICE CONNECTIONS MAY NOT BE SHOWN ON THE DRAWINGS. THE OWNER WILL MARK THE LOCATION OF SUCH CONNECTIONS, PROVIDED THE CONTRACTOR GIVES THE OWNER AT LEAST 72 HOURS ADVANCE NOTICE.

22. ALL NEW WATER SERVICES SHALL BE THE SAME SIZE AS THE EXISTING WATER SERVICE, EXCEPT THAT NO SERVICE SHALL BE LESS THAN 1" DIAMETER. COORDINATE THIS WORK WITH THE WATER DEPARTMENT.

23. ELEVATIONS REFERENCED ARE NAD83 MASSACHUSETTS STATE PLANES, MAINLAND ZONE, US FOOT.

24. EXISTING UTILITY INFORMATION, TOPOGRAPHIC INFORMATION, EDGE OF PAVEMENT, UTILITY POLE LOCATIONS, AND LOCATIONS OF EXISTING ABOVE GROUND STRUCTURES WERE TAKEN FROM PLANS PREPARED BY BEALS AND THOMAS, INC., KELLY ENGINEERING GROUP, GIS DATA, AND GROUND SURVEY CONDUCTED BY WESTON & SAMPSON.

25. ASSESSORS INFORMATION REPRESENTED ON THESE DRAWINGS IS TAKEN FROM THE CITY/TOWN ASSESSOR'S PARCEL MAPS, MASS GIS DATA AND IS INCLUDED FOR ILLUSTRATIVE PURPOSES ONLY. ASSESSORS INFORMATION IS NOT INTENDED TO BE AN AUTHORITATIVE RECORD OF PROPERTY BOUNDARIES OR A SOURCE OF INFORMATION FOR AN ACTUAL SURVEY OR LEGAL DESCRIPTION OF THE PROPERTY. NO WORK HAS BEEN PERFORMED TO DETERMINE THE DEPICTED PROPERTY LINES AND THEREFORE, THESE DRAWINGS ARE NOT INTENDED BE USED TO DELINEATE ANY EXISTING OR PROPOSED STRUCTURES, FEATURES OR BOUNDARIES RELATIVE TO PROPERTY LINES. AUTHORITATIVE RECORDS OF PROPERTY LINES MAY BE LOCATED AT THE STATE OR MUNICIPAL AGENCY RESPONSIBLE FOR MAINTAINING PUBLIC RECORDS IN WHICH THE PARCEL IS LOCATED. LEGALLY AUTHORITATIVE MAPS OF PROPERTY LINES MAY ONLY BE PRODUCED BY A PROFESSIONAL LAND SURVEYOR.

Project:

LITTLETON WATER DEPARTMENT

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

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

COA:

Seal:

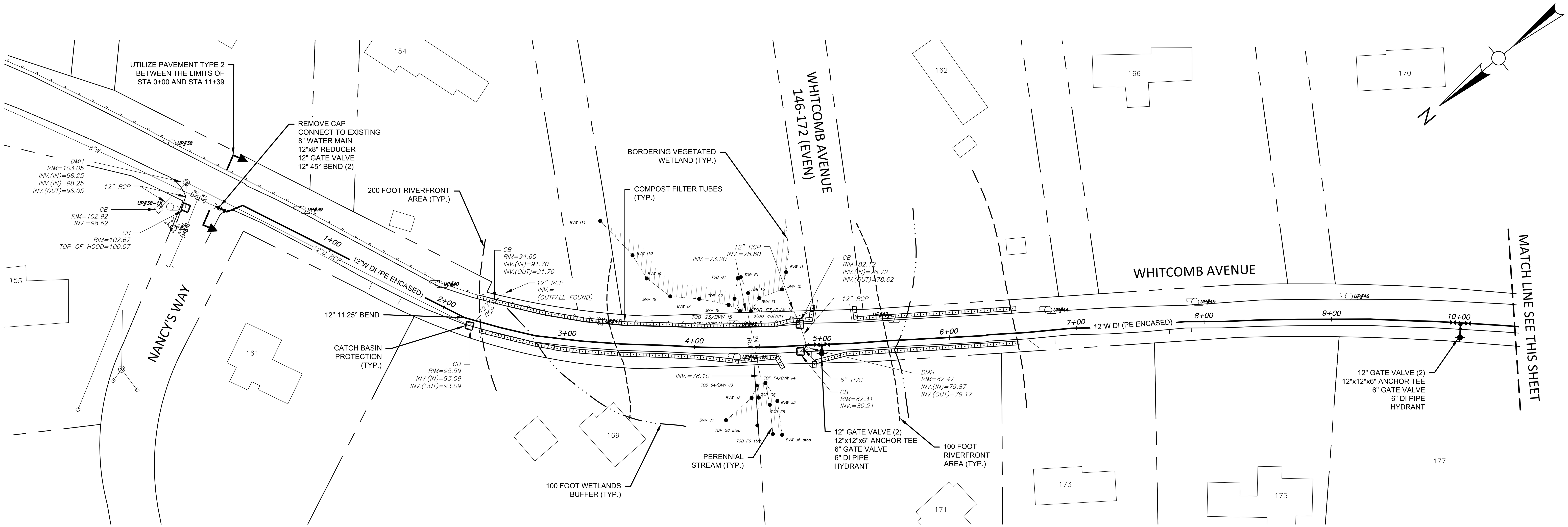
Issued For: PERMITTING

Scale: AS NOTED

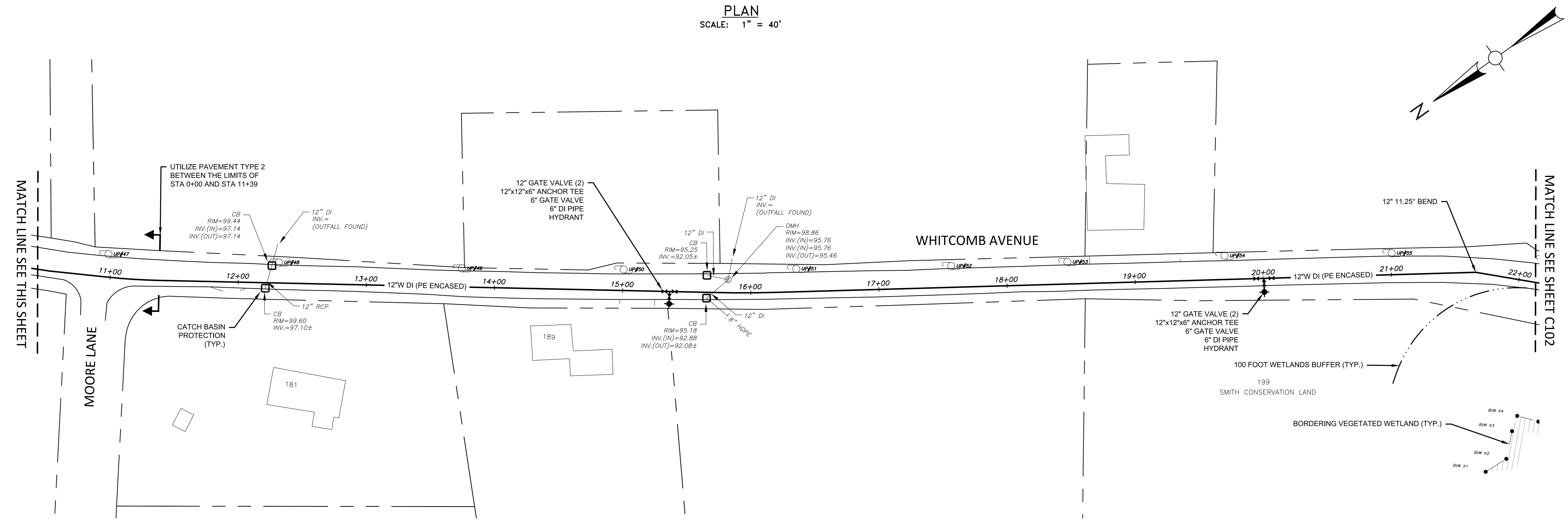
Date: DECEMBER 2023
Drawn By: GJK/RWS
Reviewed By: BAR
Approved By: TEM
W&S Project No.: ENG23-0679
W&S File No.:

Drawing Title: ABBREVIATIONS, NOTES, & LEGEND

Sheet Number: G001



PLAN
SCALE: 1" = 40'



PLAN
SCALE: 1" = 40'

NOTE:

1. WATER SERVICE LINES FOR EACH PROPERTY TO BE WORKED OUT DURING CONSTRUCTION.
2. CONTRACTOR SHALL INSTALL CATCH BASIN PROTECTION FOR ALL CATCH BASINS SHOWN ON THE PLAN OR AS REQUIRED BY THE ENGINEER.
3. PAVEMENT MARKINGS SHALL BE REPLACED IF REMOVED DURING CONSTRUCTION.
4. WETLAND DELINEATION CONDUCTED IN DECEMBER 2022 AND JANUARY 2023 BY WESTON & SAMPSON ENGINEERS, INC.

40 20 0 40 80
SCALE: 1"=40'

Project:

LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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

Weston & Sampson
Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

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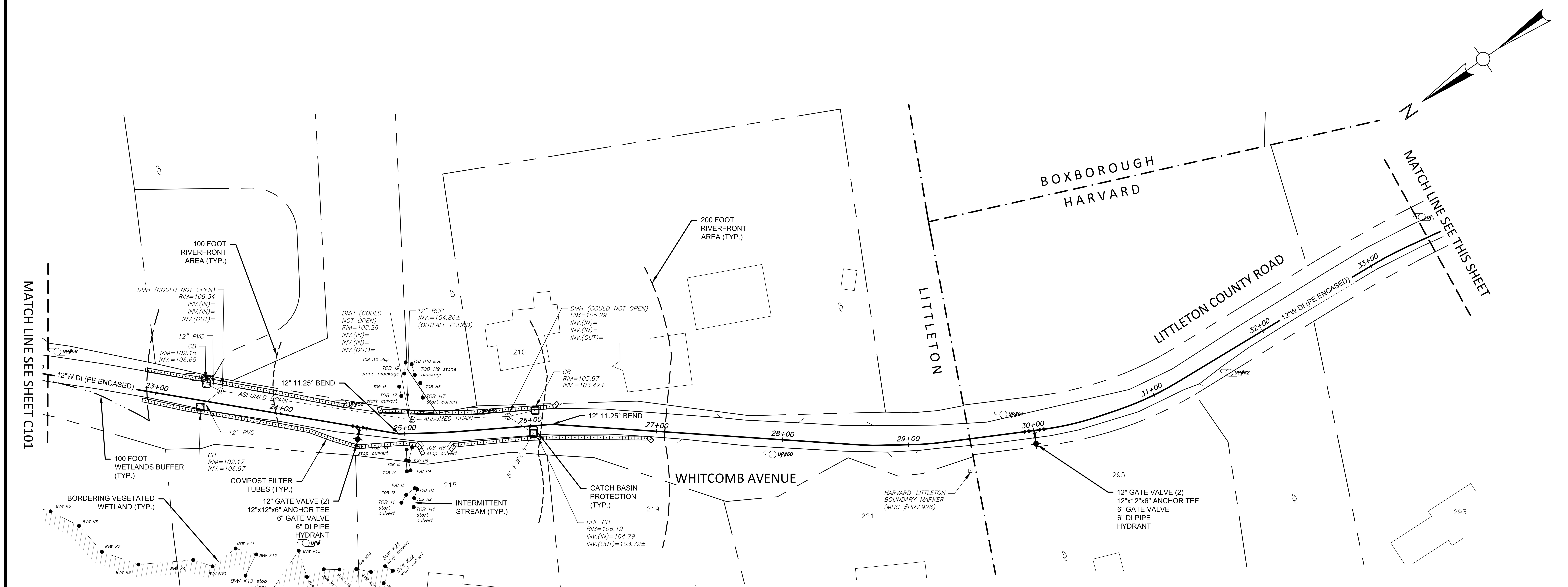
Date:	DECEMBER 2023
Drawn By:	GJK/RWS
Reviewed By:	BAR
Approved By:	TEM
W&S Project No.:	ENG23-0679
W&S File No.:	

Drawing Title:

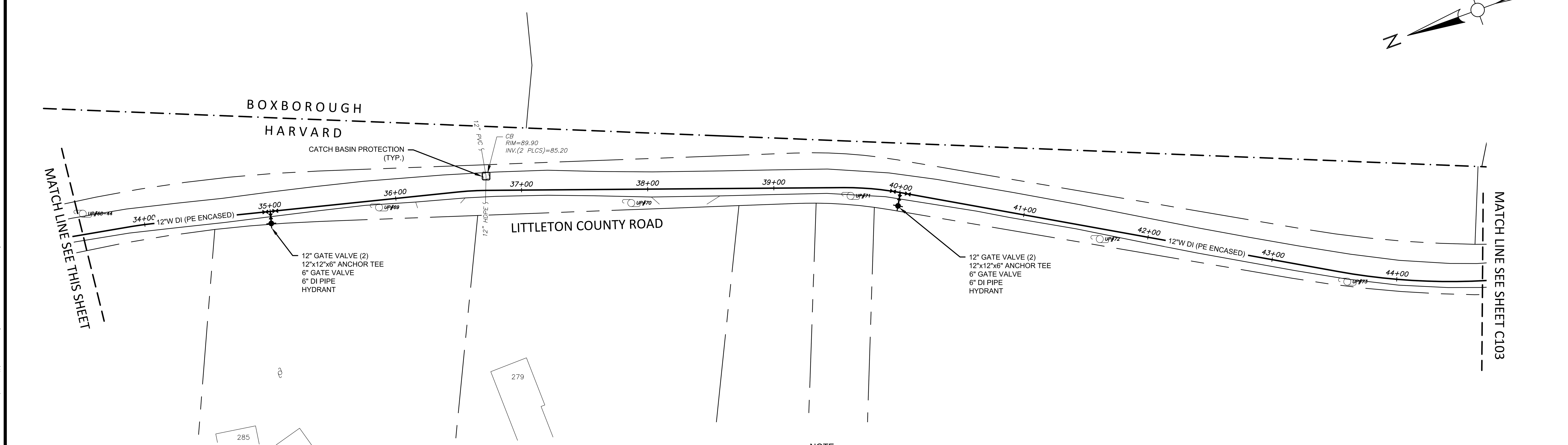
FINISH WATER PLAN
WHITCOMB AVENUE

Sheet Number:

C101



PLAN
SCALE: 1" = 40'



PLAN
SCALE: 1" = 40'

NOTE:
1. WATER SERVICE LINES FOR EACH PROPERTY TO BE WORKED OUT DURING CONSTRUCTION.
2. CONTRACTOR SHALL INSTALL CATCH BASIN PROTECTION FOR ALL CATCH BASINS SHOWN ON THE PLAN OR AS REQUIRED BY THE ENGINEER.
3. PAVEMENT MARKINGS SHALL BE REPLACED IF REMOVED DURING CONSTRUCTION.
4. WETLAND DELINEATION CONDUCTED IN DECEMBER 2022 AND JANUARY 2023 BY WESTON & SAMPSON ENGINEERS, INC.

40 20 0 40 80
SCALE: 1"=40'

Project:
LITTLETON WATER DEPARTMENT
LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS
WATER SUPPLY FROM LITTLETON TO BOXBOROUGH
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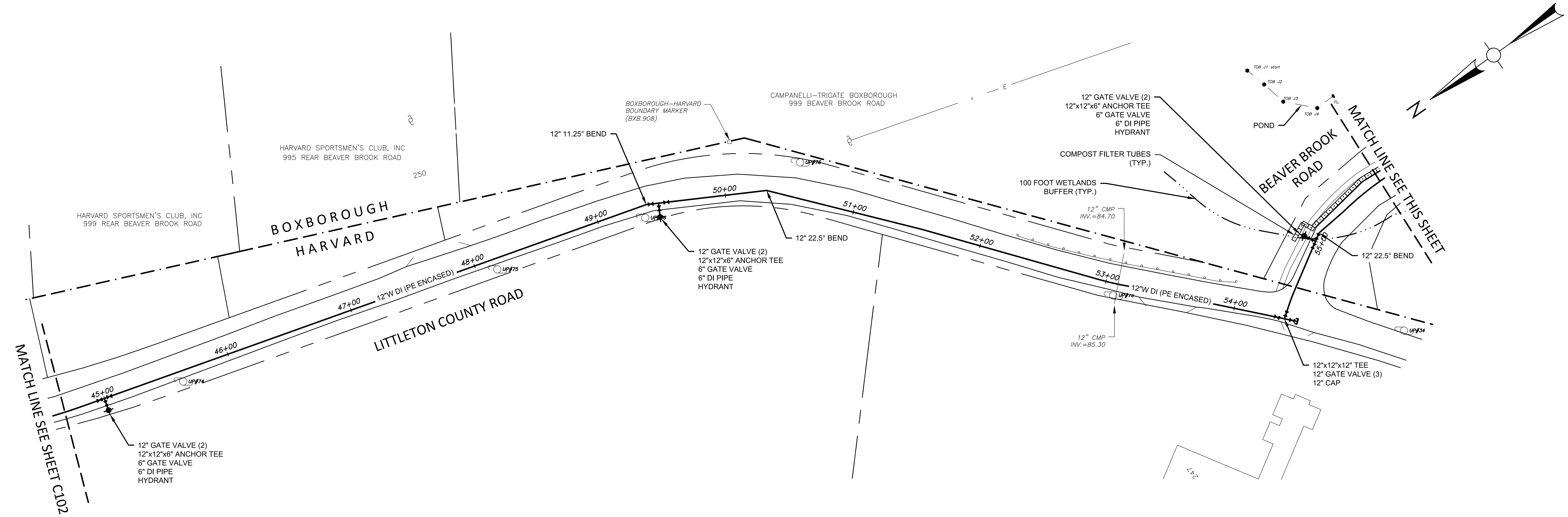
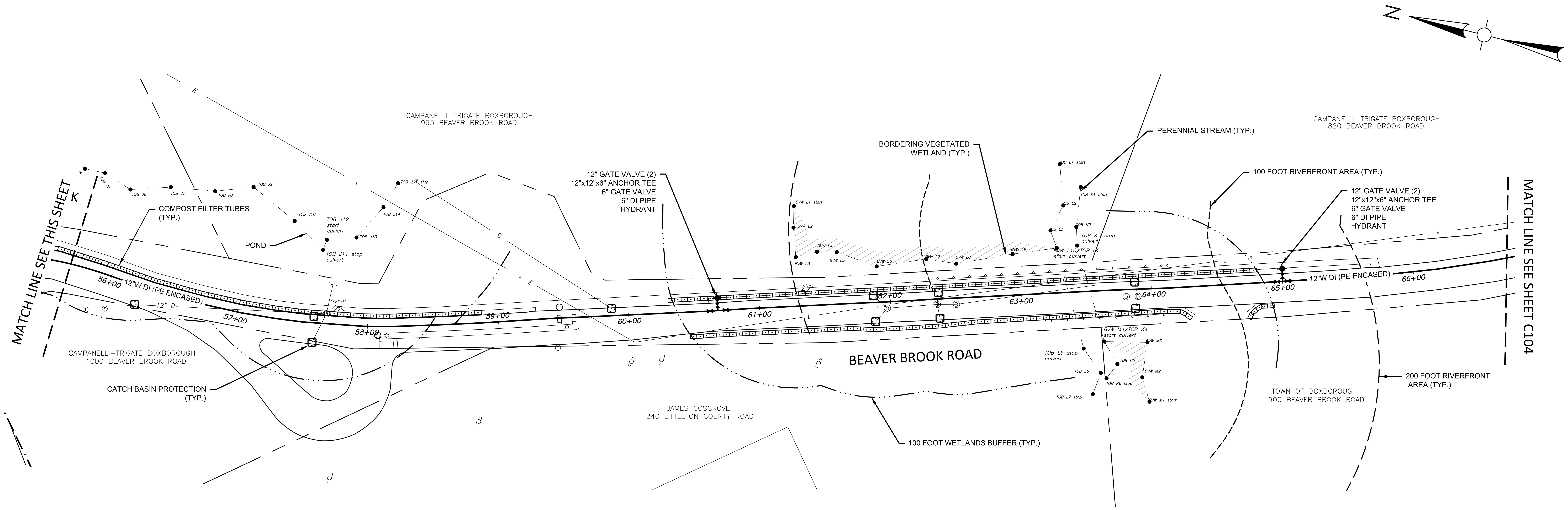
Reviewed By:	SBR
Approved By:	TEM
W&S Project No.:	ENG23-0679
W&S File No.:	

Drawing Title:
FINISH WATER PLAN WHITCOMB AVENUE AND LITTLETON COUNTY ROAD

Sheet Number:
C102



PLAN
SCALE: 1" = 40'



PLAN
SCALE: 1" = 40'

NOTE:

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40 20 0 40 80
SCALE: 1"=40'

Project:
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LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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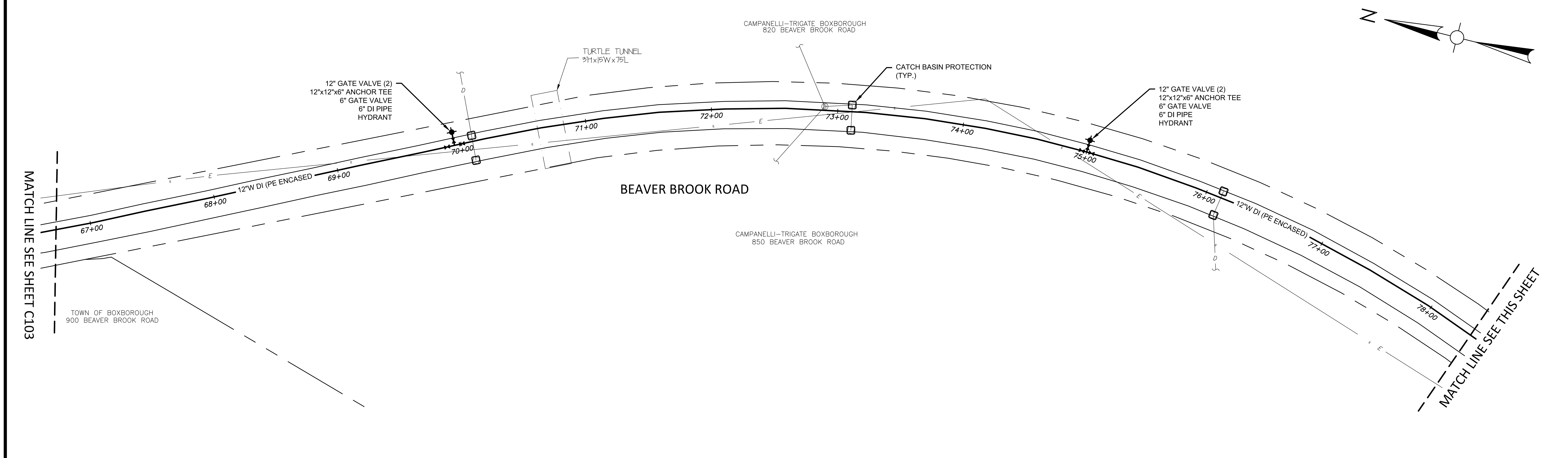
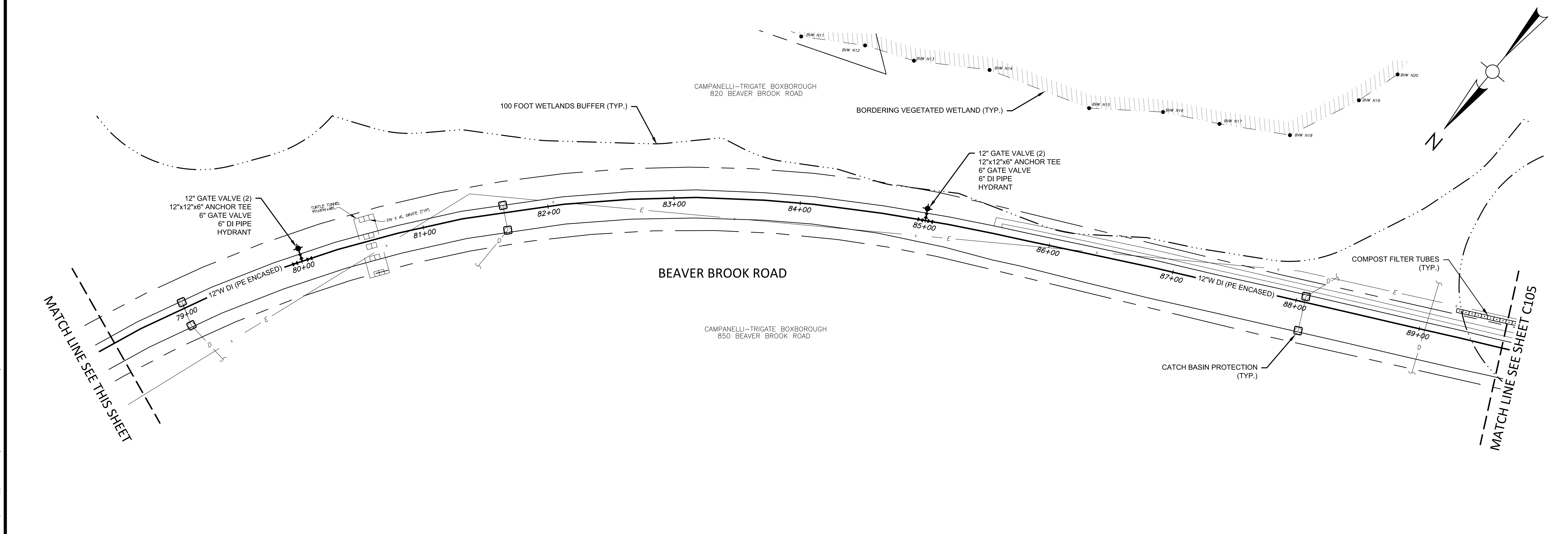
Approved By:	TEM
W&S Project No.:	ENG23-0679
W&S File No.:	

Drawing Title:
FINISH WATER PLAN LITTLETON COUNTY ROAD AND BEAVER BROOK ROAD

Sheet Number:
C103



PLAN
SCALE: 1" = 40'



PLAN
SCALE: 1" = 40'

NOTE:

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40 20 0 40 80
SCALE: 1"=40'

Project:
LITTLETON WATER DEPARTMENT

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TOWN CONTRACT NO. IFB-2024
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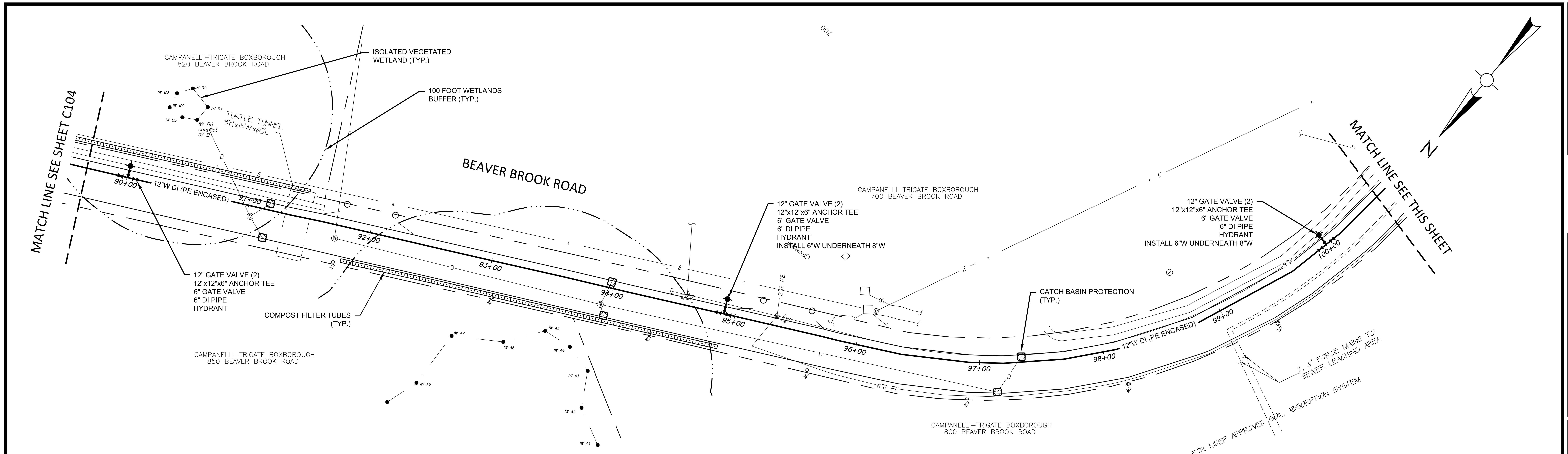
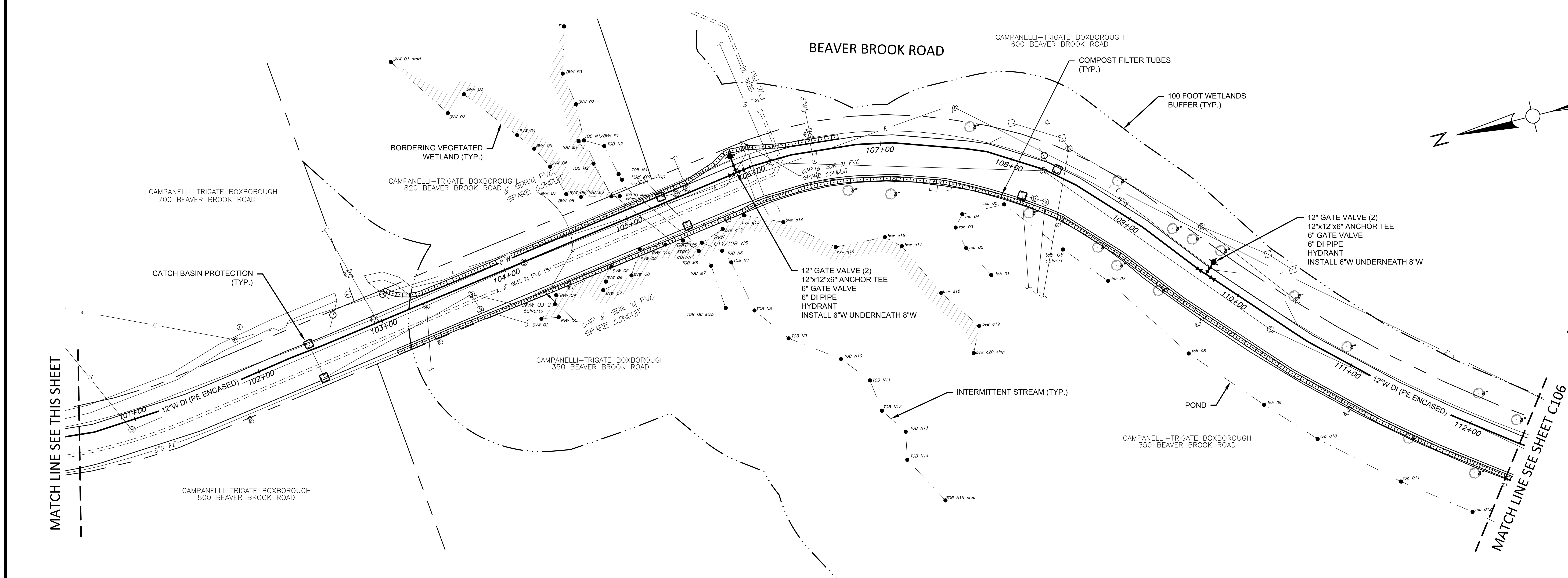
Approved By:	TEM
W&S Project No.:	ENG23-0679
W&S File No.:	

Drawing Title:
FINISH WATER PLAN
BEAVER BROOK ROAD

Sheet Number:
C104



PLAN
SCALE: 1" = 40'



PLAN
SCALE: 1" = 40'

NOTE:

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40 20 0 40 80
SCALE: 1"=40'

Project:
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WATER SUPPLY FROM LITTLETON TO BOXBOROUGH
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Approved By:	TEM
W&S Project No.:	ENG23-0679
W&S File No.:	

Drawing Title:
FINISH WATER PLAN
BEAVER BROOK ROAD

Sheet Number:
C105

Project:

LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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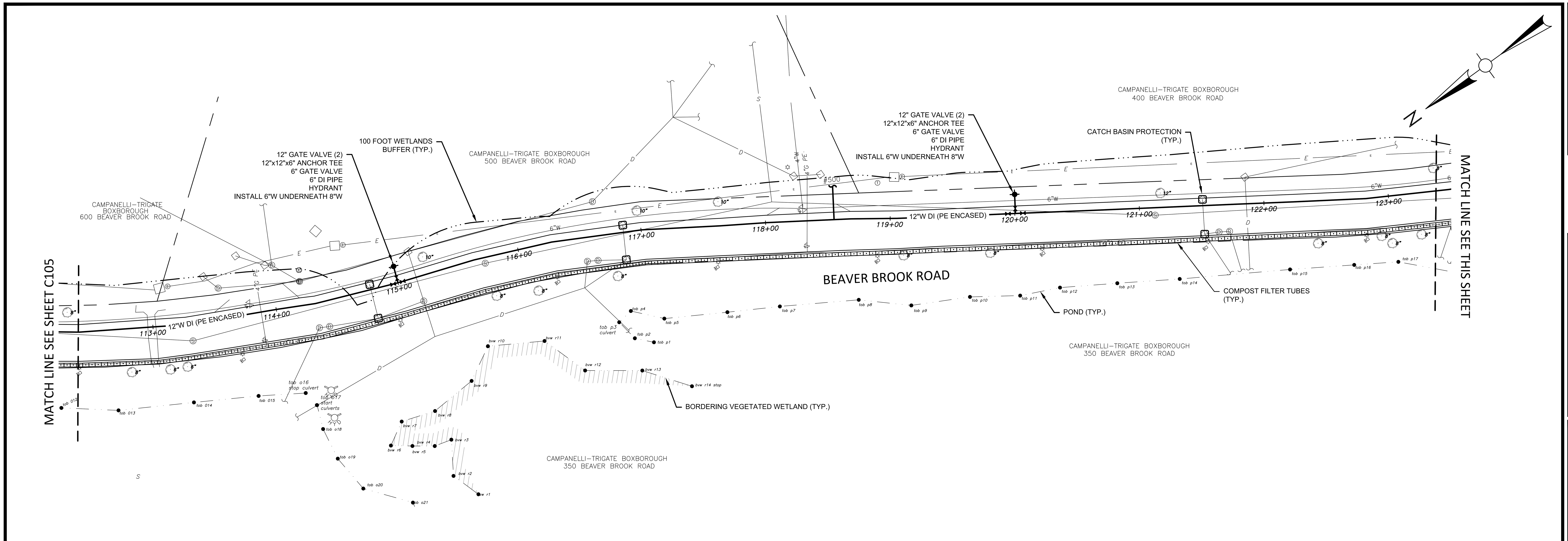
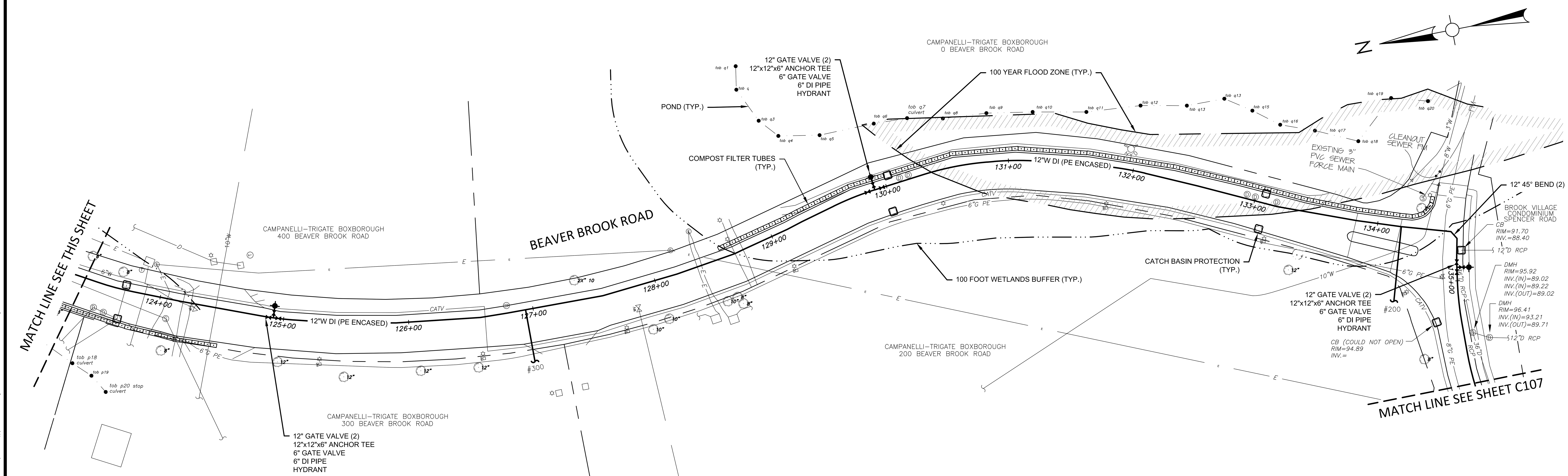


PLAN
SCALE: 1" = 40'



PLAN
SCALE: 1" = 40'

NOTE:

1. ADDITIONAL SURVEY DATA FROM BEALS & THOMAS "ORIGINAL CAD PLAN - B&T".
2. WATER SERVICE LINES FOR EACH PROPERTY TO BE WORKED OUT DURING CONSTRUCTION.
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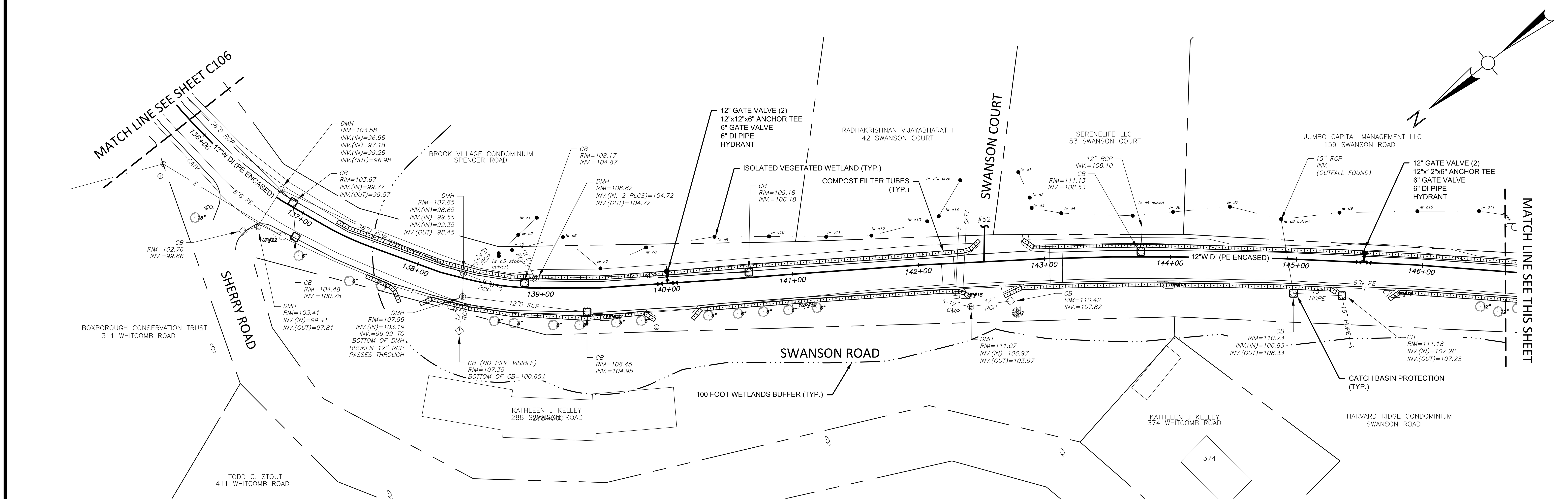
Date:	DECEMBER 2023
Drawn By:	GJK/RWS
Reviewed By:	SBR
Approved By:	TEM
W&S Project No.:	ENG23-0679
W&S File No.:	

Drawing Title:

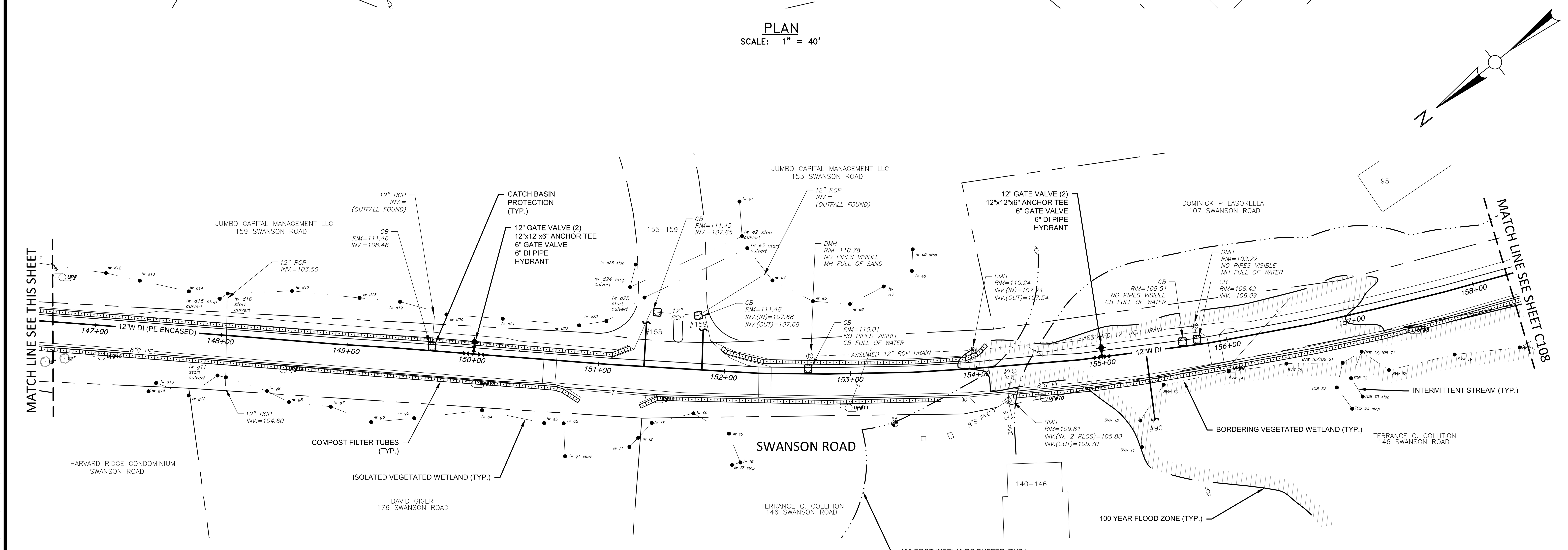
FINISH WATER PLAN
BEAVER BROOK ROAD

Sheet Number:

C106



PLAN
SCALE: 1" = 40'



PLAN
SCALE: 1" = 40'

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40 20 0 40 80
SCALE: 1"=40'

Project:
LITTLETON WATER DEPARTMENT

WATER SUPPLY FROM LITTLETON TO BOXBOROUGH
TOWN CONTRACT NO. IFB-2024
DWSRF NO. 12397
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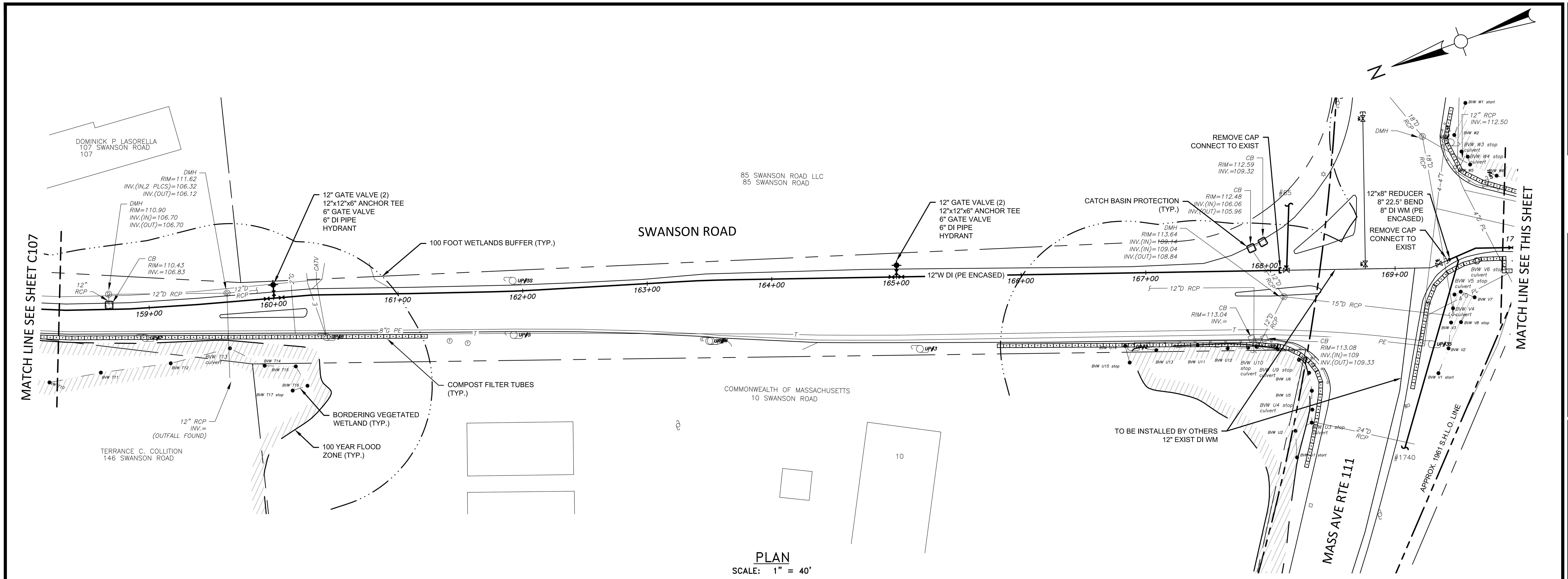
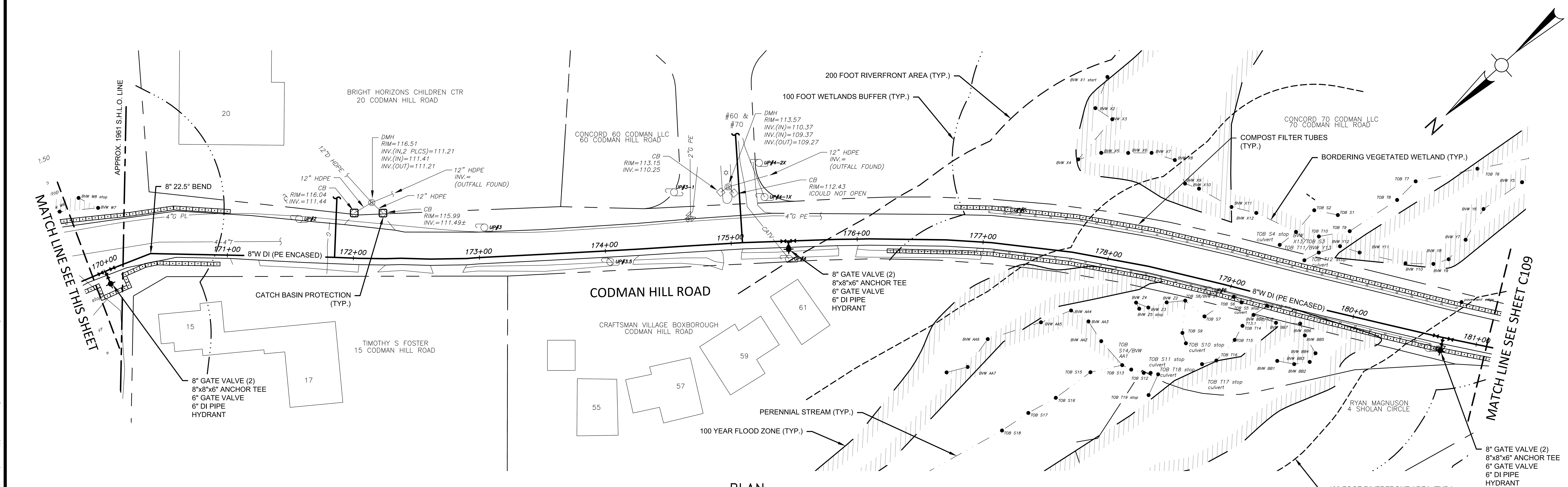
Approved By:	TEM
W&S Project No.:	ENG23-0679
W&S File No.:	

Drawing Title:
FINISH WATER PLAN
SWANSON ROAD

Sheet Number:
C107





NOTE:

1. ADDITIONAL SURVEY DATA FROM TRANSYSTEMS BOXBOROUGH ROUTE 111 OVER I-495 DRAINAGE & UTILITY PLANS DATED SEPTEMBER 7, 2023.
2. WATER SERVICE LINES FOR EACH PROPERTY TO BE WORKED OUT DURING CONSTRUCTION.
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SCALE: 1"=40'

Project:
LITTLETON WATER DEPARTMENT

WATER SUPPLY FROM LITTLETON TO BOXBOROUGH
TOWN CONTRACT NO. IFB-2024
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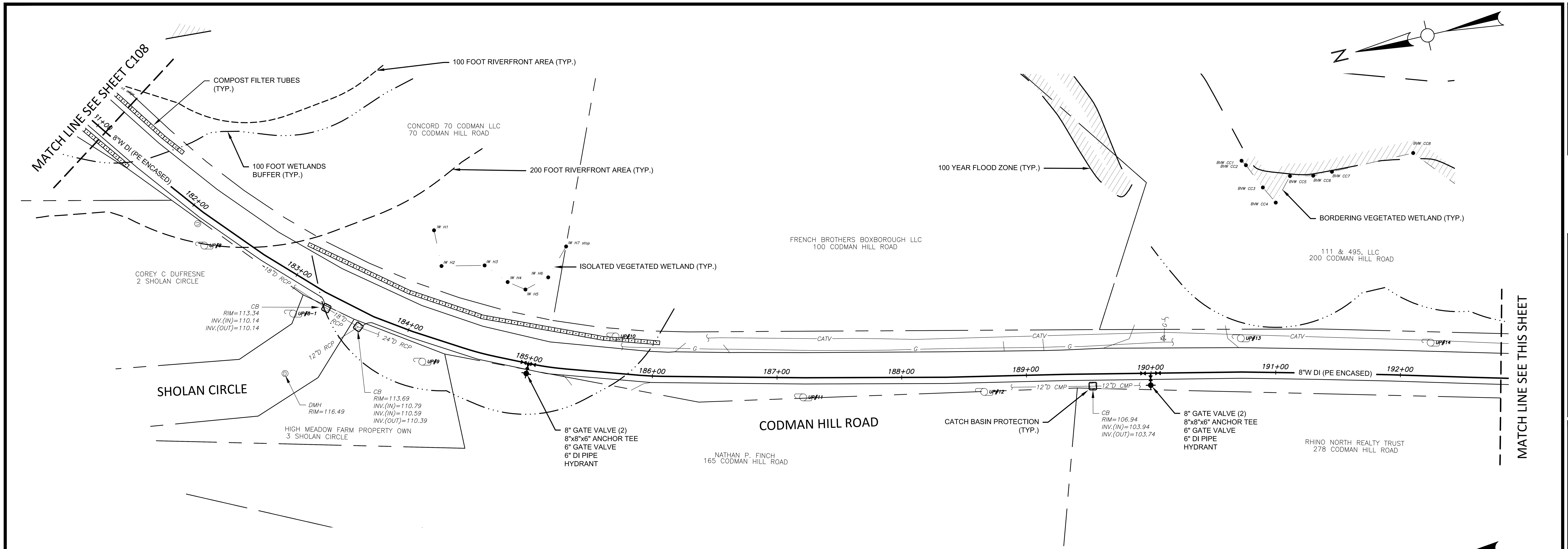
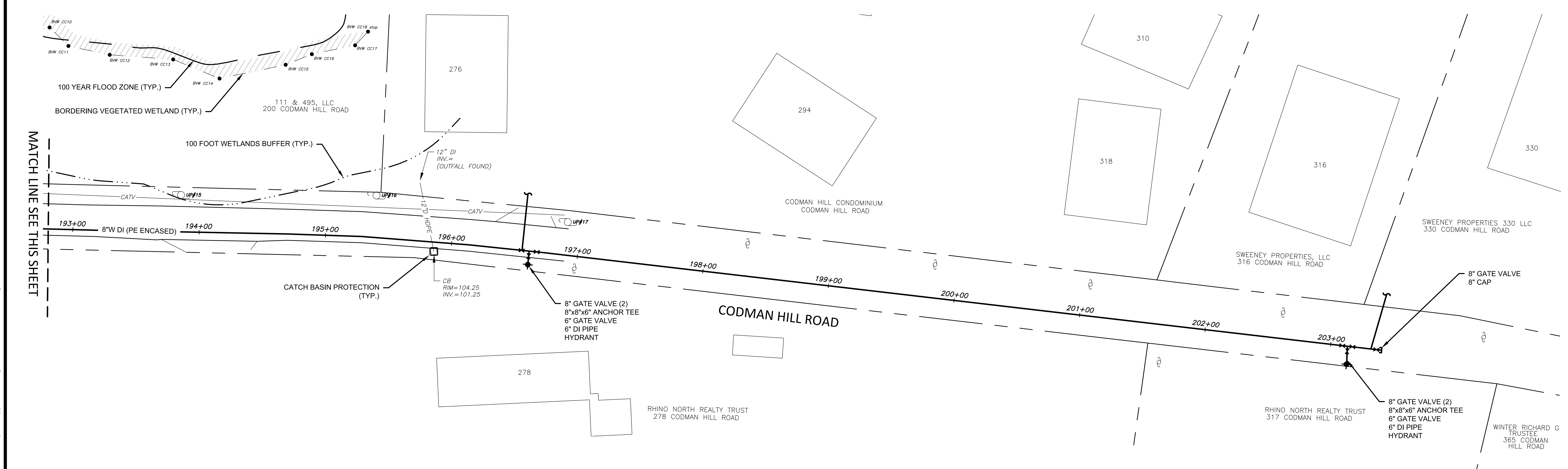
Approved By:	TEM
W&S Project No.:	ENG23-0679
W&S File No.:	

Drawing Title:
FINISH WATER PLAN
SWANSON ROAD
AND
CODMAN HILL ROAD

Sheet Number:
C108



PLAN
SCALE: 1" = 40'



PLAN
SCALE: 1" = 40'

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40 20 0 40 80
SCALE: 1"=40'

Project:
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WATER SUPPLY FROM LITTLETON TO BOXBOROUGH
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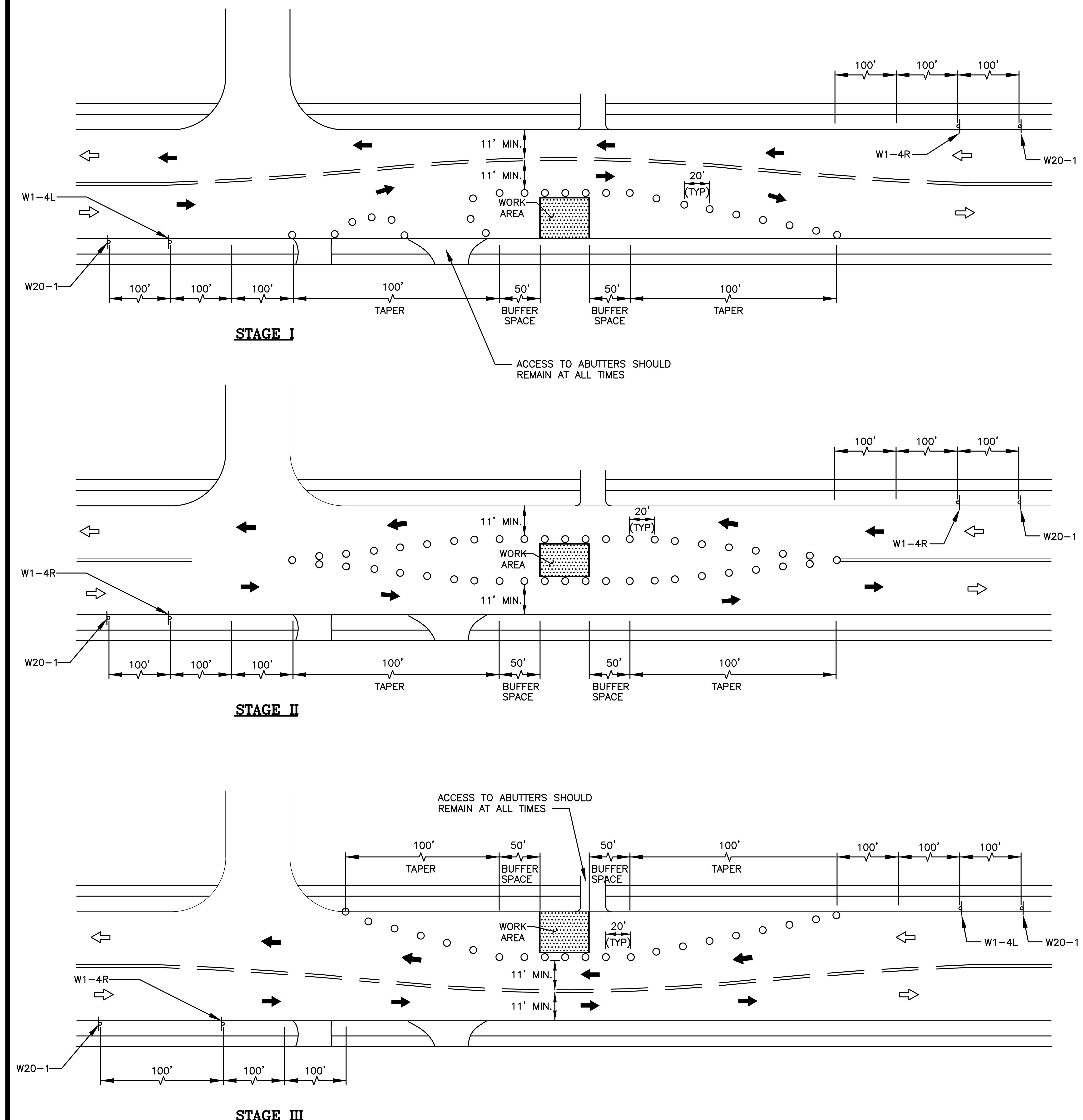
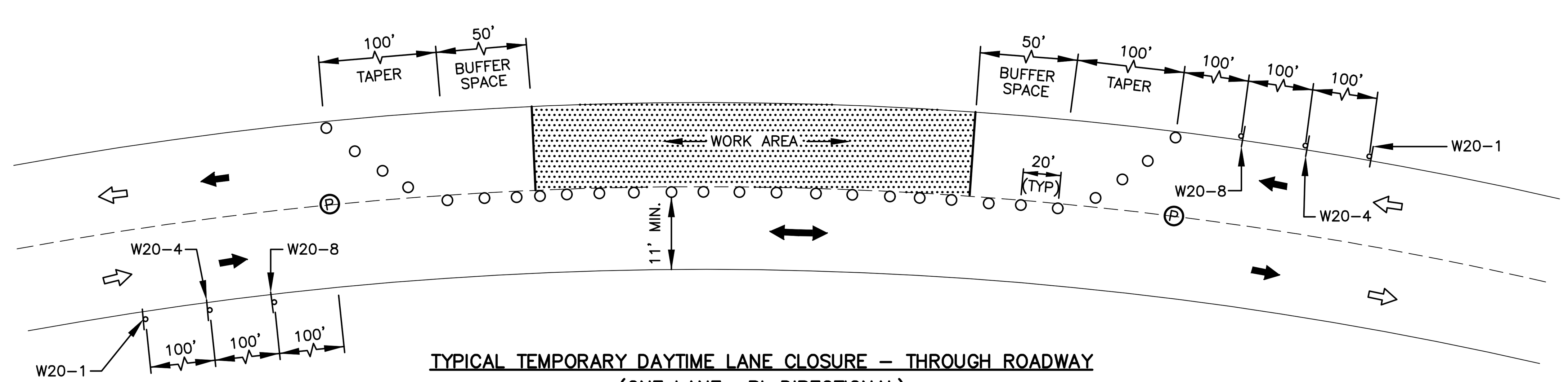
W&S File No.:	

Drawing Title:
FINISH WATER PLAN
CODMAN HILL ROAD

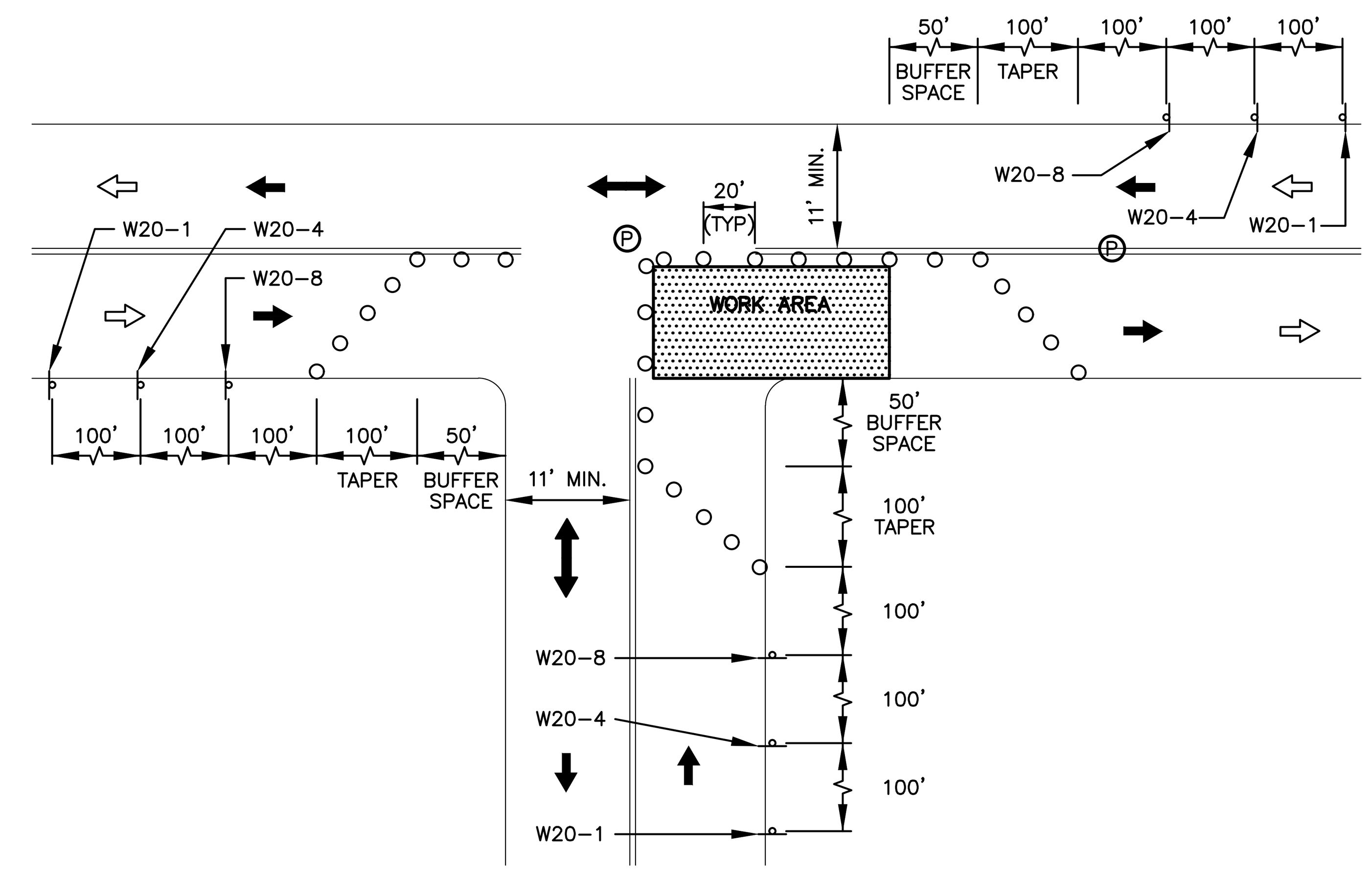
Sheet Number:
C109



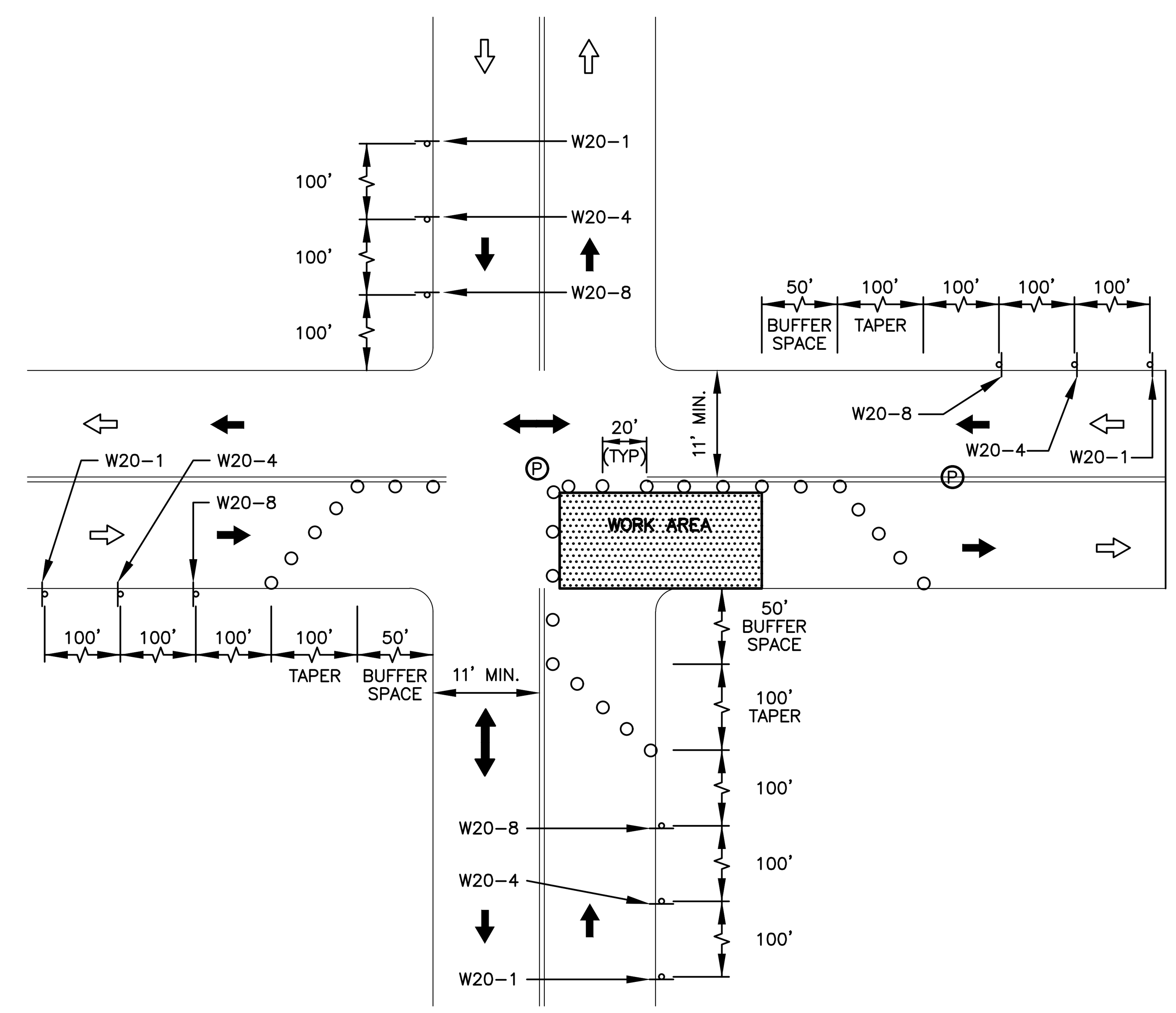
TRAFFIC OPERATION STAGES
N.T.S.



TYPICAL TEMPORARY DAYTIME LANE CLOSURE – THROUGH ROADWAY
(ONE LANE– BI-DIRECTIONAL)
N.T.S.



"T" INTERSECTION LANE CLOSURE
N.T.S.



CLOSURE AT SIDE OF INTERSECTION
N.T.S.

TEMPORARY TRAFFIC SIGN SUMMARY

MUTCD CODE	SIZE OF SIGN		SIGN
	WIDTH	HEIGHT	
W1–4L	30"	30"	
W1–4R	30"	30"	
W20–1	36"	36"	ROAD WORK AHEAD
W20–4	36"	36"	ONE LANE ROAD AHEAD
W20–8	36"	36"	POLICE OFFICER AHEAD
G20–2	36"	18"	END CONSTRUCTION

NOTE:

1. FOR THE LATEST SPECIFICATION ON TEXT DIMENSIONS AND COLOR, CONTRACTOR SHALL REFER TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CURRENT EDITION).

LEGEND:

- REFLECTORIZED DRUM
- TRAFFIC FLOW DURING CONSTRUCTION
- NORMAL TRAFFIC FLOW
- Ⓟ POLICE DETAIL OFFICER
- CONSTRUCTION SIGN
- WORK AREA

GENERAL NOTES:

1. PLACEMENT OF ALL CONSTRUCTION SIGNS, DRUMS, BARRICADES, TRAFFIC DEVICES AND THE SHAPE, SIZE & COLOR OF ALL TEMPORARY TRAFFIC SIGNS SHALL CONFORM WITH THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
2. ADVANCE WARNING SIGN PLACEMENT AND TAPER LENGTH TO BE ADJUSTED ACCORDING TO STREET CONDITIONS AND DRIVEWAY OPENINGS.
3. ALL DRUMS SHALL BE APPROXIMATELY PLACED AND MOVED AS NECESSARY TO MAINTAIN ADEQUATE ABUTTER ACCESS AT ALL TIMES.
4. THE CONTRACTOR SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT AND SIMILAR OPERATIONS.
5. NONESSENTIAL TRAFFIC CONTROL DEVICES SHALL BE COVERED OR REMOVED DURING NON–WORKING HOURS.
6. PEDESTRIANS SHALL BE PROVIDED WITH ACCESS AND SAFE PASSAGE THROUGH THE TEMPORARY TRAFFIC CONTROL ZONE AT ALL TIMES.
7. W20–8 SHALL BE TAKEN DOWN OR COVERED AFTER EACH WORKING DAY OR WHEN OTHERWISE NOT APPLICABLE, OR WHEN POLICE OFFICERS ARE NOT PRESENT TO DIRECT TRAFFIC.
8. ADVISORY SPEED PLATES (W13–1 – SEE CURRENT EDITION OF MUTCD) SHALL BE USED IF APPLICABLE AND AS REQUIRED BY THE ENGINEER.
9. NO DIFFERENCE IN ROADWAY LANE ELEVATION WILL BE ALLOWED AT THE END OF THE WORK DAY.
10. SAMPLE TRAFFIC PLANS INCLUDED ON THIS PLAN SHEET ARE BASED ON AN URBAN (LOW SPEED) ROAD TYPE FROM THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
11. DASHED LINES SHOW LANE DESIGNATIONS TO BE USED DURING CONSTRUCTION.
12. THE CONTRACTOR SHALL SUBMIT ANY REVISIONS TO THE CONSTRUCTION ZONE SAFETY PLAN TO THE ENGINEER FOR APPROVAL.
13. THIS CONSTRUCTION ZONE SAFETY PLAN SHALL NOT RELIEVE THE CONTRACTOR OF HIS SOLE RESPONSIBILITY FOR CONSTRUCTION SITE SAFETY.

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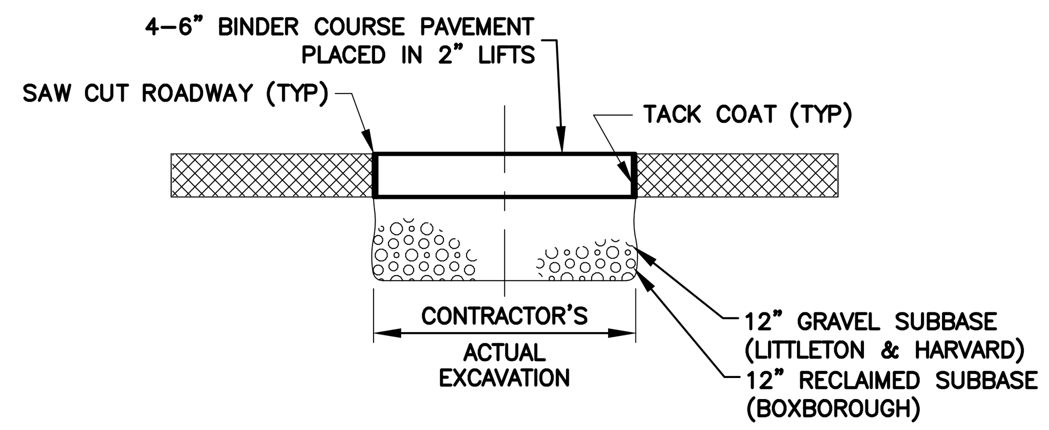
W&S Project No.: ENG23-0679
W&S File No.:

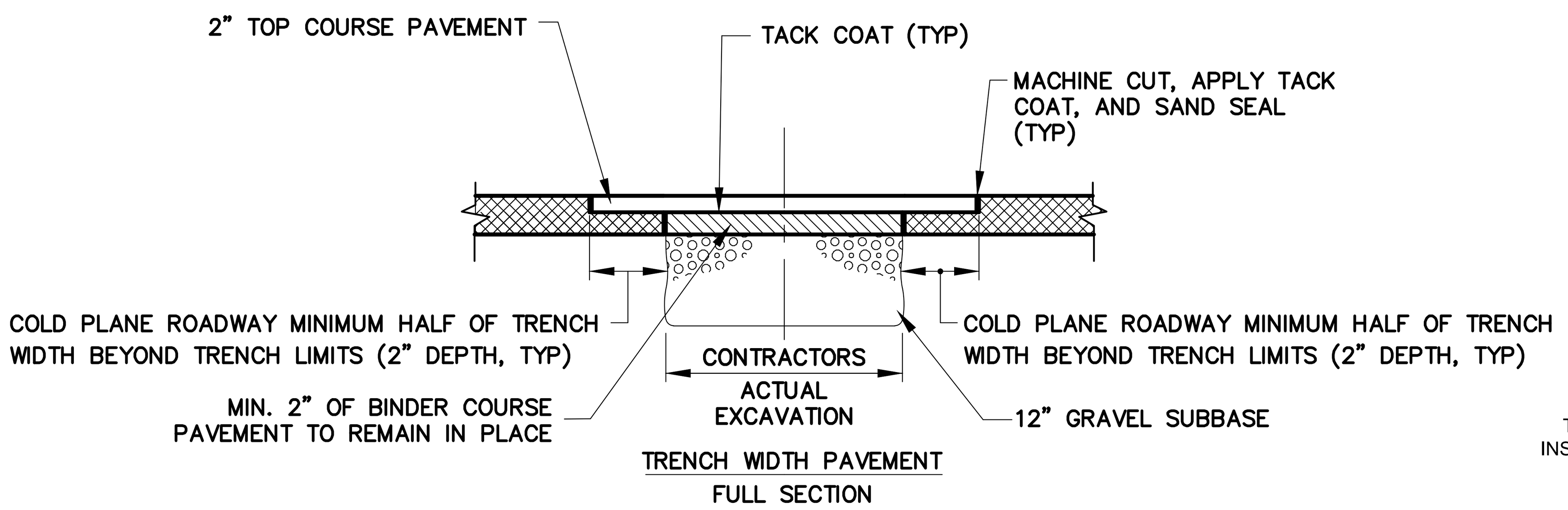
Drawing Title:
CONSTRUCTION ZONE SAFETY PLAN

Sheet Number:
C110



TEMPORARY TRENCH PAVEMENT DETAIL

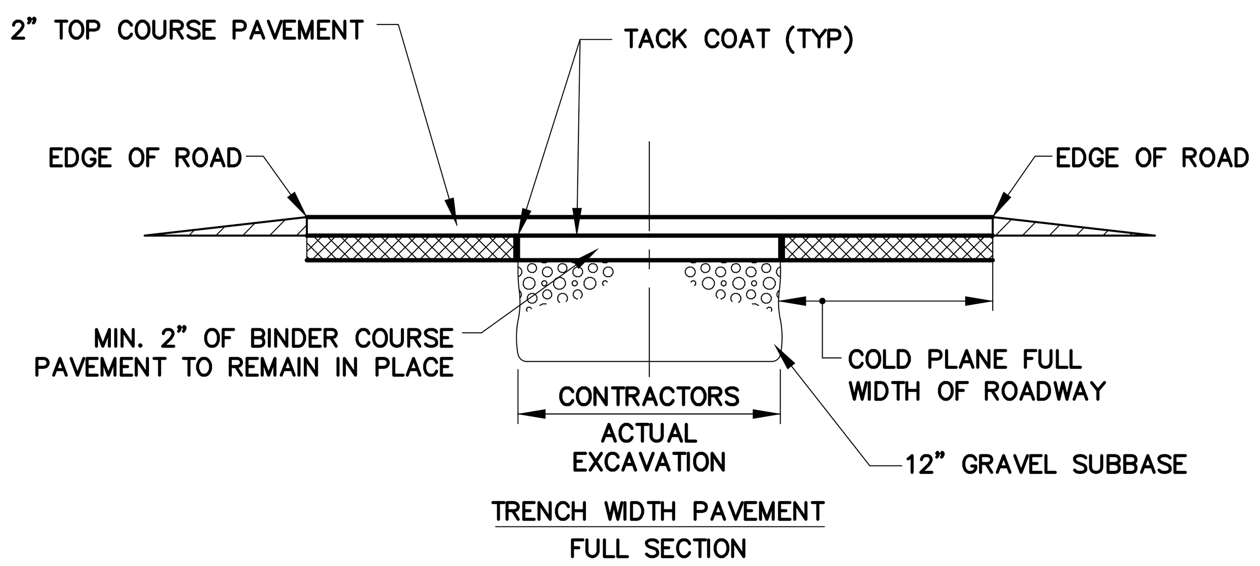
N.T.S.



TYPE 1:

LOCAL ROAD PERMANENT MILL AND OVERLAY PAVEMENT DETAIL

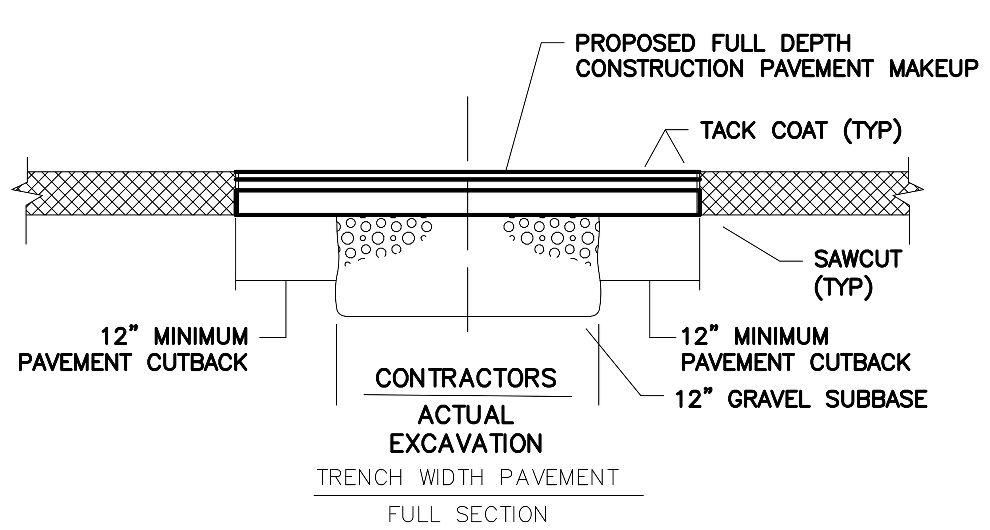
N.T.S.



TYPE 2:

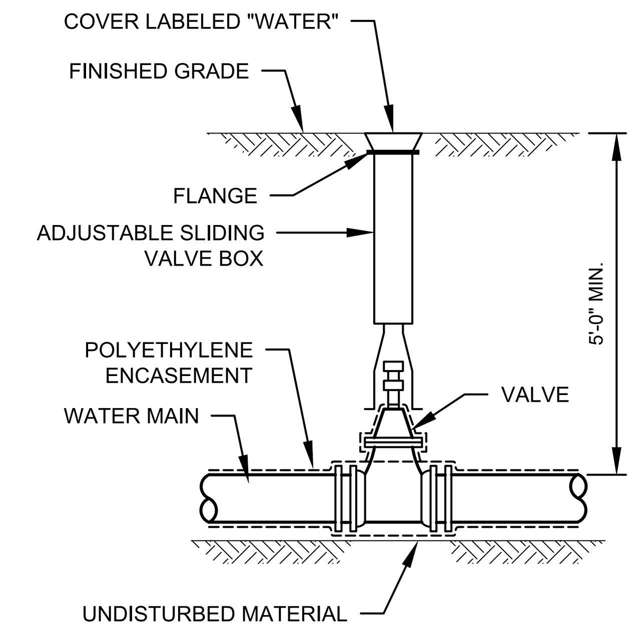
LITTLETON STA 0+00 TO 13+00 PERMANENT FULL WIDTH AND OVERLAY PAVEMENT DETAIL

N.T.S.



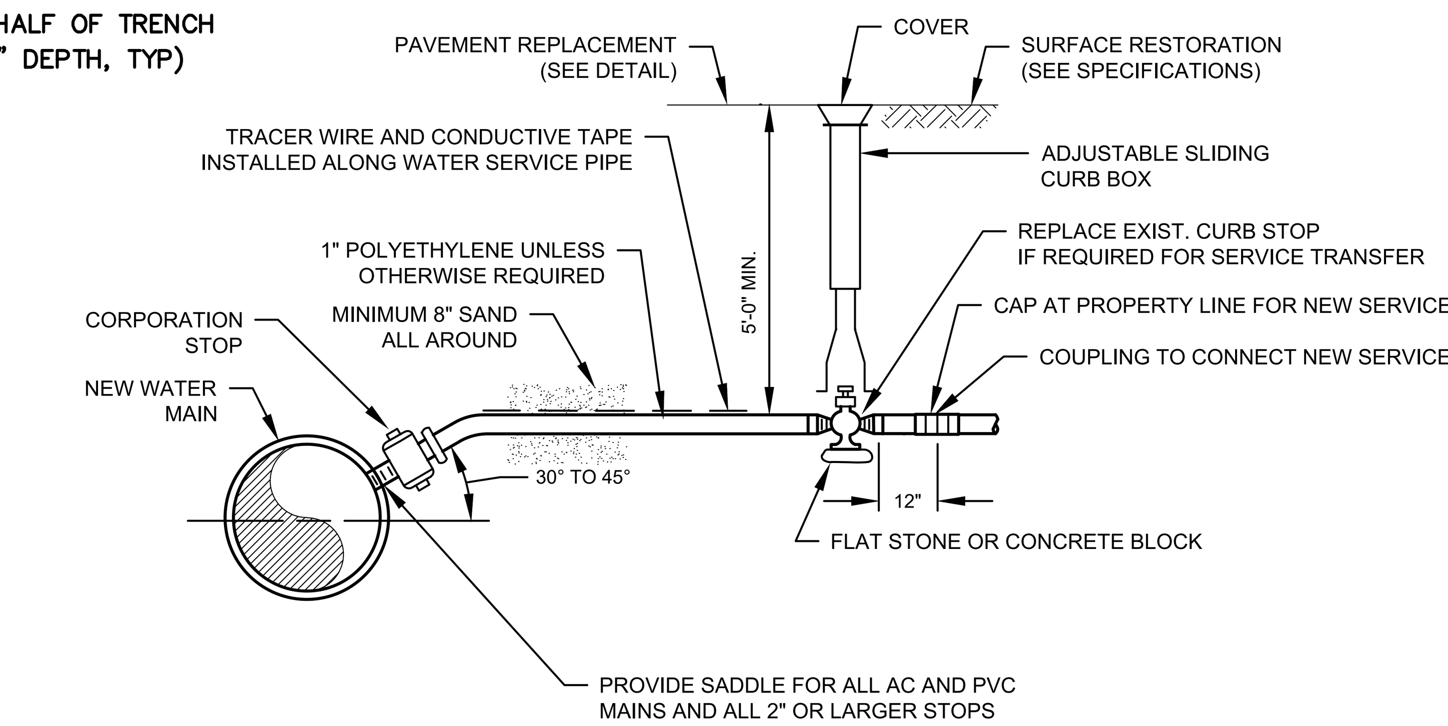
STATE HIGHWAY PERMANENT TRENCH PAVEMENT DETAIL

N.T.S.



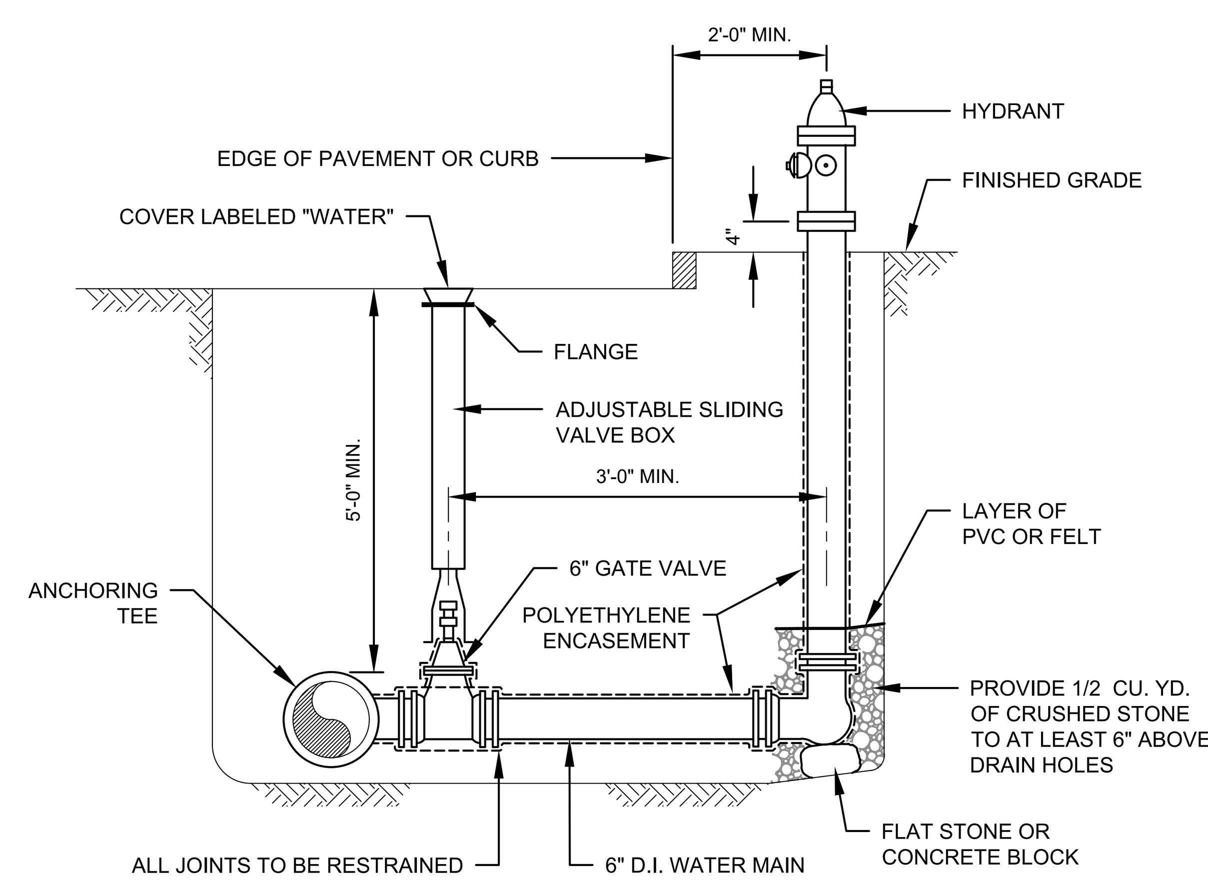
VALVE AND BOX DETAIL

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.

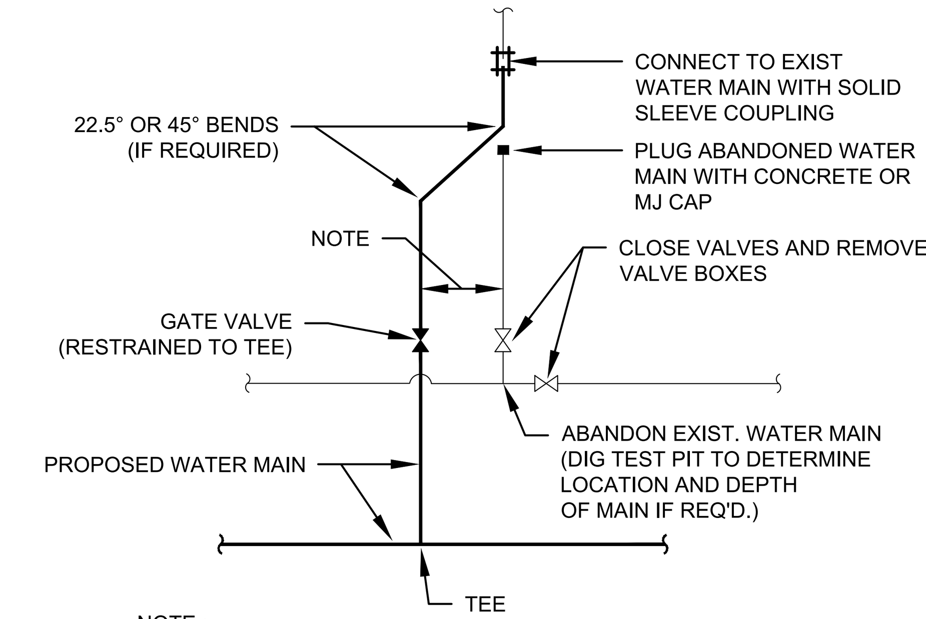
REQUIRED LENGTH OF RESTRAINED JOINTS FROM FITTINGS (FEET)

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:

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

RESTRAINED JOINT TABLE

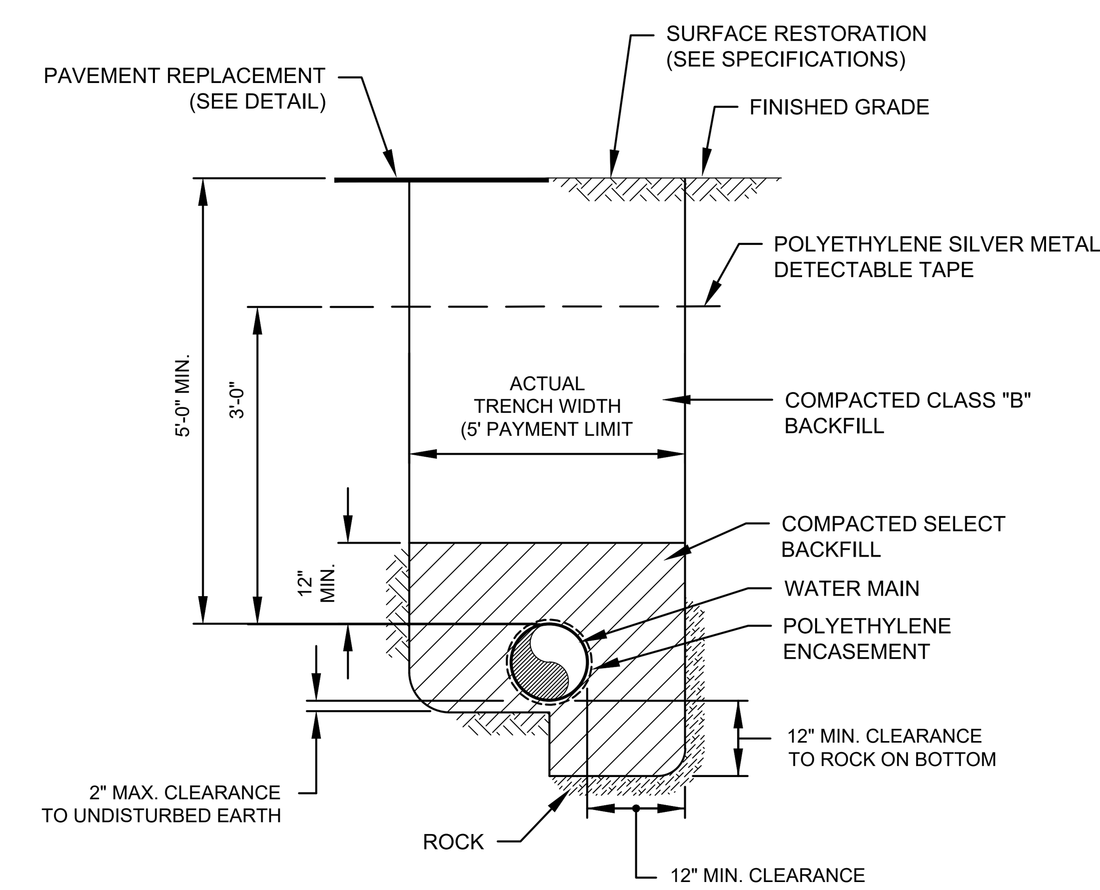


NOTE :

MINIMUM PRACTICAL DISTANCE - GENERALLY NO MORE THAN 2 FT.

WATER MAIN LATERAL CONNECTION

N.T.S.



WATER MAIN TRENCH DETAIL

N.T.S.

Project:

LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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

Weston & Sampson
Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
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Drawn By: GJK/RWS
Reviewed By: BAR
Approved By: TEM
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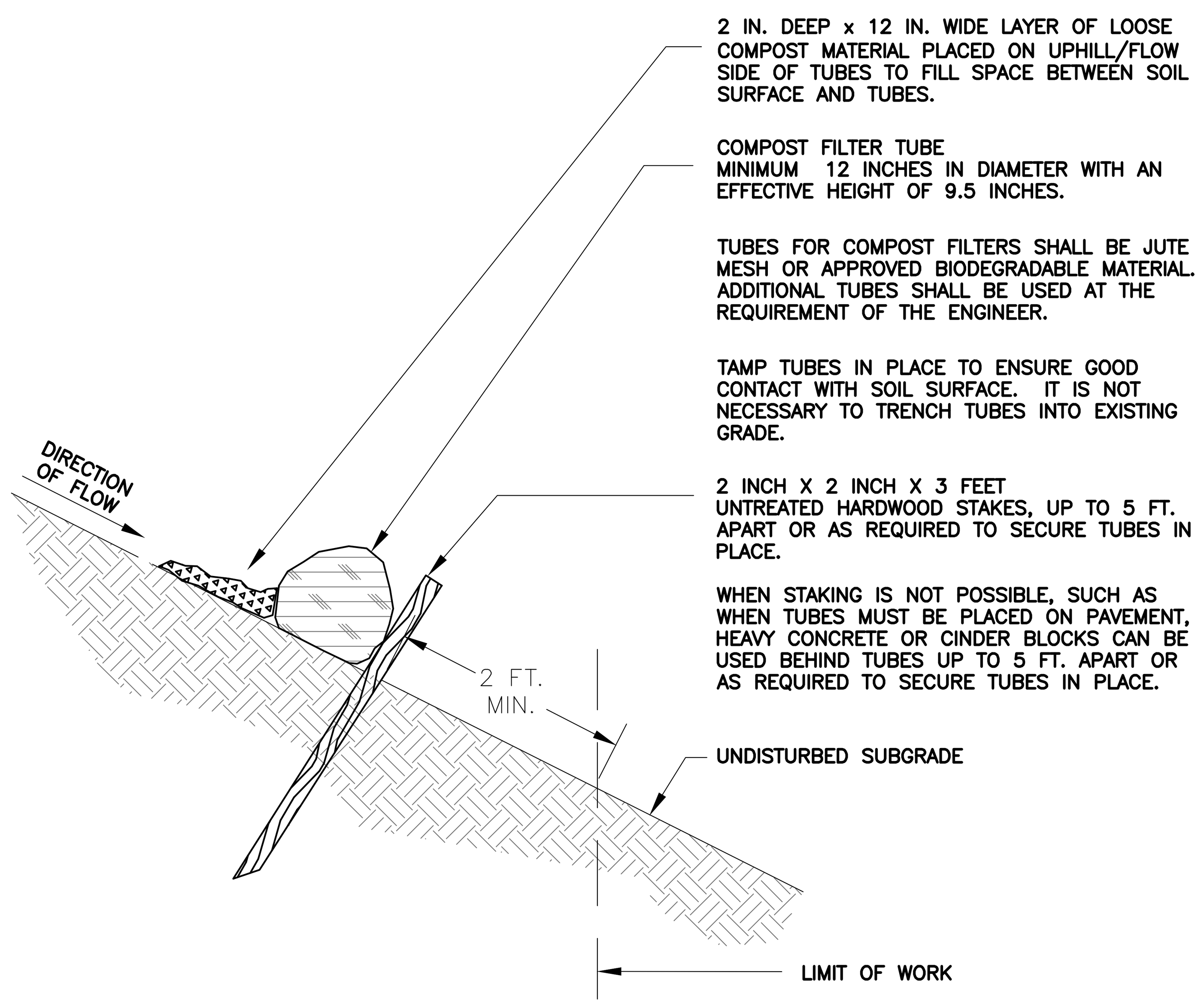
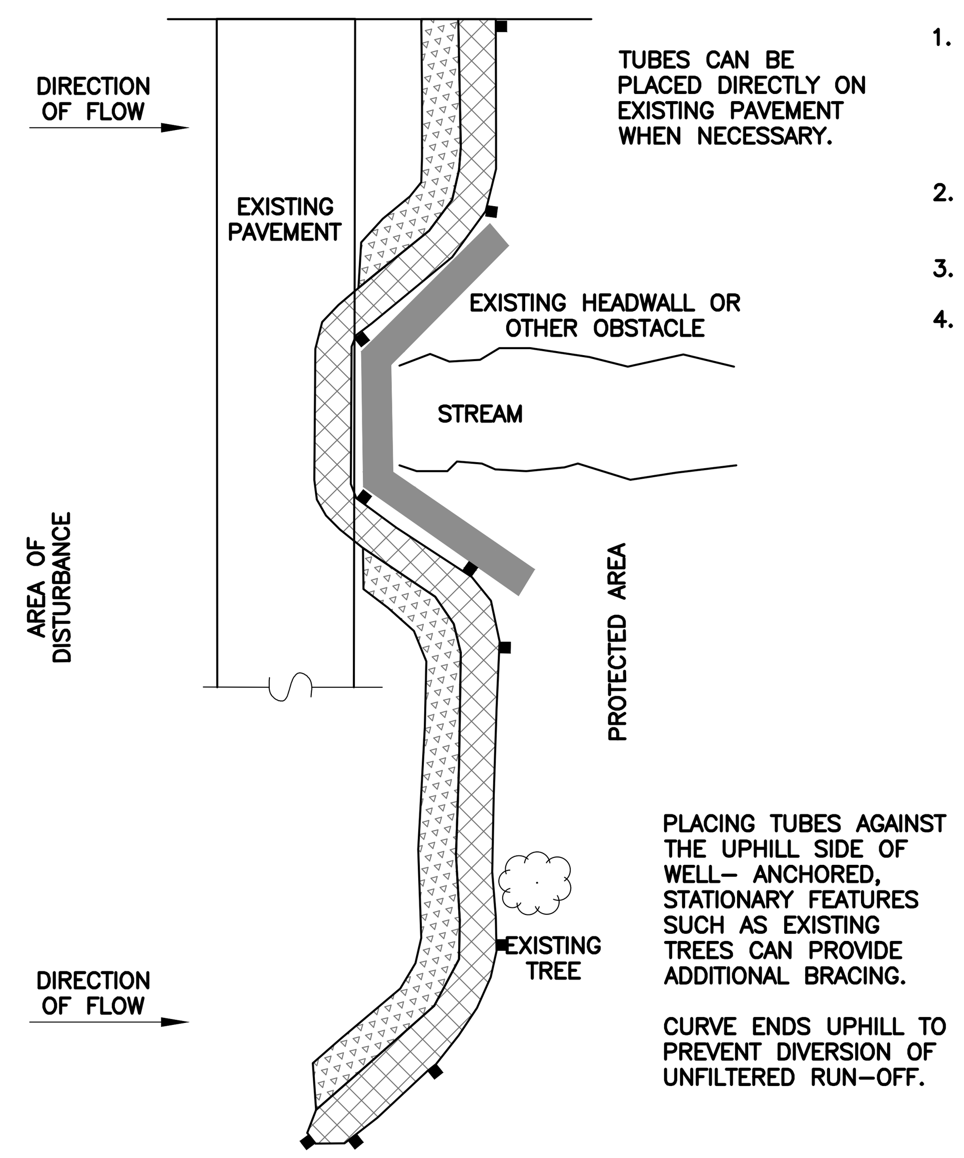
DETAILS I

Sheet Number:

C501





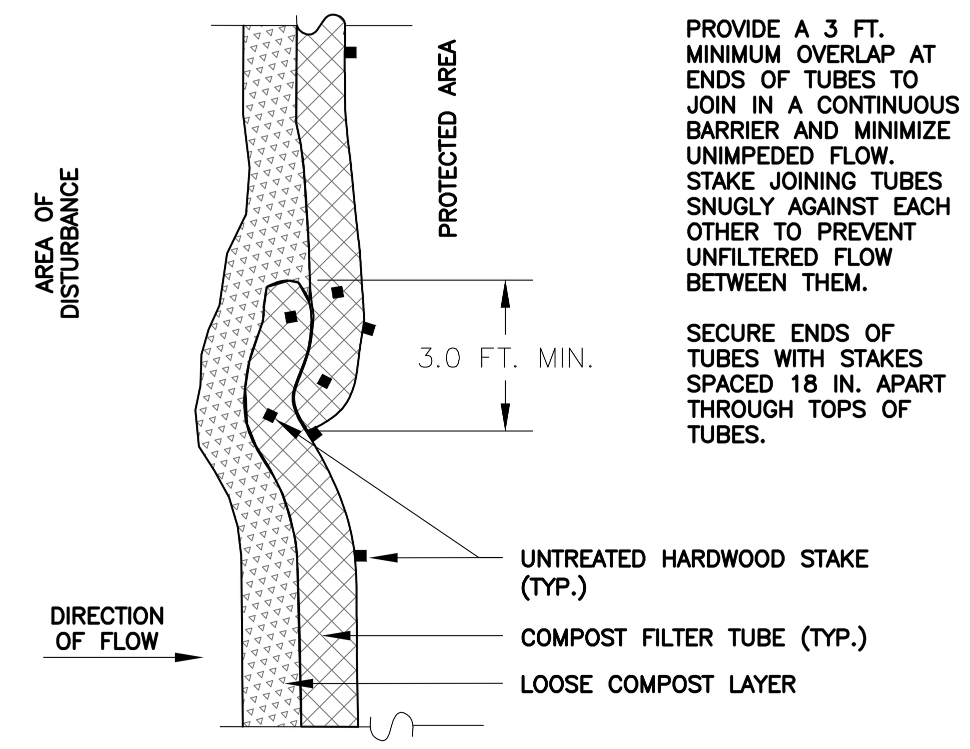
PLAN VIEW

SINGLE COMPOST FILTER TUBE DETAIL

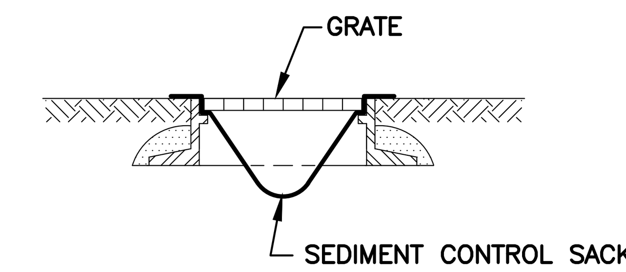
NOT TO SCALE

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 COURSING 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.

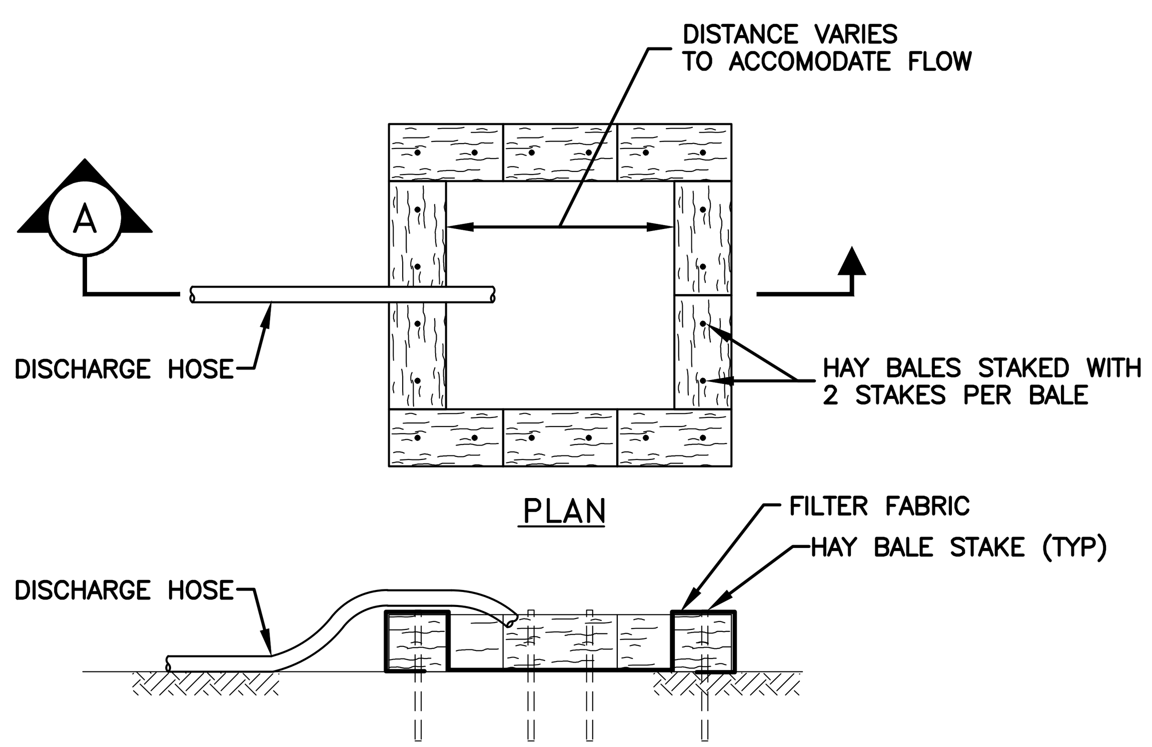


PLAN VIEW – JOIN DETAIL



CATCH BASIN PROTECTION DETAIL

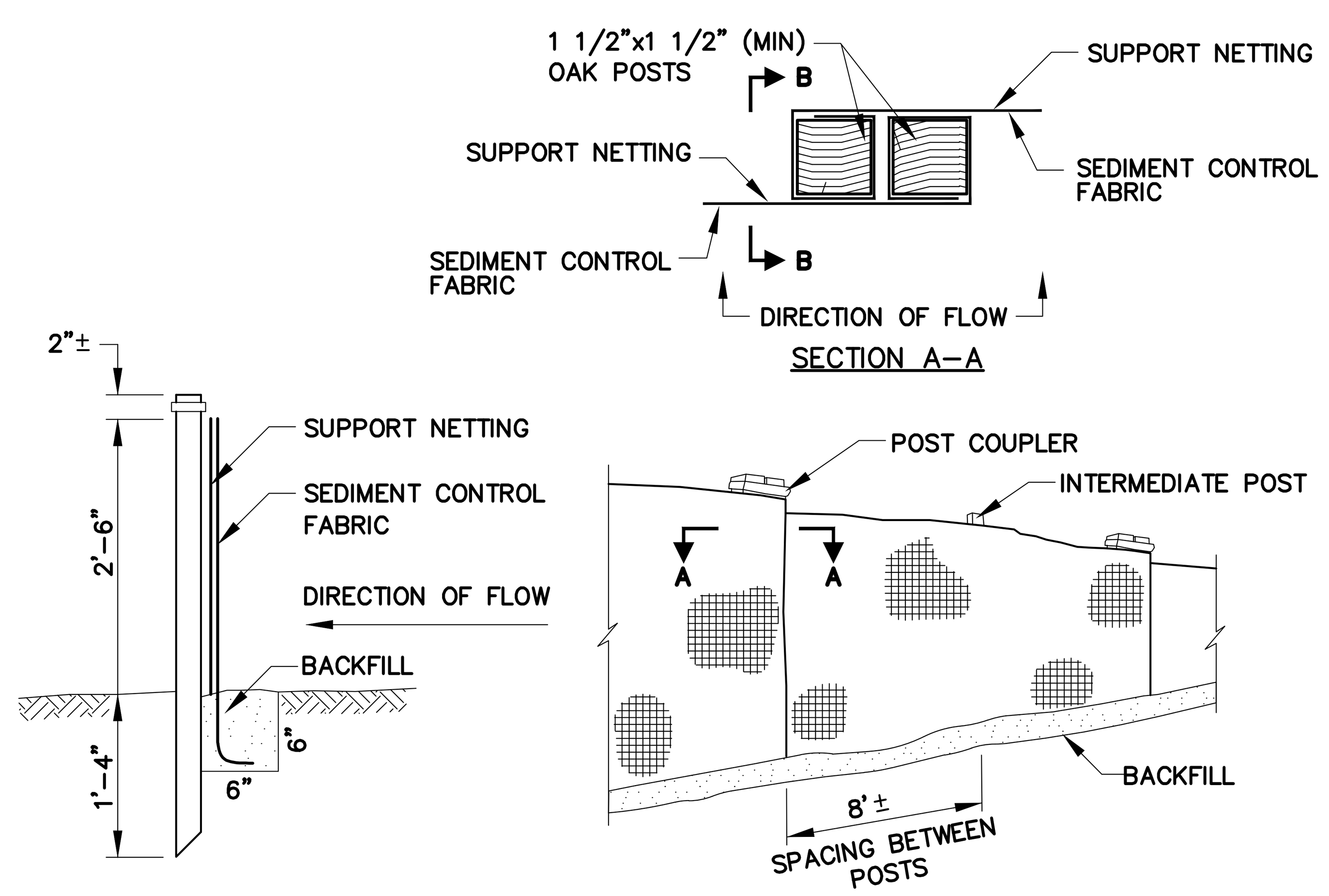
N.T.S.



SECTION A

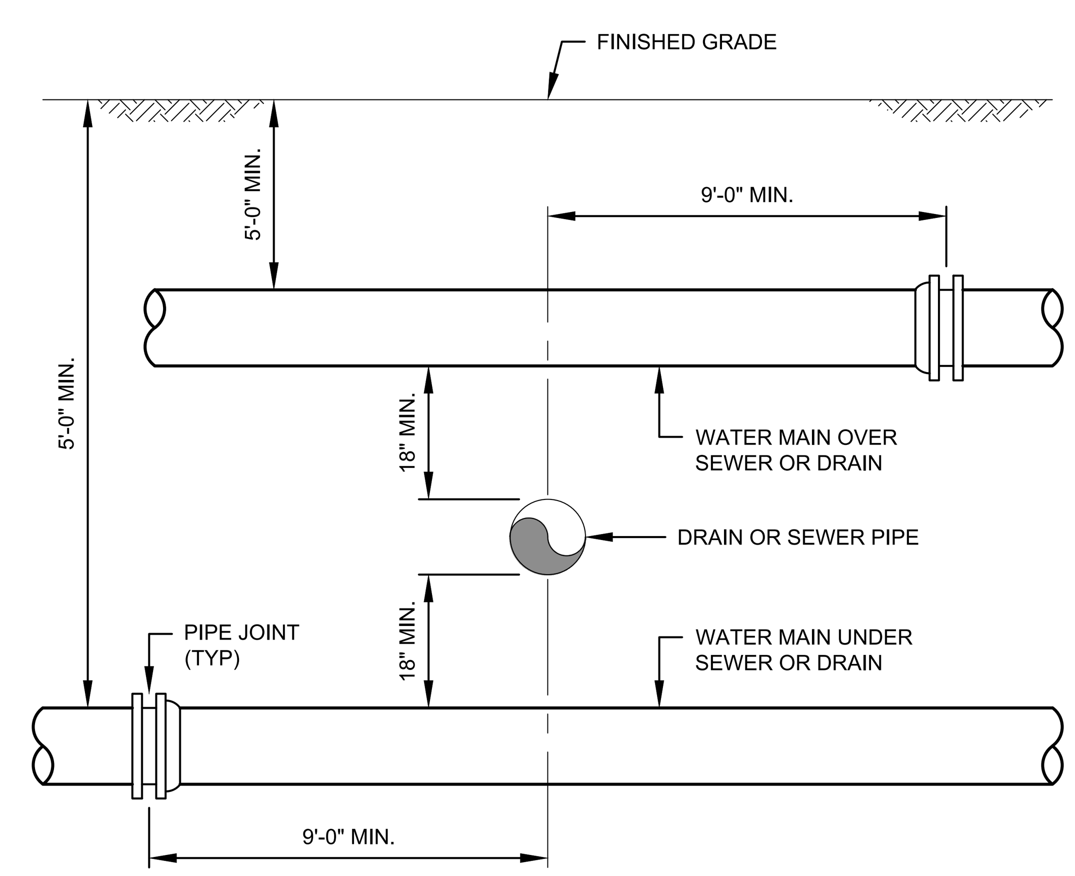
DEWATERING DISCHARGE DISPOSAL DETAIL

N.T.S.



SILT FENCE DETAIL

N.T.S.



SEWER OR DRAIN CROSSING DETAIL

N.T.S.

Project:
LITTLETON WATER DEPARTMENT

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

Drawing Title:
DETAILS II

Sheet Number:
C502

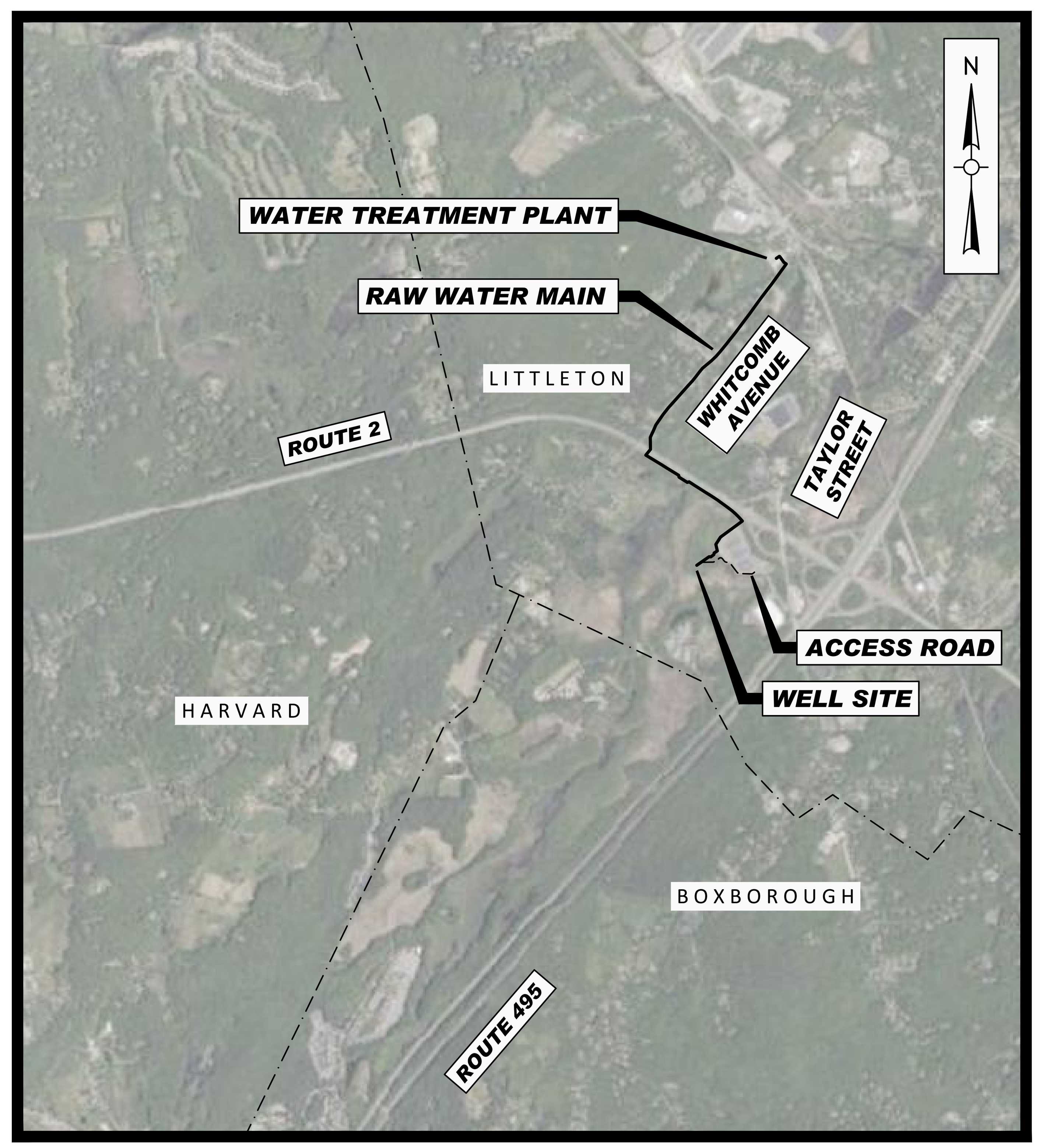
LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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
C106	CONSTRUCTION ZONE SAFETY PLAN I
C107	CONSTRUCTION ZONE SAFETY PLAN II
C501	DETAILS I
C502	DETAILS II
C503	DETAILS III
C504	DETAILS IV
G101	CODE SUMMARY
A011	ABBREVIATIONS, SYMBOLS, LEGEND AND GENERAL NOTES
A021	GENERAL NOTES
A101	OVERALL FLOOR, REFLECTED CEILING & ROOF PLANS
A201	OVERALL ELEVATIONS / 3D VIEWS
A301	BUILDING & WALL SECTIONS
A501	LARGE SCALE STAIR PLANS / SECTIONS
A601	DETAILS
A602	ROOF DETAILS
A801	DOOR SCHEDULE, TYPES & DETAILS
A831	FENESTRATION TYPES & DETAILS
S001	GENERAL NOTES
S002	TYPICAL DETAILS I
S101	FOUNDATION PLAN, SLAB PLAN, ROOF FRAMING PLAN
S201	FRAME ELEVATIONS
S301	FOUNDATION SECTIONS & DETAILS 1
S901	3D VIEWS
I001	INSTRUMENTATION AND CONTROLS ABBREVIATIONS, NOTES & LEGEND
I100	INSTRUMENTATION AND CONTROLS DETAILS - I
I101	INSTRUMENTATION AND CONTROLS DETAILS - II
M101	PROCESS PIPING PLAN
M301	PROCESS PIPING SECTIONS
M501	PROCESS PIPING DETAILS
M502	TAYLOR STREET PUMP DETAIL
H000	LEGENDS, NOTES, AND ABBREVIATIONS
H101	FIRST FLOOR NEW WORK DUCT PLAN
H501	DETAILS
H601	SCHEDULES
H701	AUTOMATIC TEMPERATURE CONTROLS
E001	ELECTRICAL LEGEND, ABBREVIATIONS, AND GENERAL NOTES
E002	ELECTRICAL SITE PLAN
E101	WELL BUILDING ELECTRICAL PLAN
E501	ELECTRICAL DETAILS
E601	ELECTRICAL DIAGRAMS AND SCHEDULES



LOCUS MAP
SCALE : 1"=2000'

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FILE NO. __-__

LEGEND

DESCRIPTION	EXISTING	PROPOSED
SANITARY SEWER	S	S
FORCE MAIN	FM	FM
WATER MAIN	W	W
TEMPORARY WATER		TW
STORM DRAIN	D	D
GAS	G	G
ELECTRIC	E	E
OVERHEAD WIRE	OHW	OHW
TELEPHONE	T	T
CABLE TELEVISION	CATV	CATV
GRINDER PUMP	○	● GP
SANITARY SEWER MANHOLE	Ⓢ	● SMH
STORM DRAIN MANHOLE	Ⓓ	● DMH
ELECTRICAL MANHOLE	Ⓔ	● EMH
TELEPHONE MANHOLE	Ⓣ	● TMH
AIR RELEASE VALVE MANHOLE	○	● ARMH
FORCE MAIN CLEANOUT MANHOLE	○	● FMCO
CLEANOUT	○	● CO
CATCH BASIN	□	■ CB
HYDRANT		
TEMPORARY HYDRANT		Ⓗ
GATE VALVE	WV	
CHECK VALVE		
CURB STOP		
BUTTERFLY VALVE		
BALL VALVE		
REDUCER		
CAP OR PLUG		
GAS GATE VALVE	GV	
UTILITY POLE		
GUY POLE		
LIGHT POST		
EDGE OF PAVEMENT		
EDGE OF UNPAVED ROAD		
CURB		
SIDEWALK		
STONE WALL		
RETAINING WALL	RET WALL	RET WALL
FENCE	x x	
GUARD RAIL		
DECIDUOUS TREE		
CONIFEROUS TREE		
TREE LINE		
STONE BOUND	□	
PROPERTY LINE		
EASEMENT LINE		
LIMIT OF WORK		
APPROX. LIMIT OF REFUSE		
SPOT ELEVATIONS	x100.5	x100.5
CONTOUR LINES	56	56
HOUSE NUMBER	#35	
FLOOR ELEVATION	FL=56.7	
SILL ELEVATION	S=56.7	
WETLAND FLAGS	WF-7 WF-8	
100-FT WETLAND BUFFER		
FEMA 100-YR FLOOD PLAIN		
CRUSHED STONE / RIP-RAP		
CRUSHED STONE INFILTRATION TRENCH		
DRAINAGE DITCH / SWALE		
STATION NUMBERING	10	10
GUARD POST	△	▲
BOLLARD	B	●
SIGN		
BENCH MARK		
PERCOLATION TEST	PT 1	PT-1
TEST PIT	TP 1	TP-1
BORING	B-1	B-1
PROBE	P-1	P-1
GROUNDWATER MONITORING WELL	WS-1	WS-1
GAS MONITORING WELL	GMW-1	GMW-1
WATER WELL / OBSERVATION WELL	Ⓦ	
GAS VENT	○ GV	● GV
COMPOST FILTER TUBE		
COMPOST FILTER TUBE & SILT FENCE		X X
CATCH BASIN FILTER BAG		□
ROCK OUTCROP		

NOTE: ITEMS SHOWN IN THE LEGEND MAY NOT BE PRESENT IN THESE PLANS

ABBREVIATIONS

AC	ASBESTOS CEMENT PIPE
ACCMP	ASPHALT COATED CORRUGATED METAL PIPE
ARV	AIR RELEASE VALVE
ASTM	ASTM INTERNATIONAL
BC	BITUMINOUS CONCRETE
BIT	BITUMINOUS
BLDG	BUILDING
BM	BENCH MARK
BO	BLOW OFF
BV	BUTTERFLY VALVE
CATV	CABLE TELEVISION
CB	CATCH BASIN
CC	CONCRETE CURB
CI	CAST IRON
℄	CENTERLINE
CL	CEMENT LINED
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
CU FT	CUBIC FEET
CY	CUBIC YARD
D	STORM DRAIN, DEPTH FROM RIM TO INVERT
DI	DROP INLET, DUCTILE IRON
DIA	DIAMETER
DMH	DRAIN MANHOLE
DWG	DRAWING
E	EAST, ELECTRIC
EA	EACH
EF	EACH FACE
ELEV	ELEVATION
EOP	EDGE OF PAVEMENT
EW	EACH WAY
EXIST	EXISTING
FLG	FLANGE
FT	FEET, FOOT
G	NATURAL GAS
GALV	GALVANIZED
GC	GRANITE CURB
GR	GRANITE
HC	HOUSE CONNECTION
HORIZ	HORIZONTAL
HP	HIGH PRESSURE
HYD	FIRE HYDRANT
I	INVERT
INV	INVERT
ID	INSIDE DIAMETER
IP	IRON PIPE
LB	POUND
LF	LINEAR FEET
LS	LUMP SUM
MAX	MAXIMUM
MB	MAIL BOX
MECH	MECHANICAL
MH	MANHOLE
MassDOT	MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MWRA	MASSACHUSETTS WATER RESOURCES AUTHORITY
N	NORTH
NE	NORTH EAST
NW	NORTH WEST
NF	NOT FOUND
NO OR #	NUMBER
OD	OUTSIDE DIAMETER
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE
PE	PLAIN END, POLYETHYLENE
ℓ	PROPERTY LINE
PL	PLATE
PVC	POLYVINYL CHLORIDE
PVCO	MOLECULARLY ORIENTED POLYVINYL CHLORIDE
PVMT	PAVEMENT
RCP	REINFORCED CONCRETE PIPE
ROW	RIGHT-OF-WAY
RQD	ROCK QUALITY
S	SEWER, SOUTH
SE	SOUTH EAST
SECT	SECTION
SF	SQUARE FEET
SHT	SHEET
SPEC	SPECIFICATIONS
SQ FT	SQUARE FEET
SS	SEWER SERVICE, STAINLESS STEEL
STA	STATION
STL	STEEL
SW	SIDEWALK, SOUTH WEST
T	HYDROSTATIC THRUST, TELEPHONE
TBM	TEMPORARY BENCH MARK
THK	THICK (NESS)
TYP	TYPICAL
UP	UTILITY POLE
VC	VITRIFIED CLAY
VERT	VERTICAL
W	WATER, WEST
W/	WITH
W/O	WITHOUT

CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL CALL DIGSAFE AT 1-888-344-7233 AND CITY/TOWN DEPARTMENTS AS APPROPRIATE AT LEAST 72 HOURS, SATURDAYS, SUNDAYS, AND HOLIDAYS EXCLUDED, PRIOR TO EXCAVATING AT ANY LOCATION. A COPY OF THE DIGSAFE PROJECT REFERENCE NUMBER(S) SHALL BE GIVEN TO THE OWNER PRIOR TO EXCAVATION.
2. LOCATIONS OF EXISTING PIPES, CONDUITS, UTILITIES, FOUNDATIONS AND OTHER UNDERGROUND OBJECTS ARE NOT WARRANTED TO BE CORRECT AND THE CONTRACTOR SHALL HAVE NO CLAIM ON THAT ACCOUNT SHOULD THEY BE OTHER THAN SHOWN.
3. TEST PITS TO LOCATE EXISTING UTILITIES MAY BE ORDERED BY THE ENGINEER TO DETERMINE WHETHER TO RAISE OR LOWER THE PROPOSED WATER MAIN TO CLEAR EXISTING UTILITIES OR VERIFY EXISTING UTILITY LOCATION, SIZE AND TYPE.
4. STONE WALLS, FENCES, MAIL BOXES, SIGNS, CURBS, LIGHT POLES, ETC. SHALL BE REMOVED AS NECESSARY TO PERFORM THE WORK AND REPLACED TO A CONDITION AT LEAST EQUAL TO THAT BEFORE CONSTRUCTION BEGAN. UNLESS OTHERWISE INDICATED, ALL SUCH WORK SHALL BE INCIDENTAL TO CONSTRUCTION OF THE PROJECT.
5. ALL PAVEMENT DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED IN ACCORDANCE WITH THE SPECIFICATIONS AND AS SHOWN ON THE DRAWINGS.
6. ALL AREAS DISTURBED BY THE CONTRACTOR BEYOND PAYMENT LIMITS SHALL BE RESTORED AT NO ADDITIONAL COST TO THE OWNER.
7. UNLESS OTHERWISE INDICATED, CONCRETE USED FOR PIPE ANCHOR BLOCKS, BACKING, PIPE CRADLES, ARCHES, AND FILL SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS.
8. APPROVED JOINT RESTRAINT METHODS SHALL BE PROVIDED FOR WATER MAINS WHERE ANY BENDS, TEES, PLUGS, OR WYES ARE INSTALLED. CONCRETE THRUST BLOCKS, ANCHOR BLOCKS AND TIE RODS MAY BE USED FOR 6-INCH AND 8-INCH PIPE WHERE JOINT RESTRAINT IS NOT FEASIBLE UPON APPROVAL OF THE ENGINEER. SEE TABLE 1 DETAIL FOR REQUIRED RESTRAINING LENGTHS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
9. THE CONTRACTOR SHALL NOT STORE ANY APPARATUS, MATERIALS, SUPPLIES, OR EQUIPMENT ON DRAINAGE STRUCTURES OR WITHIN 100 FEET OF WETLANDS.
10. NEW WATER MAINS AND SERVICES SHALL BE INSTALLED AT THE MINIMUM DEPTH FROM FINISH GRADE TO TOP OF PIPE AS SHOWN ON THE DRAWINGS. WHERE NECESSARY, NEW WATER MAINS SHALL BE INSTALLED AT A GREATER DEPTH TO CLEAR OBSTACLES SHOWN ON THE DRAWINGS AT NO ADDITIONAL COST TO THE OWNER. MINIMUM CLEARANCES TO UTILITIES, AS SHOWN ON THE DRAWINGS SHALL BE MAINTAINED.
11. EXISTING SERVICES SHALL NOT BE CONNECTED TO THE PROPOSED WATER MAIN UNTIL THAT MAIN HAS PASSED PRESSURE TEST AND DISINFECTION REQUIREMENTS.
12. EXISTING WATER MAINS OR SERVICES SHALL NOT BE ABANDONED WITHOUT THE APPROVAL OF THE OWNER. WATER SERVICE SHALL NOT BE INTERRUPTED MORE THAN 4 HOURS WITHOUT PRIOR APPROVAL OF THE OWNER.
13. ALL HYDRANTS REMOVED SHALL BE SALVAGED AND DELIVERED TO A LOCATION TO BE DETERMINED BY THE OWNER. SURFACE RESTORATION SHALL BE IN KIND UNLESS OTHERWISE NOTED.
14. ANY HYDRANT WHICH IS NOT IN SERVICE SHALL BE COVERED WITH A SECURELY FASTENED AND APPROVED BAG.
15. THE LOCATION OF PIPES, CAPS, REDUCERS, BENDS, AND OTHER FITTINGS AT POINTS OF CONNECTIONS TO EXISTING MAINS IS APPROXIMATE. CONTRACTOR SHALL DIG A TEST PIT AT EACH LOCATION TO DETERMINE THE DIAMETER AND MATERIAL OF THE EXISTING PIPE AND THE LOCATION OF THE TIE-IN POINT.
16. ALL CATCH BASINS WITHIN PROJECT LIMITS SHALL BE PROTECTED AS SHOWN ON DETAIL SHEET.
17. THE CONTRACTOR SHALL NOTIFY THE MassDOT DISTRICT PERMITS ENGINEER AT 857-368-3000 TWO (2) DAYS PRIOR TO THE START OF WORK IN A STATE ROADWAY.
18. ALL STREET EXCAVATIONS SHALL BE COMPLETELY CLOSED AT THE END OF EACH WORKING DAY BY BACKFILLING. COVERING WITH STEEL PLATES MAY BE ALLOWED IF APPROVED BY THE ENGINEER.
19. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF MASSACHUSETTS GENERAL LAW CHAPTER 82A, TRENCH EXCAVATION AND SAFETY REQUIREMENTS, TO PREVENT THE GENERAL PUBLIC FROM UNAUTHORIZED ACCESS TO UNATTENDED TRENCHES.
20. THE CONTRACTOR SHALL NOT OPEN OR CLOSE ANY VALVES WHICH HOLD WATER IN THE SYSTEM. THE OWNER WILL, ON 72 HOURS NOTICE FROM THE CONTRACTOR, OPEN AND/OR CLOSE ANY VALVES REQUIRED FOR DRAINING OR ADMITTING WATER TO THE VARIOUS SECTIONS OF THE WATER MAINS. THE CONTRACTOR IS RESPONSIBLE TO NOTIFY IN WRITING 48 HOURS IN ADVANCE, ANY OCCUPANT THAT WILL BE WITHOUT WATER DUE TO A SHUTDOWN.
21. SOME WATER SERVICE CONNECTIONS MAY NOT BE SHOWN ON THE DRAWINGS. THE OWNER WILL MARK THE LOCATION OF SUCH CONNECTIONS, PROVIDED THE CONTRACTOR GIVES THE OWNER AT LEAST 72 HOURS ADVANCE NOTICE.
22. ALL NEW WATER SERVICES SHALL BE THE SAME SIZE AS THE EXISTING WATER SERVICE, EXCEPT THAT NO SERVICE SHALL BE LESS THAN 1" DIAMETER. COORDINATE THIS WORK WITH THE WATER DEPARTMENT.
23. ELEVATIONS REFERENCED ARE NAD83 MASSACHUSETTS STATE PLANES, MAINLAND ZONE, US FOOT.
24. EXISTING UTILITY INFORMATION, TOPOGRAPHIC INFORMATION, EDGE OF PAVEMENT, UTILITY POLE LOCATIONS, AND LOCATIONS OF EXISTING ABOVE GROUND STRUCTURES WERE TAKEN FROM PLANS PREPARED BY BEALS AND THOMAS, INC., KELLY ENGINEERING GROUP, GIS DATA, AND GROUND SURVEY CONDUCTED BY WESTON & SAMPSON.
25. ASSESSORS INFORMATION REPRESENTED ON THESE DRAWINGS IS TAKEN FROM THE CITY/TOWN ASSESSOR'S PARCEL MAPS, MASS GIS DATA AND IS INCLUDED FOR ILLUSTRATIVE PURPOSES ONLY. ASSESSORS INFORMATION IS NOT INTENDED TO BE AN AUTHORITATIVE RECORD OF PROPERTY BOUNDARIES OR A SOURCE OF INFORMATION FOR AN ACTUAL SURVEY OR LEGAL DESCRIPTION OF THE PROPERTY. NO WORK HAS BEEN PERFORMED TO DETERMINE THE DEPICTED PROPERTY LINES AND THEREFORE, THESE DRAWINGS ARE NOT INTENDED BE USED TO DELINEATE ANY EXISTING OR PROPOSED STRUCTURES, FEATURES OR BOUNDARIES RELATIVE TO PROPERTY LINES. AUTHORITATIVE RECORDS OF PROPERTY LINES MAY BE LOCATED AT THE STATE OR MUNICIPAL AGENCY RESPONSIBLE FOR MAINTAINING PUBLIC RECORDS IN WHICH THE PARCEL IS LOCATED. LEGALLY AUTHORITATIVE MAPS OF PROPERTY LINES MAY ONLY BE PRODUCED BY A PROFESSIONAL LAND SURVEYOR.

Project:
LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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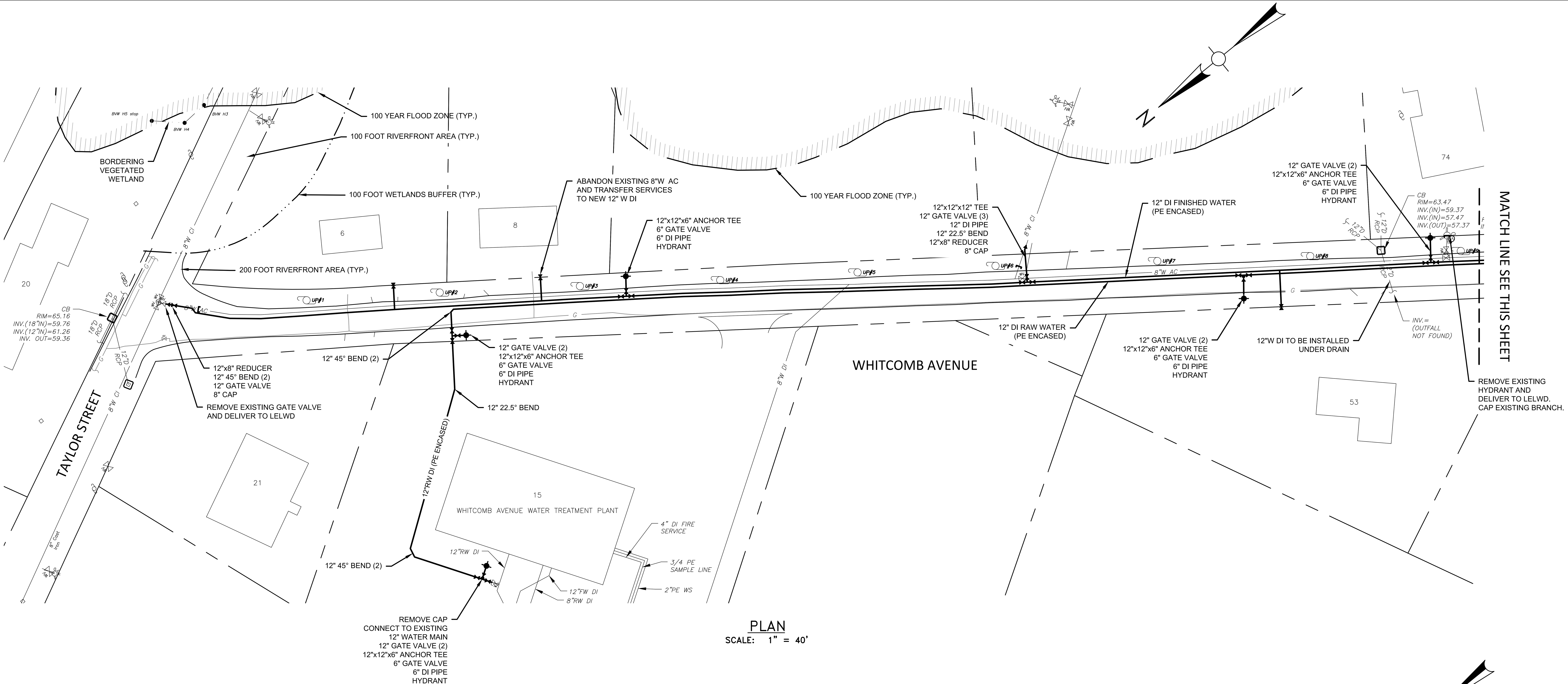
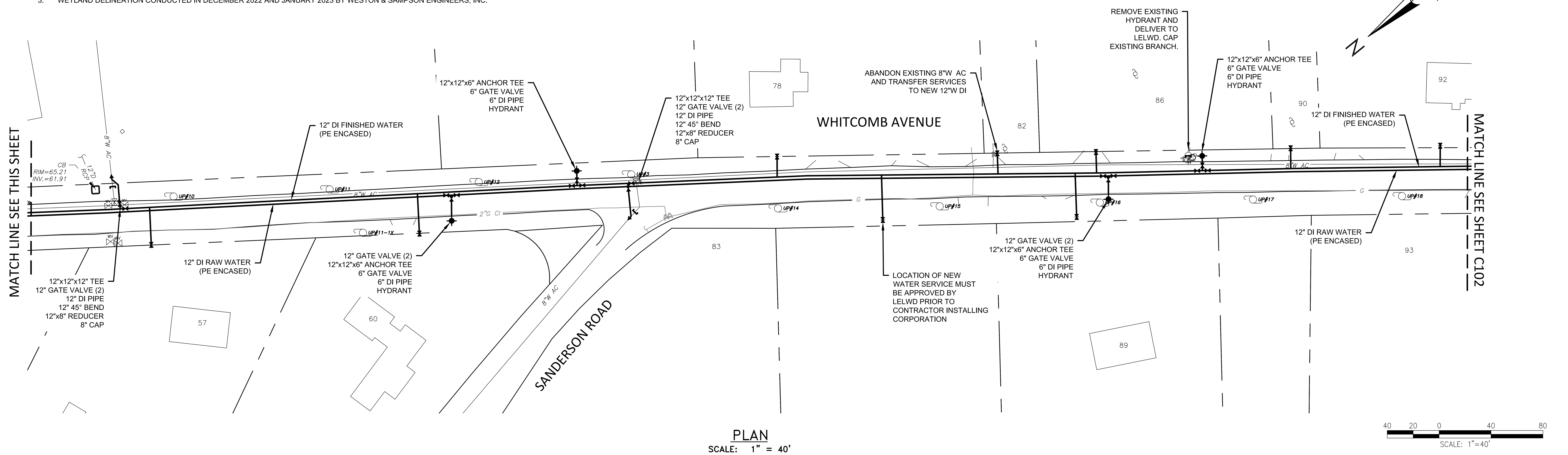
ABBREVIATIONS, NOTES, & LEGEND

Sheet Number:
G001



NOTE:

1. CONTRACTOR SHALL INSTALL CATCH BASIN PROTECTION FOR ALL CATCH BASINS SHOWN ON THE PLAN OR AS REQUIRED BY THE ENGINEER.
2. PAVEMENT MARKINGS SHALL BE REPLACED IF REMOVED DURING CONSTRUCTION.
3. WETLAND DELINEATION CONDUCTED IN DECEMBER 2022 AND JANUARY 2023 BY WESTON & SAMPSON ENGINEERS, INC.



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LITTLETON WATER DEPARTMENT

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ELECTRIC LIGHT & WATER DEPARTMENTS

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

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

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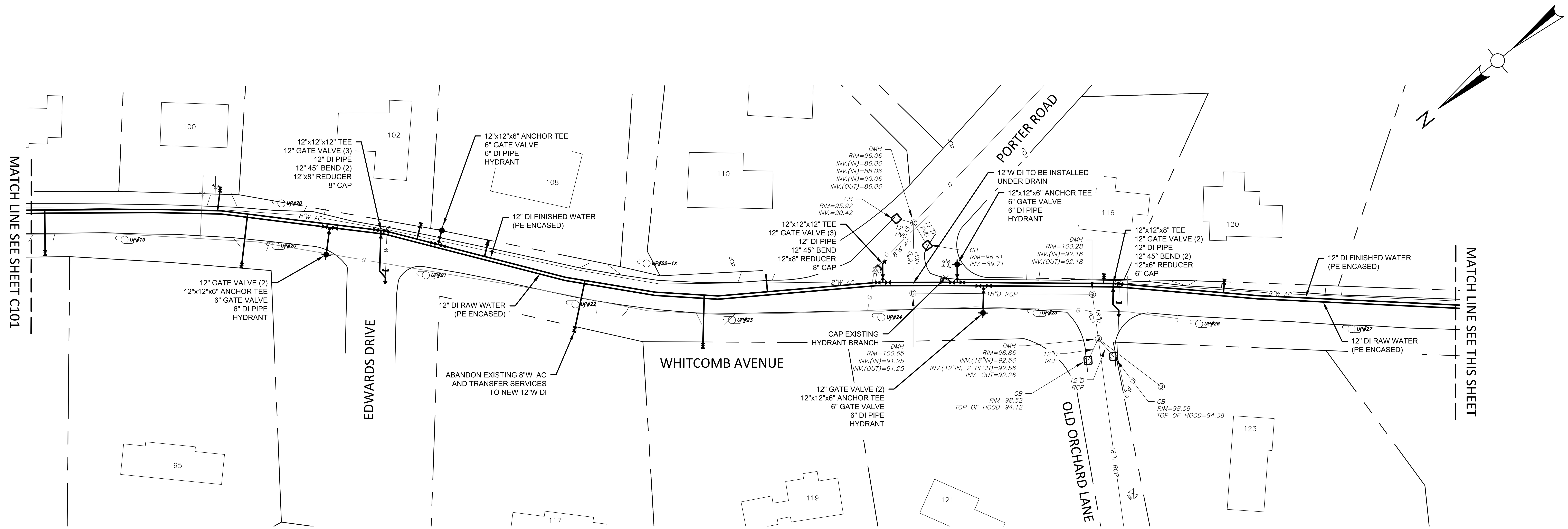
Drawn By:	GJK/RWS
Reviewed By:	SBR
Approved By:	TEM
W&S Project No.:	ENG23-0679
W&S File No.:	

Drawing Title:

RAW WATER PLAN
WHITCOMB AVENUE

Sheet Number:

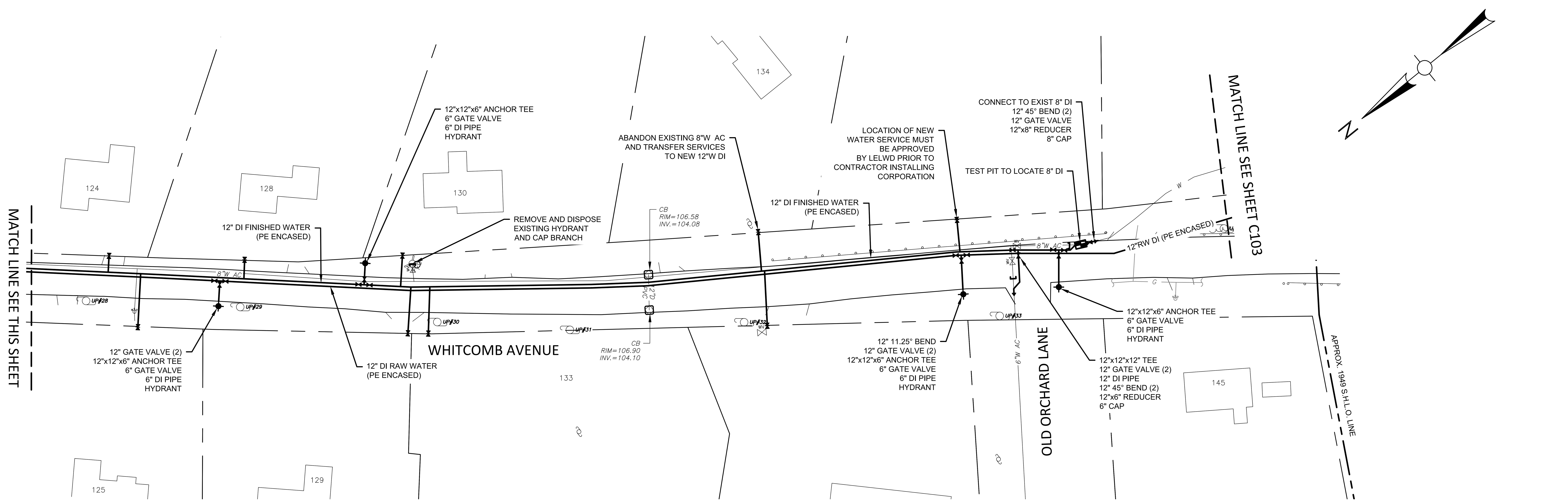
C101



NOTE:

1. CONTRACTOR SHALL INSTALL CATCH BASIN PROTECTION FOR ALL CATCH BASINS SHOWN ON THE PLAN OR AS REQUIRED BY THE ENGINEER.
2. PAVEMENT MARKINGS SHALL BE REPLACED IF REMOVED DURING CONSTRUCTION.
3. WETLAND DELINEATION CONDUCTED IN DECEMBER 2022 AND JANUARY 2023 BY WESTON & SAMPSON ENGINEERS, INC.

PLAN
SCALE: 1" = 40'



PLAN
SCALE: 1" = 40'

40 20 0 40 80
SCALE: 1"=40'

Project:
LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

TAYLOR STREET WELL AND RAW WATER MAIN
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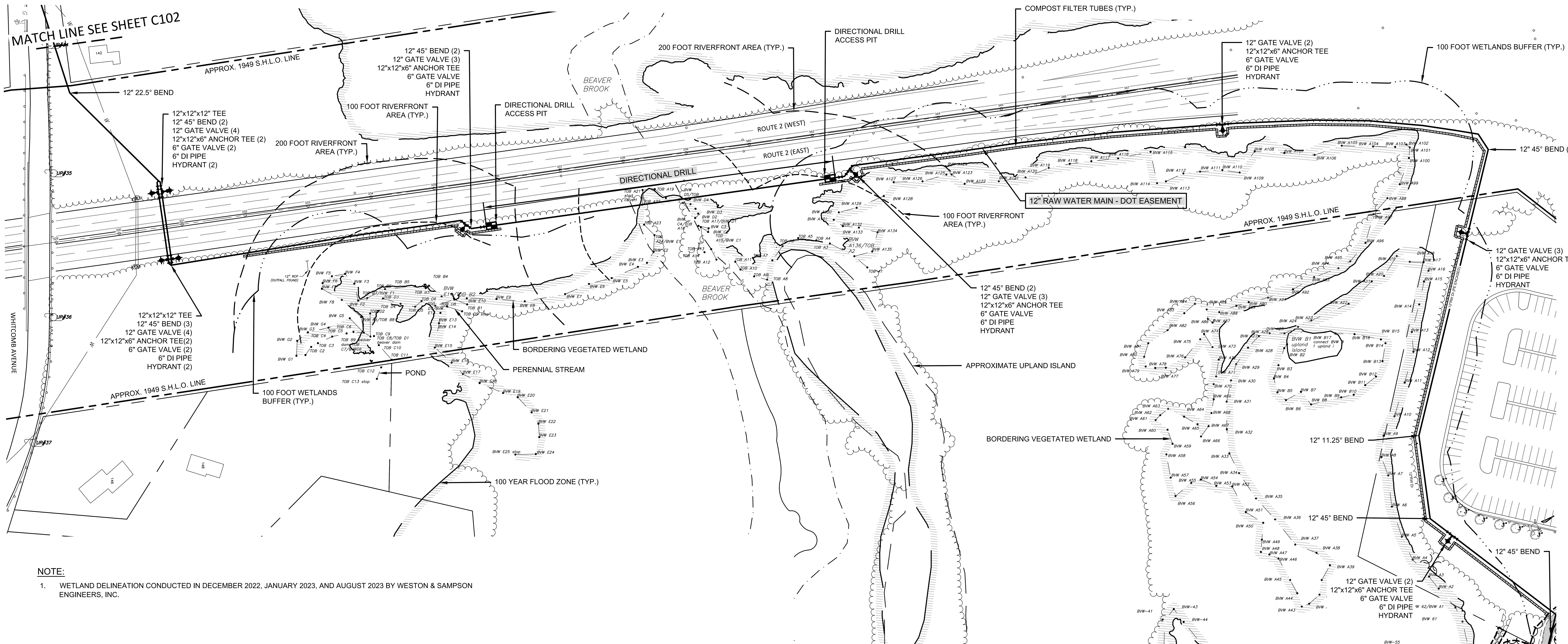
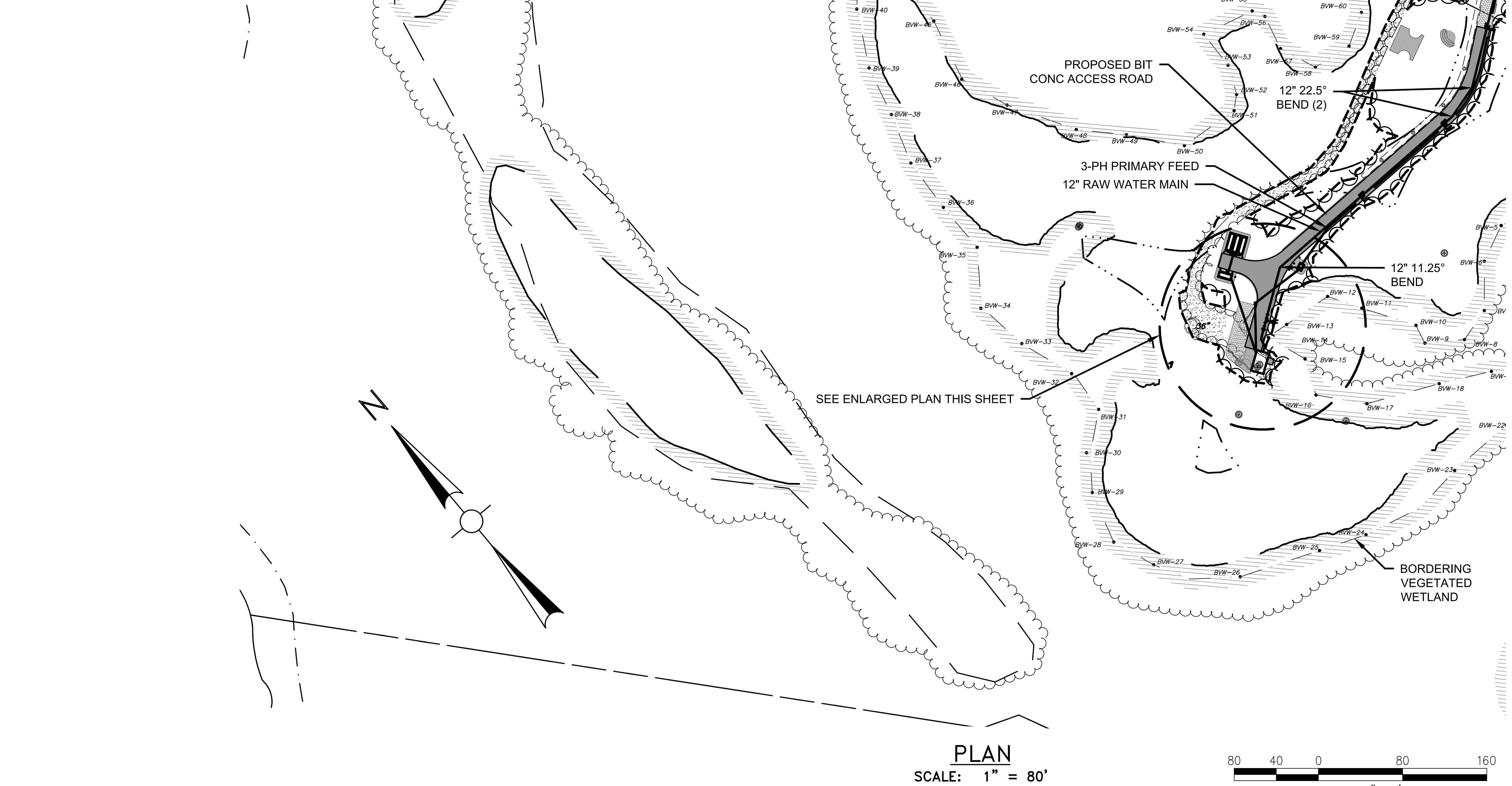
W&S Project No.:	ENG23-0679
W&S File No.:	

Drawing Title:
RAW WATER PLAN
WHITCOMB AVENUE

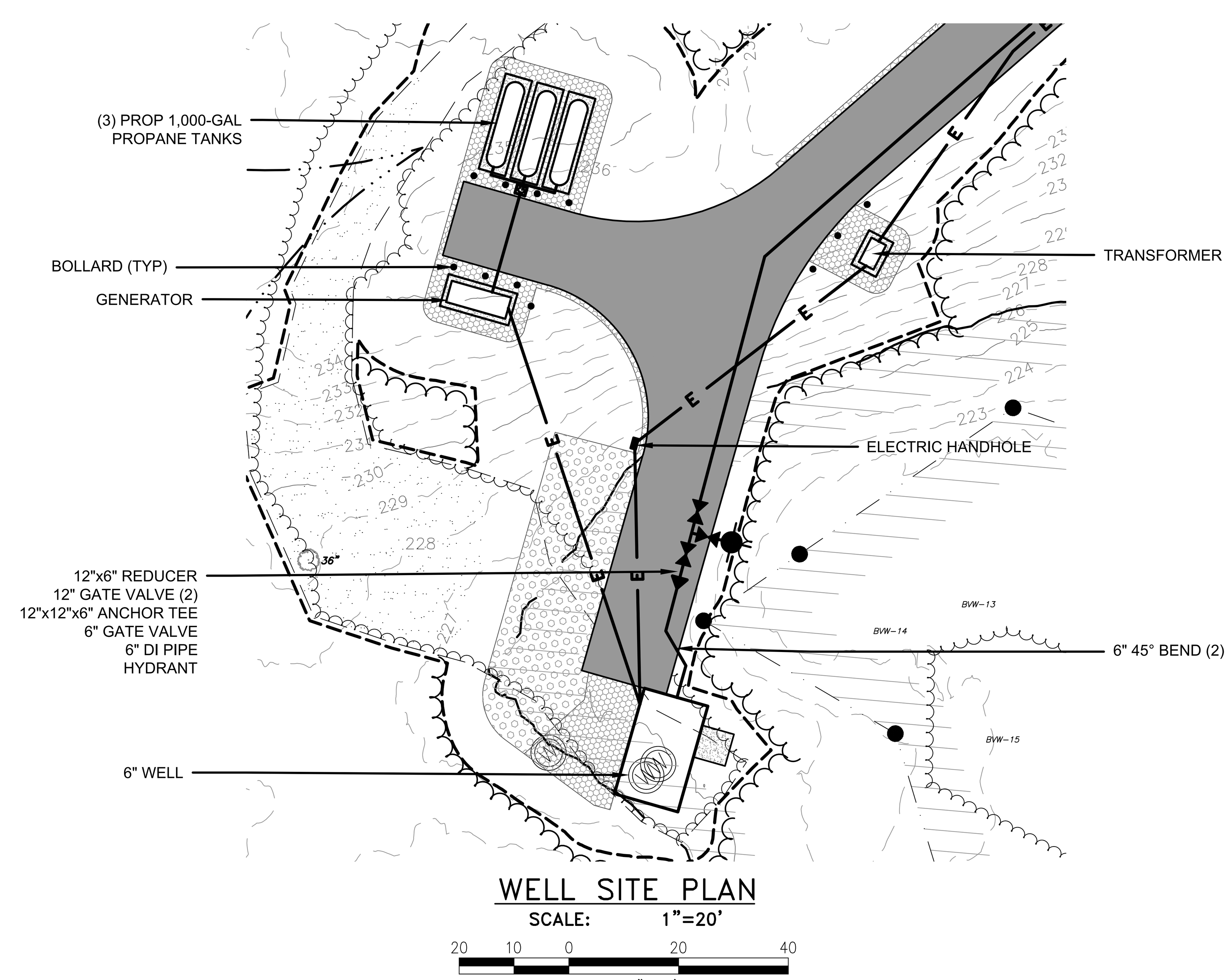
Sheet Number:
C102





NOTE:

1. WETLAND DELINEATION CONDUCTED IN DECEMBER 2022, JANUARY 2023, AND AUGUST 2023 BY WESTON & SAMPSON ENGINEERS, INC.



Project:

LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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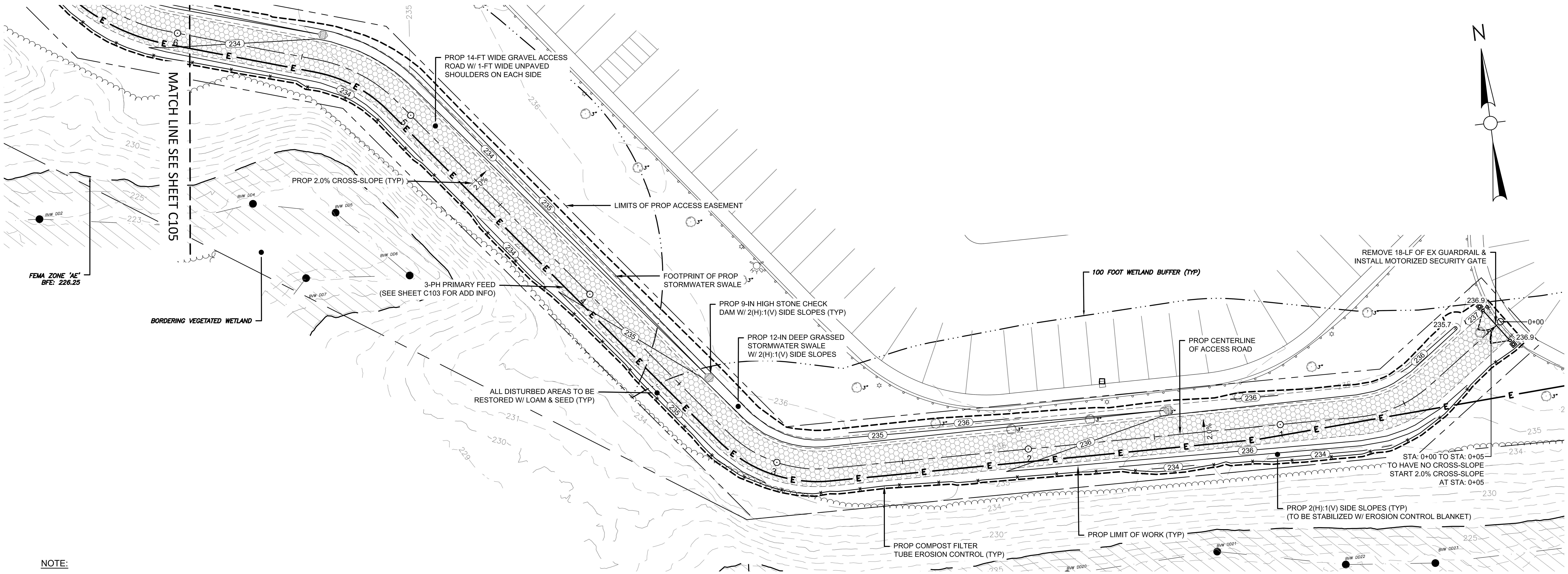
W&S File No.:	

Drawing Title:

RAW WATER PLAN CROSS COUNTRY

Sheet Number:

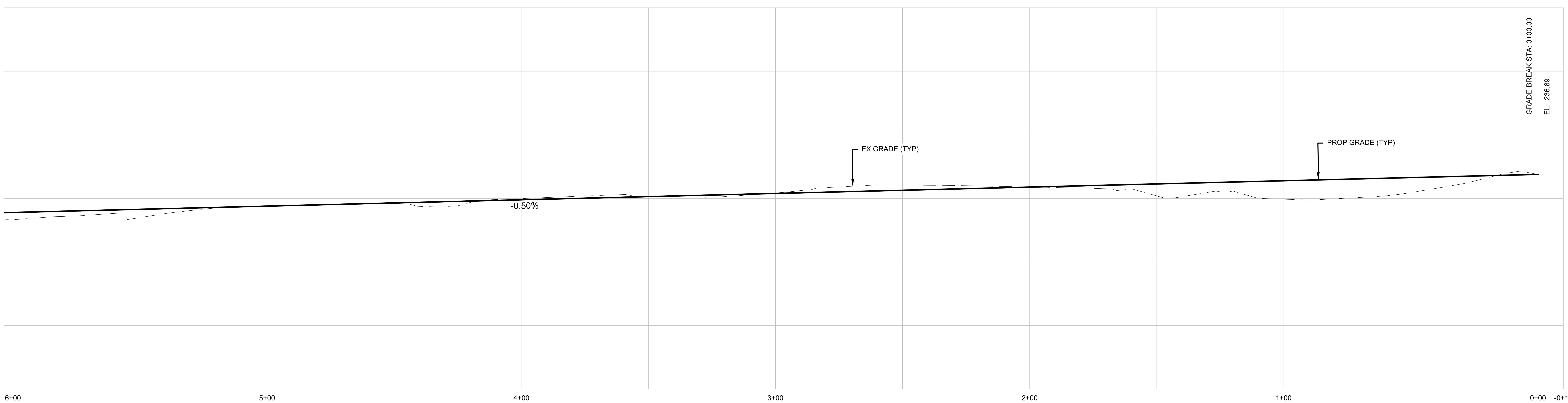
C103



NOTE:

1. WETLAND DELINEATION CONDUCTED IN AUGUST 2023 BY WESTON & SAMPSON ENGINEERS, INC.

PLAN
SCALE: 1" = 20'



PROFILE
SCALE: 1"=20' HORIZ
1"=4' VERT

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

Project:
LITTLETON WATER DEPARTMENT

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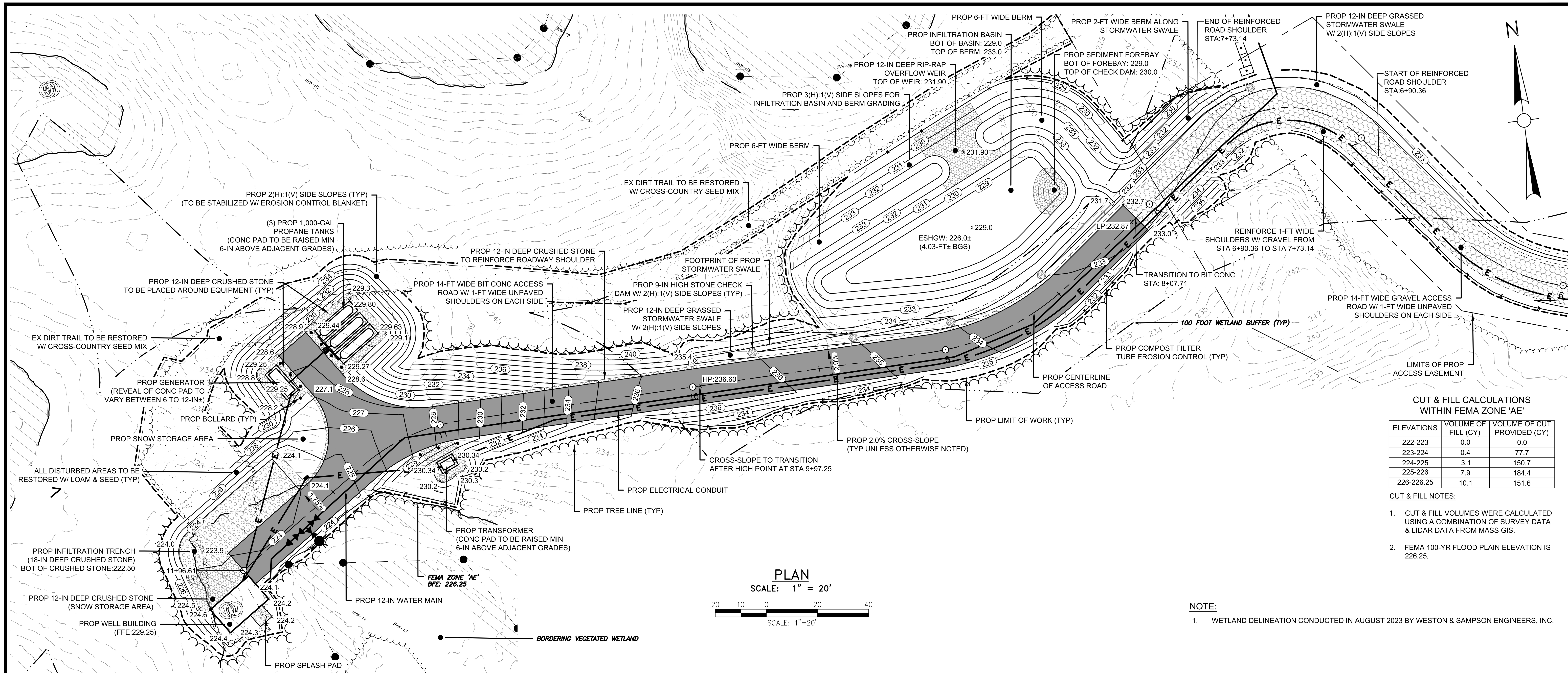
W&S File No.:	

Drawing Title:
ACCESS ROAD GRADING & DRAINAGE PLAN

Sheet Number:
C104



CUT & FILL CALCULATIONS WITHIN FEMA ZONE 'AE'

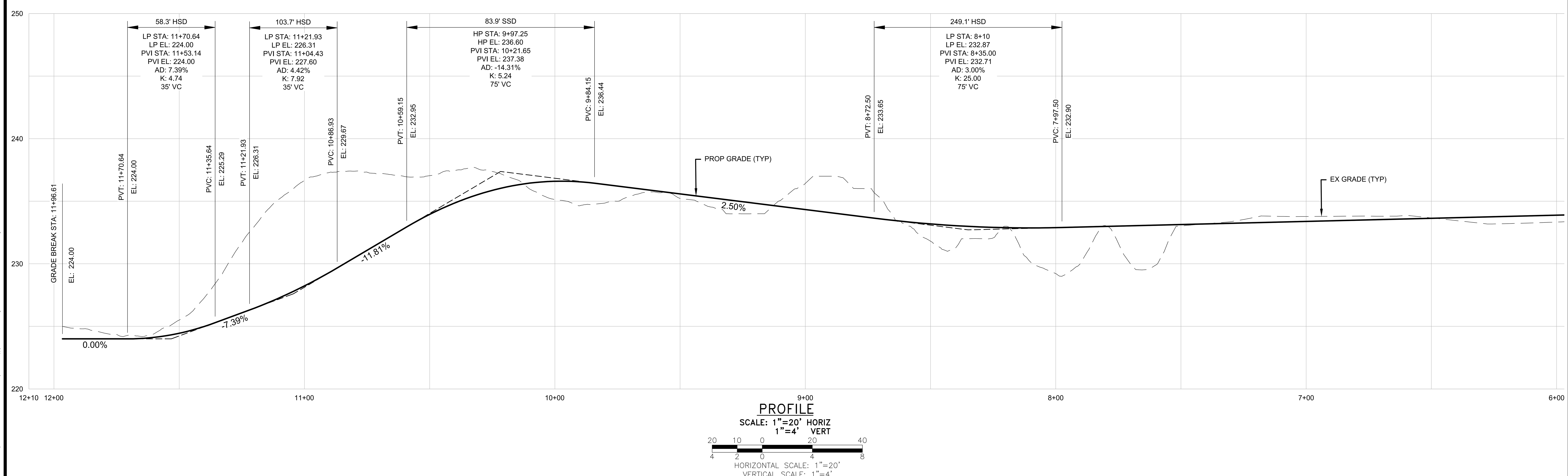
ELEVATIONS	VOLUME OF FILL (CY)	VOLUME OF CUT PROVIDED (CY)
222-223	0.0	0.0
223-224	0.4	77.7
224-225	3.1	150.7
225-226	7.9	184.4
226-226.25	10.1	151.6

CUT & FILL NOTES:

1. CUT & FILL VOLUMES WERE CALCULATED USING A COMBINATION OF SURVEY DATA & LIDAR DATA FROM MASS GIS.
2. FEMA 100-YR FLOOD PLAIN ELEVATION IS 226.25.

NOTE:

1. WETLAND DELINEATION CONDUCTED IN AUGUST 2023 BY WESTON & SAMPSON ENGINEERS, INC.



Project:

LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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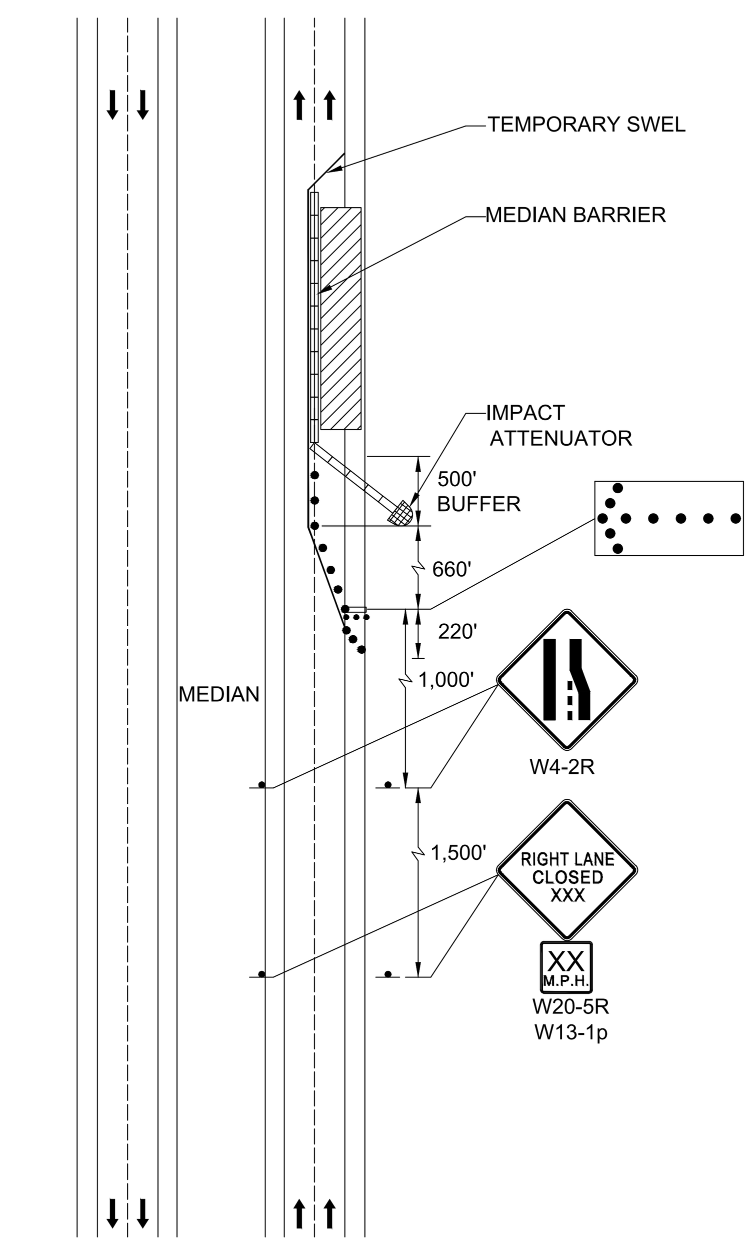
W&S File No.:	

Drawing Title:

ACCESS ROAD GRADING & DRAINAGE PLAN

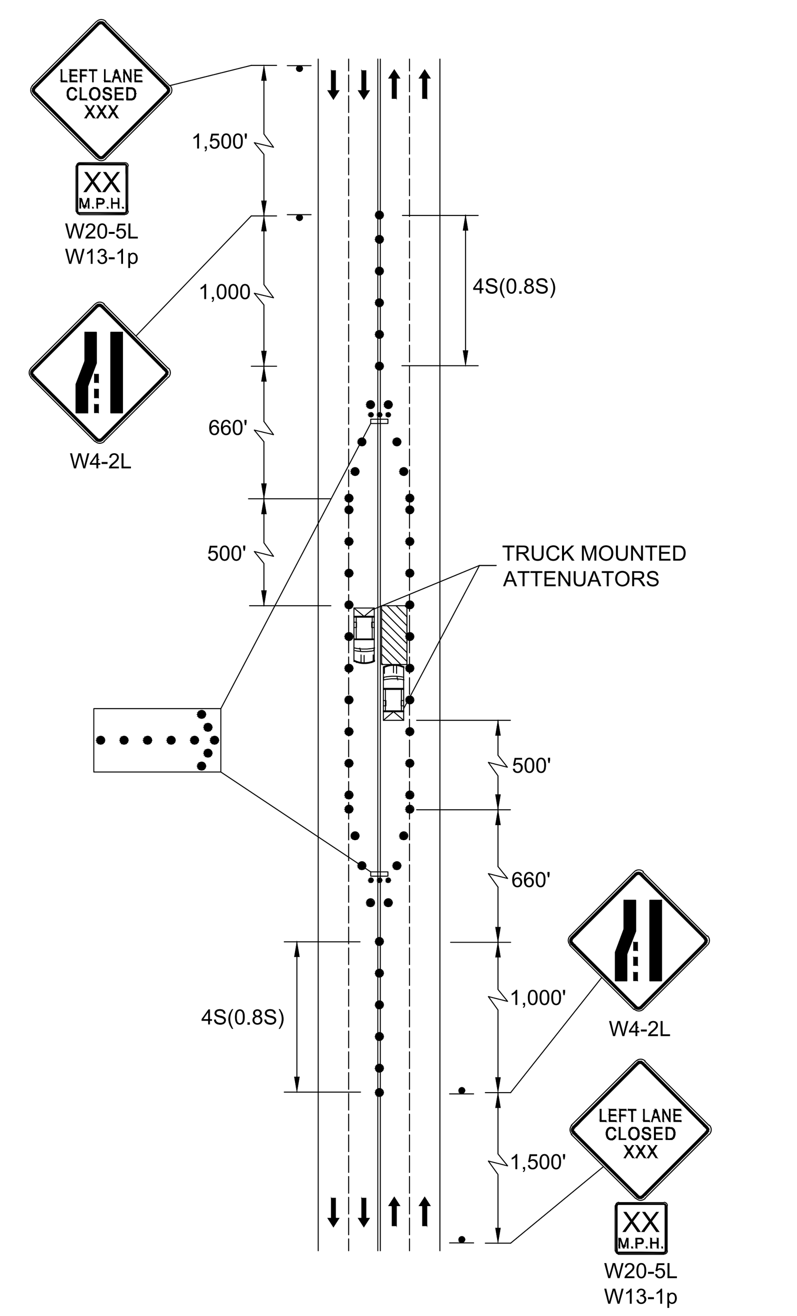
Sheet Number:

C105



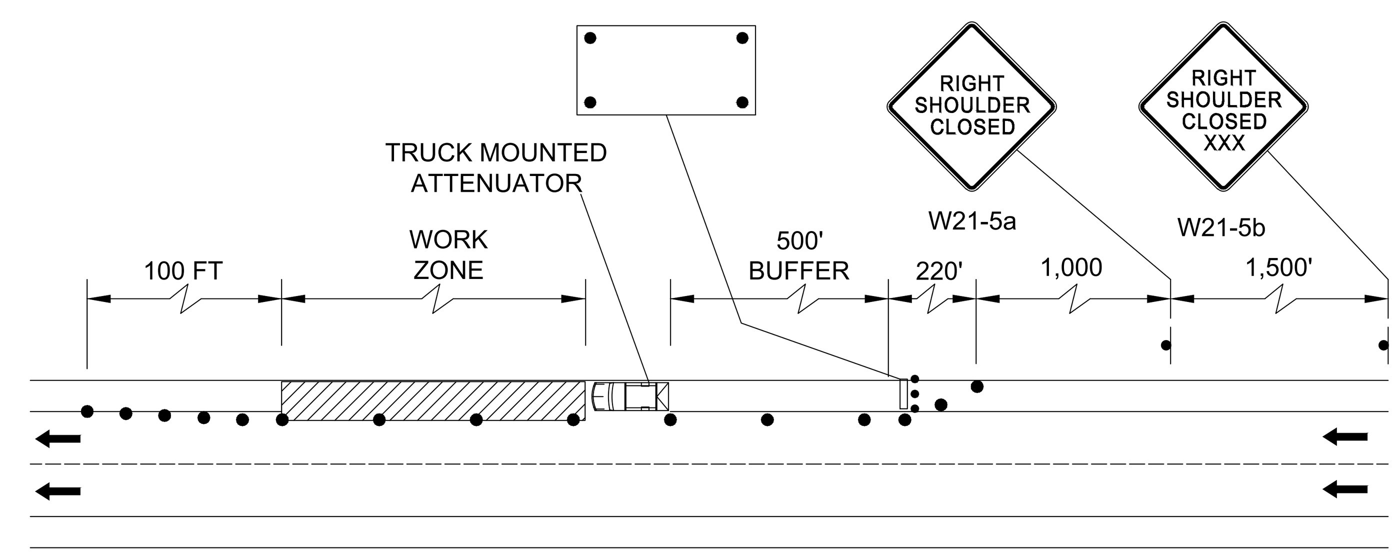
ROUTE 2 DIVIDED HIGHWAY ONE LANE CLOSED WITH BARRIER

NOT TO SCALE



ROUTE 2 MULTIPILE LANE ROAD INTERIOR LANE CLOSURE

NOT TO SCALE



ROUTE 2 DIVIDED HIGHWAY SHOULDER CLOSED

NOT TO SCALE

LEGEND:

- REFLECTORIZED PLASTIC DRUM OR 36" CONE
- P/F POLICE/FLAGGER DETAIL
- TYPE III BARRICADE
- CHANGEABLE MESSAGE SIGN
- ARROW BOARD
- WORK ZONE
- DIRECTION OF TRAFFIC
- IMPACT ATTENUATOR
- MEDIAN BARRIER
- MEDIAN BARRIER WITH WARNING LIGHTS
- WORK VEHICLE
- TRUCK MOUNTED ATTENUATOR
- TRAFFIC OR PEDESTRIAN SIGNAL
- SIGN

Project:

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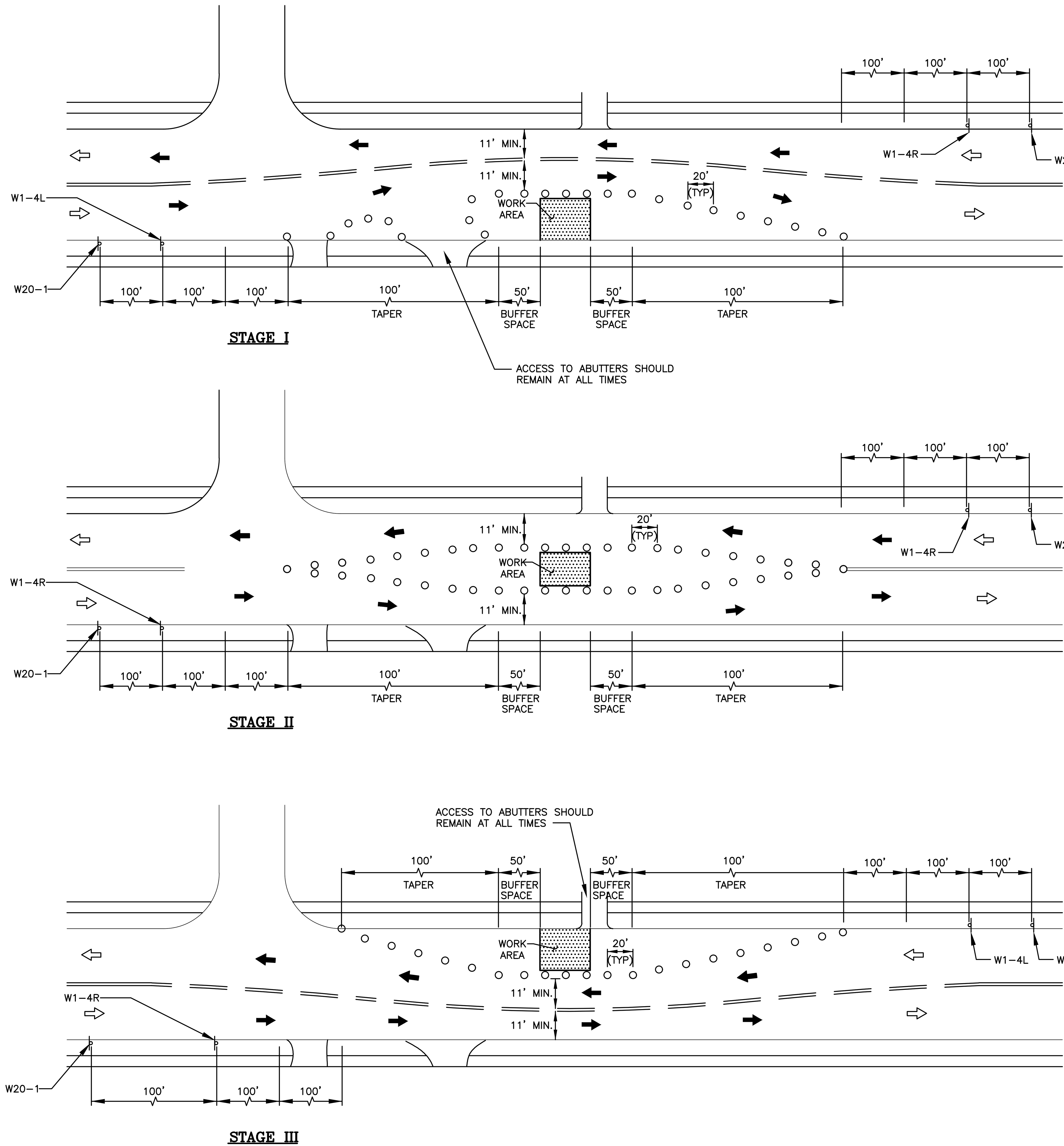
W&S File No.:

Drawing Title:

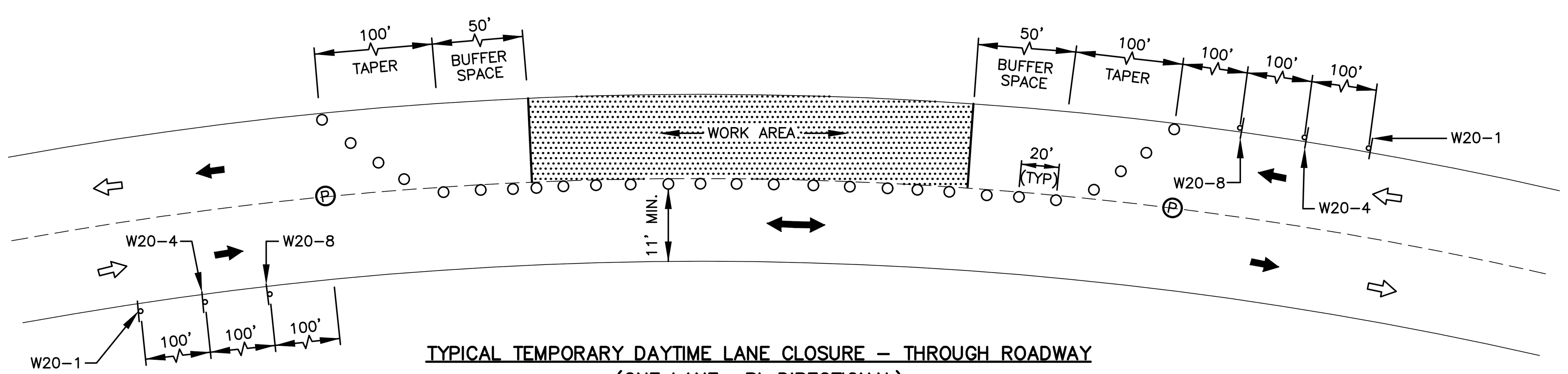
CONSTRUCTION ZONE SAFETY PLAN I

Sheet Number:

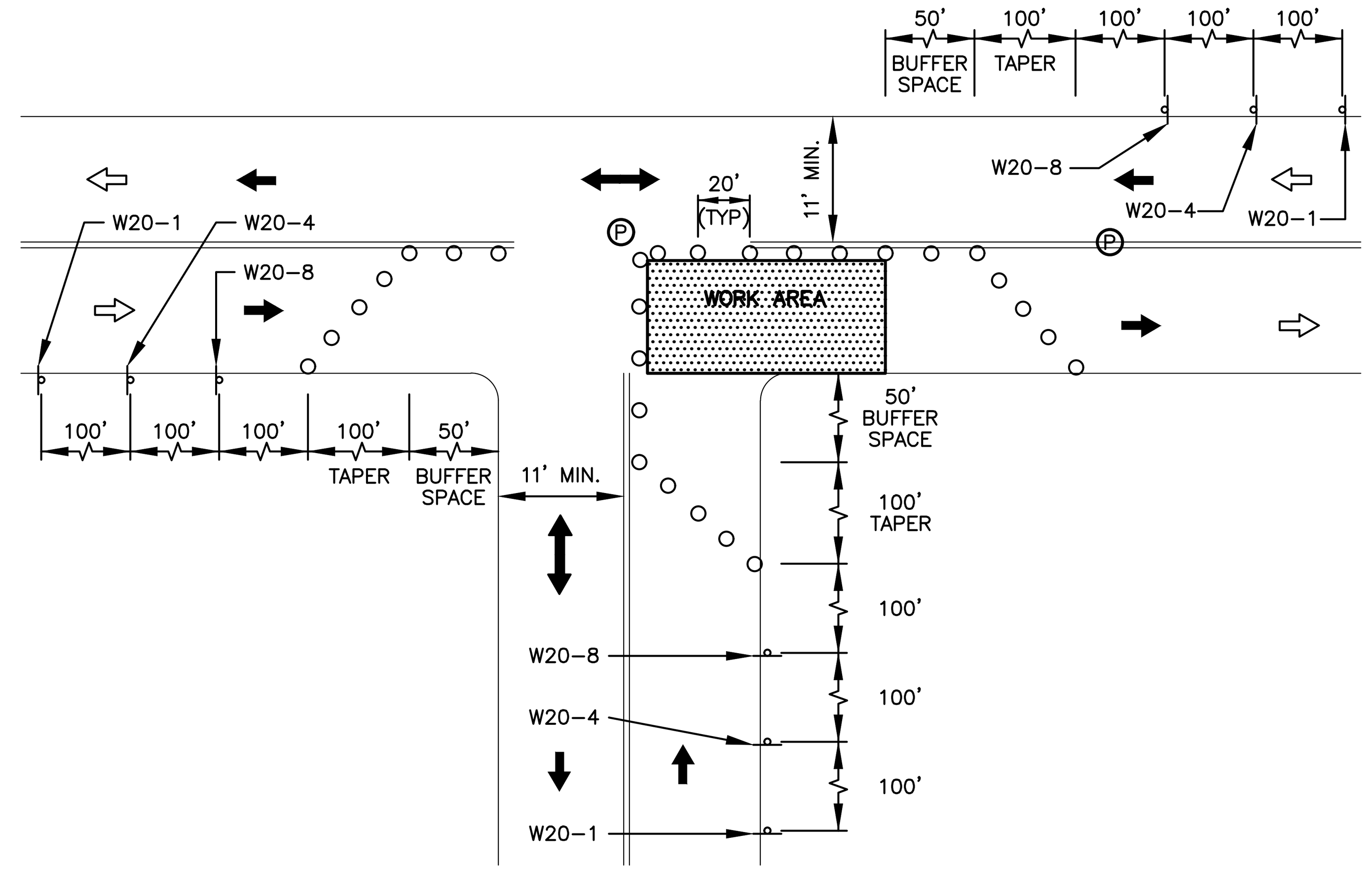
C106



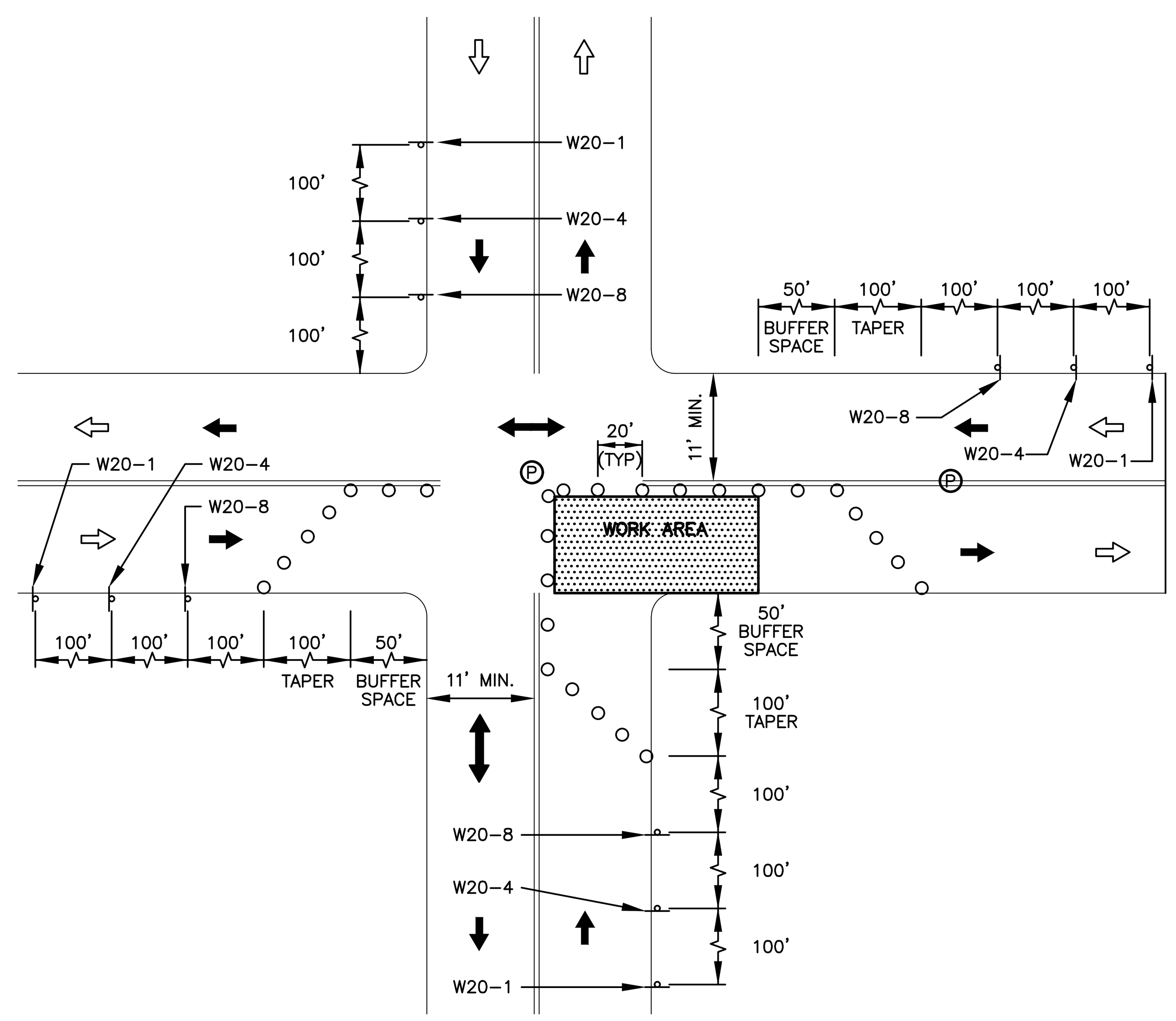
TRAFFIC OPERATION STAGES
N.T.S.



TYPICAL TEMPORARY DAYTIME LANE CLOSURE – THROUGH ROADWAY
(ONE LANE- BI-DIRECTIONAL)
N.T.S.



"T" INTERSECTION LANE CLOSURE
N.T.S.



CLOSURE AT SIDE OF INTERSECTION
N.T.S.

TEMPORARY TRAFFIC SIGN SUMMARY

MUTCD CODE	SIZE OF SIGN WIDTH	HEIGHT	SIGN
W1-4L	30"	30"	
W1-4R	30"	30"	
W20-1	36"	36"	ROAD WORK AHEAD
W20-4	36"	36"	ONE LANE ROAD AHEAD
W20-8	36"	36"	POLICE OFFICER AHEAD
G20-2	36"	18"	END CONSTRUCTION

NOTE:

1. FOR THE LATEST SPECIFICATION ON TEXT DIMENSIONS AND COLOR, CONTRACTOR SHALL REFER TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CURRENT EDITION).

LEGEND:

- REFLECTORIZED DRUM
- TRAFFIC FLOW DURING CONSTRUCTION
- NORMAL TRAFFIC FLOW
- POLICE DETAIL OFFICER
- CONSTRUCTION SIGN
- WORK AREA

GENERAL NOTES:

1. PLACEMENT OF ALL CONSTRUCTION SIGNS, DRUMS, BARRICADES, TRAFFIC DEVICES AND THE SHAPE, SIZE & COLOR OF ALL TEMPORARY TRAFFIC SIGNS SHALL CONFORM WITH THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
2. ADVANCE WARNING SIGN PLACEMENT AND TAPER LENGTH TO BE ADJUSTED ACCORDING TO STREET CONDITIONS AND DRIVEWAY OPENINGS.
3. ALL DRUMS SHALL BE APPROXIMATELY PLACED AND MOVED AS NECESSARY TO MAINTAIN ADEQUATE ABUTTER ACCESS AT ALL TIMES.
4. THE CONTRACTOR SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT AND SIMILAR OPERATIONS.
5. NONESSENTIAL TRAFFIC CONTROL DEVICES SHALL BE COVERED OR REMOVED DURING NON-WORKING HOURS.
6. PEDESTRIANS SHALL BE PROVIDED WITH ACCESS AND SAFE PASSAGE THROUGH THE TEMPORARY TRAFFIC CONTROL ZONE AT ALL TIMES.
7. W20-8 SHALL BE TAKEN DOWN OR COVERED AFTER EACH WORKING DAY OR WHEN OTHERWISE NOT APPLICABLE, OR WHEN POLICE OFFICERS ARE NOT PRESENT TO DIRECT TRAFFIC.
8. ADVISORY SPEED PLATES (W13-1 – SEE CURRENT EDITION OF MUTCD) SHALL BE USED IF APPLICABLE AND AS REQUIRED BY THE ENGINEER.
9. NO DIFFERENCE IN ROADWAY LANE ELEVATION WILL BE ALLOWED AT THE END OF THE WORK DAY.
10. SAMPLE TRAFFIC PLANS INCLUDED ON THIS PLAN SHEET ARE BASED ON AN URBAN (LOW SPEED) ROAD TYPE FROM THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
11. DASHED LINES SHOW LANE DESIGNATIONS TO BE USED DURING CONSTRUCTION.
12. THE CONTRACTOR SHALL SUBMIT ANY REVISIONS TO THE CONSTRUCTION ZONE SAFETY PLAN TO THE ENGINEER FOR APPROVAL.
13. THIS CONSTRUCTION ZONE SAFETY PLAN SHALL NOT RELIEVE THE CONTRACTOR OF HIS SOLE RESPONSIBILITY FOR CONSTRUCTION SITE SAFETY.

Project:
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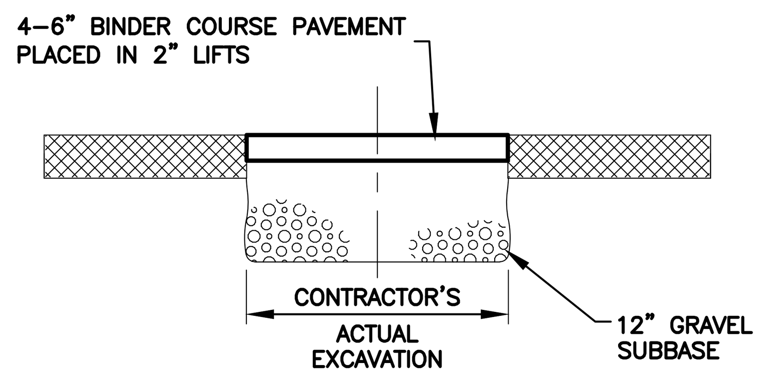
W&S File No.:

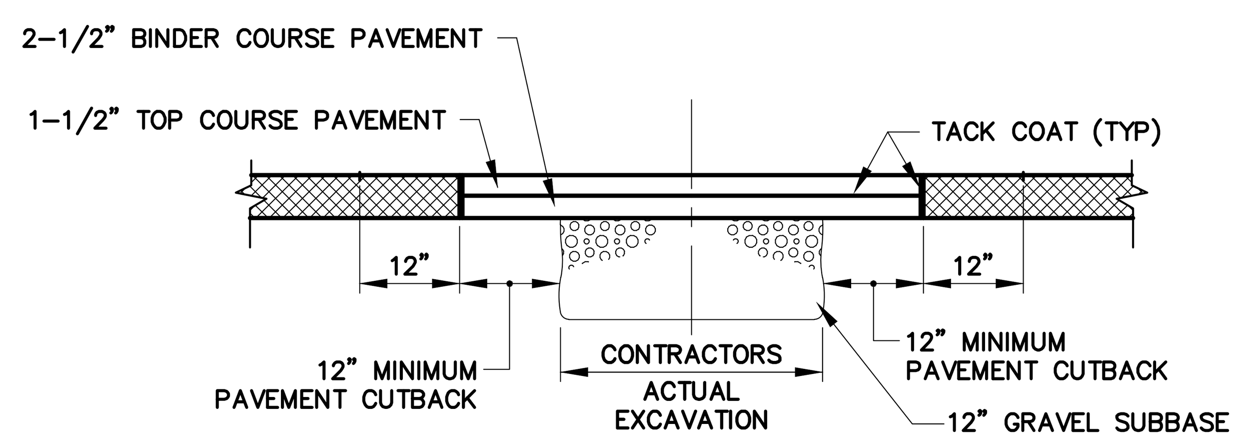
Drawing Title:
CONSTRUCTION ZONE SAFETY PLAN II

Sheet Number:
C107



TEMPORARY TRENCH PAVEMENT

N.T.S.

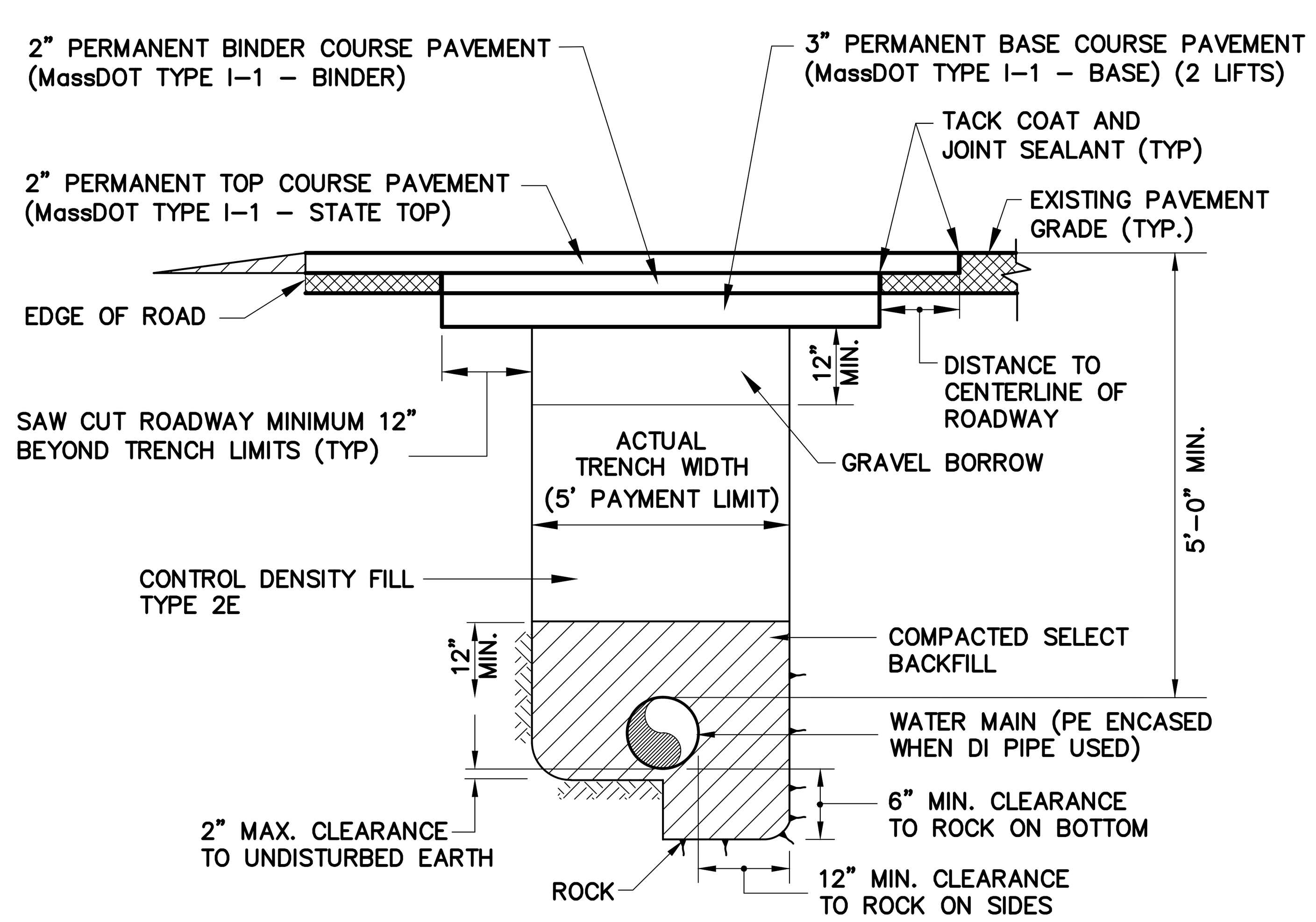


TRENCH WIDTH PAVEMENT

FULL SECTION

PERMANENT PAVEMENT REPLACEMENT DETAIL

N.T.S.



TYPE 3 AND TYPE 4

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MassDOT)

PERMANENT TRENCH PAVEMENT AND WATER MAIN TRENCH

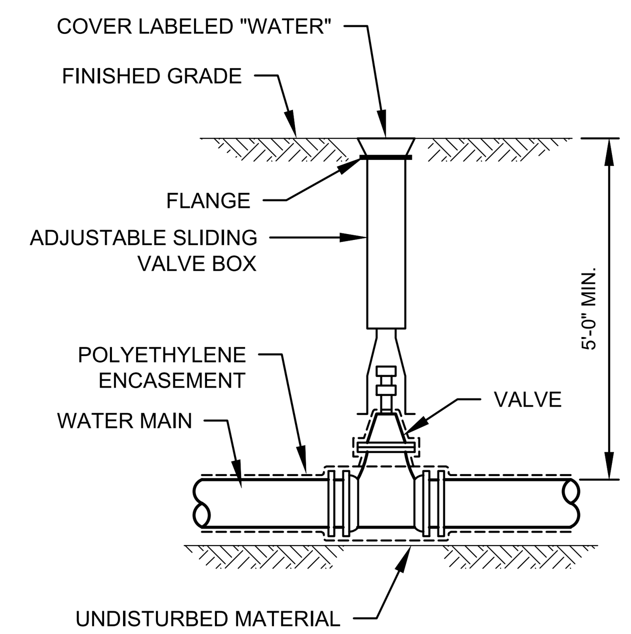
N.T.S.

NOTES:

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

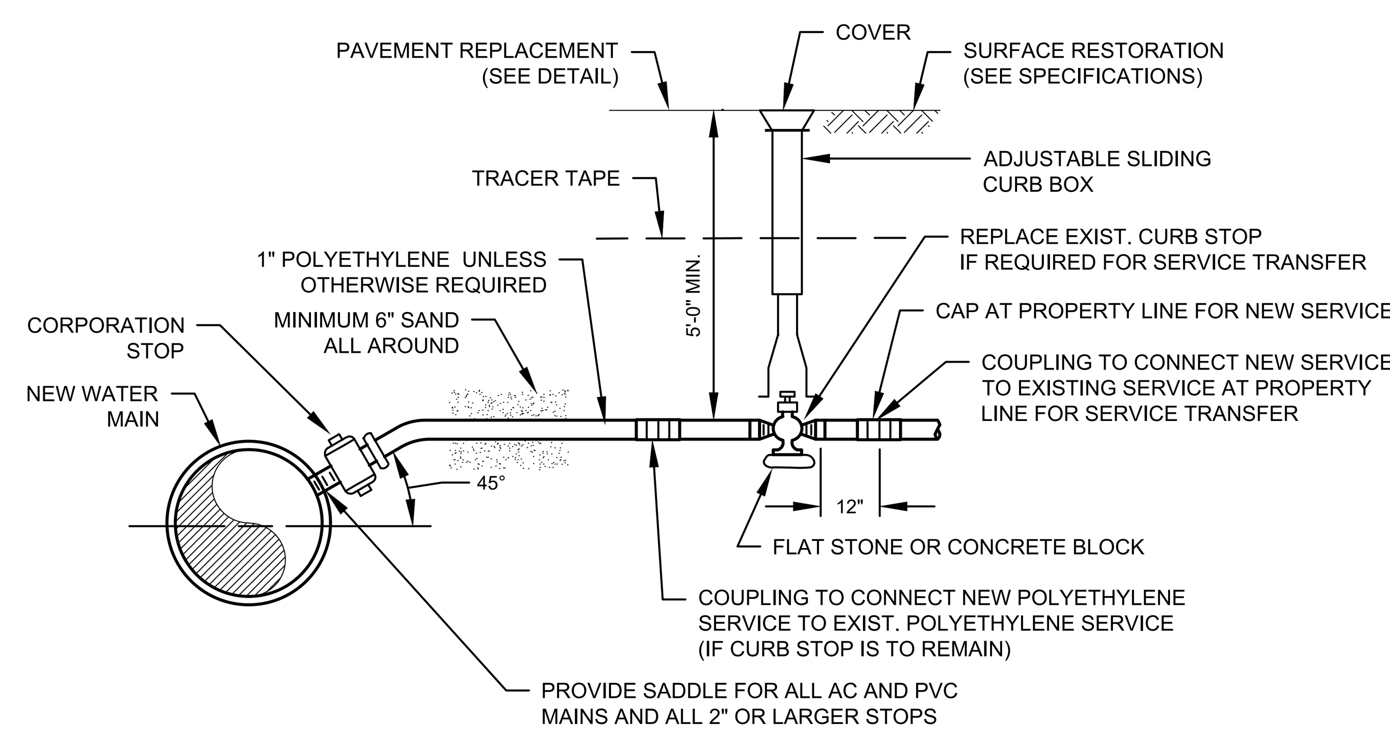
PAVEMENT REPLACEMENT DETAILS

N.T.S.



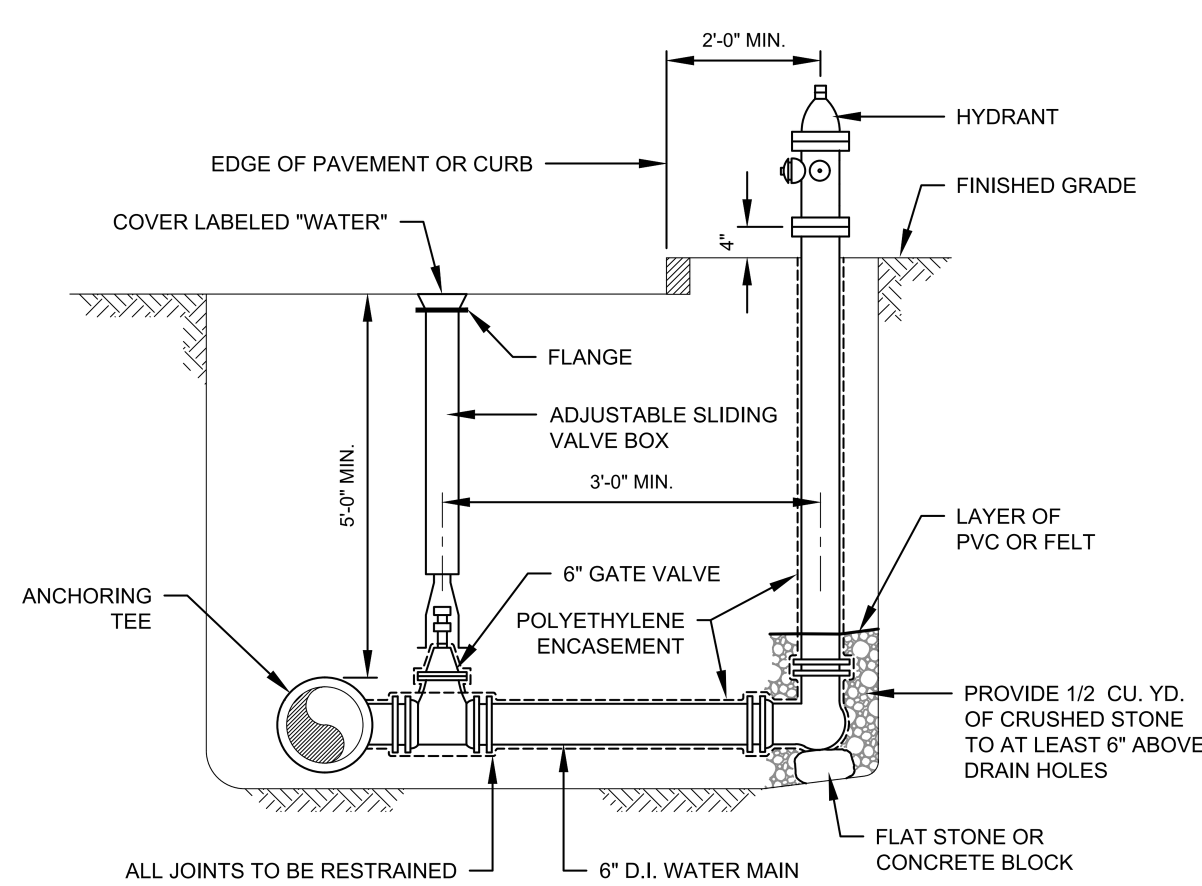
VALVE AND BOX DETAIL

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.

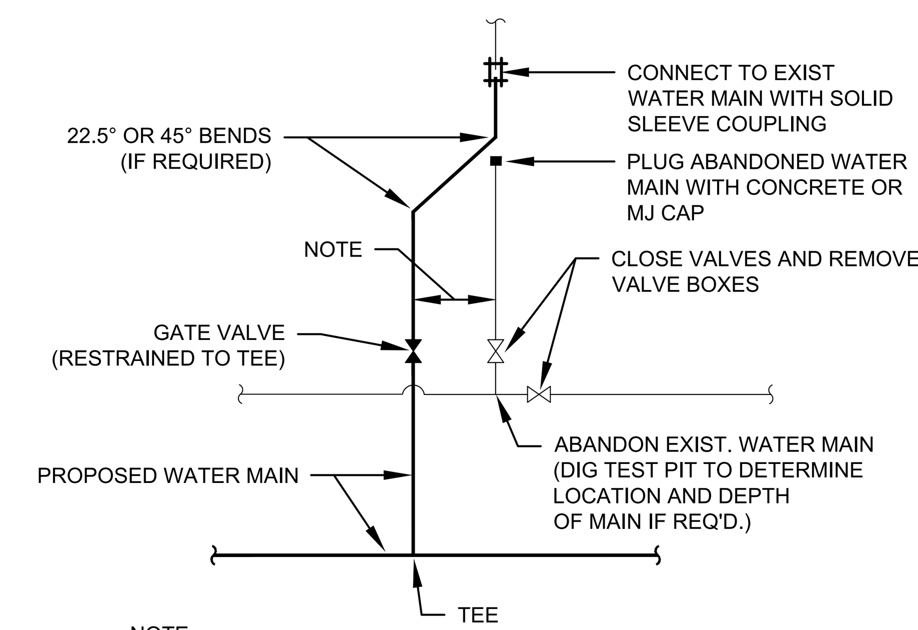
REQUIRED LENGTH OF RESTRAINED JOINTS FROM FITTINGS (FEET)

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:

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

RESTRAINED JOINT TABLE

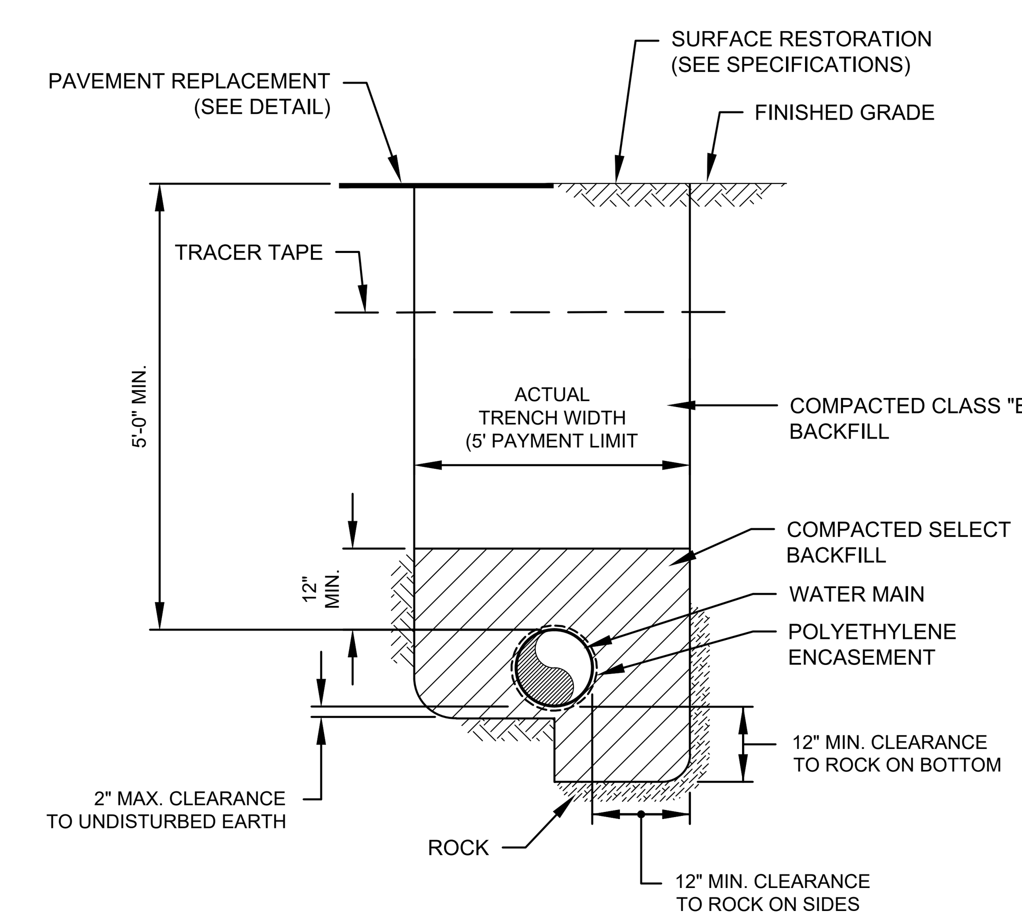


NOTE :

MINIMUM PRACTICAL DISTANCE - GENERALLY NO MORE THAN 2 FT.

WATER MAIN LATERAL CONNECTION

N.T.S.



WATER MAIN TRENCH DETAIL

N.T.S.

Project:

LITTLETON WATER
DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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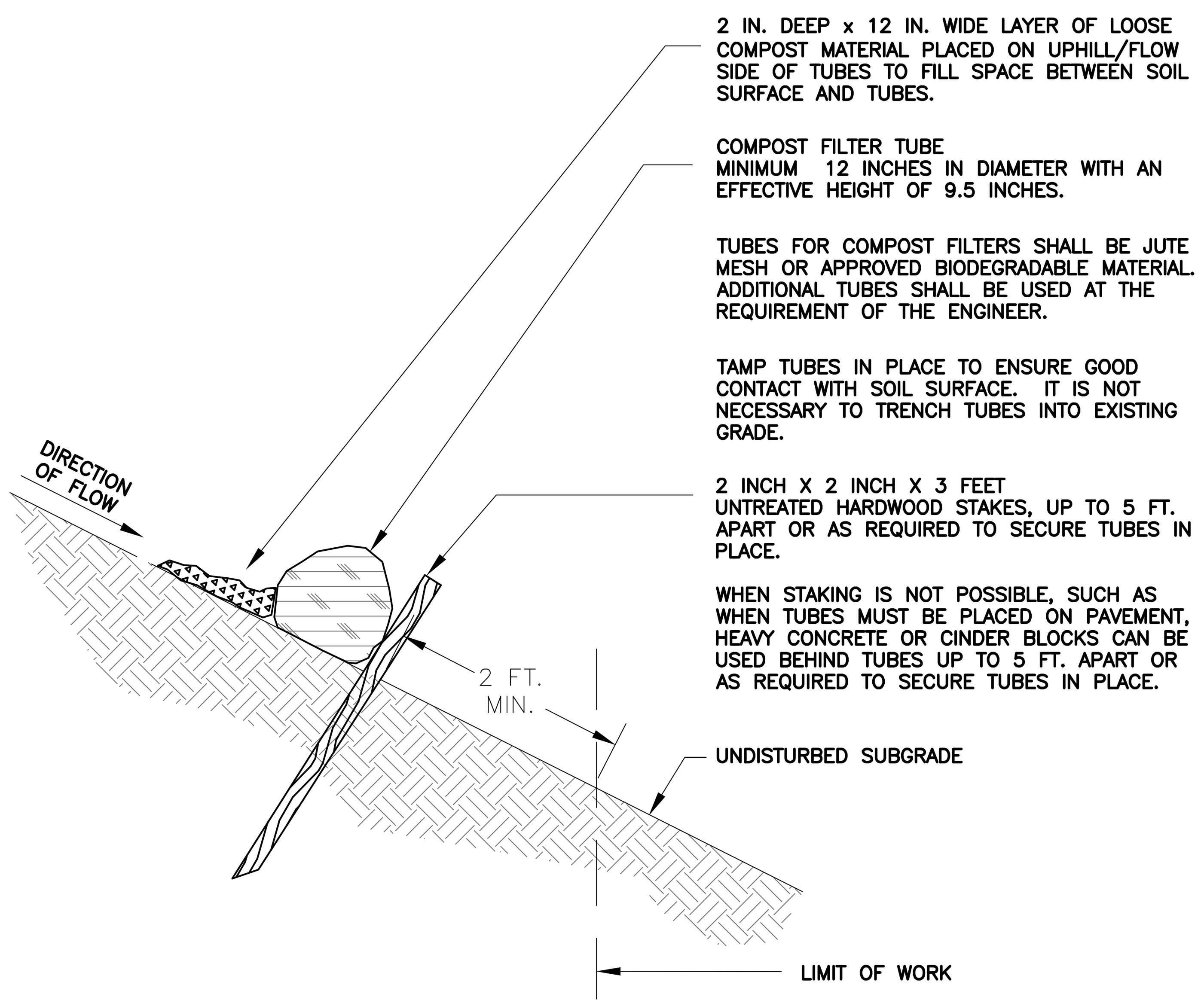
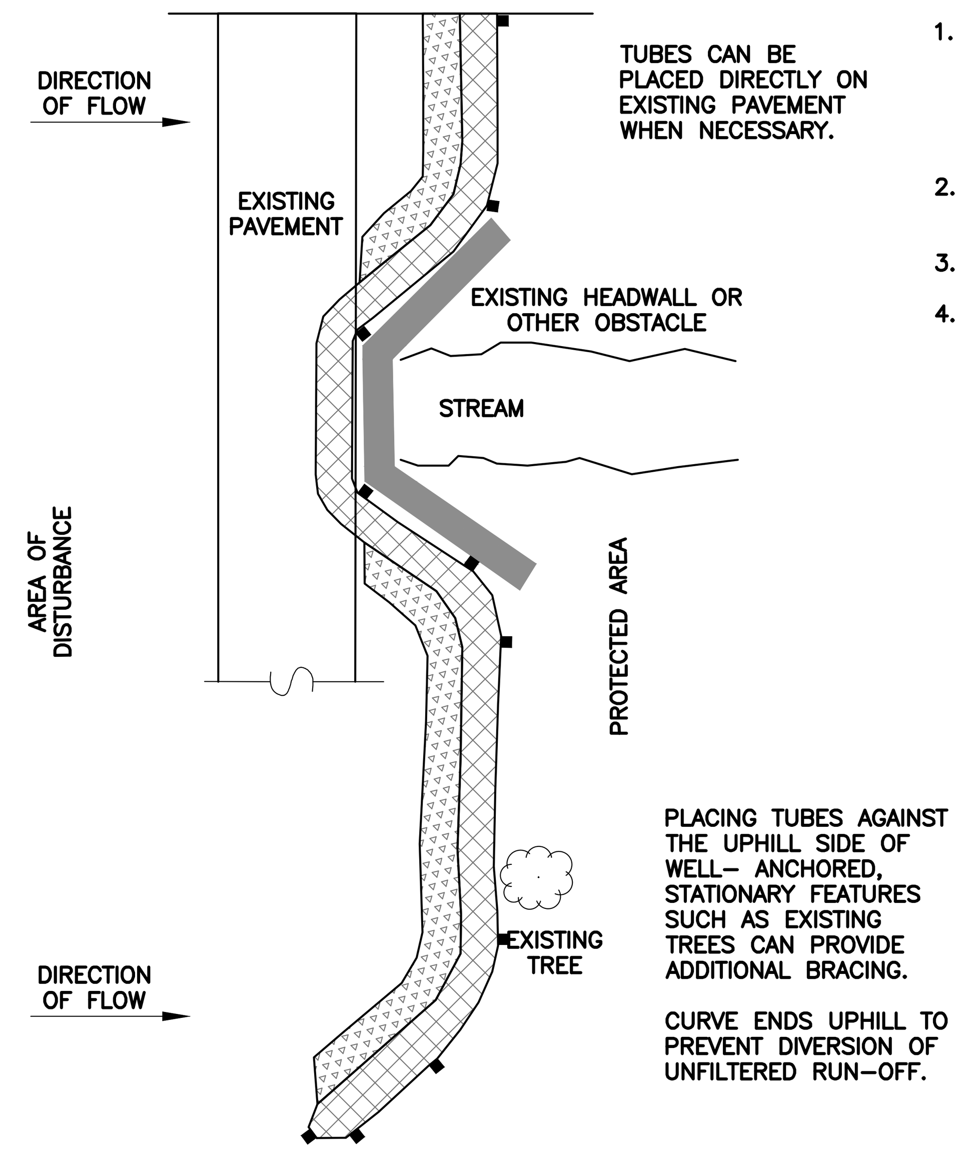
DETAILS I

Sheet Number:

C501

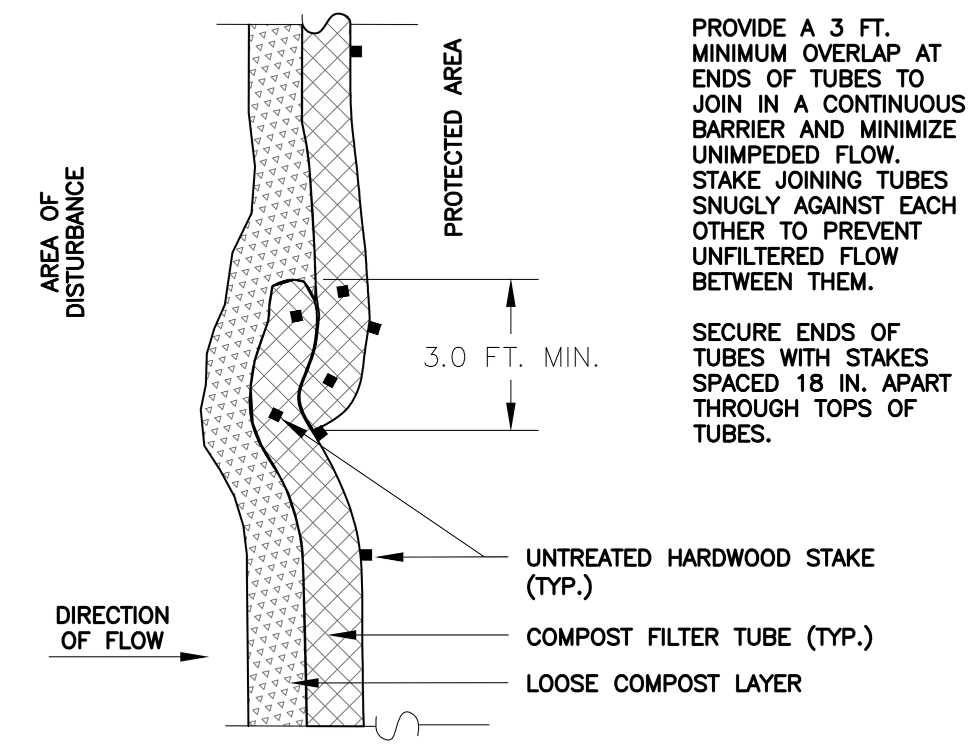




PLAN VIEW

GENERAL NOTES:

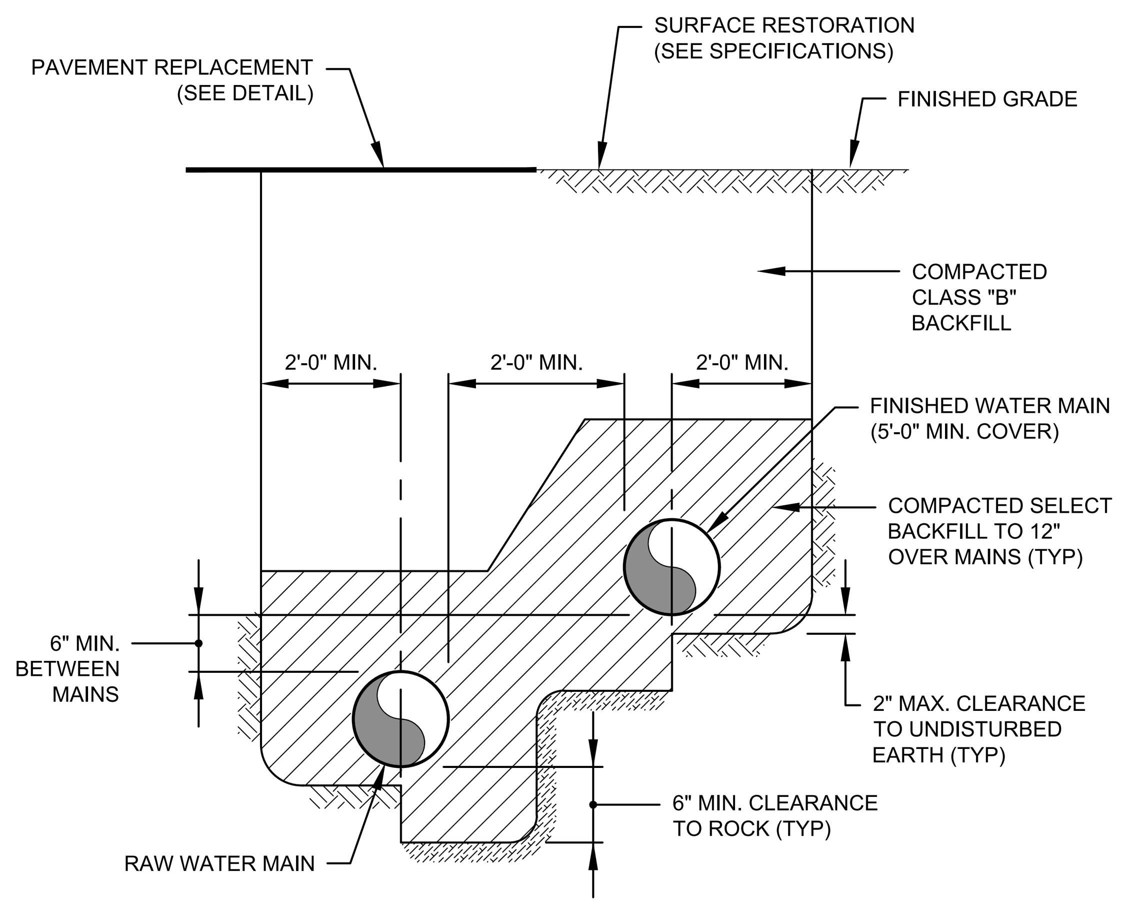
1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH 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

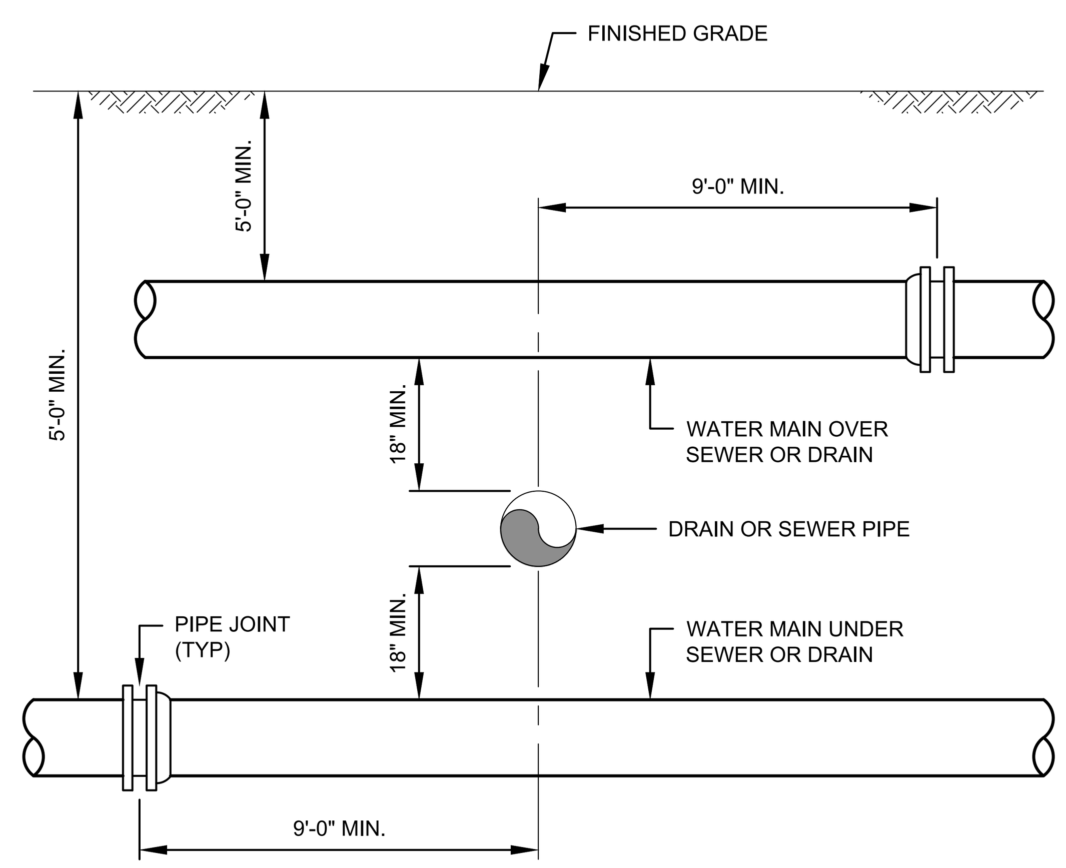
SINGLE COMPOST FILTER TUBE DETAIL

NOT TO SCALE



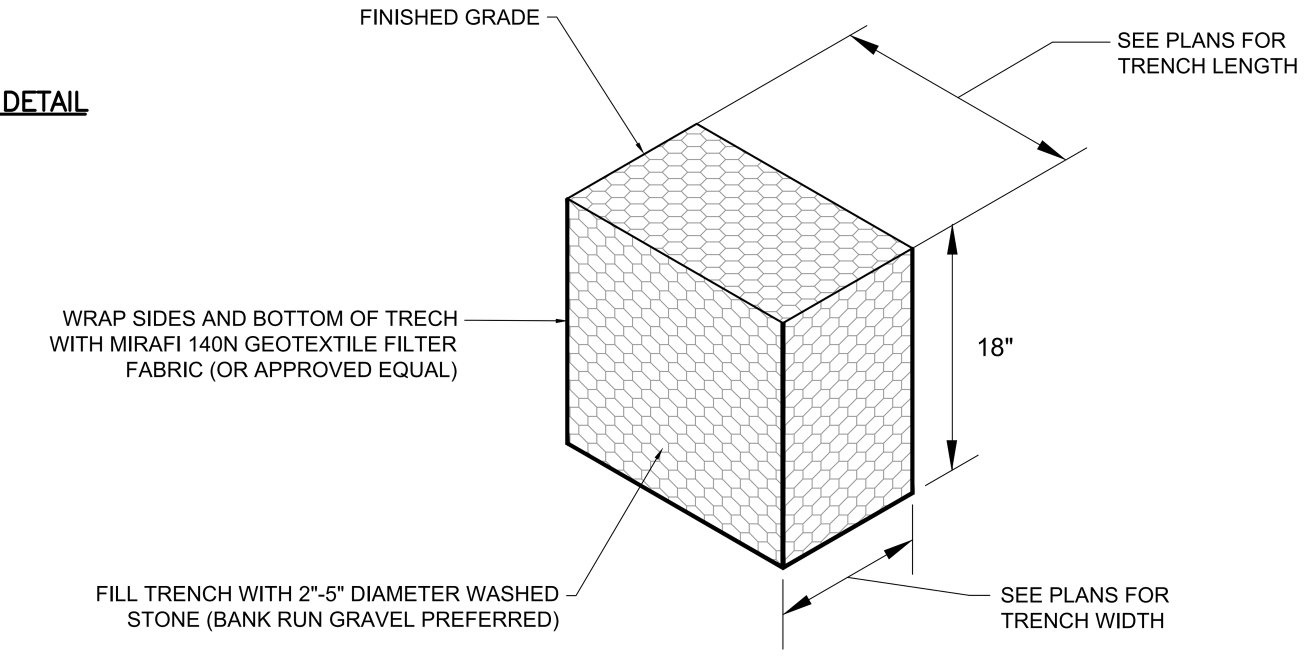
DUAL WATER MAIN TRENCH DETAIL

N.T.S.



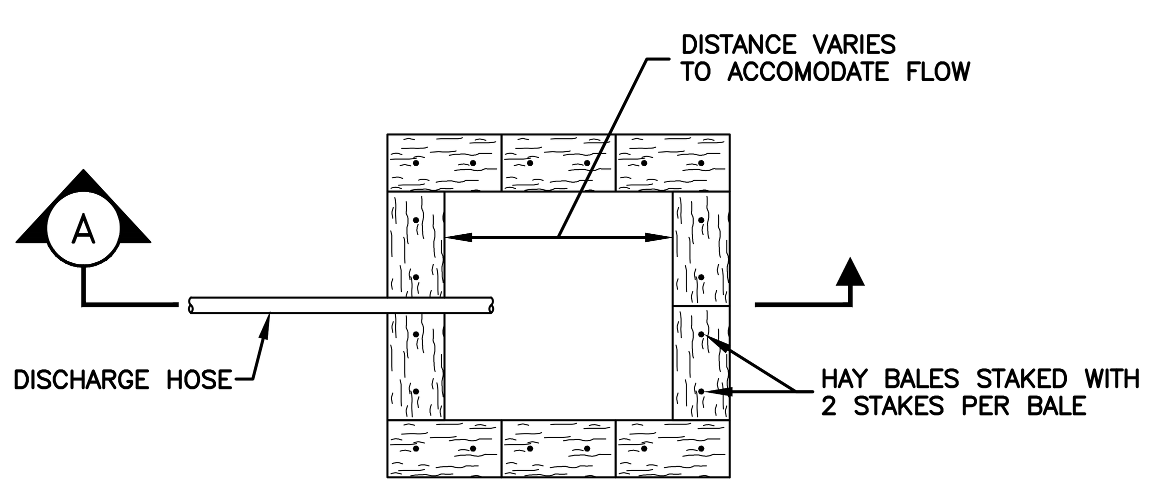
SEWER OR DRAIN CROSSING DETAIL

N.T.S.

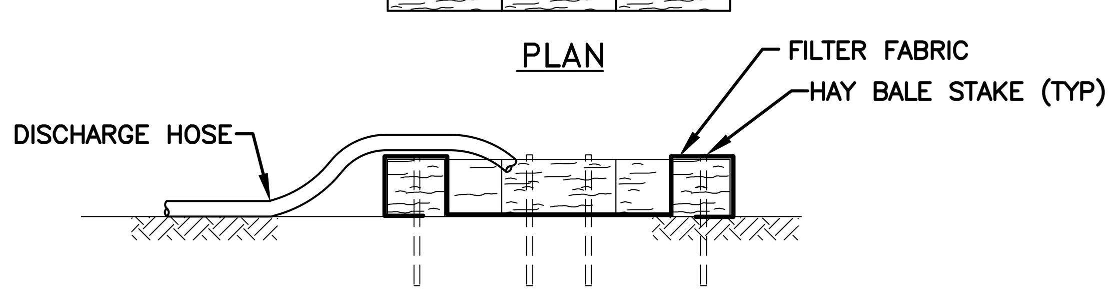


STORMWATER INFILTRATION TRENCH

N.T.S.



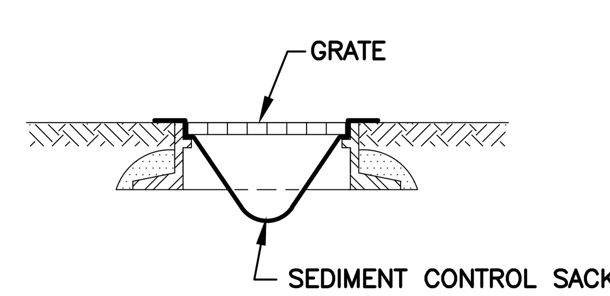
PLAN



SECTION A

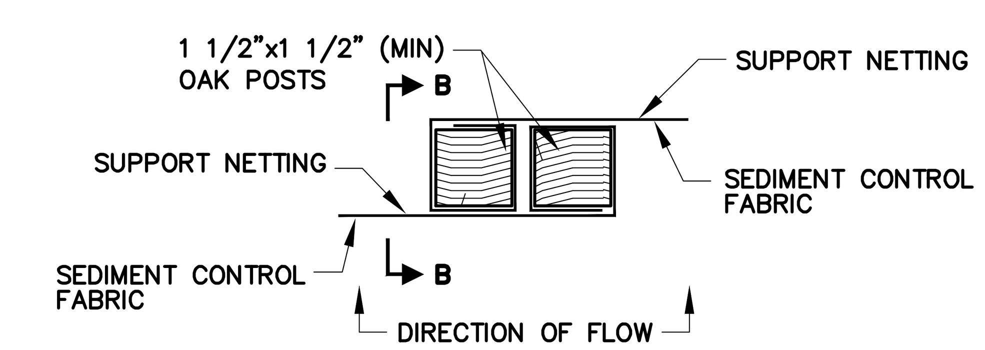
DEWATERING DISCHARGE DISPOSAL DETAIL

N.T.S.

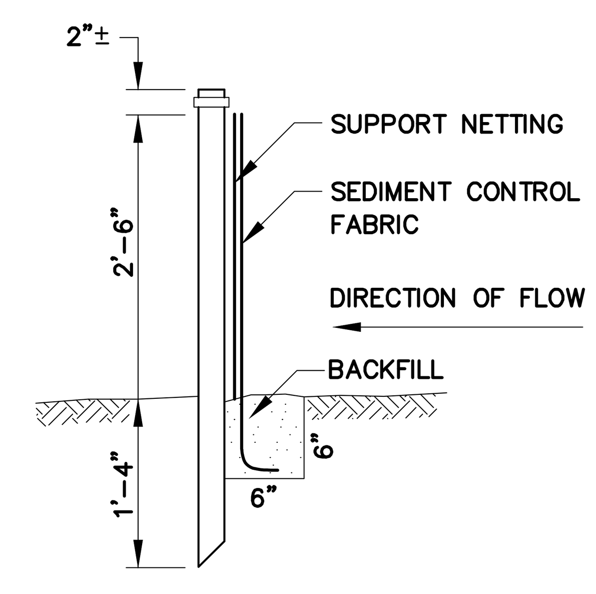


CATCH BASIN PROTECTION DETAIL

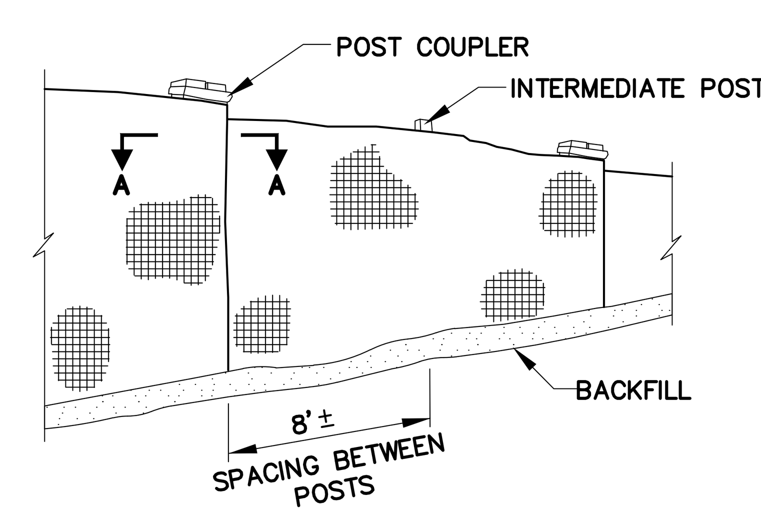
N.T.S.



SECTION A–A



SECTION B–B



ELEVATION

SILT FENCE DETAIL

N.T.S.

Project:

LITTLETON WATER DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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

Weston & Sampson

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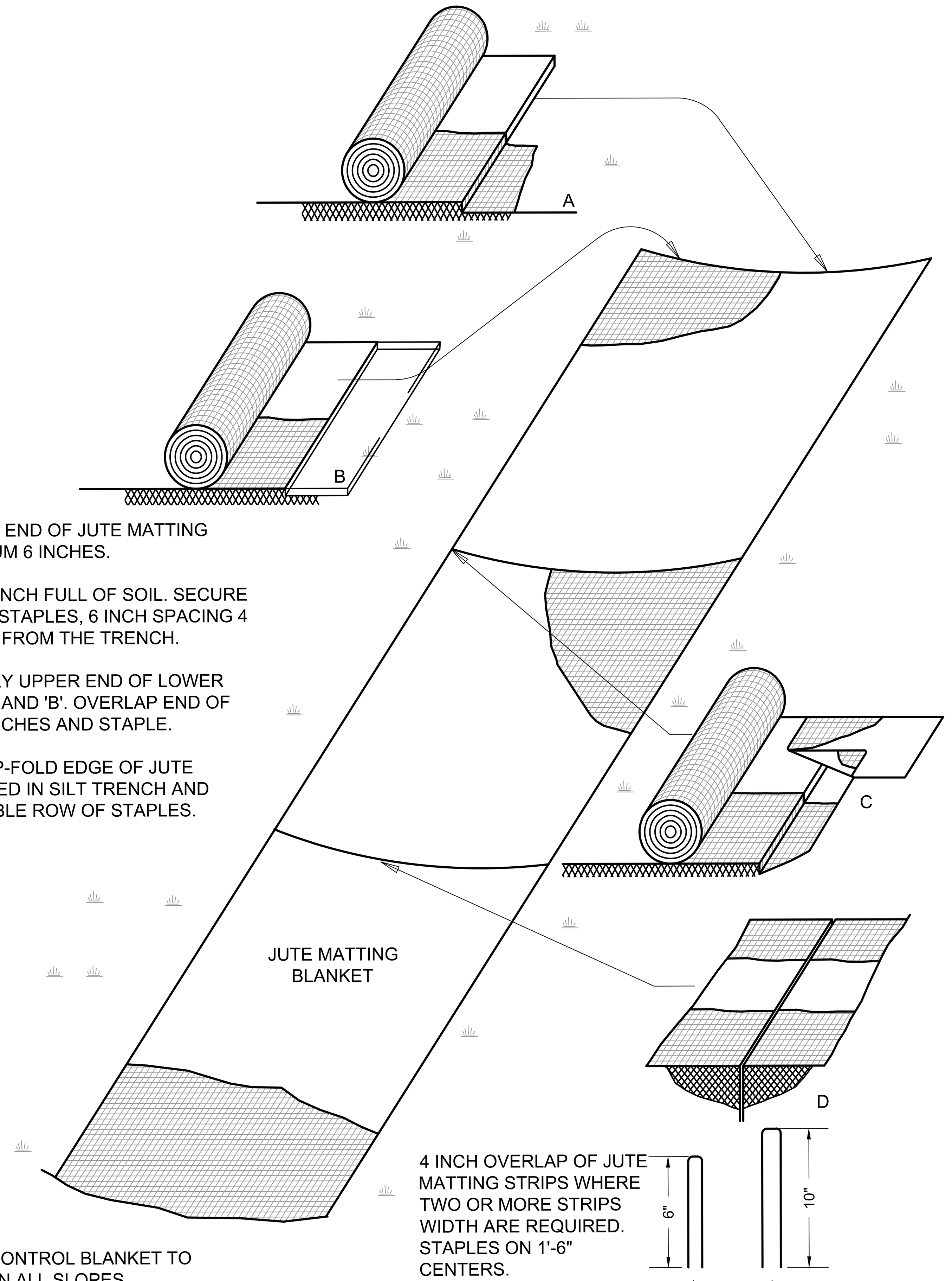
DETAILS II

Sheet Number:

C502



A. BURY THE TOP END OF JUTE MATTING STRIPS MINIMUM 6 INCHES.

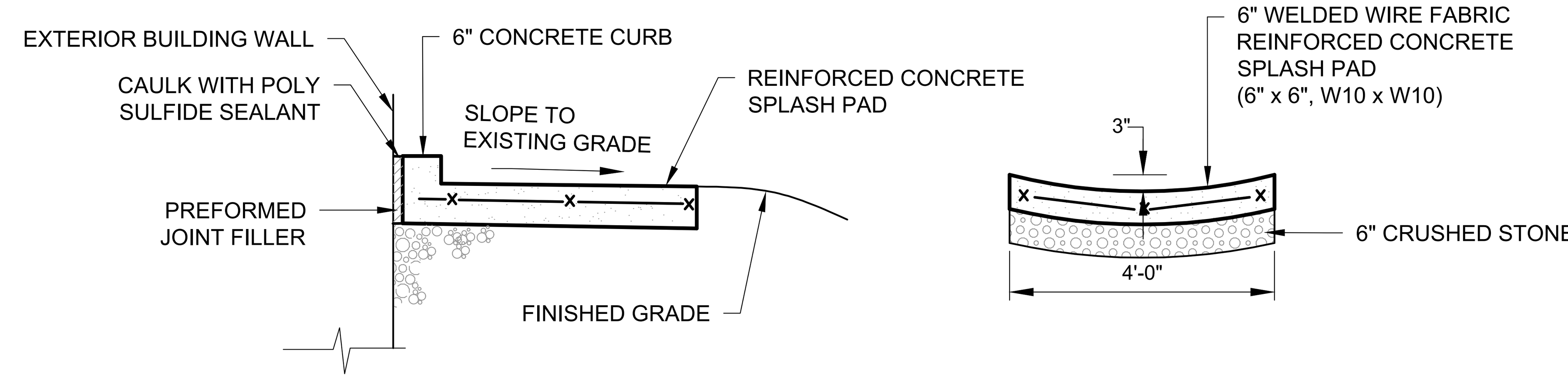
B. TAMP THE TRENCH FULL OF SOIL. SECURE WITH ROW OF STAPLES, 6 INCH SPACING 4 INCHES DOWN FROM THE TRENCH.

C. OVERLAP- BURY UPPER END OF LOWER STRIP AS IN 'A' AND 'B'. OVERLAP END OF TOP STRIP 4 INCHES AND STAPLE.

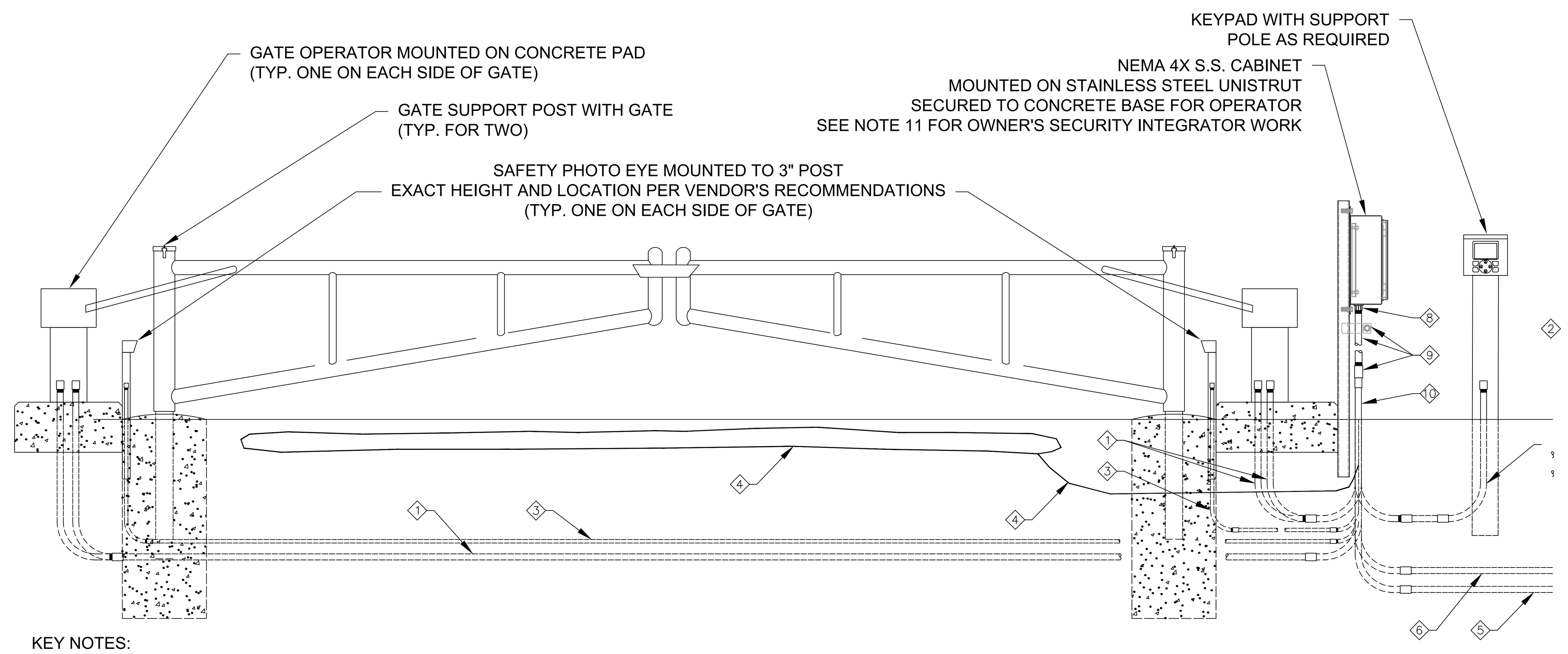
D. EROSION STOP-FOLD EDGE OF JUTE MATTING BURIED IN SILT TRENCH AND TAMPED; DOUBLE ROW OF STAPLES.

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

EROSION CONTROL BLANKET DETAIL
N.T.S.



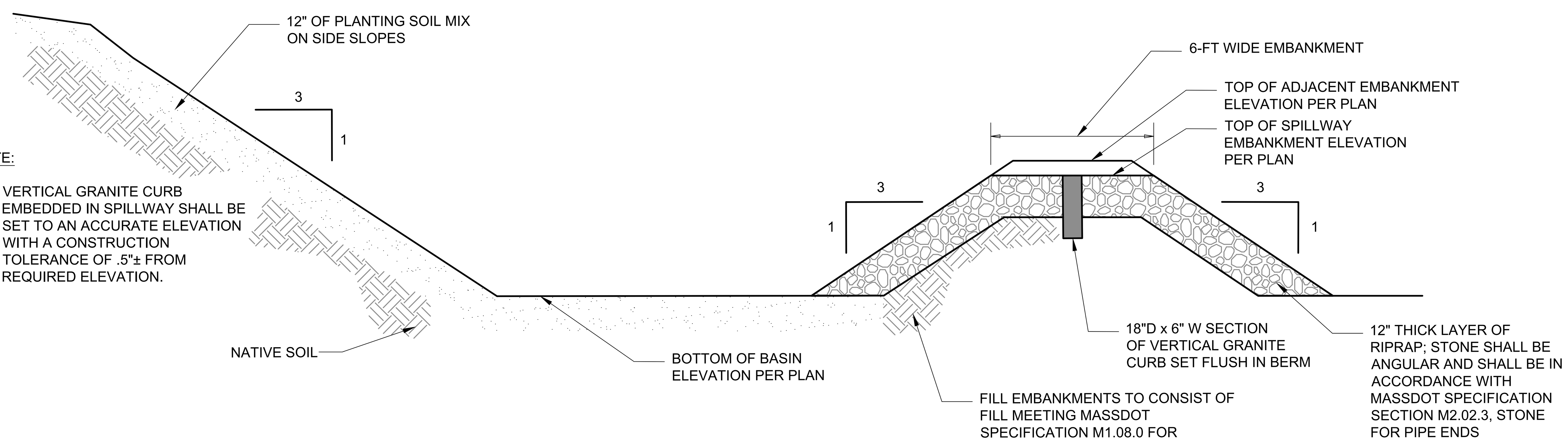
REINFORCED CONCRETE SPLASH PAD DETAIL
N.T.S.



KEY NOTES:

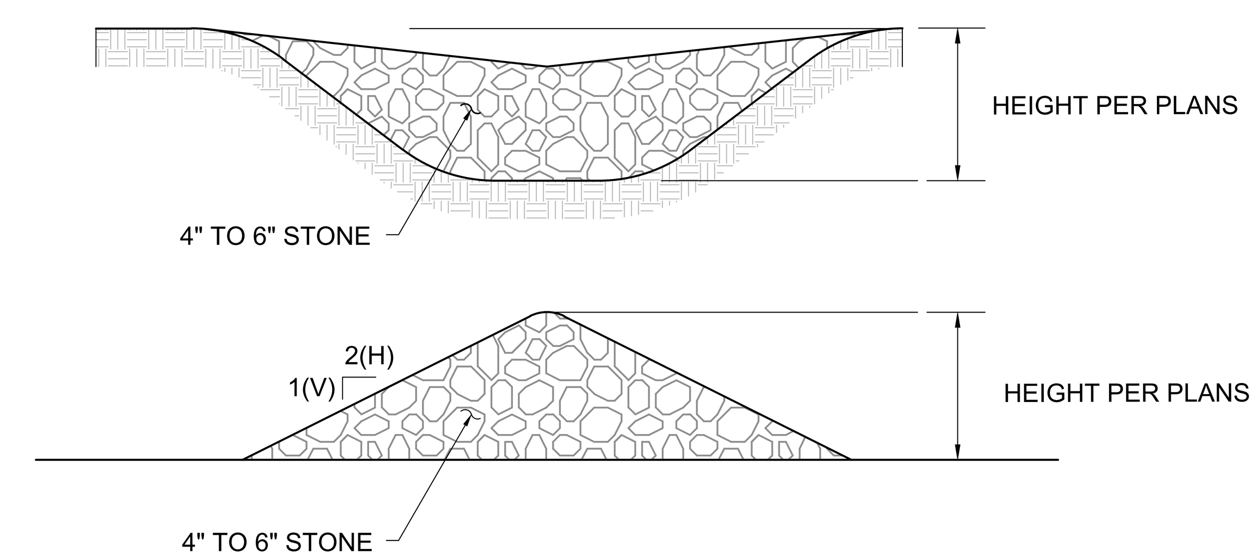
1. (1) 1" U.G. CONDUIT WITH 3#10, 1#10G AND (1) 1" U.G. CONDUIT WITH VENDOR CONTROL CABLES FROM GATE OPERATOR TO NEMA 4X CABINET W/ GATE CONTROLLER.
2. (1) 1" U.G. CONDUIT WITH VENDOR CONTROL CABLE FROM KEYPAD TO NEMA 4X CABINET W/ GATE CONTROLLER, AS REQUIRED.
3. (1) 3/4" U.G. CONDUIT WITH 4#14 FROM SAFETY PHOTO EYE TO NEMA 4X CABINET W/ GATE CONTROLLER.
4. (1) MAGNETIC LOOP DETECTOR CABLE IMBEDDED UNDER PAVEMENT IN THREE (3) LOCATIONS TO NEMA 4X CABINET W/ GATE CONTROLLER.
5. (1) 1 1/2" U.G. FEEDER CONDUIT WITH 3#6, 1#8G FROM MAIN CONTROL PANEL (RTU-TW) INSIDE WELL #6 BUILDING. SEE SITE PLANS FOR ROUTING. FURNISHED AND INSTALLED BY CONTRACTOR. STUB UP AND CAP 12" ABOVE GROUND FOR GATE VENDOR CONNECTION.
6. (1) 1 1/2" U.G. SIGNAL CONDUIT WITH FIBER OPTIC CABLE FROM FIBER OPTIC PATCH PANEL INSIDE WELL #6 BUILDING. SEE SITE PLAN FOR ROUTING. FURNISHED AND INSTALLED BY CONTRACTOR. STUB UP AND CAP 12" ABOVE GROUND FOR GATE VENDOR CONNECTION.
7. CONTRACTOR TO CAREFULLY COORDINATE EXACT LOCATION OF ALL GATE EQUIPMENT WITH OWNER AND ENGINEER IN FIELD PRIOR TO INSTALLATION. REFER TO SPECIFICATIONS FOR EXACT WIRING PER GATE VENDER'S REQUIREMENTS.
8. PROVIDE MYERS TYPE THREADED GASKETED CONDUIT HUBS INTO BOXES/ENCLOSURES AS REQUIRED (TYP.)
9. RGS SLIP FITTING, RGS CONDUIT ABOVE TO CABINET WITH S.S. UNISTRUT CLIPS (TYP.)
10. PVC COATED RGS CONDUIT 12" ABOVE GROUND (TYP.)
11. COORDINATE WITH OWNER'S SECURITY INTEGRATOR. OWNER'S SECURITY INTEGRATOR WILL MOUNT GATE CONTROLLER AND FIBER OPTIC SWITCH INSIDE NEMA 4X S.S. CABINET.
12. EQUIPMENT & MATERIALS ARE FURNISHED AND INSTALLED BY GATE VENDOR UNLESS NOTED.

MOTOR OPERATED GATE 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. STRUCTURES SHALL BE INSTALLED ACCORDING TO THE DIMENSIONS SHOWN ON THE PLANS WHERE SEDIMENT FOREBAYS OR STONE CHECK DAMS ARE LOCATED.

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

Project:
LITTLETON WATER DEPARTMENT

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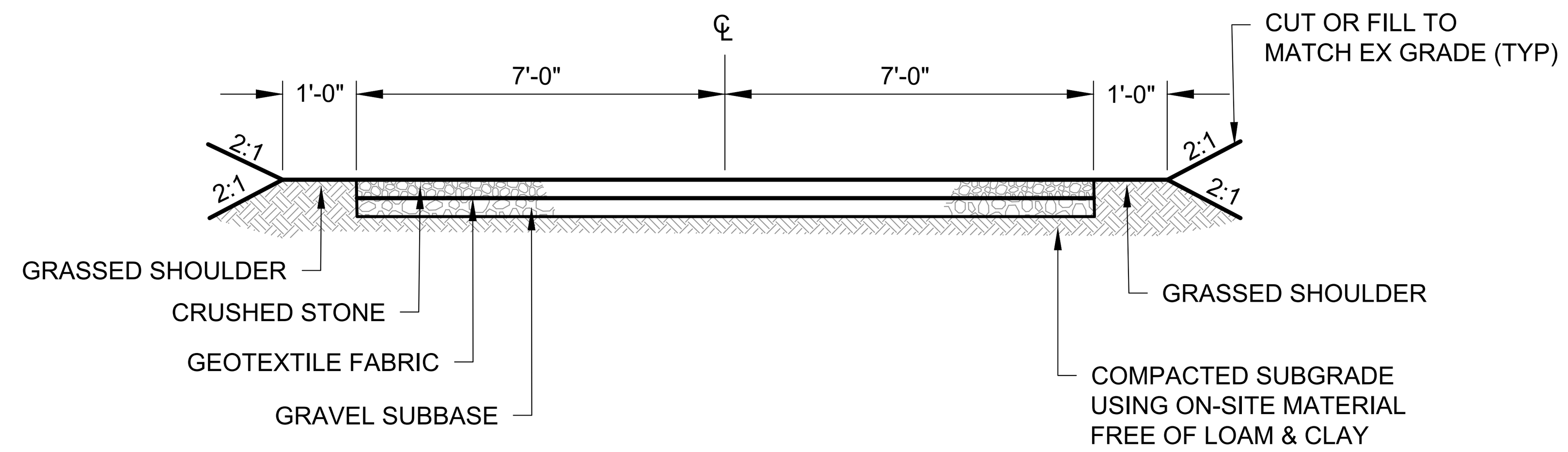
Reviewed By:	SBR
Approved By:	TEM
W&S Project No.:	ENG23-0679
W&S File No.:	

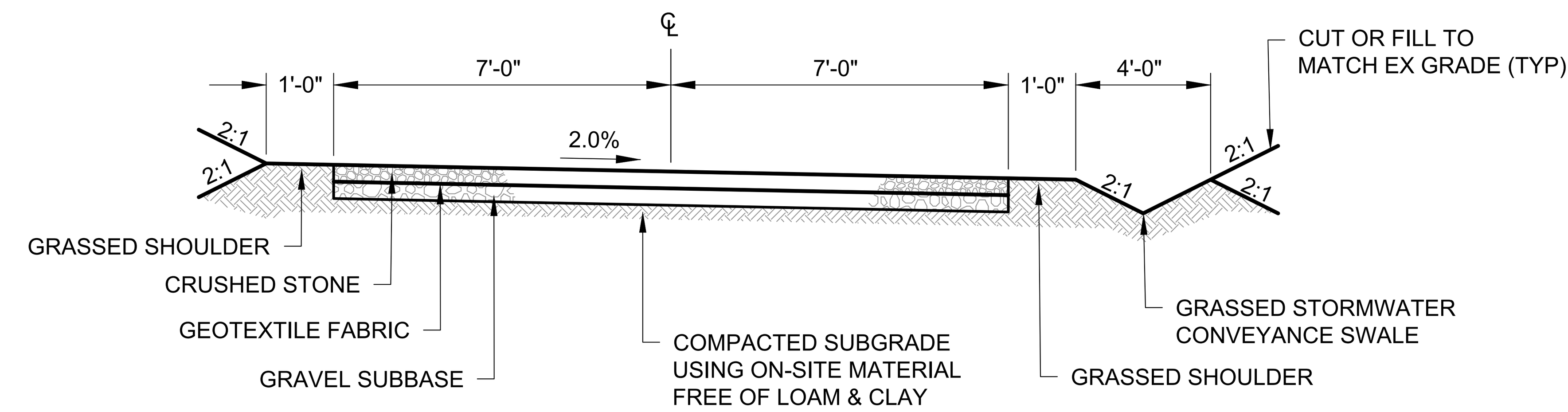
Drawing Title:
DETAILS III

Sheet Number:
C503



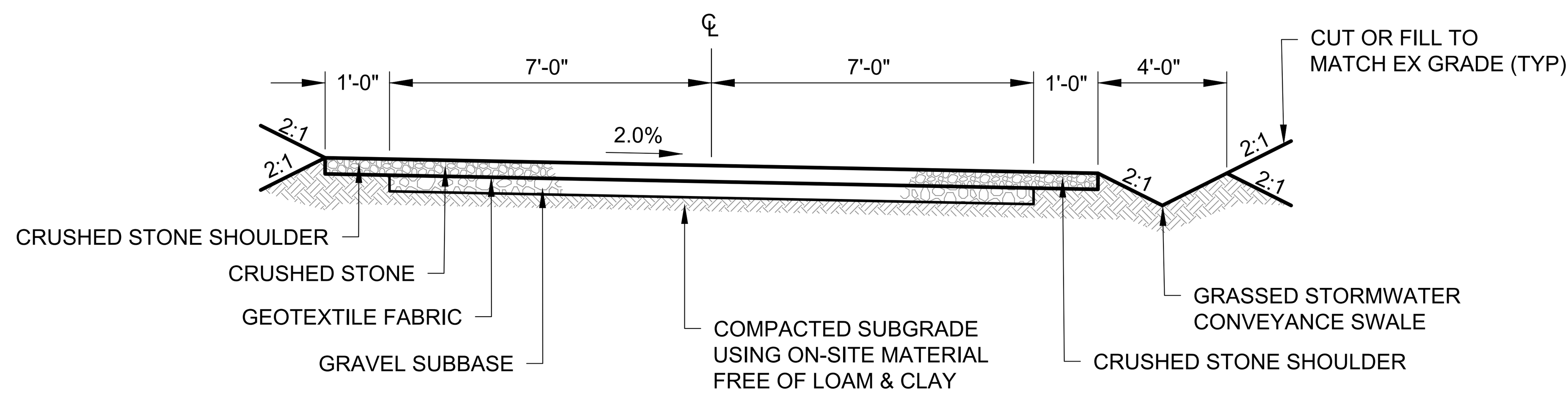
GRAVEL ROAD - TYPICAL SECTION 'A'

STA 0+00.00 - 0+05.00



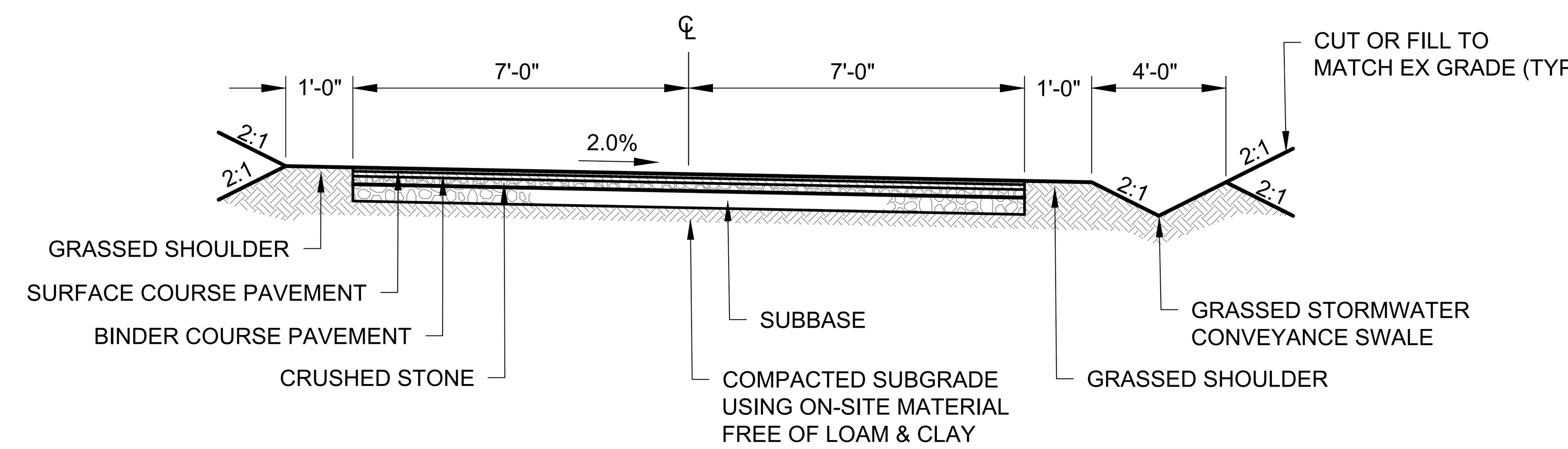
GRAVEL ROAD - TYPICAL SECTION 'B'

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



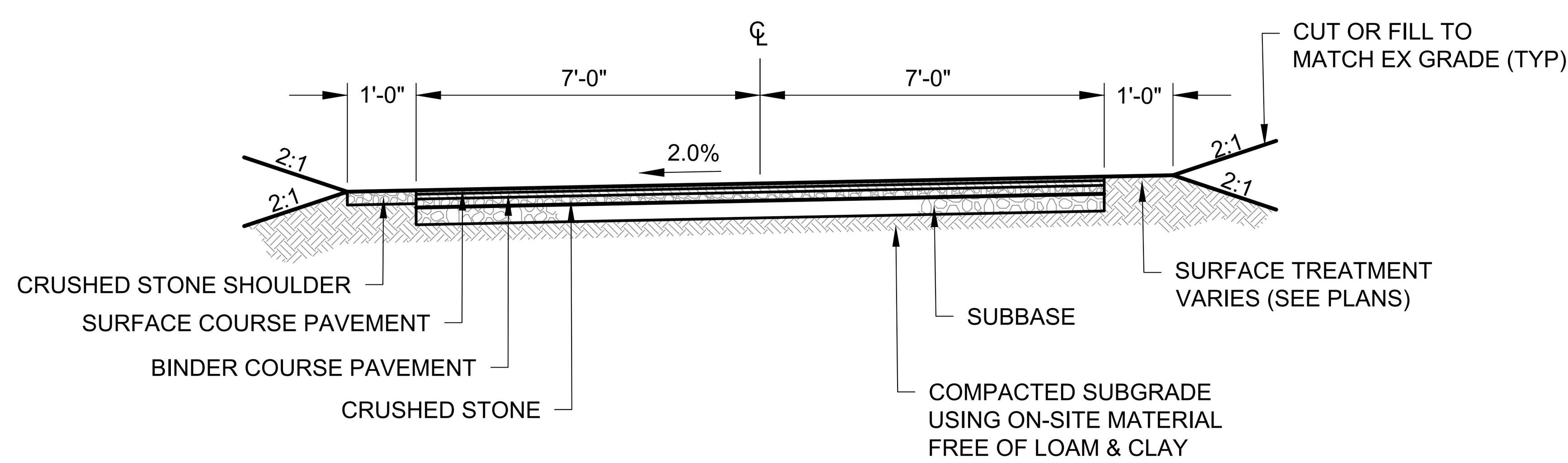
GRAVEL ROAD - TYPICAL SECTION 'C'

STA 6+90.36 - 7+73.14



PAVED ROAD - TYPICAL SECTION 'D'

STA 8+07.71 - 9+97.25



PAVED ROAD - TYPICAL SECTION 'E'

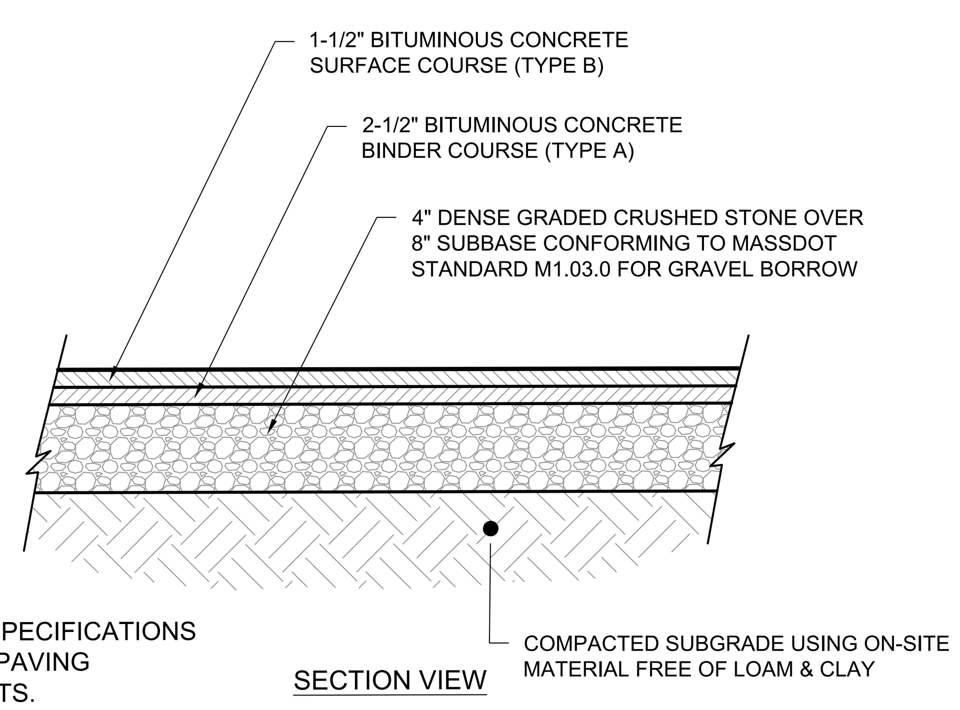
STA 9+97.25 - 11+96.61

NOTE:

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

ACCESS ROADWAY CROSS–SECTIONS

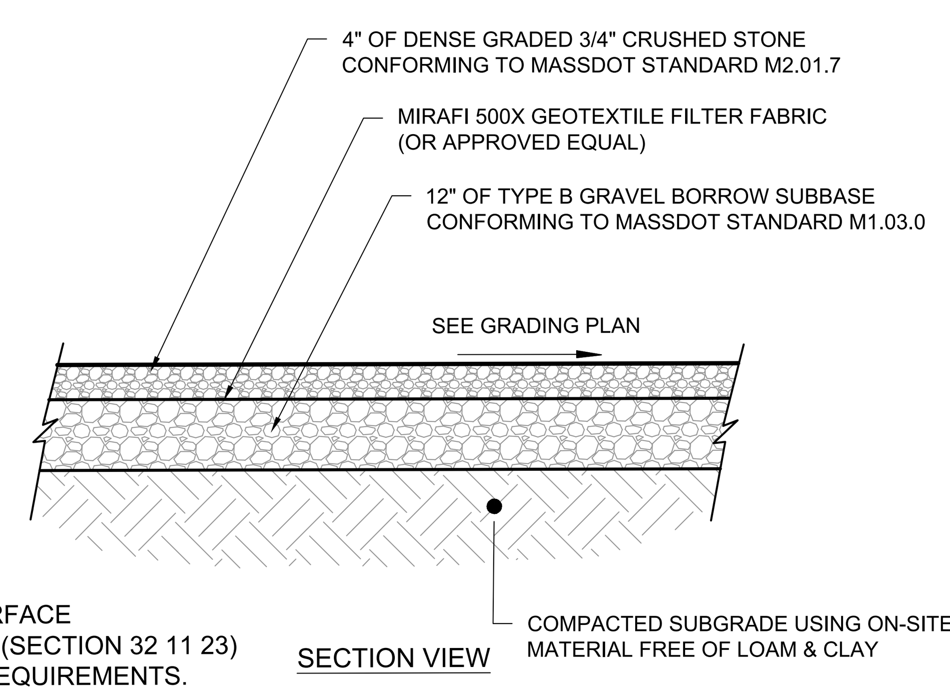
N.T.S.



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

BITUMINOUS CONCRETE ACCESS ROADWAY CROSS–SECTION

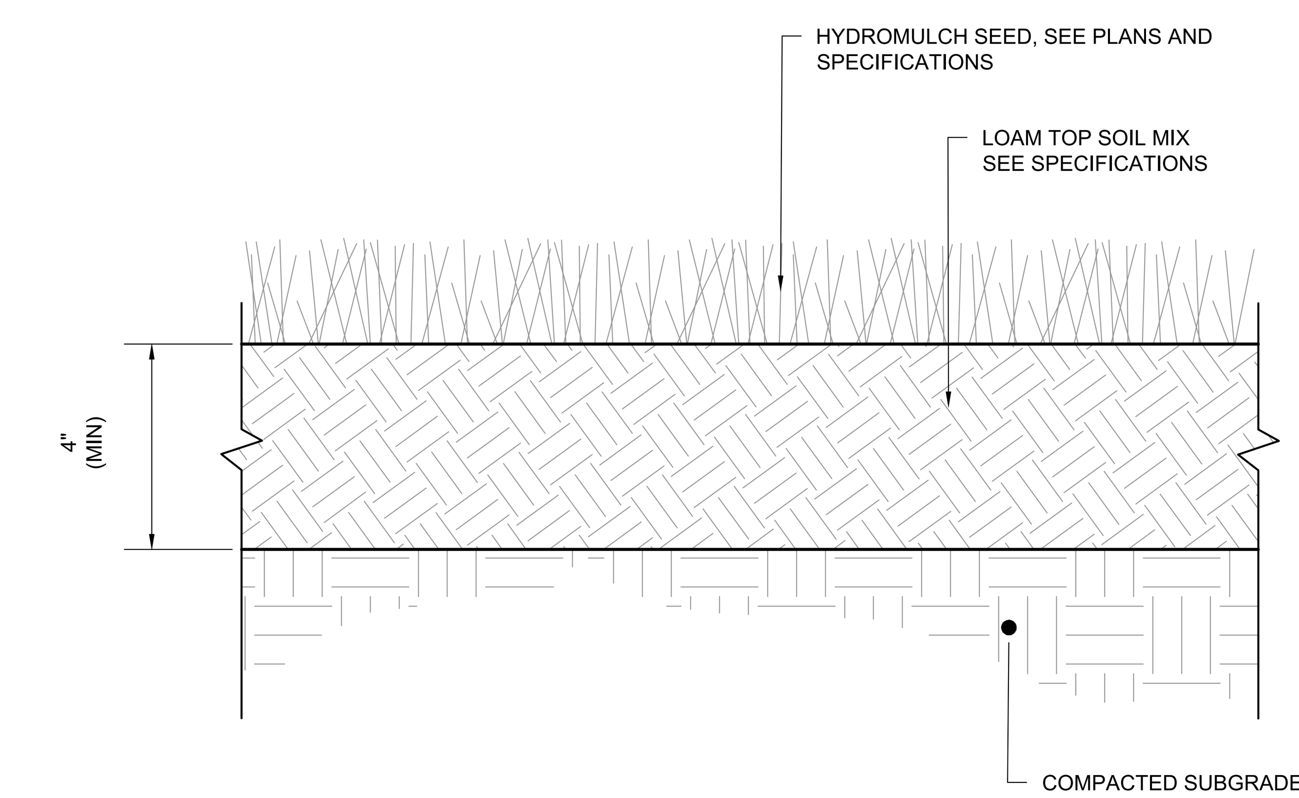
N.T.S.



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 DEPARTMENT

LITTLETON LELWD ELECTRIC LIGHT & WATER DEPARTMENTS

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DETAILS IV

Sheet Number:
C504